Differences in Survival Before Retirement in Denmark: The Role of Living Arrangements and Marital Status

Serena Vigezzi (SDU) and Cosmo Strozza (SDU)

1. Introduction

The literature on mortality by living arrangement and marital status is flourishing. Throughout these studies, one result has been consistently supported: married individuals experience lower mortality levels than other groups, typically followed by other kinds of cohabiters (Frisch and Simonsen 2013; Kilpi et al. 2015; Poulain et al. 2016; Rendall et al. 2011; Zueras et al. 2020). These results differ by sex and age, with some studies, although not all, finding a stronger correlation for men and younger individuals (Koskinen et al. 2007; Manzoli et al. 2007; Scafato et al. 2008). The moderating role of other characteristics, such as socioeconomic status or ethnicity, has received less attention and is thus even more difficult to pinpoint (Drefahl 2012; Franke and Kulu 2018; Liu 2009). Most of these analyses, however, use a cross-sectional approach, risking to obscure the role of non-period elements. Longitudinal data give the possibility to study how transitions from one state to another affect survival, for example by disrupting the life of an individual (Feng et al. 2017; Hewitt et al. 2012; Robards et al. 2012; Williams and Umberson 2004), and to capture cohort effects (Liu 2012; Soons and Kalmijn 2009).

This is especially important when evaluating the impact of cohort-based policies, such as pension reforms. As population ageing has put in jeopardy the financial sustainability of retirement systems across industrialised countries (Doyle et al. 2009; Ediev 2014), governments have strived to lengthen the working lives of their citizens, often by increasing the legal age of retirement (Directorate-General for Employment and Inclusion 2021; Li 2021). However, a unique retirement age does not reflect existing inequalities and risks further prejudicing already disadvantaged groups (Brønnum-Hansen et al. 2017; Alvarez et al. 2021). In Denmark, and a number of other European countries, retirement age will eventually be linked to life expectancy (Danish Ministry for Employment 2015; Directorate-General for Employment and Inclusion 2021), increasing gradually from the current statutory age of 65.

Using high-quality and extensive longitudinal data from Denmark, we investigate whether differences by living arrangements and marital status are stark enough to warrant a debate around the fairness of such a system. While Denmark is a rather specific case, we hope that highlighting the potentially unjust consequences of an increasing unique age at retirement will raise awareness of the issue in other countries as well.

2. Methods and data

We use data from the Danish registries. These provide information on, among others, marital status and co-residence for all individuals residing in Denmark, updated yearly since 1986, for a total of about 3.3 million individuals and 35.7 million person-years of observation. We
use a variable capturing both marital status and cohabitation (as suggested by Zueras et al. (2020)) to distinguish four household types: single people living alone, married couples living together, cohabiting couples living together and complex households (i.e. different families living at the same address). Given the definition used by the registries, complex households can also be constituted of parents and children aged 25 or over. From the R package `eha`, we use the function `aftreg` without coefficients to run a parametric survival analysis with a Gompertz distribution. From this, we calculate the cumulated hazard of death between age 50 and retirement age at 65. We restrict our analysis to middle-aged individuals, because they have usually contributed enough to the pension system that dying before reaping the fruits of their efforts would be considered particularly unfair.

We first analyse mortality differentials by period from 1986 to 2018 for a general overview and to allow comparisons with other period-based analyses. Then, we analyse cohorts born between 1936 and 1954. On the one hand, we focus on the predominant household type in each individual observation period (i.e. the modal state for each individual sequence). On the other, we study how differences in the number of changes from one state to another are tied with survival differentials. We consider the standardised number of transitions experienced during the observation period to avoid biases depending on the length of observation, and we divide the resulting distribution in quartiles (for each sex and cohort) to obtain a discrete variable.

3. Preliminary results

Figure 1 shows the results of the survival analyses, with panel 1a focusing on the period approach. As expected, females experience lower mortality levels than males and mortality levels decrease for all groups. Moreover, female survival levels are more clustered together than the ones of males, supporting previous results that living arrangement and marital status may matter less for females. Single men living alone experience a much higher mortality than any other group. While this finding is not surprising, the magnitude of the inequality is staggering: in 1986, single 50-year-old men living alone had more than double the chances of dying before reaching retirement compared to their married counterparts and in 2019 more than three times the chances (the absolute difference remained constant). For women, the gap is much narrower, with single women living alone having just under twice the chances of dying before age 65 in 1986 compared to their married counterparts and about twice the chances in 2019. Mortality levels for females and males in unmarried couples and complex households steadily decrease, closing the gap with married individuals. While the drop in mortality levels for cohabiting couples can be tied with the spread of the practice in Denmark, the trend for complex households is more perplexing. In order to understand its meaning, we will need to further explore the composition of this group. The cohort results in panel 1b are similar to the period ones. However, the cohort results suggest that compositional effects drive the rapid improvement in period survival across household types for men. Cohorts, which are the groups actually impacted by changes in the retirement system, have so far experienced slower survival advances. This is particularly worrying for single men living alone, whose cumulated risk of dying between ages 50 and 65 was almost halved between 1986 and 2019, but dropped by only 15% between the 1936 and 1954 cohorts.
Panel 1c shows mortality levels according to the number of transitions during the observation period. Contrary to what we had expected, no linear relationship can be observed between the frequency of transitions and mortality levels. In fact, survival levels for the first, second or last quartile were similar for the 1936 cohort (especially for females) and converged completely for cohorts born in the late 1940s. On the contrary, members of the third quartile experienced significantly and consistently lower mortality levels throughout our cohorts. This warrants paying closer attention to this group in further analyses. Another interesting pattern is that, after a period of steady decline, male members of the first quartile saw their mortality levels rise again for cohorts born in the 1950s, leading a divergence with the other quartiles. A similar pattern, although much less defined, also appears for females in the same quartile. If this result holds true, we should strive to understand who the members of this groups are and why their survival levels are worsening rather than improving.

4. Next steps

We plan to expand our analyses in a number of ways. First of all, we will include other characteristics, namely the presence of children, in the definition of our groups. The presence of children has been significantly tied to differences in survival although the relationship is complex (Barclay and Kolk 2019; Koskinen et al. 2007). We hope that our extensive database will allow us to more finely assess this relationship. We also plan to analyse the potentially mediating role of socioeconomic status, as it was suggested to be a relevant driver in previous research (Drefahl 2012) and to account for health status, so as to control for a potential cause of selection into different household types (Franke and Kulu 2018).

In these analyses we have included the number of transitions experienced by an individual. These transitions, however, are not all equivalent: marriage and divorce are both transitions, but entail vastly different changes. Using the results of our current analyses, we will determine whether an individual transitions from a higher to a lower-risk group or vice-versa. In this way, we will examine mortality differentials according to whether individuals experience a worsening or an improvement of their living situation. We will also examine more closely the relationship between number, kind of transitions and prevalent household type, so as to better interpret our results.

The richness of our data will also allow us to run sensitivity analyses on the definition of our groups. While we have chosen to use a mix of marital and residential status, we will analyse survival differences by each. We will also verify whether the introduction of the Makeham term in our model affects the results.

Finally, we plan to analyse the likelihood of having the time to enjoy retirement after reaching it. While not reaching retirement at all is greatly unfair, dying right afterward retiring is hardly better. Thus, in future analyses we will consider differences in mortality up to age 70, five years after the statutory retirement age.
Figure 1: Cumulated hazards of dying between ages 50 and 65

(a) Cumulated hazard by household type, period

(b) Cumulated hazard by household type, cohort

(c) Cumulated hazard by number of transitions, cohort

Source: Statistics Danmark
References


