

Trends in life expectancy by education and marital status in Sweden 2000–2014

Aim and background

The main aim of this study is to analyze trends in life expectancy at age 30 and 65 in relation to education and marital status in Sweden.

In Sweden, as in most countries, clear differences in survival and mortality have been reported between educational as well as marital status groups. Groups with higher education and married have better survival than those with lower education and unmarried. A number of previous studies have reported that differences in mortality between groups with different educational attainment have increased in a number of countries in the last decades (Mackenbach et al., 2008; Hayward et al., 2015). Although less often analyzed, increased differences have also been found between marital status groups (Valkonen et al., 2004).

Life expectancy by sex and education was first reported for Sweden for the period 1986 through 2003 in a report from 2004 (Statistics Sweden, 2004). The estimates were calculated from age 30, and clear disparities by education was reported for both sexes. However, old age mortality was adjusted due to missing educational data in the elderly, from age 75 years and older in the 1980s. Life expectancy measured by education before the turn of the century is therefore probably somewhat biased in Sweden due to adjustments of old-age mortality. In the last fifteen years, the same methodology has been used and annual estimates are comparable over time. The present study focuses the development in this period, 2000–2014.

A large number of factors is likely to contribute to differences in adult mortality by educational attainment. According to a conceptual model recently developed by Hayward and co-workers (2015), improved survival due to higher education is caused by adult mechanisms and early life factors. Early life factors could be childhood health, parental income and education or childhood intelligence. Adult mechanisms include increased human capital (e.g., cognitive skills, greater sense of control and human agency) and improved access to rewarding jobs with higher income, healthier work conditions and social networks.

The causes to higher survival in married compared with unmarried groups might to some extent be similar to those leading to high survival in groups with high educational attainment. But there are also differences. For instance, it should not be self-evident that a married person have better access to rewarding jobs than an unmarried person. Marital status also changes for large segments of the population over the life course, due to divorce or widowhood, after which remarriage might occur. Whereas formal educational attainment at age 30 cannot decrease over the life course, the married state often changes before death.

During the period 2000–2014 there have been significant changes in the distribution of the Swedish population by education and marital status. There has been an increase in the proportion with post-secondary educational attainment in all ages 30 and over, and a decrease in the proportion with a compulsory education only in ages around 40 and over. In higher ages, 70+ years for women and 82+ years for men, the proportion married and divorced has increased and the proportion never married and widowed has decreased. Compositional

changes by marital status are not as homogenous for various ages as compared with education. The changing population size of different marital status groups probably have contributed to changes in survival differences between these groups. Compositional changes may also have contributed to the overall change in life expectancy in the population. Rising educational attainment in the population have been suggested to improve technological knowledge that benefits health and survival (Hayward et al., 2015).

The following questions is analyzed in the study:

- What are the trends in life expectancy by education and marital status in Sweden for the period 2000–2014?
- Have there been any changes in differences in life expectancy between various educational and marital status groups?
- What is the contribution from specific age groups to changes in life expectancy in different educational and marital status groups?
- Have compositional changes, such as increased educational attainment in the population, contributed to increased survival in the Swedish population?

Data

Swedish administrative registry data is used in the study. Trends in life expectancy by education and by marital status is analyzed for the period 2000–2014.

We use three main groups of education: primary (compulsory), secondary and post-secondary level of education. Marital status is classified into four groups: never married, married, divorced and widowed.

A relatively large share of the foreign born population residing in Sweden have missing data on educational level. There is also a relatively high probability of denominator-numerator bias for the foreign born group. They often do not register their emigration which leads to an overestimation of population size and the number of deaths in the foreign born group is therefore underestimated. This known bias has been recognized in earlier studies. Therefore the study was restricted to the Swedish-born population 30 years and older (Statistics Sweden, 2016).

Methods

Conventional life-table calculations were performed using one-year age categories. All analyses were separated by sex.

Educational attainment has not been registered in Sweden for the most advanced ages. In order to calculate life expectancy time series by education, old age mortality have to be adjusted. This has been made using mortality risks for the entire Swedish born population in higher ages, 90 and older.

Changes in life expectancy by education and marital status is analyzed for the period 2000–2014. This is a sufficiently long period with similar adjustments for mortality in the oldest ages in order analyze changes over time, including differences between groups. Age-specific contributions to life expectancy change were calculated as suggested by Arriaga (1984).

Life expectancy at age 65 is given priority in a comparison between education and marital status, in relation to changes over time and to the size of differences between groups.

Findings

In the year 2000 life expectancy at age 30 was 50.9 years for women and 46.6 years for men with a compulsory education only. It was more than four years higher for those with a post-secondary educational attainment, 55.2 years for women and 51.4 years for men. The group with a secondary education had a life expectancy level in between the other two groups.

During the period 2000–2014 life expectancy increased in all educational groups and for both sexes, but it was a gradient in the size of the increase. For women the increase was smallest for the group with compulsory education only, 0.6 years. It was clearly greater for those with a secondary education, 1.4 years, but even greater for the group with post-secondary education, 1.5 years. Men had an overall greater increase in life expectancy than women, but the pattern with a gradient in life expectancy change by education was observed in a similar way as for women. The increase was greatest for men with a post-secondary education, 2.4 years, and smallest for those with a compulsory education, 1.5 years. Thus, increased differences in life expectancy by education was observed in the period 2000–2014. Towards the end of the period the life expectancy gap between those with the lowest and highest educational attainment widened by approximately one year for both women and men in Sweden.

A similar development by education was found for life expectancy at age 65 as compared with age 30. However, among men those with a secondary level of education had the largest increase in life expectancy. An interesting observation was that for men and women with a compulsory education, the increase in life expectancy between 2000 and 2014 was greater at age 65 than at age 30. The analysis of the age specific contributions to life expectancy change showed that the contribution was negative for a number of age groups for those with a compulsory education only; age 30–34, 45–54 and 60–64 for women and age 30–44 for men.

Table 1. Life expectancy at age 30 and 65 years by sex and educational attainment in 2000 and 2014 and change between years. Swedish-born population

Age Educational attainment	Women			Men		
	2000	2014	Change	2000	2014	Change
<i>Age 30</i>						
Primary	50.9	51.5	0.6	46.6	48.1	1.5
Secondary	53.1	54.5	1.4	49.0	51.2	2.2
Post-secondary	55.2	56.7	1.5	51.4	53.8	2.4
Total	52.6	54.5	1.9	48.5	51.2	2.7
<i>Age 65</i>						
Primary	19.7	20.7	1.0	16.2	18.0	1.8
Secondary	20.6	21.7	1.1	17.2	19.2	2.0
Post-secondary	21.8	23.0	1.2	18.5	20.4	1.9
Total	20.1	21.5	1.4	16.7	18.9	2.2

At age 65 there were clear differences in life expectancy by marital status, from 18.3 years for never married women to 21.6 years for married women in the year 2000. The corresponding gap in those groups for men was 14.3 years and 17.8 years respectively. The groups of divorced and widowed had intermediate levels of life expectancy, but it was higher for widowed than for divorced.

Trends in life expectancy by marital status in the period 2000–2014 was similar as those found by education. Life expectancy increased for both sexes in all marital status groups, but the size of the increase differed by marital status. For

both sexes the increase was smallest for never married and widowed and greatest for married and divorced. For marital status, as for education, there was an increase in differences between some of the groups. However, the gap in life expectancy between married and divorced, and between widowed and never married, remained about the same.

Table 2. Life expectancy at age 65 years by sex and marital status in 2000 and 2014 and change between years. Swedish-born population

Marital status	Women			Men		
	2000	2014	Change	2000	2014	Change
Never married	18.3	19.5	1.2	14.3	16.2	1.9
Married	21.6	23.1	1.5	17.8	20.3	2.5
Divorced	18.8	20.4	1.6	14.6	17.1	2.5
Widowed	19.7	20.8	1.1	15.7	17.7	2.0
Total	20.1	21.5	1.4	16.7	18.9	2.2

When the trends in life expectancy at age 65 are compared for each educational and marital status group, the married and the divorced had the greatest increase for both sexes, and those with a compulsory education had the smallest.

An important finding was that the increase in life expectancy for all women and men was greater than the increase for the educational group with the greatest increase (post-secondary education). This is taken as support for the hypothesis that increased educational attainment in the Swedish population also have contributed to increased survival in the population.

A similar result was not found for marital status. But compositional changes for marital status has not been similar for all ages 65 and older. Groups that increased in population size in most ages, married and divorced, had a greater increase in life expectancy than all women and men. It is possible that there are interaction effects between education and marital status. For instance, in a study on self-rated global health, it was found that own and spousal education combine to influence health (Brown et al., 2014).

Other factors must have contributed to the great survival increase in the divorced group. It has previously been suggested that this group was smaller and more negatively selected in the past (Valkonen et al., 2004). There has also been an increase in non-marital unions in elderly unmarried people in Sweden between 1985 and 2014 (Statistics Sweden, 2016). Other studies are needed in order to better understand the trends in life expectancy by marital status, considering information on spouses education and the extent to which people are cohabiting in non-marital unions.

References

- Arriaga, E. E. (1984). Measuring and explaining the change in life expectancies. *Demography*, 21: 83–96.
- Brown, D. C., Hummer, R. A., & Hayward, M. D. (2014). The importance of spousal education for the self-rated health of married adults in the United States. *Population and Policy Review*, 33: 127–151.
- Hayward, M., Hummer, R., & Sasson, I. (2015). Trends and group differences in the association between educational attainment and U.S. mortality: Implications for understanding education’s causal influence. *Social Science & Medicine* 127: 8–18.
- Mackenbach, J.P., Stirbu, I., Roskam, A-J., Schaap, M., Menvielle, G., Leinsalu, M., Kunst, A. (2008). Socioeconomic inequalities in health in 22 European countries. *The New England Journal of Medicine* 358: 2468–2481.

- Statistics Sweden (2004). *Dödlighet efter utbildning, boende och civilstånd. Perioden 1986–2003* [Mortality by education, housing and marital status. The period 1986–2003]. Demographic reports 2004:4.
- Statistics Sweden (2016). *Livslängd och dödlighet i olika sociala grupper* [Life expectancy and mortality in different social groups]. Demographic reports 2016:2.
- Valkonen, T., Martikainen, P., & Blomgren, J. (2004). Increasing excess mortality among non-married elderly people in developed countries. *Demographic Research*, Special collection 2, Article 12, pp. 305–330, www.demographic-research.org/special/2/12/.