Stockholm Research Reports in Demography | no 2021:20

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ISSN 2002-617X | Department of Sociology

Stockholm University
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Abstract

Period life expectancy at birth (PLE*0*) is defined as how long – on average – a newborn baby could expect to live if current mortality rates do not change. It is one of the most widely used population health indicators in the world by academics, governments, statistical agencies, and international organisations. Yet, while estimates of PLE*0* routinely factor immigrations and emigrations into population denominators and migrant residents form part of these population denominators, the effect of the unique mortality of international migrants on national PLE*0* has almost never been studied. Here, our aim is to understand whether estimates and comparisons of national PLE*0* in four Nordic nations – Denmark, Finland, Norway, and Sweden – are being affected by the mortality of their international migrant populations. We use register data for over three decades, from 1990 to 2019. We calculate PLE*0* by sex for entire resident, native-born, and migrant populations, as well as the differences between them. Our analysis reveals a dynamic and increasing impact of the mortality of international migrants on national PLE*0* that is already beginning to affect inter-country comparisons and rankings of mortality. Our unique findings should resonate strongly in all nations with substantial shares of international migrants and all of the aforementioned stakeholders that use PLE*0* to drive and inform public health policy.

Keywords: international migration, mortality, period life expectancy, public health policy

Stockholm Research Reports in Demography 2021:20

ISSN 2002-617X

Introduction

Period life expectancy at birth (PLE*0*) is defined as how long – on average – a newborn baby could expect to live if current death rates do not change. It is one of the most widely used population health indicators in the world by agencies such as the *World Bank*, *Organisation for Economic Co-operation and Development*, *World Health Organisation,* and *United Nations* to summarize and rank the current mortality situation of countries. Nationally, PLE*0* is used to inform public policy and insurance systems. More than half of OECD nations have automated links between residual PLE (e.g., at age 65) and pensions in their retirement-income systems (1). Although estimates of PLE*0* routinely factor immigration and emigration into population denominators and migrant residents form part of these population denominators, the effect of the unique mortality of international migrants (2,3) on national figures has almost never been studied.

Yet as of the end of 2019, there were an estimated 272 million international migrants globally, with over two thirds residing in rich countries. Migration to rich countries has alone accounted for most of the growth of the world's migrant population in the last decades (4). The relative share of migrants, as a share of the population of all rich countries, has doubled in the past thirty years from, on average, 7.5% in 1990 to 14% in 2019 (5). Of the twenty (rich) nations that led United Nations life expectancy rankings in 2019 sixteen have shares above this average (5). The life expectancy gap between the top ranked country and twentieth ranked country is just 3.7 years for women (Hong Kong [87.7] vs. the Netherlands [84.0]) and just 2.3 years for men (Hong Kong [82.0] vs. France [79.7]); many nations in the top twenty are separated in the rankings by less than one fifth of a year (6). All of these patterns and trends combine to suggest that international migrants have the potential to affect national mortality and global mortality rankings.

Here, our aim is to understand whether estimates and comparisons of national PLE*0* in four Nordic nations – Denmark, Finland, Norway, and Sweden – are being affected by the mortality of international migrants. The choice of the Nordics is driven by some similarities, such as the availability of national registers renowned for their high quality, similar structures and validity, facilitating comparative research (7). However, there are also differences between countries, not least in their migration and mortality. For example, while men in Norway and Sweden and women in Finland, Norway and Sweden are global PLE*0* leaders positioned closely to one another in mortality rankings, men in Finland and Denmark and women in Denmark fall some way behind (5). Moreover, while it is true that the international migrant population of all four countries has grown in the last few decades, only Norway and Sweden can be considered major migrant-receiving countries (8), with shares of migrants above the average for rich countries (5).

Materials & Methods

We use population and death registers from each country to derive the deaths and population denominators by year (1990 to 2019), age (in single years from 0-1 to the open-ended interval 95+), sex, and nativity status. For migrants, we adopt a straightforward and internationally-recognisable definition: all individuals who are born in a country other than the country that they are living in are classified as migrants. Thus, nativity status represents a dichotomous variable indicating foreign and native-born status. Deaths and denominators are calculated in the same way across countries. For deaths, in a given year we calculate exact age at death of people who die $\frac{date\ of\ death - date\ of\ birth}{365.25}$ and collapse the number of deaths by sex, age, and nativity status. For denominators, we collapse a dichotomous variable indicating residence or not in a country at the end of a calendar year by age, sex, and nativity status. We then generate mid-year population estimates $\frac{n\ people\ aged\ x\ \ in\ year\ y + n\ people\ aged\ x\ in\ year\ y+1}{2}$. Whether or

not an individual is resident in a country is determined at the end of each calendar year across the Nordic countries and in a comparable way using trace evidence from multiple register data sources.

Next, we calculate the age-specific deaths rates $\frac{deaths\ at\ age\ x\ in\ year\ y}{mid-year\ population\ at\ age\ x\ in\ year\ y}$ for the entire resident, native-born, and migrant populations. Finally, the age-specific death rates and population denominators for each country, sex, and sub-population are fed into *R* package *Demography* to generate lifetables, closed at age 95+. From these lifetables we take the PLE*0* estimate.

We pose four questions: (a) How does the impact of the mortality of international migrants on national PLE*0* develop over time within the countries? (b) How does their impact vary across countries? (c) Does the impact of the mortality of international migrants on national PLE*0* *within* countries affect comparisons of PLE*0* *between* countries? (d) Is there an explicit gender focus?

Main results

Table 1 shows general characteristics relating to the population, migration, and mortality of the four countries. Both the absolute and relative proportions of migrants have increased over time everywhere. In relative terms, between 1990 and 2019 the migrant population has doubled in Sweden, tripled in Denmark, quadrupled in Norway, and quintupled in Finland. Despite this, the relative proportion of migrants in Finland remains the lowest of all of the countries and is well below the UN rich country average of 14.5%. Sweden, on the other hand, has the largest relative proportion of migrants followed closely by Norway. Both are above average for a rich country.

Table 1. Population, migration, and mortality characteristics of the four countries.

Country	Year			
	1990	**2000**	**2010**	**2019**
Total resident population *(n)*				
Denmark	5 141 115	5 341 194	5 554 844	5 771 876
Finland	4 996 222	5 187 954	5 365 782	5 532 156
Norway	4 247 285	4 499 367	4 885 878	5 378 857
Sweden	8 567 384	8 881 640	9 390 168	10 036 379
Migrant population *(n)*				
Denmark	235 189	371 026	500 772	722 878
Finland	63 255	136 203	228 481	383 116
Norway	192 587	292 440	526 799	867 765
Sweden	788 767	1 003 798	1 384 929	2 005 210
Migrant population *(%)*				
Denmark	4.6	6.9	9.0	12.5
Finland	1.3	2.6	4.3	6.9
Norway	4.5	6.5	10.8	16.1
Sweden	9.2	11.3	14.7	20.0
Migrant population, age *(median and IQR)*				
Denmark	22 [32] 48	25 [33] 45	28 [37] 48	29 [41] 52
Finland	14 [26] 44	20 [31] 42	25 [34] 45	27 [36] 48
Norway	22 [32] 44	23 [34] 46	25 [35] 46	28 [37] 49
Sweden	27 [40] 54	29 [42] 56	29 [42] 57	30 [42] 57
Native-born population, age *(median and IQR)*				
Denmark	21 [39] 58	21 [41] 59	19 [43] 62	20 [44] 64
Finland	19 [36] 53	20 [39] 55	21 [42] 60	22 [43] 63
Norway	18 [35] 56	18 [37] 55	18 [39] 57	19 [40] 60
Sweden	20 [38] 58	20 [39] 58	20 [41] 61	21 [42] 63
UN mortality ranking, women (PLE*0*)				
Denmark	35th	41st	39th	29th
Finland	17th	17th	18th	11th
Norway	12th	15th	21st	17th
Sweden	6th	10th	16th	15th
UN mortality ranking, men (PLE*0*)				
Denmark	32nd	32nd	25th	29th
Finland	38th	33rd	31st	24th
Norway	15th	14th	14th	16th
Sweden	5th	5th	8th	9th

Source: United Nations World Population Prospects 2019; authors' calculations based upon the death and total population registers of Denmark, Finland, Norway, and Sweden.

Concerning age, all of the migrant populations are younger than their respective native-born populations. They are also and more intensely concentrated at young adult – or peak migration

– ages. Sweden's migrant population is, on average, the oldest of all migrant populations, while those of Norway and Finland are, on average, the youngest. Expectedly, the average age of the native-born and migrant populations has increased over time in all countries. Interestingly, the migrant population of Sweden has aged, on average, the least. Regarding their mortality levels, Sweden remains a world leader in PLE*0* among men and women, though it is gradually falling down the rankings. Norway has also consistently occupied the top twenty for men and women. On the contrary, Finland has performed well in women's PLE*0*, but less so for men's, although it is climbing the rankings; men and women in Denmark remain outside the top twenty for PLE*0*.

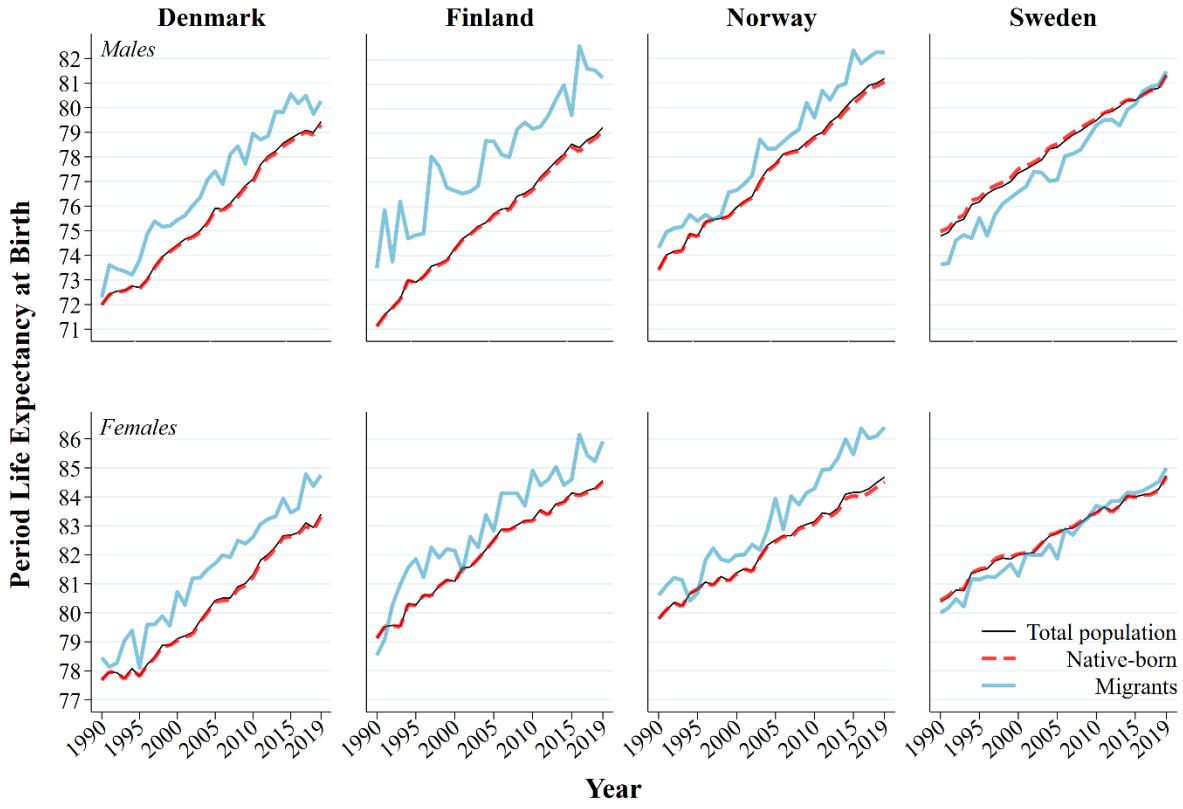

Figure 1. PLE*0* among men and women in Denmark, Finland, Norway, and Sweden, 1990-2019, intra-country comparisons of total, native-born, and international migrant populations.

Source: authors' calculations based upon the death and total population registers of Denmark, Finland, Norway, and Sweden.

Figure 1 presents PLE*0* among men (top row) and women (bottom row) in (from left to right) Denmark, Finland, Norway, and Sweden from 1990 to 2019. We present PLE*0* for the (1) total

resident population (black solid line), (2) native-born population (long dashed red line), and (3) migrant population (light blue solid line). For Denmark, Finland, and Norway, we find similar patterns and describe these countries together. PLE*0* is systematically higher among migrant men and women relative to native-born men and women between 1990 and 2019. The magnitude of this difference appears to increase gradually across time, most visibly in Norway. Furthermore, we can see that while the PLE*0* of native-born men and women appears to be indistinguishable from the PLE*0* of all resident men and women in these three countries at the start of the period a visible gap emerges over time. Consequently, the PLE*0* of native-born men and women begins to fall away from that of all resident men and women. This difference is not readily apparent on this larger scale, so we examine these differences more intuitively in Figure 2.

For Sweden in Figure 1, the picture is different. For men, the PLE*0* of migrant men is lower than the PLE*0* of native-born men in 1990. Thus, at the start of the time series, the PLE*0* of native-born men is visibly higher than that of all resident men. Over time, the PLE*0* of migrant men catches up to, and surpasses, the PLE*0* of native-born men. For women, the story is similar, albeit the initial gap in 1990 between the PLE*0* of migrant and native-born women is somewhat smaller.

Figure 2 displays the contributions of migrant men (top row) and women (bottom row) to the national PLE*0* of Denmark, Finland, Norway, and Sweden (from left to right). We show the difference between the PLE*0* of the total resident population minus the PLE*0* of the native-born population to assess the impact of migrants. Negative values (below zero; in red) indicate a negative impact of migrants (i.e., that national PLE*0* would be higher without migrants in the calculations). While positive values (above zero; in blue) instead indicate a positive impact of

migrants (i.e., that national PLE*0* would alternatively be lower without migrants in mortality calculations).

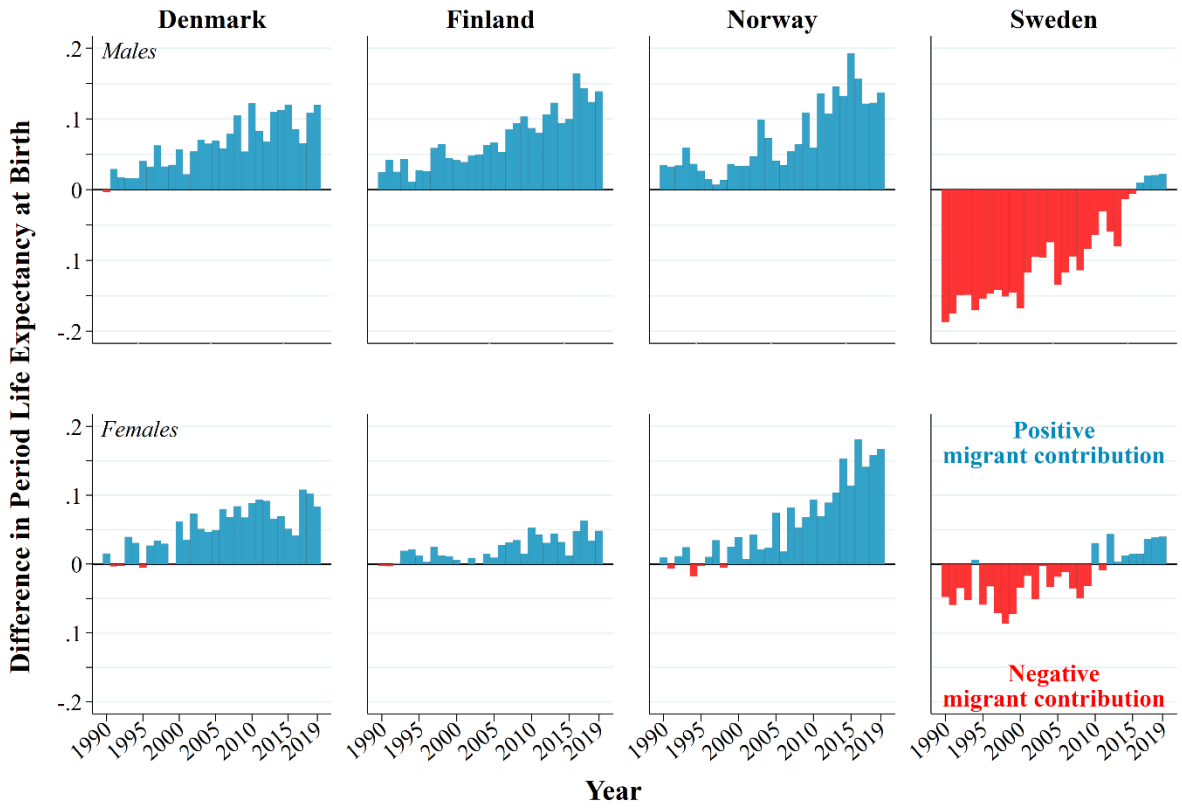

Figure 2. The contributions of international migrants to PLE*0* in Denmark, Finland, Norway, and Sweden, 1990-2019.

Notes: Difference in PLE0 refers to total resident population minus the native-born population

Source: authors' calculations based upon the death and total population registers of Denmark, Norway, and Sweden.

For Denmark, we find an initial small positive contribution in 1990 of migrant men and women that increases gradually over time to a modest positive contribution of one tenth of a year (+0.1) by 2017. For Norway, we also find an initial positive contribution of migrant men and women in 1990. The contribution of migrant men and women increases more sharply in Norway than in Denmark, culminating in a more sizeable contribution of around one fifth of a year (+0.2) to national PLE*0*. For Finland, the trend for men reflects men in Norway; the trend for women more broadly reflects women in Denmark. For Sweden, we find an initial negative contribution of migrant men in 1990 (-0.2) and a more modest negative contribution of women (-0.1). Over

time, this deficit falls for both men and women in Sweden and a minor positive contribution emerges.

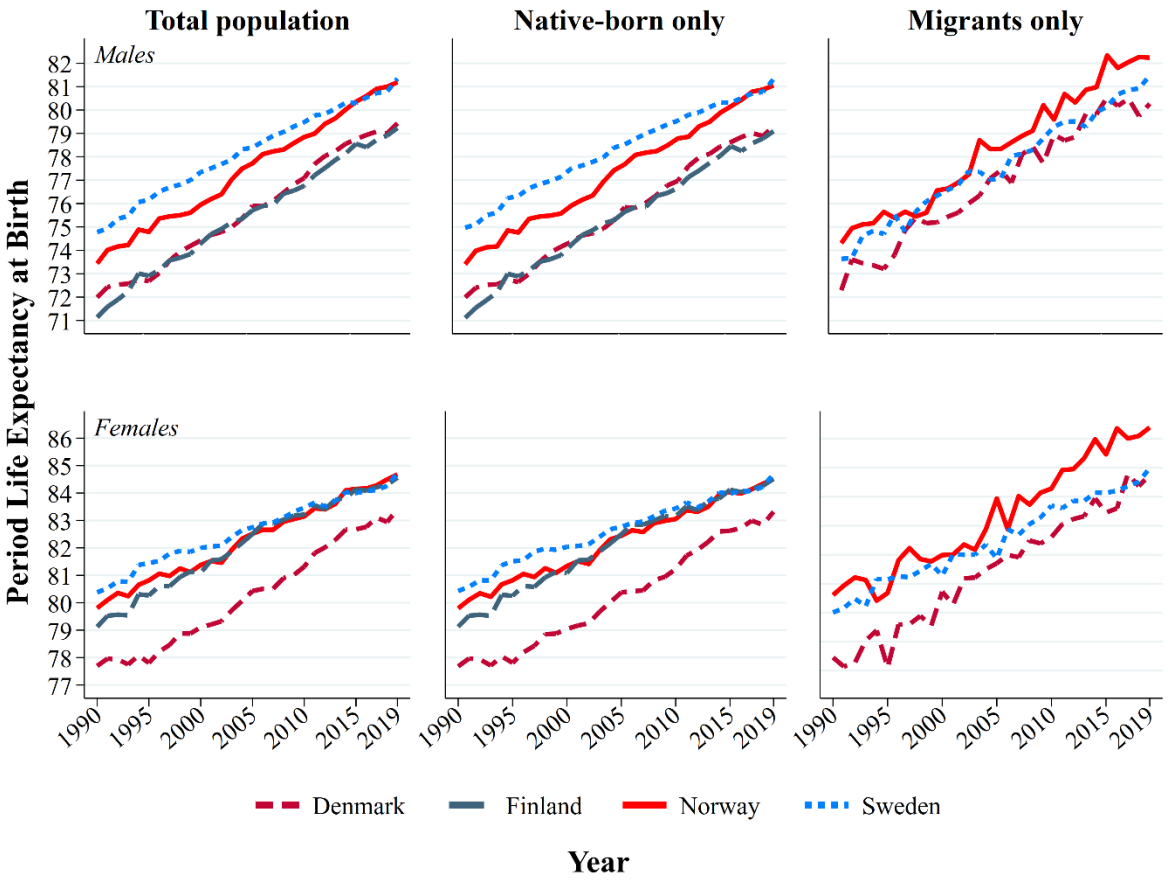

Figure 3. PLE*0* among men and women in Denmark, Finland, Norway, and Sweden, 1990-2019 inter-country comparisons of total, native-born, and international migrant populations.

Source: authors' calculations based upon the death and total population registers of Denmark, Norway, and Sweden.

Figure 3 compares the long-run trends in PLE*0* for the total resident, native-born, and migrant populations among men (top row) and women (bottom row) across countries, rather than within countries (as in Figure 1). We highlight patterns and trends that are more clearly emphasised by visualising our results in this way. First, the left column of panels shows the long run trends in PLE*0* for the four countries. For men in 1990, PLE*0* is highest in Sweden (light blue dashed line), then Norway (light red solid line), Denmark (dark red dashed line), and Finland (dark blue solid line). From 1990 to 2018, we can see Norway gradually catching – and overtaking – Sweden in around 2015. We can also see that the PLE*0* of men in Denmark and Finland track

one another closely; a gap only emerges (between the higher PLE*0* of men in Denmark and lower PLE*0* of men in Finland) from 2010 onward. For women, PLE*0* is highest in Sweden, then Norway, Finland, and Denmark. From 1990 to 2019, we then see both Finland and Norway catching and overtaking Sweden in 2010. The PLE*0* of women in Denmark remains some way apart from the other countries. For men and women in Sweden, a near unprecedented half a year increase in PLE*0* in 2019 saw Sweden regain the highest PLE*0* of the four Nordic countries (9).

For the middle column (and native-born panels), the trends are very similar to those of the total populations. We do see some differences toward the end of the time series (in comparison to the total population) that suggest that the impact of migrants in PLE*0* calculations could affect rankings in recent years. We explore these rankings from 2015-19 in Table 2. The right column (and migrant panels) shows long run trends for the migrant populations of Denmark, Norway, and Sweden. Migrant men and women Norway are consistently the most longevous of all of migrant populations, while migrant men and women from Denmark are consistently the least. For Sweden, we see that the PLE*0* of migrant men or women does not improve over time in the same way as in the other three nations. Indeed, for both men and women, Sweden's migrant population transitions from being one of the most longevous populations in the 1990s to one of the least in the 2010s. Even so, if we refer back to Figure 1, it tells us that the PLE*0* of Sweden's migrant population still rises more over time than the PLE*0* of Sweden's native-born population.

Table 2 presents a Nordic league table for the years 2015-2019. We do not present earlier years because the gaps in national PLE*0* between the countries, as Figure 3 shows, are large and the impact of migrants on national PLE*0*, as Figure 2 shows, is fairly small. From Table 2, we can nevertheless see that migrants *are* beginning to impact upon comparisons of mortality between

countries. Specifically, for the cases highlighted in light red, we can see that without its migrant population, men in Norway would not have overtaken men in Sweden in 2015 or 2016 (moving from 2nd to 1st) at the top of the Nordic PLE*0* league table. Additionally, we can see that women in Norway would not have topped the national PLE*0* rankings in 2016 (from 3rd to 1st) or 2017 (from 2nd to 1st) without the positive PLE*0* contribution of their especially longevous migrant population.

Table 2. Nordic league table of national PLE*0* with and without international migrants.

Year	Men						Women					
	With migrants				Without migrants		With migrants				Without migrants	
	Pos.	Ctr.	e0		Ctr.	e0	Pos.	Ctr.	e0		Ctr.	e0
2015	**1st**	NO	80.36	↓	SE	80.30	**1st**	FI	84.17	=	FI	84.15
	2nd	SE	80.30	↑	NO	80.16	**2nd**	NO	84.15	=	NO	84.04
	3rd	DK	78.75	=	DK	78.63	**3rd**	SE	84.00	=	SE	83.99
	4th	FI	78.59	=	FI	78.49	**4th**	DK	82.68	=	DK	82.63
2016	**1st**	NO	80.60	↓	SE	80.52	**1st**	NO	84.17	↓	FI	84.07
	2nd	SE	80.53	↑	NO	80.44	**2nd**	FI	84.12	↑	SE	84.06
	3rd	DK	78.93	=	DK	78.85	**3rd**	SE	84.07	↑	NO	83.98
	4th	FI	78.43	=	FI	78.26	**4th**	DK	82.77	=	DK	82.73
2017	**1st**	NO	80.91	=	NO	80.79	**1st**	NO	84.28	↓	FI	84.16
	2nd	SE	80.73	=	SE	80.71	**2nd**	FI	84.23	↑	NO	84.14
	3rd	DK	78.72	=	DK	79.02	**3rd**	SE	84.11	=	SE	84.08
	4th	FI	79.08	=	FI	78.58	**4th**	DK	83.10	=	DK	82.99
2018	**1st**	NO	81.00	=	NO	80.88	**1st**	NO	84.49	=	NO	84.34
	2nd	SE	80.79	=	SE	80.77	**2nd**	FI	84.31	=	FI	84.27
	3rd	DK	79.00	=	DK	78.89	**3rd**	SE	84.26	=	SE	84.22
	4th	FI	78.91	=	FI	78.79	**4th**	DK	82.94	=	DK	82.84
2019	**1st**	SE	81.34	=	SE	81.32	**1st**	SE	84.73	=	SE	84.69
	2nd	NO	81.19	=	NO	81.05	**2nd**	NO	84.68	↑	FI	84.51
	3rd	DK	79.43	=	DK	79.31	**3rd**	FI	84.56	↓	NO	84.51
	4th	FI	79.22	=	FI	79.08	**4th**	DK	83.40	=	DK	83.32

Source: authors' calculations based upon the death and total population registers of Denmark, Finland, Norway, and Sweden.

Notes: DK = Denmark, FI = Finland, NO = Norway, SE = Sweden; red boxes highlight changes in rankings due to international migrants

Supplementary and sensitivity analyses

Some other analyses were conducted to complement and validate the main analyses. They can be found in the supplementary materials. Table S1 and Table S2 compare our PLE*0* estimates with the Human Mortality Database (HMD), a collection of freely available and high quality mortality data (10). We observe a very high consistency; our estimates are almost always within +/-0.03, if not identical, notably in recent years where we compare directly across the countries. Tables S3-S8 show PLE*25*, PLE*50*, and PLE*75* for total populations, migrants, and native-born, along with the impact of migrants on these metrics. The impact of migrants on PLE*25* is comparable to PLE*0*; the impact roughly halves on PLE*50,* and all but disappears on PLE*75*. Figure S1 displays age-specific mortality rate ratios for migrants relative to native-born across the four countries over time. Here, we see that mortality is elevated among migrants in all four countries in infancy and childhood, much lower at young adult ages (in a U-shape of advantage between ages 20 to 50), and then gradually converges toward, or overtakes, the mortality of the native-born with age. In Sweden, this low young adult mortality only emerges in recent years. These patterns are consistent with previous work on age variation in migrant mortality patterns (11,12) and reveal a specific age element to the effect of international migrants in our results. Figure S2 shows the difference between the PLE*0* of migrants and native-born in the four nations. The difference is largest in Finland, where the PLE*0* of migrant men is often two years higher than native-born men. In Sweden, initially PLE*0* is over a year lower among migrant men.

Discussion

Here, our aim was to understand whether estimates and comparisons of national PLE*0* in four Nordic nations were being affected by the mortality of international migrants. We found a positive and growing effect of migrants on national PLE*0* over time. This effect was largest on

PLE*0* for men and women in Norway (+0.2) and men in Finland (+0.15). In Sweden, we instead saw a negative effect of migrants on PLE*0* that was larger among men (-0.2) and diminished over time. In all four countries, the impact was largest at PLE*0* and smallest at PLE*75*; mortality at young to middle adult ages appeared to drive their contributions. Although it might appear somewhat modest, the impact of the mortality of international migrants on PLE*0* in the Nordic countries is *already* affecting mortality rankings; this was most beneficial for Norway. Given the stable long-term trends that we have reported in this paper, there is no reason not to expect the impact to continue increasing as the proportion of migrants in these countries is projected to grow and age (8). With the patterns and trends that we have found here, we wonder how the mortality of migrants might affect PLE*0* in other migrant-receiving nations and/or global PLE*0* leaders.

For Sweden, the findings contrasted with the other countries. We turned to previous work to try to find an explanation. Previous studies have found lower mortality among many origins in Sweden but an excess mortality among migrants from Finland, which is traditionally Sweden's largest migrant group (12,13). At the start of our time series in 1990, Finns accounted for 42% of all migrants in Sweden. This share fell steadily over time to 10% in 2017. Moreover, the age distribution of Finns was – and is – older compared to other origins, permitting them a greater influence in PLE*0* calculations. As a simple exercise, we removed Finns from the deaths and exposure of Sweden and plotted this new PLE*0* against that of the total resident population. This revealed a positive and growing impact of all other migrant groups comparable in size to migrant men and women in Denmark. Consequently, it appears that the patterns and trends we find for Sweden can be explained by the waning influence of excess mortality among migrants from Finland. Sweden provides a compelling case of a country in which, despite low mortality levels being observed in nearly all origin groups (12,13), the aggregate mortality of all migrants is dominated by one influential origin group. The other three countries lack such a single large

origin group and the proportion of migrants from Finland in Denmark and Norway is also much smaller.

On the contrary, we saw a positive and growing impact of migrants in Denmark, Finland, and Norway. In the context previous work from Australia (14) and the United States (15), which showed migrant contributions of around one half to two thirds of a year, the contributions we found were somewhat modest (albeit growing steadily over time). We propose several reasons for this. As with Sweden, there may be some counteracting origin group, or groups, with higher mortality that result in a reduced net overall advantage among migrants. It is true, for example, that most of the Nordic countries host substantial refugee populations. Previous research from Denmark, Norway, and Sweden has shown that the mortality levels of refugees are not as low as migrants arriving for other reasons and that their mortality may be closer to the mortality levels of native-born populations (8,16,17). Moreover, intra-Nordic agreements and EU/EEA memberships allow migrants coming from other Nordic or European countries to do so without any restrictions, so they may be less selective. This is interesting in the context of immigration to Australia, which is conditional on a points-based system related directly to education and skills. For the United States, migrant with Hispanic and Latino origins makes up around half of the total migrant population and a large mortality advantage in this group is well established (18).

Another possible explanation – which is not mutually exclusive from the one above – is that the register data in Denmark, Norway, and Sweden may better monitor the greater mobility of migrants and more accurately capture those who are resident or not in the country. The studies from Australia and the United States (14,15) both derived their denominators from census data, which may be more prone to over-estimating the resident migrant population than register data, which is routinely verified and corrected. Prior evidence concerning data-related explanations of lower migrant mortality is substantial but inconclusive. Some studies indicate a tangible

effect of denominator over-estimation on the magnitude of lower migrant mortality (19–22), while others indicate only a negligible effect of data biases in the presence or not of a migrant mortality advantage (12,23,24). With this in mind, it could be that the contributions of migrants in these Australia and the United States are being inflated by the type of data used to estimate migrants' exposure bases and that the estimates produced here provide a truer reflection of their impact.

Our study has many strengths including an international comparative perspective, a long-term temporal perspective, the use of high-quality registers, provision of unique new evidence at the intersection of migration and mortality, and findings that should have interest and policy impact beyond academia. Simultaneously, there are some limitations. First, even with the register data, there is some scope for the misclassification of nativity status. Second, we dichotomise nativity status into native-born and foreign-born. Resultantly, we do not investigate variation in PLE*0* according to specific origins. While this would have been interesting and added context to the impact of migrants to national PLE*0*, it was not essential to the aim of the paper. Nevertheless, as we have documented for Sweden, one origin group can have a large influence in the overall impact of migrants on national PLE*0* levels. Future work could look to adopt an origin-specific outlook.

Overall, we have observed that international migrants do affect the national PLE*0* of men and women. Their impact is not small in the context of annual of PLE*0* gains (25) or in the context of the size of differences in PLE*0* between countries at the top of the global mortality rankings (6). Researchers, policy makers, and global agencies must now acknowledge the role that the mortality of international migrants plays in affecting national PLE*0* of countries and mortality rankings. This affects how we compare and interpret differences in mortality over time *within* countries and *between* countries. The impact of migrants does not always act in one direction, which may well exacerbate PLE*0* differences in inter-country comparisons. While our findings

show that migrants do not *currently* affect residual PLE – and are not *currently* affecting later life policies, they might come to in the future as more migrants reach older ages in which they can have a greater effect on mortality levels. The share of older migrants is projected to grow in many countries (26). Finally, it is imperative that we continue to try to uncover exactly what generates lower mortality among migrants in order to determine whether their impact on PLE*0* reflects the genuine health contributions of international migrants or the inability of national data systems to capture their mobility. If the latter, this would suggest need for a major reform of such data systems and re-evaluation of how we calculate and compare national estimates of mortality.

References

1. OECD. Pensions at a Glance 2019: OECD and G20 Indicators [Internet]. OECD; 2019 [cited 2020 Sep 25]. (OECD Pensions at a Glance). Available from: https://www.oecd-ilibrary.org/social-issues-migration-health/pensions-at-a-glance-2019_b6d3dcfc-en

2. Aldridge RW, Nellums LB, Bartlett S, Barr AL, Patel P, Burns R, et al. Global patterns of mortality in international migrants: a systematic review and meta-analysis. The Lancet. 2018 Dec 15;392(10164):2553–66.

3. Shor E, Roelfs D. A Global Meta-analysis of the Immigrant Mortality Advantage. International Migration Review. 2021 Apr 5;0197918321996347.

4. United Nations Department of Economic and Social Affairs. International Migration 2019: report. (ST/ESA/SERA/438). 2019;

5. United Nations. International Migrant Stock 2019. United Nations database, POP/DB/MIG/Stock/Rev2019. 2019;

6. United Nations Development Programme. Human development report 2019: beyond income, beyond averages, beyond today: inequalities in human development in the 21st century. 2019.

7. Maret-Ouda J, Tao W, Wahlin K, Lagergren J. Nordic registry-based cohort studies: Possibilities and pitfalls when combining Nordic registry data. Scand J Public Health. 2017 Jul 1;45(17_suppl):14–9.

8. Karlsdottir A, Rispling L, Norlen G, Randall L, Gassen NS, Heleniak T, et al. State of the Nordic Region 2018: Immigration and integration edition [Internet]. Nordic Council of Ministers; 2018 [cited 2020 Sep 24]. Available from: http://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-5181

9. Hemström Ö. Forecast on deaths and life expectancy in 2020. Statistikmyndigheten SCB (Statistics Sweden);

10. Barbieri M, Wilmoth JR, Shkolnikov VM, Glei D, Jasilionis D, Jdanov D, et al. Data Resource Profile: The Human Mortality Database (HMD). Int J Epidemiol. 2015 Oct 1;44(5):1549–56.

11. Guillot M, Khlat M, Elo I, Solignac M, Wallace M. Understanding age variations in the migrant mortality advantage: An international comparative perspective. PLoS One [Internet]. 2018 Jun 29 [cited 2020 Apr 16];13(6). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6025872/

12. Wallace M, Wilson B. Age Variations and Over-Coverage: Is the Migrant Mortality Advantage Merely a Data Artefact? Population Studies [Internet]. 2020 Jan 7 [cited 2020 Sep 25];Accepted, in press. Available from: /articles/preprint/Age_Variations_and_Over-Coverage_Is_the_Migrant_Mortality_Advantage_Merely_a_Data_Artefact_/11534109/1

13. Juárez SP, Drefahl S, Dunlavy A, Rostila M. All-cause mortality, age at arrival, and duration of residence among adult migrants in Sweden: A population-based longitudinal study. SSM - Population Health. 2018 Dec 1;6:16–25.

14. Page A, Begg S, Taylor R, Lopez AD. Global comparative assessments of life expectancy: the impact of migration with reference to Australia. Bull World Health Organ. 2007 Jun;85:474–81.

15. Preston SH, Elo IT. Anatomy of a Municipal Triumph: New York City's Upsurge in Life Expectancy. Population and Development Review. 2014;40(1):1–29.

16. Syse A, Dzamarija MT, Kumar BN, Diaz E. An observational study of immigrant mortality differences in Norway by reason for migration, length of stay and characteristics of sending countries. BMC Public Health. 2018 Apr 17;18(1):508.

17. Norredam M, Olsbjerg M, Petersen JH, Juel K, Krasnik A. Inequalities in mortality among refugees and immigrants compared to native Danes – a historical prospective cohort study. BMC Public Health [Internet]. 2012 Dec [cited 2020 Apr 16];12(1). Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-12-757

18. Ruiz JM, Steffen P, Smith TB. Hispanic Mortality Paradox: A Systematic Review and Meta-Analysis of the Longitudinal Literature. Am J Public Health. 2013 Jan 17;103(3):e52–60.

19. Weitoft GR, Gullberg A, Hjern A, Rosén M. Mortality statistics in immigrant research: method for adjusting underestimation of mortality. Int J Epidemiol. 1999 Aug 1;28(4):756–63.

20. Kibele E, Scholz R, Shkolnikov VM. Low migrant mortality in Germany for men aged 65 and older: fact or artifact? Eur J Epidemiol. 2008 Apr 17;23(6):389.

21. Monti A, Drefahl S, Mussino E, Härkönen J. Over-coverage in population registers leads to bias in demographic estimates. Population Studies. 2019 Nov 14;0(0):1–19.

22. Kohls M. Selection, Social Status or Data Artefact - What Determines the Mortality of Migrants in Germany? In: Salzmann T, Edmonston B, Raymer J, editors. Demographic Aspects of Migration [Internet]. Wiesbaden: VS Verlag für Sozialwissenschaften; 2010 [cited 2020 Apr 16]. p. 153–77. Available from: https://doi.org/10.1007/978-3-531-92563-9_6

23. Wallace M, Kulu H. Low immigrant mortality in England and Wales: A data artefact? Social Science & Medicine. 2014 Nov 1;120:100–9.

24. Razum O, Zeeb H, Rohrmann S. The 'healthy migrant effect'–not merely a fallacy of inaccurate denominator figures. Int J Epidemiol. 2000 Apr 1;29(1):191–2.

25. Oeppen J, Vaupel JW. Broken Limits to Life Expectancy. Science. 2002 May 10;296(5570):1029–31.

26. Lanzieri G. Fewer, older, and multicultural? Projections of the EU populations by foreign/national background. Publications Office of the European Union; 2011.

Funding

Work was supported by the Swedish Research Council for Health, Working Life and Welfare (*Forte*): **2019-00603** '*Migrant mortality advantage lost? Emerging lifespan inequalities among migrants and their descendants in Sweden*'; **2016-07105** '*Migrant Trajectories*'; and **2016–07115** '*Ageing Well*'.

Supplementary materials

Table S1. Comparison of period life expectancy at birth in four Nordic countries with the Human Mortality Database, men, 1990-2019.

Year	Denmark			Finland			Norway			Sweden		
	HMD	Est.	**Diff.**	HMD	Est.	**Diff.**	HMD	Est.	**Diff.**	HMD	Est.	**Diff.**
1990	72.02	71.99	**-0.03**	70.94	71.14	**0.20**	73.45	73.44	**-0.01**	74.81	74.78	**-0.03**
1991	72.47	72.43	**-0.04**	71.33	71.59	**0.26**	74.02	74.01	**-0.01**	74.95	74.93	**-0.02**
1992	72.56	72.54	**-0.02**	71.67	71.89	**0.22**	74.17	74.16	**-0.01**	75.36	75.35	**-0.01**
1993	72.60	72.57	**-0.03**	72.11	72.25	**0.14**	74.24	74.23	**-0.01**	75.49	75.47	**-0.02**
1994	72.78	72.75	**-0.03**	72.80	73.01	**0.21**	74.89	74.89	**0.00**	76.08	76.06	**-0.02**
1995	72.73	72.70	**-0.03**	72.81	72.91	**0.10**	74.80	74.79	**-0.01**	76.18	76.17	**-0.01**
1996	73.05	73.03	**-0.02**	73.03	73.16	**0.13**	75.37	75.36	**-0.01**	76.52	76.51	**-0.01**
1997	73.56	73.56	**0.00**	73.43	73.57	**0.14**	75.46	75.45	**-0.01**	76.70	76.69	**-0.01**
1998	73.94	73.94	**0.00**	73.52	73.68	**0.16**	75.53	75.50	**-0.03**	76.87	76.81	**-0.06**
1999	74.21	74.19	**-0.02**	73.74	73.84	**0.10**	75.61	75.61	**0.00**	77.07	77.00	**-0.07**
2000	74.44	74.43	**-0.01**	74.16	74.29	**0.13**	75.96	75.95	**-0.01**	77.38	77.35	**-0.03**
2001	74.67	74.66	**-0.01**	74.58	74.69	**0.11**	76.21	76.19	**-0.02**	77.54	77.51	**-0.03**
2002	74.80	74.79	**-0.01**	74.87	74.91	**0.04**	76.40	76.39	**-0.01**	77.71	77.69	**-0.02**
2003	75.15	75.00	**-0.15**	75.13	75.20	**0.07**	77.04	77.04	**0.00**	77.91	77.88	**-0.03**
2004	75.29	75.36	**0.07**	75.31	75.35	**0.04**	77.51	77.50	**-0.02**	78.35	78.32	**-0.03**
2005	75.94	75.91	**-0.03**	75.53	75.72	**0.19**	77.72	77.72	**0.00**	78.42	78.39	**-0.03**
2006	75.90	75.89	**-0.01**	75.82	75.90	**0.08**	78.12	78.11	**-0.01**	78.69	78.66	**-0.03**
2007	76.13	76.12	**-0.01**	75.87	75.95	**0.08**	78.24	78.23	**-0.01**	78.93	78.90	**-0.03**
2008	76.48	76.47	**-0.01**	76.32	76.42	**0.10**	78.32	78.31	**-0.01**	79.09	79.06	**-0.03**
2009	76.84	76.83	**-0.01**	76.48	76.55	**0.07**	78.59	78.59	**0.00**	79.34	79.30	**-0.04**
2010	77.12	77.10	**-0.02**	76.72	76.76	**0.04**	78.85	78.85	**0.00**	79.52	79.48	**-0.04**
2011	77.70	77.69	**-0.01**	77.19	77.21	**0.02**	79.00	78.99	**-0.01**	79.80	79.77	**-0.03**
2012	78.07	78.04	**-0.03**	77.50	77.52	**0.02**	79.42	79.41	**-0.01**	79.87	79.84	**-0.03**
2013	78.27	78.24	**-0.03**	77.88	77.86	**-0.02**	79.66	79.65	**-0.01**	80.10	80.05	**-0.05**
2014	78.57	78.56	**-0.01**	78.13	78.14	**0.01**	80.03	80.02	**-0.01**	80.36	80.31	**-0.05**
2015	78.77	78.75	**-0.02**	78.59	78.56	**-0.03**	80.35	80.36	**0.01**	80.32	80.30	**-0.02**
2016	78.95	78.93	**-0.02**	78.43	78.41	**-0.02**	80.60	80.60	**0.00**	80.57	80.53	**-0.04**
2017	79.09	79.08	**-0.01**	78.72	78.72	**0.00**	80.91	80.91	**0.00**	80.73	80.73	**0.00**
2018	79.02	79.00	**-0.02**	78.91	78.91	**0.00**	81.00	81.00	**0.00**	80.79	80.79	**0.00**
2019	79.44	79.43	**-0.01**	79.22	79.23	**0.01**	81.19	81.19	**0.00**	81.35	81.34	**-0.01**

Source: authors' calculations based upon respective register data for each country; Human Mortality Database

Table S2. Comparison of period life expectancy at birth in four Nordic countries with the Human Mortality Database, women, 1990-2019.

Year	Denmark			Finland			Norway			Sweden		
	HMD	Est.	**Diff.**	HMD	Est.	**Diff.**	HMD	Est.	**Diff.**	HMD	Est.	**Diff.**
1990	77.73	77.70	**-0.03**	78.88	79.12	**0.24**	79.80	79.80	**0.00**	80.40	80.38	**-0.02**
1991	77.98	77.96	**-0.02**	79.32	79.52	**0.20**	80.09	80.10	**0.01**	80.54	80.53	**-0.01**
1992	77.97	77.93	**-0.04**	79.44	79.57	**0.13**	80.35	80.36	**0.01**	80.78	80.78	**0.00**
1993	77.77	77.75	**-0.02**	79.48	79.54	**0.06**	80.24	80.24	**0.00**	80.78	80.76	**-0.02**
1994	78.10	78.08	**-0.02**	80.15	80.31	**0.16**	80.65	80.65	**0.00**	81.38	81.38	**0.00**
1995	77.84	77.81	**-0.03**	80.21	80.27	**0.06**	80.81	80.82	**0.01**	81.44	81.45	**0.01**
1996	78.26	78.22	**-0.04**	80.55	80.61	**0.06**	81.06	81.06	**0.00**	81.52	81.52	**0.00**
1997	78.47	78.47	**0.00**	80.51	80.60	**0.09**	80.97	80.97	**0.00**	81.80	81.79	**-0.01**
1998	78.88	78.88	**0.00**	80.84	80.94	**0.10**	81.26	81.25	**-0.01**	81.91	81.89	**-0.02**
1999	78.89	78.88	**-0.01**	81.03	81.14	**0.11**	81.12	81.12	**0.00**	81.89	81.85	**-0.04**
2000	79.12	79.11	**-0.01**	81.02	81.09	**0.07**	81.37	81.38	**0.01**	82.02	82.01	**-0.02**
2001	79.21	79.21	**0.00**	81.54	81.54	**0.00**	81.52	81.52	**0.00**	82.05	82.05	**0.00**
2002	79.34	79.32	**-0.02**	81.53	81.58	**0.05**	81.46	81.46	**0.00**	82.08	82.08	**0.00**
2003	79.80	79.72	**-0.08**	81.81	81.87	**0.06**	81.93	81.93	**0.00**	82.41	82.40	**-0.01**
2004	80.05	80.07	**0.02**	82.27	82.18	**-0.09**	82.33	82.34	**0.01**	82.66	82.65	**-0.01**
2005	80.45	80.43	**-0.02**	82.30	82.51	**0.21**	82.51	82.52	**0.01**	82.75	82.75	**0.00**
2006	80.51	80.51	**0.00**	82.83	82.88	**0.05**	82.66	82.66	**0.00**	82.90	82.89	**-0.01**
2007	80.53	80.51	**-0.02**	82.86	82.88	**0.02**	82.67	82.66	**-0.01**	82.94	82.93	**-0.01**
2008	80.92	80.91	**-0.01**	83.01	83.03	**0.02**	82.96	82.95	**-0.01**	83.12	83.10	**-0.02**
2009	81.03	81.02	**-0.01**	83.11	83.18	**0.07**	83.06	83.05	**-0.01**	83.33	83.32	**-0.01**
2010	81.33	81.32	**-0.01**	83.24	83.21	**-0.03**	83.15	83.15	**0.00**	83.47	83.46	**-0.01**
2011	81.83	81.81	**-0.02**	83.54	83.56	**0.02**	83.44	83.45	**0.01**	83.67	83.65	**-0.02**
2012	82.04	82.02	**-0.02**	83.41	83.40	**-0.01**	83.42	83.40	**-0.02**	83.53	83.51	**-0.02**
2013	82.31	82.29	**-0.02**	83.82	83.76	**-0.06**	83.61	83.60	**-0.01**	83.72	83.69	**-0.03**
2014	82.67	82.67	**0.00**	83.85	83.83	**-0.02**	84.10	84.10	**0.00**	84.05	84.03	**-0.02**
2015	82.69	82.68	**-0.01**	84.17	84.13	**-0.04**	84.12	84.15	**0.03**	84.02	84.00	**-0.02**
2016	82.79	82.77	**-0.02**	84.12	84.09	**-0.03**	84.15	84.17	**0.02**	84.08	84.07	**-0.01**
2017	83.12	83.11	**-0.01**	84.23	84.22	**-0.01**	84.26	84.28	**0.02**	84.12	84.11	**-0.01**
2018	82.96	82.94	**-0.02**	84.31	84.30	**-0.01**	84.47	84.49	**0.02**	84.26	84.26	**0.00**
2019	83.42	83.40	**-0.02**	84.56	84.56	**0.00**	84.68	84.68	**0.00**	84.73	84.73	**0.00**

Source: authors' calculations based upon respective register data for each country; Human Mortality Database

Table S3. Period life expectancy at age 25 among men in four Nordic countries, men, 1990-2019.

Year	Denmark, e25				Finland, e25				Norway, e25				Sweden, e25			
	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**
1990	48.32	48.36	47.64	**-0.04**	47.16	47.14	49.46	**0.02**	49.82	49.78	50.51	**0.03**	50.92	51.10	49.49	**-0.17**
1991	48.75	48.77	48.42	**-0.01**	47.52	47.48	51.35	**0.03**	50.19	50.17	50.51	**0.02**	50.98	51.14	49.59	**-0.17**
1992	48.76	48.78	48.54	**-0.03**	47.71	47.69	49.36	**0.02**	50.39	50.35	51.30	**0.05**	51.31	51.46	50.15	**-0.15**
1993	48.62	48.66	48.50	**-0.03**	48.00	47.95	52.21	**0.05**	50.30	50.24	51.32	**0.06**	51.41	51.56	50.30	**-0.15**
1994	48.83	48.86	48.78	**-0.03**	48.81	48.79	50.92	**0.02**	50.91	50.87	51.62	**0.05**	51.89	52.06	50.62	**-0.16**
1995	48.76	48.77	48.67	**-0.01**	48.66	48.63	50.73	**0.03**	50.84	50.81	51.74	**0.03**	51.98	52.13	50.92	**-0.16**
1996	49.10	49.10	49.60	**0.00**	48.89	48.86	50.52	**0.02**	51.30	51.27	51.48	**0.02**	52.24	52.38	51.40	**-0.14**
1997	49.56	49.55	50.13	**0.01**	49.29	49.23	53.82	**0.06**	51.43	51.42	51.41	**0.02**	52.44	52.58	51.53	**-0.14**
1998	49.83	49.86	49.71	**-0.02**	49.31	49.25	53.14	**0.06**	51.48	51.46	51.75	**0.02**	52.63	52.75	51.81	**-0.12**
1999	50.13	50.13	50.23	**0.00**	49.56	49.51	53.02	**0.05**	51.65	51.62	52.20	**0.03**	52.76	52.89	51.97	**-0.13**
2000	50.46	50.49	50.06	**-0.03**	50.00	49.95	52.95	**0.05**	51.97	51.96	52.15	**0.01**	53.14	53.30	52.11	**-0.16**
2001	50.56	50.59	50.38	**-0.03**	50.43	50.40	52.07	**0.03**	52.22	52.19	52.59	**0.03**	53.30	53.40	52.67	**-0.11**
2002	50.69	50.70	50.88	**-0.01**	50.61	50.57	52.21	**0.04**	52.31	52.26	53.05	**0.05**	53.45	53.55	52.82	**-0.10**
2003	50.90	50.89	50.98	**0.01**	50.90	50.85	53.75	**0.06**	52.95	52.85	54.50	**0.10**	53.64	53.74	53.08	**-0.10**
2004	51.23	51.22	51.41	**0.00**	51.09	51.02	54.90	**0.08**	53.37	53.31	53.77	**0.06**	53.96	54.11	52.92	**-0.15**
2005	51.77	51.75	52.06	**0.02**	51.35	51.28	54.46	**0.07**	53.58	53.54	53.99	**0.04**	54.05	54.17	53.20	**-0.12**
2006	51.70	51.73	51.27	**-0.03**	51.59	51.53	54.12	**0.06**	53.94	53.90	54.31	**0.04**	54.36	54.48	53.61	**-0.12**
2007	51.93	51.91	52.42	**0.02**	51.60	51.51	53.70	**0.09**	53.95	53.89	54.52	**0.06**	54.55	54.65	53.87	**-0.10**
2008	52.33	52.33	52.47	**0.00**	52.09	51.98	55.17	**0.10**	54.11	54.05	54.51	**0.05**	54.69	54.80	53.90	**-0.11**
2009	52.43	52.44	52.43	**-0.02**	52.14	52.04	55.00	**0.10**	54.38	54.27	55.64	**0.10**	54.96	55.04	54.49	**-0.08**
2010	52.73	52.67	53.18	**0.05**	52.39	52.31	54.70	**0.08**	54.54	54.47	55.13	**0.07**	55.09	55.17	54.56	**-0.08**
2011	53.30	53.32	53.11	**-0.02**	52.80	52.72	54.85	**0.08**	54.73	54.60	56.10	**0.12**	55.35	55.38	54.93	**-0.04**
2012	53.63	53.65	53.13	**-0.02**	53.06	52.95	55.37	**0.11**	55.02	54.90	55.74	**0.11**	55.45	55.52	54.90	**-0.07**
2013	53.79	53.75	54.21	**0.04**	53.33	53.23	55.60	**0.11**	55.19	55.03	56.29	**0.15**	55.66	55.73	55.23	**-0.07**
2014	54.18	54.11	54.64	**0.08**	53.63	53.53	56.50	**0.10**	55.60	55.48	56.33	**0.12**	55.88	55.90	55.67	**-0.01**
2015	54.34	54.27	54.73	**0.07**	54.02	53.93	55.71	**0.10**	55.90	55.71	57.68	**0.19**	55.90	55.91	55.65	**-0.01**
2016	54.50	54.49	54.46	**0.01**	53.87	53.71	57.93	**0.16**	56.10	55.96	56.99	**0.14**	56.07	56.06	55.92	**0.02**
2017	54.73	54.74	54.77	**-0.01**	54.24	54.10	57.12	**0.14**	56.48	56.35	57.58	**0.13**	56.29	56.25	56.32	**0.04**
2018	54.61	54.55	54.71	**0.06**	54.40	54.29	56.87	**0.11**	56.52	56.39	57.70	**0.13**	56.36	56.31	56.32	**0.04**
2019	55.00	54.94	55.16	**0.06**	54.77	54.64	56.68	**0.13**	56.78	56.66	57.51	**0.12**	56.88	56.84	56.32	**0.04**

Source: authors' calculations based upon respective register data for each country

Table S4. Period life expectancy at age 50 among men in four Nordic countries, men, 1990-2019.

Year	Denmark, e50				Finland, e50				Norway, e50				Sweden, e50			
	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**
1990	25.34	25.36	24.84	**-0.02**	24.84	24.83	26.00	**0.01**	26.55	26.55	26.78	**0.00**	27.50	27.60	26.53	**-0.10**
1991	25.77	25.79	25.52	**-0.01**	25.28	25.27	27.38	**0.01**	26.82	26.82	26.94	**0.01**	27.59	27.69	26.68	**-0.09**
1992	25.73	25.73	25.73	**0.00**	25.28	25.28	25.90	**0.00**	27.01	27.00	27.52	**0.02**	27.82	27.92	26.91	**-0.11**
1993	25.64	25.62	25.99	**0.02**	25.47	25.45	28.21	**0.02**	26.91	26.90	27.40	**0.02**	27.89	27.99	27.16	**-0.09**
1994	25.87	25.86	26.20	**0.01**	26.22	26.21	27.58	**0.01**	27.45	27.43	27.80	**0.01**	28.41	28.53	27.38	**-0.12**
1995	25.75	25.74	25.81	**0.00**	26.04	26.03	27.21	**0.01**	27.39	27.38	28.05	**0.01**	28.40	28.50	27.67	**-0.10**
1996	26.03	26.01	26.64	**0.02**	26.34	26.34	27.12	**0.01**	27.83	27.81	27.90	**0.01**	28.60	28.69	28.09	**-0.09**
1997	26.44	26.43	27.13	**0.02**	26.65	26.62	29.79	**0.03**	27.95	27.95	27.63	**-0.01**	28.76	28.86	28.00	**-0.11**
1998	26.65	26.67	26.57	**-0.02**	26.62	26.59	29.10	**0.03**	28.08	28.08	28.23	**0.00**	28.89	29.00	28.15	**-0.11**
1999	26.87	26.88	26.91	**-0.01**	26.86	26.83	29.49	**0.03**	28.15	28.13	28.61	**0.02**	29.06	29.15	28.52	**-0.09**
2000	27.16	27.18	26.73	**-0.03**	27.26	27.24	29.14	**0.02**	28.65	28.66	28.53	**-0.02**	29.39	29.49	28.71	**-0.10**
2001	27.23	27.26	27.08	**-0.03**	27.62	27.61	28.57	**0.01**	28.80	28.79	28.99	**0.01**	29.58	29.68	28.94	**-0.11**
2002	27.37	27.38	27.59	**-0.01**	27.68	27.67	28.53	**0.01**	28.82	28.81	29.19	**0.01**	29.62	29.73	28.92	**-0.11**
2003	27.56	27.58	27.51	**-0.02**	27.94	27.92	30.02	**0.03**	29.41	29.37	30.44	**0.03**	29.82	29.92	29.23	**-0.11**
2004	27.88	27.90	27.97	**-0.02**	28.24	28.21	31.27	**0.03**	29.74	29.73	29.74	**0.01**	30.16	30.29	29.22	**-0.13**
2005	28.26	28.24	28.59	**0.02**	28.41	28.38	30.68	**0.03**	29.93	29.92	30.11	**0.01**	30.20	30.32	29.36	**-0.12**
2006	28.22	28.27	27.65	**-0.06**	28.57	28.54	30.41	**0.03**	30.27	30.26	30.45	**0.01**	30.43	30.56	29.63	**-0.13**
2007	28.44	28.44	28.90	**0.01**	28.67	28.64	29.76	**0.02**	30.20	30.17	30.64	**0.04**	30.67	30.79	29.92	**-0.12**
2008	28.75	28.75	28.94	**0.01**	29.08	29.04	31.35	**0.05**	30.36	30.35	30.54	**0.02**	30.81	30.94	29.92	**-0.13**
2009	28.83	28.86	28.77	**-0.03**	29.14	29.11	31.21	**0.04**	30.66	30.60	31.75	**0.06**	31.06	31.19	30.43	**-0.13**
2010	29.05	29.03	29.39	**0.02**	29.23	29.20	30.95	**0.03**	30.76	30.74	31.16	**0.02**	31.15	31.25	30.56	**-0.10**
2011	29.59	29.64	29.33	**-0.05**	29.55	29.51	31.13	**0.03**	31.00	30.96	32.05	**0.04**	31.39	31.48	30.80	**-0.09**
2012	29.79	29.84	29.18	**-0.05**	29.78	29.74	31.40	**0.04**	31.15	31.12	31.61	**0.03**	31.49	31.61	30.75	**-0.12**
2013	29.93	29.92	30.28	**0.02**	30.04	30.00	31.75	**0.04**	31.34	31.31	32.07	**0.03**	31.73	31.84	31.18	**-0.11**
2014	30.35	30.35	30.61	**0.00**	30.25	30.19	32.79	**0.05**	31.73	31.71	32.18	**0.01**	31.96	32.03	31.57	**-0.07**
2015	30.40	30.35	30.71	**0.05**	30.49	30.46	31.61	**0.03**	31.93	31.85	33.40	**0.08**	31.96	32.03	31.54	**-0.07**
2016	30.60	30.62	30.50	**-0.01**	30.39	30.34	33.71	**0.05**	32.17	32.14	32.78	**0.03**	32.16	32.23	31.77	**-0.06**
2017	30.75	30.77	30.76	**-0.02**	30.72	30.65	33.04	**0.06**	32.40	32.35	33.27	**0.05**	32.38	32.42	32.18	**-0.04**
2018	30.64	30.63	30.65	**0.02**	30.84	30.79	32.92	**0.05**	32.56	32.51	33.54	**0.05**	32.38	32.42	32.18	**-0.04**
2019	30.98	30.97	31.01	**0.01**	31.24	31.18	32.62	**0.05**	32.78	32.74	33.32	**0.04**	32.85	32.89	32.18	**-0.04**

Source: authors' calculations based upon respective register data for each country

Table S5. Period life expectancy at age 75 among men in four Nordic countries, men, 1990-2019.

Year	Denmark, e75				Finland, e75				Norway, e75				Sweden, e75			
	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**
1990	8.43	8.43	8.44	**0.00**	8.37	8.37	8.48	**0.00**	8.66	8.65	8.89	**0.00**	8.94	8.94	8.92	**0.00**
1991	8.68	8.69	8.37	**-0.01**	8.59	8.59	8.60	**0.00**	8.79	8.80	8.59	**0.00**	9.03	9.03	9.03	**0.00**
1992	8.60	8.60	8.59	**0.00**	8.45	8.45	7.93	**-0.01**	8.83	8.82	9.09	**0.00**	9.17	9.16	9.40	**0.01**
1993	8.39	8.38	8.65	**0.01**	8.42	8.41	9.28	**0.01**	8.67	8.67	8.52	**0.00**	9.06	9.04	9.38	**0.01**
1994	8.62	8.62	8.53	**0.00**	8.85	8.85	9.26	**0.00**	9.10	9.10	9.38	**0.00**	9.47	9.47	9.45	**0.00**
1995	8.45	8.46	8.29	**0.00**	8.85	8.85	9.13	**0.00**	8.85	8.85	9.68	**0.00**	9.37	9.36	9.66	**0.01**
1996	8.61	8.58	9.46	**0.02**	8.87	8.88	8.18	**-0.01**	9.14	9.15	8.65	**-0.01**	9.46	9.45	9.82	**0.01**
1997	8.78	8.76	9.78	**0.02**	9.06	9.06	9.46	**0.00**	9.11	9.11	9.03	**0.00**	9.58	9.58	9.64	**0.00**
1998	8.87	8.86	9.22	**0.01**	9.04	9.03	9.96	**0.01**	9.23	9.22	9.54	**0.01**	9.61	9.61	9.73	**0.00**
1999	8.90	8.89	9.22	**0.01**	9.19	9.17	10.85	**0.02**	9.14	9.13	9.58	**0.01**	9.66	9.65	9.86	**0.00**
2000	9.04	9.04	8.93	**0.00**	9.27	9.26	10.65	**0.01**	9.41	9.40	9.88	**0.01**	9.84	9.85	9.96	**0.00**
2001	9.05	9.05	9.09	**0.00**	9.43	9.43	9.73	**0.00**	9.41	9.41	9.30	**0.00**	9.95	9.95	10.20	**0.00**
2002	9.15	9.13	9.91	**0.02**	9.51	9.52	8.89	**-0.01**	9.49	9.47	10.29	**0.02**	9.95	9.95	10.04	**-0.01**
2003	9.21	9.20	9.53	**0.01**	9.74	9.73	10.27	**0.01**	9.89	9.89	10.33	**0.00**	10.08	10.09	10.27	**-0.01**
2004	9.41	9.39	10.05	**0.02**	10.10	10.09	11.67	**0.02**	10.15	10.16	9.62	**-0.01**	10.39	10.41	10.18	**-0.02**
2005	9.59	9.58	9.66	**0.00**	10.24	10.23	11.48	**0.01**	10.11	10.10	10.29	**0.01**	10.31	10.34	10.01	**-0.04**
2006	9.69	9.69	9.67	**0.00**	10.26	10.25	11.11	**0.01**	10.43	10.42	10.96	**0.01**	10.48	10.49	10.45	**-0.01**
2007	9.83	9.79	10.92	**0.04**	10.34	10.34	10.41	**0.00**	10.25	10.25	10.30	**0.00**	10.59	10.61	10.48	**-0.02**
2008	9.94	9.92	10.32	**0.02**	10.70	10.70	10.74	**0.00**	10.35	10.35	10.36	**0.00**	10.69	10.70	10.57	**-0.01**
2009	9.94	9.92	10.38	**0.02**	10.58	10.57	11.67	**0.01**	10.64	10.64	11.06	**0.01**	10.79	10.80	10.99	**0.00**
2010	10.14	10.12	10.63	**0.02**	10.60	10.59	11.47	**0.01**	10.69	10.68	11.00	**0.00**	10.84	10.85	10.81	**-0.01**
2011	10.38	10.37	10.74	**0.01**	10.78	10.78	10.97	**0.00**	10.80	10.78	11.78	**0.03**	11.00	11.02	10.85	**-0.02**
2012	10.51	10.53	10.17	**-0.02**	10.85	10.85	11.14	**0.00**	10.88	10.87	11.11	**0.01**	10.97	10.99	10.87	**-0.02**
2013	10.59	10.56	11.15	**0.03**	11.05	11.05	11.30	**0.00**	11.05	11.04	11.75	**0.02**	11.22	11.26	11.14	**-0.04**
2014	10.95	10.91	11.60	**0.03**	11.09	11.08	12.42	**0.01**	11.26	11.25	11.84	**0.01**	11.36	11.38	11.33	**-0.02**
2015	10.91	10.89	11.15	**0.01**	11.19	11.19	11.49	**0.00**	11.33	11.31	12.30	**0.02**	11.35	11.37	11.29	**-0.01**
2016	11.05	11.05	11.15	**0.01**	11.17	11.15	13.64	**0.02**	11.58	11.57	12.15	**0.01**	11.50	11.51	11.43	**-0.01**
2017	11.05	11.03	11.50	**0.03**	11.25	11.24	12.20	**0.01**	11.60	11.59	12.31	**0.01**	11.54	11.55	11.55	**-0.01**
2018	10.90	10.90	10.97	**0.00**	11.37	11.36	12.51	**0.01**	11.70	11.69	12.50	**0.01**	11.59	11.60	11.55	**-0.01**
2019	11.26	11.25	11.40	**0.00**	11.58	11.58	11.70	**0.00**	11.89	11.89	12.22	**0.00**	11.92	11.92	11.56	**-0.01**

Source: authors' calculations based upon respective register data for each country

Table S6. Period life expectancy at age 25 among women in four Nordic countries, men, 1990-2019.

Year	Denmark, e25				Finland, e25				Norway, e25				Sweden, e25			
	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**
1990	53.65	53.65	53.78	**0.00**	54.66	54.65	54.21	**0.00**	55.66	55.66	55.86	**0.00**	56.18	56.21	56.13	**-0.03**
1991	53.86	53.87	53.59	**-0.01**	54.98	54.98	54.82	**0.00**	55.98	55.99	56.34	**-0.01**	56.32	56.36	56.06	**-0.04**
1992	53.77	53.78	53.53	**-0.01**	55.06	55.06	55.93	**0.01**	56.14	56.13	56.62	**0.01**	56.47	56.50	56.41	**-0.03**
1993	53.51	53.49	53.77	**0.01**	54.92	54.90	56.13	**0.02**	55.96	55.94	56.37	**0.02**	56.44	56.49	56.11	**-0.05**
1994	53.84	53.82	54.52	**0.02**	55.70	55.69	56.62	**0.01**	56.42	56.43	56.12	**-0.01**	56.96	56.95	57.18	**0.01**
1995	53.52	53.52	53.50	**0.00**	55.65	55.64	57.51	**0.02**	56.42	56.41	56.95	**0.01**	57.00	57.06	56.67	**-0.06**
1996	53.96	53.93	54.74	**0.03**	56.00	55.99	56.74	**0.01**	56.64	56.63	57.03	**0.01**	57.08	57.12	56.99	**-0.04**
1997	54.14	54.11	54.68	**0.03**	55.98	55.96	57.39	**0.02**	56.63	56.60	57.49	**0.03**	57.36	57.42	56.98	**-0.06**
1998	54.54	54.52	54.85	**0.02**	56.32	56.30	57.47	**0.02**	56.87	56.88	57.09	**-0.01**	57.44	57.51	57.18	**-0.07**
1999	54.43	54.42	54.92	**0.01**	56.55	56.53	57.70	**0.02**	56.77	56.74	57.27	**0.03**	57.34	57.41	56.95	**-0.07**
2000	54.77	54.72	55.44	**0.05**	56.49	56.48	57.52	**0.01**	57.01	56.97	57.77	**0.04**	57.51	57.54	57.39	**-0.03**
2001	54.89	54.86	55.36	**0.03**	56.85	56.86	56.51	**-0.01**	57.12	57.12	57.31	**0.00**	57.59	57.62	57.60	**-0.03**
2002	54.95	54.89	55.88	**0.06**	56.91	56.90	58.25	**0.01**	57.13	57.09	57.57	**0.04**	57.60	57.65	57.25	**-0.05**
2003	55.30	55.26	56.04	**0.04**	57.19	57.19	57.64	**0.00**	57.54	57.52	57.82	**0.02**	57.90	57.90	57.99	**0.00**
2004	55.72	55.69	56.29	**0.03**	57.63	57.62	58.73	**0.01**	57.93	57.91	58.27	**0.02**	58.06	58.14	57.70	**-0.08**
2005	55.94	55.91	56.36	**0.03**	57.86	57.85	59.07	**0.01**	58.06	57.99	59.18	**0.07**	58.20	58.22	58.10	**-0.02**
2006	56.01	55.95	56.72	**0.06**	58.20	58.17	59.46	**0.03**	58.15	58.13	58.57	**0.02**	58.38	58.40	58.36	**-0.02**
2007	56.03	55.97	56.60	**0.06**	58.28	58.25	59.70	**0.03**	58.18	58.10	59.29	**0.08**	58.38	58.43	58.19	**-0.05**
2008	56.40	56.38	56.78	**0.02**	58.35	58.32	59.29	**0.03**	58.40	58.36	58.97	**0.04**	58.55	58.60	58.33	**-0.05**
2009	56.51	56.45	57.29	**0.05**	58.51	58.49	59.07	**0.01**	58.54	58.47	59.53	**0.07**	58.77	58.81	58.53	**-0.04**
2010	56.79	56.73	57.51	**0.06**	58.55	58.49	60.24	**0.05**	58.64	58.55	59.90	**0.09**	58.91	58.88	59.17	**0.03**
2011	57.32	57.21	58.29	**0.11**	58.86	58.81	59.85	**0.05**	58.90	58.83	60.19	**0.07**	59.06	59.05	59.09	**0.01**
2012	57.46	57.39	57.69	**0.07**	58.76	58.73	59.91	**0.03**	58.82	58.73	60.13	**0.09**	58.93	58.88	59.11	**0.05**
2013	57.76	57.72	58.25	**0.05**	59.05	59.01	60.22	**0.04**	59.05	58.95	60.44	**0.10**	59.12	59.11	59.13	**0.01**
2014	58.13	58.06	58.80	**0.07**	59.10	59.07	59.67	**0.03**	59.46	59.31	61.11	**0.15**	59.41	59.40	59.37	**0.01**
2015	58.14	58.10	58.43	**0.05**	59.36	59.36	59.66	**0.00**	59.50	59.38	60.68	**0.12**	59.42	59.40	59.35	**0.02**
2016	58.23	58.12	59.05	**0.11**	59.37	59.32	61.40	**0.05**	59.56	59.38	61.55	**0.18**	59.50	59.48	59.51	**0.02**
2017	58.53	58.43	59.24	**0.10**	59.52	59.45	60.99	**0.07**	59.66	59.52	61.25	**0.14**	59.52	59.48	59.66	**0.04**
2018	58.34	58.22	59.11	**0.13**	59.57	59.54	60.48	**0.04**	59.84	59.67	61.31	**0.17**	59.68	59.64	59.66	**0.04**
2019	58.79	58.67	59.63	**0.12**	59.89	59.84	61.33	**0.05**	60.05	59.88	61.68	**0.17**	60.12	60.08	59.66	**0.04**

Source: authors' calculations based upon respective register data for each country

Table S7. Period life expectancy at age 50 among women in four Nordic countries, men, 1990-2019.

Year	Denmark, e50				Finland, e50				Norway, e50				Sweden, e50			
	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**
1990	29.92	29.91	30.17	**0.01**	30.77	30.77	30.33	**0.00**	31.69	31.69	32.00	**0.00**	32.19	32.20	32.28	**-0.01**
1991	30.13	30.14	29.77	**-0.01**	31.11	31.12	30.60	**0.00**	31.98	31.98	32.49	**0.00**	32.33	32.35	32.22	**-0.02**
1992	30.03	30.04	29.83	**-0.01**	31.21	31.21	31.61	**0.00**	32.10	32.08	32.61	**0.02**	32.41	32.43	32.40	**-0.02**
1993	29.76	29.75	29.96	**0.01**	31.01	30.99	32.17	**0.01**	31.89	31.88	32.09	**0.01**	32.37	32.38	32.28	**-0.01**
1994	30.10	30.07	30.86	**0.03**	31.77	31.76	32.56	**0.01**	32.34	32.36	31.99	**-0.02**	32.92	32.91	33.18	**0.01**
1995	29.81	29.81	29.93	**0.01**	31.74	31.72	33.32	**0.02**	32.33	32.32	32.89	**0.01**	32.89	32.92	32.71	**-0.03**
1996	30.20	30.16	31.04	**0.03**	32.06	32.06	32.34	**0.00**	32.58	32.58	32.86	**0.00**	32.93	32.96	32.90	**-0.03**
1997	30.35	30.33	30.80	**0.02**	32.11	32.10	33.16	**0.01**	32.54	32.52	33.25	**0.02**	33.17	33.21	32.85	**-0.04**
1998	30.66	30.64	30.98	**0.02**	32.37	32.36	33.35	**0.01**	32.80	32.79	33.27	**0.01**	33.26	33.30	33.13	**-0.04**
1999	30.57	30.54	31.18	**0.03**	32.59	32.58	33.45	**0.01**	32.68	32.66	33.17	**0.02**	33.19	33.25	32.86	**-0.06**
2000	30.83	30.79	31.47	**0.04**	32.62	32.61	33.72	**0.01**	32.92	32.90	33.47	**0.02**	33.29	33.31	33.23	**-0.02**
2001	30.97	30.94	31.40	**0.03**	32.92	32.92	32.54	**0.00**	33.01	33.02	33.09	**-0.01**	33.35	33.37	33.34	**-0.02**
2002	31.00	30.95	31.89	**0.04**	32.94	32.93	34.25	**0.02**	32.95	32.93	33.24	**0.02**	33.35	33.40	32.99	**-0.05**
2003	31.31	31.27	32.12	**0.05**	33.15	33.15	33.67	**0.01**	33.40	33.39	33.61	**0.01**	33.66	33.68	33.69	**-0.02**
2004	31.70	31.67	32.31	**0.03**	33.69	33.67	34.85	**0.02**	33.83	33.81	34.01	**0.02**	33.87	33.93	33.53	**-0.06**
2005	31.87	31.85	32.29	**0.02**	33.86	33.85	35.07	**0.01**	33.93	33.89	34.87	**0.04**	33.91	33.93	33.81	**-0.02**
2006	31.90	31.86	32.47	**0.03**	34.13	34.12	35.14	**0.01**	33.97	33.95	34.36	**0.02**	34.10	34.11	34.08	**-0.01**
2007	31.95	31.91	32.44	**0.04**	34.20	34.17	35.55	**0.02**	33.98	33.93	34.90	**0.05**	34.08	34.13	33.88	**-0.05**
2008	32.31	32.30	32.64	**0.01**	34.26	34.25	34.94	**0.01**	34.18	34.16	34.57	**0.02**	34.24	34.29	34.05	**-0.05**
2009	32.37	32.32	33.19	**0.06**	34.45	34.43	35.04	**0.01**	34.30	34.25	35.15	**0.05**	34.45	34.49	34.19	**-0.04**
2010	32.58	32.55	33.22	**0.03**	34.43	34.41	35.84	**0.03**	34.37	34.33	35.41	**0.04**	34.54	34.52	34.76	**0.02**
2011	33.08	33.01	33.92	**0.07**	34.67	34.66	35.26	**0.02**	34.62	34.56	35.87	**0.06**	34.71	34.73	34.67	**-0.02**
2012	33.20	33.19	33.28	**0.02**	34.58	34.56	35.68	**0.02**	34.48	34.43	35.67	**0.05**	34.59	34.58	34.65	**0.01**
2013	33.45	33.41	33.92	**0.04**	34.86	34.84	35.91	**0.02**	34.72	34.67	35.99	**0.05**	34.77	34.78	34.72	**-0.01**
2014	33.83	33.79	34.43	**0.04**	34.82	34.80	35.23	**0.01**	35.08	34.99	36.52	**0.09**	35.06	35.07	34.94	**-0.01**
2015	33.80	33.76	34.08	**0.04**	35.09	35.08	35.46	**0.01**	35.13	35.06	36.16	**0.07**	35.02	35.05	34.84	**-0.03**
2016	33.90	33.84	34.63	**0.06**	35.08	35.05	37.03	**0.04**	35.17	35.05	36.97	**0.12**	35.12	35.13	35.07	**-0.01**
2017	34.17	34.09	34.82	**0.08**	35.24	35.21	36.46	**0.03**	35.28	35.18	36.71	**0.10**	35.13	35.13	35.19	**0.00**
2018	34.01	33.94	34.67	**0.07**	35.30	35.28	36.12	**0.02**	35.43	35.34	36.70	**0.09**	35.28	35.27	35.19	**0.01**
2019	34.38	34.28	35.19	**0.10**	35.62	35.59	37.00	**0.04**	35.62	35.52	37.04	**0.10**	35.74	35.73	35.19	**0.01**

Source: authors' calculations based upon respective register data for each country

Table S8. Period life expectancy at age 75 women in four Nordic countries, men, 1990-2019.

Year	Denmark, e75				Finland, e75				Norway, e75				Sweden, e75			
	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**	Total	NB	FB	**Total - NB**
1990	10.98	10.99	10.67	**-0.01**	10.53	10.53	10.90	**0.01**	11.10	11.09	11.68	**0.01**	11.42	11.41	11.78	**0.01**
1991	11.14	11.15	10.71	**-0.01**	10.65	10.64	11.12	**0.00**	11.30	11.28	12.34	**0.02**	11.58	11.57	11.72	**0.01**
1992	11.04	11.04	10.92	**0.00**	10.75	10.75	10.34	**-0.01**	11.44	11.43	11.92	**0.01**	11.68	11.66	12.01	**0.02**
1993	10.81	10.82	10.79	**0.00**	10.47	10.47	10.96	**0.01**	11.18	11.17	11.43	**0.01**	11.52	11.52	11.55	**0.00**
1994	11.05	11.04	11.15	**0.00**	11.00	10.99	11.61	**0.01**	11.64	11.64	11.88	**0.00**	12.02	12.00	12.35	**0.02**
1995	10.87	10.88	10.57	**-0.01**	10.99	10.99	11.23	**0.00**	11.59	11.58	11.98	**0.01**	11.94	11.94	11.98	**0.00**
1996	11.07	11.06	11.53	**0.02**	11.12	11.13	10.92	**0.00**	11.79	11.78	12.26	**0.01**	12.00	11.99	12.25	**0.01**
1997	11.22	11.21	11.26	**0.00**	11.22	11.23	10.83	**-0.01**	11.72	11.70	12.35	**0.02**	12.13	12.14	12.02	**-0.01**
1998	11.46	11.46	11.28	**-0.01**	11.43	11.42	12.26	**0.01**	11.82	11.82	12.07	**0.00**	12.20	12.18	12.49	**0.02**
1999	11.24	11.23	11.58	**0.01**	11.46	11.45	12.23	**0.01**	11.77	11.77	11.90	**0.00**	12.07	12.06	12.25	**0.01**
2000	11.46	11.47	11.26	**-0.01**	11.51	11.52	11.47	**0.00**	11.95	11.94	12.40	**0.01**	12.23	12.23	12.34	**0.00**
2001	11.39	11.39	11.32	**0.00**	11.73	11.74	11.43	**0.00**	12.00	11.99	12.52	**0.01**	12.25	12.26	12.41	**-0.01**
2002	11.29	11.28	11.71	**0.02**	11.69	11.67	13.03	**0.02**	11.95	11.95	11.88	**0.00**	12.18	12.20	12.02	**-0.02**
2003	11.50	11.48	11.86	**0.02**	11.87	11.87	11.58	**0.00**	12.26	12.26	12.33	**0.00**	12.44	12.43	12.66	**0.01**
2004	11.78	11.76	12.24	**0.02**	12.47	12.46	13.14	**0.01**	12.54	12.54	12.55	**0.00**	12.65	12.67	12.61	**-0.02**
2005	11.81	11.81	11.98	**0.01**	12.70	12.69	13.56	**0.01**	12.72	12.71	13.22	**0.01**	12.70	12.72	12.69	**-0.02**
2006	11.81	11.79	12.23	**0.02**	12.80	12.79	13.58	**0.01**	12.61	12.60	12.93	**0.01**	12.76	12.77	12.76	**-0.01**
2007	11.77	11.76	11.93	**0.01**	12.84	12.83	13.32	**0.01**	12.65	12.65	12.86	**0.00**	12.67	12.68	12.67	**-0.01**
2008	12.01	11.99	12.46	**0.02**	12.88	12.88	13.18	**0.00**	12.85	12.84	13.13	**0.01**	12.80	12.83	12.63	**-0.03**
2009	11.95	11.93	12.35	**0.02**	13.04	13.04	13.18	**0.00**	12.89	12.88	13.19	**0.01**	13.03	13.05	12.92	**-0.02**
2010	12.07	12.04	12.77	**0.03**	13.00	12.99	13.47	**0.01**	13.02	13.00	13.71	**0.02**	13.02	13.02	13.15	**0.00**
2011	12.37	12.33	13.09	**0.04**	13.22	13.22	13.50	**0.00**	13.09	13.07	13.83	**0.02**	13.10	13.14	13.01	**-0.04**
2012	12.48	12.48	12.39	**0.00**	13.15	13.14	13.94	**0.01**	13.00	12.97	13.95	**0.03**	12.99	13.00	12.91	**-0.01**
2013	12.55	12.53	12.97	**0.02**	13.29	13.28	13.75	**0.01**	13.21	13.19	14.17	**0.02**	13.14	13.15	13.13	**-0.01**
2014	12.90	12.87	13.44	**0.03**	13.27	13.27	13.16	**0.00**	13.43	13.40	14.27	**0.03**	13.41	13.42	13.38	**-0.01**
2015	12.86	12.86	12.91	**0.00**	13.37	13.37	13.52	**0.00**	13.39	13.38	13.81	**0.01**	13.32	13.37	13.07	**-0.05**
2016	12.93	12.90	13.39	**0.03**	13.42	13.40	14.85	**0.02**	13.49	13.43	14.77	**0.06**	13.39	13.41	13.35	**-0.02**
2017	12.97	12.93	13.50	**0.04**	13.58	13.57	14.40	**0.01**	13.53	13.51	14.27	**0.02**	13.36	13.36	13.38	**0.00**
2018	12.88	12.85	13.35	**0.03**	13.59	13.58	13.83	**0.00**	13.60	13.58	14.08	**0.02**	13.49	13.50	13.39	**-0.01**
2019	13.16	13.13	13.55	**0.03**	13.85	13.84	14.57	**0.01**	13.72	13.68	14.69	**0.04**	13.81	13.81	13.39	**0.00**

Source: authors' calculations based upon respective register data for each country

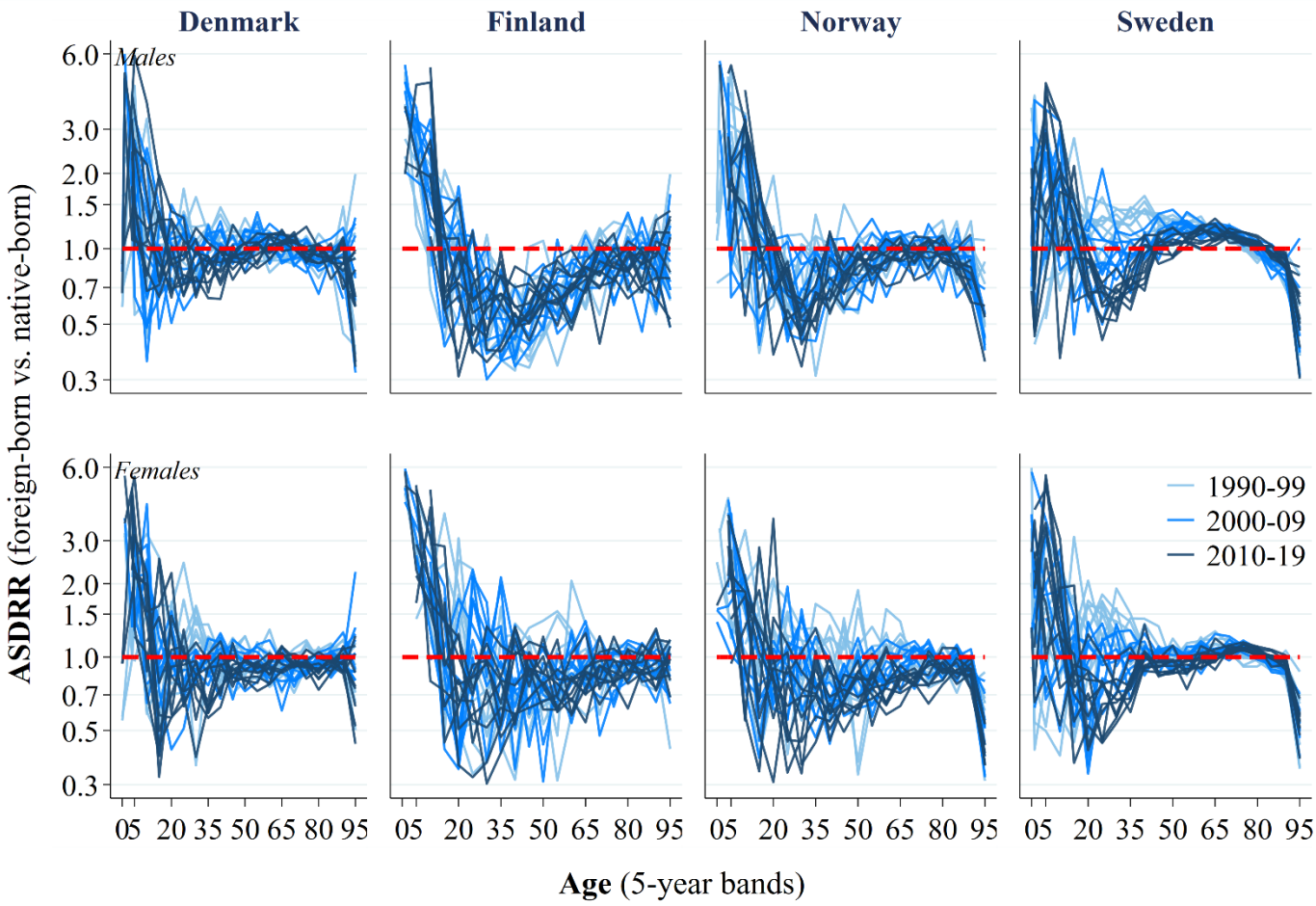

Figure S1. Annual age specific death rate ratios of migrant populations versus native-born populations of Denmark, Finland, Norway, and Sweden, 1990-2019.
Notes: ASDRRs (age specific death rate ratios); vs. (versus)
Source: authors' calculations based upon respective register data for each country

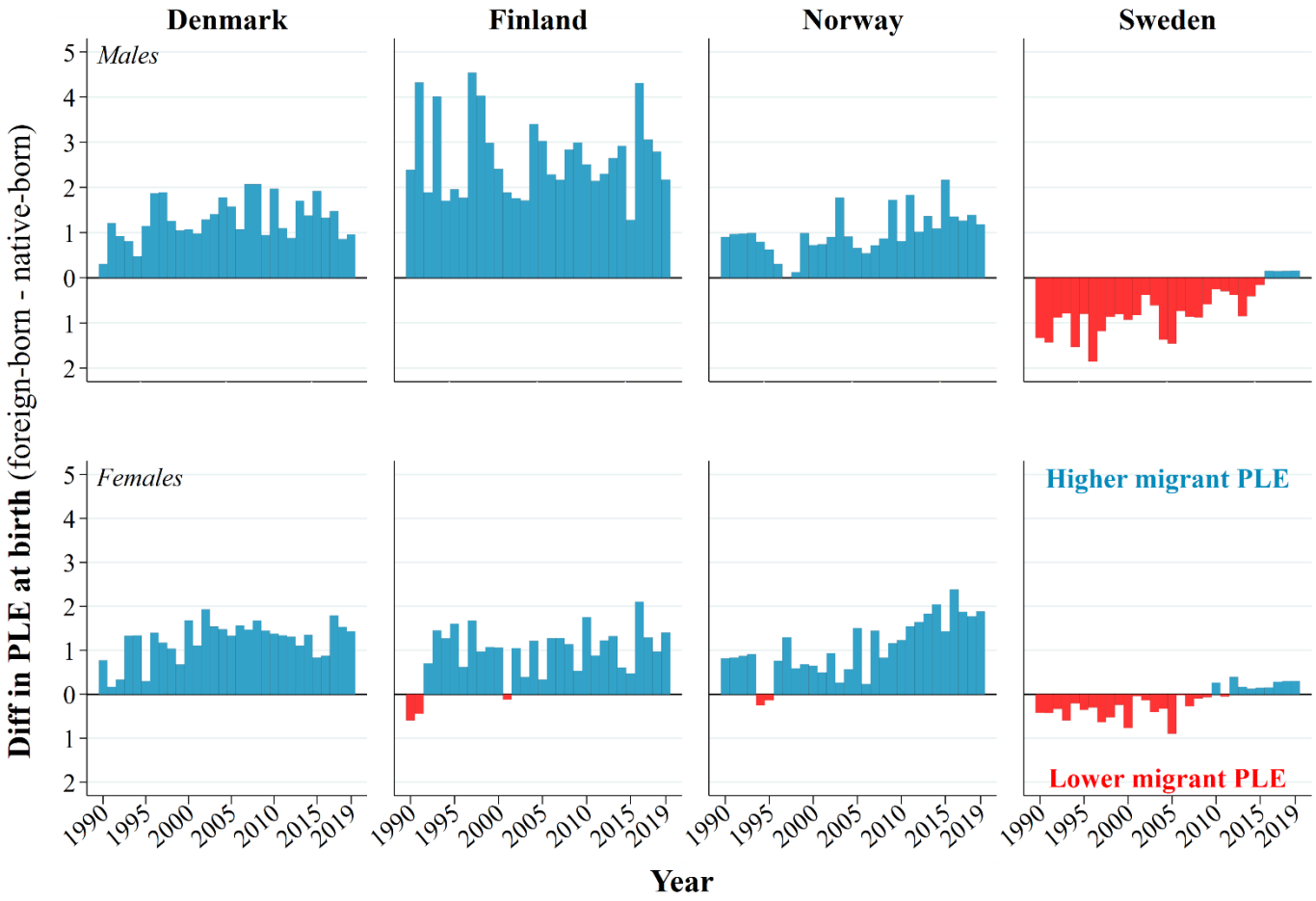

Figure S2. Differences in period life expectancy at birth between the migrant and native-born populations of Denmark, Finland, Norway, and Sweden, 1990-2019.
Notes: PLE (period life expectancy); diff. (difference)
Source: authors' calculations based upon respective register data for each country

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106 91 Stockholm,
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www.su.se | info@su.se | ISSN 2002-617X

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