Educational inequalities in life expectancy in German speaking part of Switzerland 1990-1997: Swiss National Cohort

Spoerri, Adrian; Zwahlen, Marcel; Egger, Matthias; Gutzwiller, Felix; Minder, Christoph; Bopp, Matthias

Abstract: STUDY OBJECTIVE: Switzerland belongs to the group of nations with the highest life expectancy. However, it is unclear to what extent life expectancy varies across socio-economic groups. We used data from a large longitudinal study to quantify differentials in life expectancy across educational groups for men and women of different ages. DESIGN: The Swiss National Cohort linked the records from the December 4th, 1990 census with death certificate data up to 1997, using a probabilistic record linkage method. The current analysis was restricted to Swiss nationals resident in the German speaking part of the country. Life expectancy was calculated for four educational categories ("compulsory schooling or less", "vocational training", "upper secondary education", "university education") by constructing abridged life tables for men and women aged 30 or older. RESULTS: The study was based on 3.06 million persons and 262,552 deaths recorded during 19.01 million person-years of follow up. The educational level was lower in women than in men. In most age groups vocational training was the dominant educational category. At ages 30, 50, 65 and 80 men with university education lived 7.1, 5.4, 3.5 and 1.6 years longer than their counterparts with compulsory education or less. In women the corresponding differences were 3.6, 3.1, 2.7 and 2.2 years. CONCLUSIONS: In Switzerland educational gradients in life expectancy are substantial, particularly among young and middle-aged men. Social policies and public health strategies should address this situation.
Educational inequalities in life expectancy in the German speaking part of Switzerland between 1990 and 1997: Swiss National Cohort

Adrian Spoerri\textsuperscript{a}, Marcel Zwahlen\textsuperscript{a}, Matthias Egger\textsuperscript{a,c}, Felix Gutzwiller\textsuperscript{b}, Christoph Minder\textsuperscript{a}, Matthias Bopp\textsuperscript{b}

\textsuperscript{a} Department of Social & Preventive Medicine, University of Berne, Berne, Switzerland
\textsuperscript{b} Department of Social & Preventive Medicine, University of Zürich, Zürich, Switzerland
\textsuperscript{c} Department of Social Medicine, University of Bristol, Bristol, UK

Summary

Study objective: Switzerland belongs to the group of nations with the highest life expectancy. However, it is unclear to what extent life expectancy varies across socio-economic groups. We used data from a large longitudinal study to quantify differentials in life expectancy across educational groups for men and women of different ages.

Design: The Swiss National Cohort linked the records from the December 4th, 1990 census with death certificate data up to 1997, using a probabilistic record linkage method. The current analysis was restricted to Swiss nationals resident in the German speaking part of the country. Life expectancy was calculated for four educational categories ("compulsory schooling or less", "vocational training", "upper secondary education", "university education") by constructing abridged life tables for men and women aged 30 or older.

Results: The study was based on 3.06 million persons and 262,552 deaths recorded during 19.01 million person-years of follow up. The educational level was lower in women than in men. In most age groups vocational training was the dominant educational category. At ages 30, 50, 65 and 80 men with university education lived 7.1, 5.4, 3.5 and 1.6 years longer than their counterparts with compulsory education or less. In women the corresponding differences were 3.6, 3.1, 2.7 and 2.2 years.

Conclusions: In Switzerland educational gradients in life expectancy are substantial, particularly among young and middle-aged men. Social policies and public health strategies should address this situation.

Key words: census; cohort study; record linkage; education; inequality; life expectancy; socio-economic status; Switzerland

Introduction

Life expectancy is a widely used general measure of population health. Switzerland belongs to the group of nations with the highest life expectancy (77.9 years at birth in men and 83.0 years in women in 2003). Indeed, only people from Japan and Monaco live longer than the Swiss [1]. In industrialised countries life expectancy increased over the last 30 years [2], however, in Switzerland and elsewhere, mortality differentials exist between groups characterised by their socio-economic position [3–5].

Previous research on socio-economic inequalities in health in Switzerland focussed on mortality by occupation, based on cross-sectional data [6–8]. This work was not without limitations. For example, the cross-sectional nature of the data meant that results might have been affected by numerator/denominator bias because of a combination of two unlinked datasets. The information on the deceased (eg occupation, commune of residence) was derived from death certificates (numerator) and the information on the population at risk (denominator) came from the census. These two datasets did not describe the same population, ie did not apply the same definition of residency. Furthermore the census data were subjective whereas the information about the deceased came from local authorities or a physician. Occupational information from death certificates was used to describe the socio-economic position of individuals. This implied that those who did not work, such as older men and a substantial proportion of women, were excluded. For the present study we used data from the recently established longitudinal Swiss National Cohort [9]. The Swiss National Cohort consists of all persons with Swiss nationality living...
in Switzerland at the time of the 1990 Census. This population had been followed up till the end of 1997, based on the linkage of death certificates. In this study we quantify differentials in life expectancy across educational groups for men and women of different ages.

Methods

The Swiss National Cohort is the first comprehensive longitudinal database in Switzerland. The Cohort is based on the 1990 census data and allows performing mortality analyses. We linked the anonymous records from the December 4th, 1990 census with the anonymous death certificate data registered between December 5th, 1990 and December 31st, 1997. All data were provided by the Swiss Federal Statistical Office. Because a unique numeric identifier is not available in Switzerland, a probabilistic record linkage method was used to identify the record in the census dataset corresponding to a specific death record. The linkage was based on five key variables (sex, date of birth, commune of residence, marital status, and religious denomination). As described in detail elsewhere [9, 10], different quality levels of linkage (strict, default, liberal) had been tested. For this study we agreed on the default level of linkage, which resulted in 86.6% of all death records linked to the census. For each 5-years-age-sex class we corrected for the proportion of the non-linked death records by multiplying the mortality rates by the reciprocal of the proportion of the linked. We restricted our analyses to Swiss nationals to avoid numerator/denominator bias and migration effects [8, 10]. Furthermore, differences in the educational system between the linguistic areas of Switzerland and the proportions of successfully linked records led us to restrict the analysis to the German speaking part of the country (72% of the total population).

We grouped education into four categories: "compulsory schooling or less" (up to 9 years of education), "vocational training" (12 years), "upper secondary education" (13 to 16 years, including high school, teachers training colleges, technical colleges and upper vocational education) and "university education" (19 years or more). We included every subject who was at least 30 years old at the time of the census or reached age 30 till the end of 1997. We calculated mortality rates by education and sex for 5-year age groups from age 30. Life expectancy was calculated by constructing an abridged life table using Chiang’s methods [11]. The mortality of the last open-ended age interval (80 years and older) was estimated using a Gompertz model [12]. Life tables started at the age of 30: the expected years of additional life assumed survival to the age of 30.

Results

The study was based on the 3.06 million Swiss nationals living in the German speaking part of Switzerland in 1990 and 262,552 deaths recorded subsequently during 19.01 million person-years of follow up. Table 1 shows the distribution of the study population across educational groups, age and sex. The educational level was lower in women than in men. For example, among 30 to 39 year olds, the proportion of women in the lowest educational group (compulsory schooling or less) was 19.0% compared to 10.2% in men. There were also pronounced differences between birth cohorts. For example, in men aged 80 years or older between 1990 and 1997 the proportion with upper secondary education was 8.8% compared to 21.6% in men aged 30 to 39 years. In most age groups vocational training was the dominant educational group.

We found that overall a man aged 30 could expect to live for an additional 46.7 years, and a woman of the same age for an additional 52.2 years (difference 5.5 years). Substantial differences were observed between educational groups (figure 1), with life expectancy increasing with additional education. At ages 30, 35, 40, 45, 50, 55, 60, 65, 70, 75 and 80 or older men with university education lived 7.1, 6.6, 6.3, 5.9, 5.4, 4.9, 4.2, 3.5, 2.8, 2.2 and 1.6 years longer than their counterparts with compulsory schooling.
pulsory education or less. In women the corre-
sponding differences were 3.6, 3.4, 3.3, 3.2, 3.1,
3.0, 2.9, 2.7, 2.6, 2.5 and 2.2 years. Absolute dif-
fferences thus decreased with increasing age, but in
relative terms differences increased: the 7.1 years
difference between highest and lowest educational
group in men at age 30 corresponds to 16% of life
expectancy in people with compulsory schooling
or less. In men aged 80 this had increased to 24%.
Similarly, in women absolute differences declined
with increasing age, but in relative terms differ-
ences increased from 6.9% to 25.6%. At age 30 life
expectancy in men with a university education
(50.4 years) was similar to the life expectancy of
women with compulsory schooling (51.5 years).

Discussion

We found a consistent educational gradient in
life expectancy in the German speaking part of
Switzerland in the 1990s, both among men and
women. Differences between educational groups
were most pronounced among young men, and
generally less important among women. With in-
creasing age, differences represented an increas-
ingly prominent proportion of the remaining life
expectancy in people with low educational attain-
ment.

To our knowledge this is the first analysis of
social gradients in life expectancy in Switzerland.
This study was made possible by the successful
linkage of census and death certificate records
within the framework of the Swiss National Co-
hort [9]. The population included both sexes and
a wide range of age groups, including the elderly.
Analyses were, however, restricted to the German
speaking part of Switzerland, and although ap-
proximately 70% of Swiss nationals were included,
findings may not be applicable to the French and
Italian speaking regions of the country. For the
record linkage we used the five key variables sex,
date of birth, commune of residence, marital sta-
tus and religious denomination. There was no in-
formation about education used for the linkage, as
education was not available on the death records.
Therefore we could not investigate differentials in
the proportion of non-linked death records in
relation to education. Our estimates assumed that
the proportions were equal over the educational
groups. Also, our analysis ignored quality of life
and disability. Several studies showed that educa-
tional gradients in healthy life expectancy are likely
to be even more pronounced than those observed
in our study [13–16].

Our study identified young and middle-aged
men with low educational attainment as an impor-
tant target group for interventions aimed at reduc-
ing inequalities in life expectancy. Prominent
causes of death contributing to the educational
mortality gradient in this age group include is-
chaemic heart disease and accidents, including al-
cohol related traffic accidents. This is compatible
with the data on risk factors from the cross-sec-
tional Swiss Health Survey: in men with lower
education (but not in women) smoking, heavy al-
cohol consumption and obesity is more prevalent
than in men with higher educational attainment
[17].

International comparisons show that for men
the Swiss gradient in mortality by education be-
longs to the steepest in Europe, whereas for
women, gradients are comparable to other coun-
tries [18, 19]. Efforts to reduce social inequalities
in health in Switzerland are hampered by a lack of
awareness in the general public: the Swiss tend to
be more concerned about differences between lan-
guage regions and urban and rural areas than about
socio-economic inequalities in health [3]. In the
UK inequalities in health and wealth have been
documented and discussed for many years, and
policies aimed at reducing inequalities have been
developed by the Labour government, although
there is debate on what they have achieved [20]. By
presenting differences in life expectancy, a metric
familiar to the general public, we hope the present
study will contribute to raising awareness and
stimulating debate in Switzerland. Our results are certainly relevant to the current debate on retirement age. We found substantial differences in life expectancy across educational groups at age 65, the usual retirement age in men. Our results support the notion that the age at retirement should be flexible and take life expectancy of different occupational groups into account. Of note, a retirement age of 60 years has recently been agreed for the Swiss construction sector.

In Switzerland the educational and social gradient in life expectancy is substantial among men in general, and particularly steep among younger men. Clearly, debate on social policies and public health strategies is needed, and it will be important to monitor trends over time [21].

Correspondence:
Dr. Matthias Bopp
Department of Social & Preventive Medicine
Hirschengraben 84
CH-8006 Zürich
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E-Mail: bopp@ifspm.unizh.ch

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