

## **Regional mortality inequalities in the Netherlands and the role of internal migration**

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### **Introduction**

In recent decades, an expanding body of research has demonstrated that migration and health are two intrinsically related dimensions of people's lives. First identified in the USA as the so-called 'Hispanic paradox' (Palloni & Arias, 2004), the often-found mortality advantage of migrants compared to their native counterparts in high income countries has been branded more generally as the 'Migrant Mortality Advantage' (Guillot, Khlal, Elo, Solignac, & Wallace, 2018; Razum, 2008).

More recently, with increasing interest in rising regional mortality differentials, internal migration have offered a new terrain of research in the study of the relationship between mobility and mortality. Studying the relationship between health and migration within a country presents two advantages: individuals can be entirely traced from the place of origin to the (potentially successive) destination(s) in the same national datasets, and the role played by cultural variables is limited, at least in relatively homogenous countries.

Under these combined motivations, research on mortality differentials between movers and stayers within a given country have made significant progress in the last years. Despite these efforts, persistent gaps remain in our understanding of this phenomenon, not only in terms of coverage and cross-country comparisons, but also regarding fundamental questions like whether or not selection is playing a similar role for internal migration as for international migration, or what is the contribution of internal migration to subnational mortality differentials.

This study offers the first comprehensive comparison of mortality levels between movers and stayers within the Netherlands. Using high quality register data, we investigate whether or not people who migrate to another Dutch region experience a different level of mortality than those who remain in the same region. Unlike previous studies on this country, we do not focus on a particular age group or specific outcome such as self-reported health. Instead, we aim at producing a complete picture of mortality levels for movers and stayers, measured through life expectancy at birth. We however provide disaggregated results for each region and age group, in order to identify their respective contribution to the overall picture.

### **Background**

Many studies observe that young internal migrants tend to be healthier than stayers (Boyle, 2004, Kibele & Janssen, 2013, Luy & Caselli, 2007, Norman et al., 2005), because their motives for moving are mostly related to studies and work (Thomas, 2019), two activities that frequently require being in good health. Internal migration of elderly people is however often related to unfavourable health conditions (Bentham, 1998, Boyle, 2004), because the motives for their relocation are more often associated with finding additional support from family or care providers. Kibele & Janssen (2013) indeed observe that, in the Netherlands, people of old age nearing death move more frequently than those with a longer remaining lifespan. This effect was also found at neighbourhood level in

Amsterdam by Jonker et al. (2013), where neighbourhoods with a nursing home had lower life expectancies than neighbourhoods without a nursing home.

We thus expect that internal migrants in the Netherlands are positively selected at young and working ages, and negatively selected after retirement. It is however hard to tell where the balance between these two selection processes is located and thus if, as it is often the case for international migrants, internal migrants display on average a higher life expectancy than stayers.

## **Data and Methods**

We study the total population of the Netherlands for the period 2015-2019. The 40 NUTS-3 regions, also known as COROP are used to divide the national territory. The COROP regions are based on the nodal principle, for which commuter flows form a central urban node, and the regions are roughly equal in area, but not necessarily in population size.

Individual mortality and population data are accessed through Statistics Netherlands (CBS). Demographic data in the Netherlands are maintained through a population register (Basisregistratie Personen), which includes personal information on events such as marriage, citizenship, data about death or place of residence. Since 1980, the Netherlands has consistently scored well on the vital statistics performance index (VSPI) with scores of  $\geq 0.85$ , placing them in the highest category in terms of data quality (Mikkelsen et al., 2015).

Datasets containing individual characteristics were aggregated for each year, and ultimately combined to create life tables for the period 2015-2019. This is useful to take out randomness since some regions have low numbers of mortality (e.g. Delfzijl en Omgeving with 571 yearly deaths on average). In the computation of the life tables, values for  ${}_n a_x$  were taken from the national population in 2015, as found in the Human Mortality Database (HMD). Values for mortality rates below the age of 5 are also borrowed from national values in order to solve the ambiguous migration status of recently born individuals. Confidence intervals (Andreev & Shkolnikov, 2010) are used to test differences between the sub-populations.

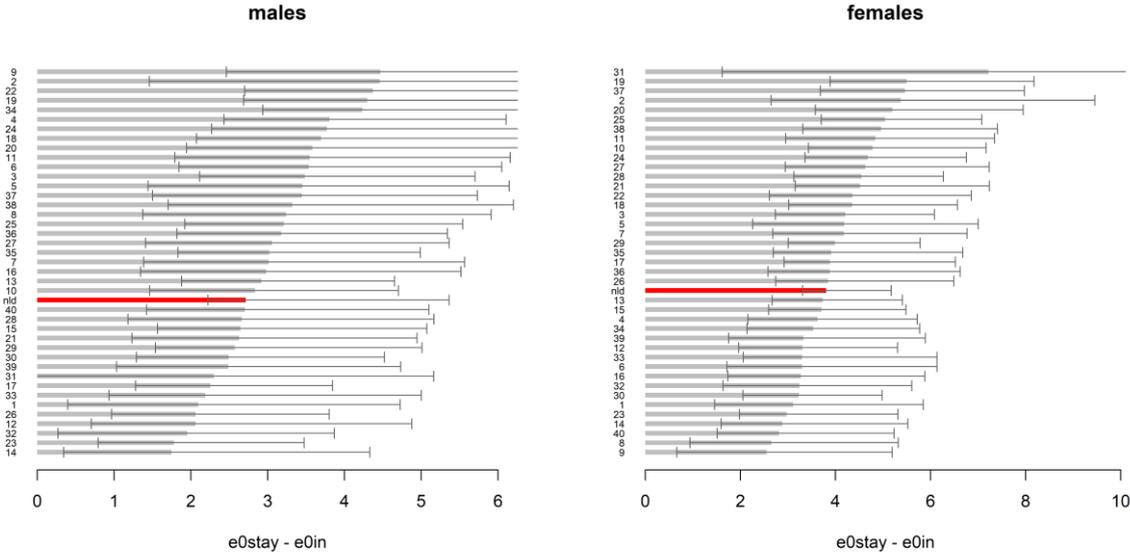
In this study, an internal migrant is defined as somebody who lived in a different COROP region 10 years before. By considering only those who move between COROP regions for a long period as internal migrants, we filter out short moves and residential mobility, which are subject to specific forces (Darlington-Pollock & Peters, 2020, Mulder & Malmberg, 2014). We compare three different subpopulations: stayers, in- and out-migrants. People who did not reside in the Netherlands in 2005-09 are excluded from the analysis.

## **Results**

During the period 2015-2019, the life expectancy of stayers was 83.72 years for females, and 80.54 for males, which represents an advantage over movers, which experienced a life expectancy of 79.91 years (-3.8) for females, and 77.83 (-2.7) for males. These results show that, in contradiction to most studies at the international level, stayers are structurally healthier, and this result is found in all 40 regions (Figure 1). This shows that this phenomenon is universal across all regions and it is moreover statistically significant even in small regions. There are however large variations across regions, with some displaying small gaps of about 1-2 years, while others reach more than 5 years. The largest gap between in-migrants and stayers is found among females in Zeeuwsch-Vlaanderen (31) with more than 7 years, and among males in Zuidwest-Drenthe (9) with about 4.5 years. Similar gaps are also present

between stayers and out-migrants. The gaps between in- and out-migrants vary from -2 to 2 years of life, but are never significant because of the small size of migrants populations (not shown).

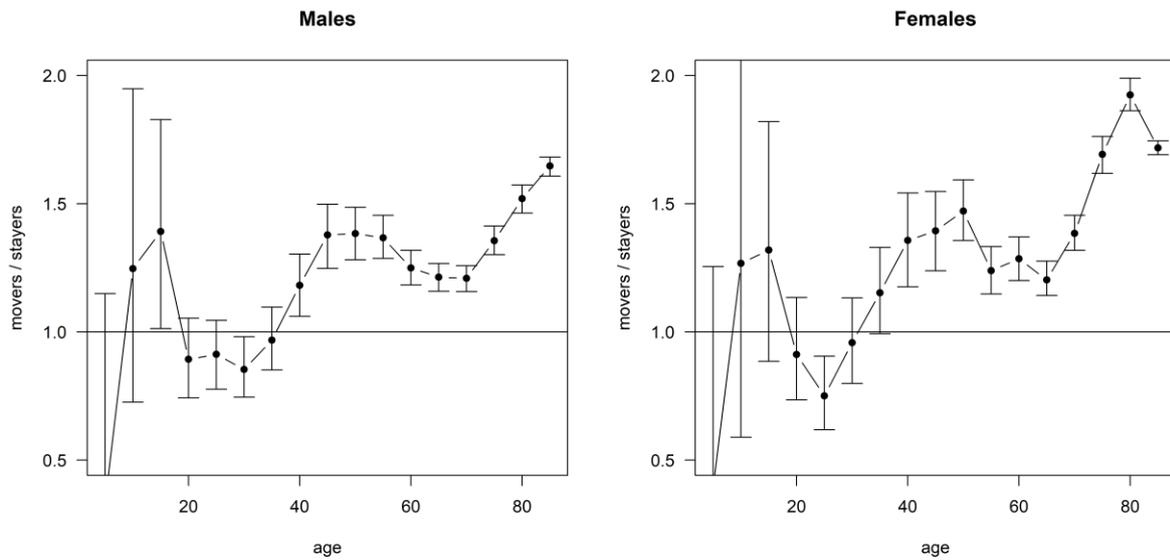
Figure 1: Difference in life expectancy at birth between stayers and in-migrants for all 40 corop regions



Despite these differences between movers and stayers, it appears that internal migrants represent a too small fraction of the total population to profoundly influence regional mortality differentials. Indeed, cancelling out the effect of migration by artificially placing migrants back to their region of origin yields a difference in life expectancy of -0.2 to 0.3 years compared to the observed figures, and most regions only show a change of -0.1 to 0.1. The cross-regional standard deviation in life expectancy is therefore the same (ca. 0.5 years of life) whether computed on observed or “migration free” scenarios. We thus conclude that internal migration does not significantly contribute to regional mortality differentials in the Netherlands, at least not at the level of Corop regions.

The age-specific mortality rates ratios between movers and stayers roughly follow our expectations (Figure 2). Young adults who move across regions are generally positively selected up to the age of 35-40 years old. This advantage is however modest and sometimes not significant. Internal migrants of retired age, on the other hand, display a strong negative selection that can lead to an excess mortality of +50% to +100% compared to stayers. Surprisingly, middle-age internal migrants are also strongly negatively selected, with risk ratios of about +50%. Contrarily to our expectations, people who move across regions between the age of 40 to 60 years seem to do it for reasons that are negatively associated with their health, even though they fall in working ages. This unexpected result explains why the cross-over from positive to negative selection of internal migrants happens at a much lower age than anticipated, namely around 30-40 years of age instead of around retirement age.

Figure 2: Age-specific mortality ratios between movers and stayers



## Conclusion

Based on these preliminary results, we conclude from our analyses that internal migrants in the Netherlands are on average negatively selected and therefore are at a disadvantage of about 2-3 years of life expectancy compared to people who remain in the same regions. This gap is found in all regions, albeit at different magnitudes ranging from 1 to 7 years across. This is however not enough to affect regional mortality differentials, due to the relatively small proportion of internal migrants in the general population. This surprising result, which contradicts most finding based on international migrants, is made possible by the fact that the cross-over from positive selection at working age and negative selection at retirement happens at a much lower age than expected. As early as at 40 years of age, internal migrants already experience excess mortality compared to their counterparts who remain in their region.

These results call for a better examination of migration motives between 40 and 60 years of age, in order to understand how this negative selection develops. Other possible alleys of research involve the estimation of the effect of individual and regional characteristics on these aggregated results, as well as the consideration of the contribution of specific causes of death to these differentials.

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