

ORIGINAL ARTICLE

Increase in social inequality in health expectancy in Denmark

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Abstract

Aims: Health expectancy represents the average lifetime in various states of health and differs among social groups. The purpose of the study was to determine trends in social inequality in health expectancy since 1994 between groups with high, medium and low educational levels in Denmark. **Methods:** The study was based on data from nationwide registers on educational level and mortality during the period 1994–2005 and data on health status derived from the Danish Health Interview Surveys carried out in 1994, 2000 and 2005. Expected lifetime in self-rated good and poor health, lifetime without and with longstanding illness and expected lifetime without and with long-lasting difficulties or restrictions were estimated by Sullivan's method. **Results:** Between 1994 and 2005, life expectancy at age 30 years increased by 1.9 years for men and 1.5 years for women with a low educational level. For people with a high educational level, the increase was 2.7 years for men and 2.2 years for women. The difference between people with low and high educational level in expected lifetime in self-rated good health increased by 2.0 and 1.3 years for 30-year-old men and women, respectively. The social gap also increased for other indicators. **Conclusions:** **During the past 12 years, social inequality in life expectancy and health expectancy has increased in Denmark, but the proportion of the population with a low educational level has decreased.**

Key Words: Education, Denmark, health expectancy, life expectancy, social inequality, trends

Background

In Denmark, the life expectancy of people with a high educational level has increased more than that of people with a lower level [1]. In particular, the life expectancy of women with a low educational level has improved only modestly during the past 25 years. The social gap in the burden of disease is well known, and, in spite of living shorter lives, people with a low educational level can expect to live more years in poor health than people with more education. Thus, a recent Danish study showed that 30-year-old men with low, medium and high educational levels could expect 21.4, 20.6 and 18.6 years with longstanding illness, respectively. For women, the expected lifetimes with longstanding illness at the three educational levels were 24.8, 23.3 and 23.2 years, respectively. The social inequalities were even greater

when expected lifetime in poor health was measured by self-rated health [2]. Cancer contributes by 0.3 years to the difference in partial life expectancy (age 30–75 years) between Danes with high and low educational levels. Cardiovascular diseases cause men with low educational levels a loss of 0.6 life years and women a loss of 0.4 life years as compared to men and women with high educational levels. Because of comorbidity, elimination of cancer would increase social inequality in expected lifetime with illness. The same was seen for women if cardiovascular diseases were eliminated. If diseases of the musculoskeletal system were eliminated, the difference in expected lifetime without longstanding, limiting illness from age 30 to 75 years between persons with high and low educational levels would be reduced by 1.2 years [3].

As morbidity and mortality are unequally distributed socially, an examination of social differences in

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health status taking differentials in life expectancy into account requires an aggregate indicator combining health prevalence and mortality rates. Health expectancy is such a measure, and can be used to categorize life expectancy into average lifetime in various states of health.

Social inequality is usually measured by occupational position, income or educational level, which cannot generally be used interchangeably [4]. The measures differ not only according to causal mechanisms but also according to their steadiness. While a person's occupation might change during life, education changes little with age. For instance, a person's occupation and income are sensitive to market fluctuations and the person's health; when retirement age is reached, the socioeconomic status changes to pensioner, while the educational level remains unchanged.

Self-rated general health, longstanding illness and illness that causes activity restrictions are frequently used to measure health expectancy. The three indicators reflect different aspects and different severity of health and disease status. The magnitude and direction of secular trends might differ between indicators and social groups.

Because national registers in Denmark can be linked at the individual level with the unique personal identification code assigned to all citizens, mortality rates and life tables for various educational groups can be calculated directly. The three recent Danish Health Interview Surveys, carried out in 1994, 2000 and 2005, included identical questions on education and several health measures. Therefore, uniform data were available with which to study trends in health expectancy between 1994 and 2005 in various educational groups. This period is of specific interest because life expectancy in Denmark began to rise in the mid-1990s after many years of stagnation. Although the improvement in life expectancy benefited socially advantaged people more than those in less fortunate social positions, we still need to know whether and how health expectancy changed. In spite of a general increase in life expectancy, the life years gained are not exclusively years in good health. The question is whether the social gradient in health expectancy has changed and whether it has narrowed or widened the social gap in health status.

Material and methods

In the Danish Health Interview Surveys carried out in 1994, 2000 and 2005, random samples of Danes aged 16 years or more (including people living in

institutions) were interviewed. The 1994 sample comprised approximately 6,000 individuals and the 2000 and 2005 samples almost 22,500 and 22,000, respectively. Professionals from the Danish National Institute of Social Research visited and interviewed approximately 3,500 persons aged 30 years or more in 1994 and a little more than 13,000 and 12,000 persons in 2000 and 2005. Response rates were 76.6%, 73.5% and 67.0%, respectively. Extensive descriptions of the health surveys have been published previously [5–8].

The questions in the three health surveys that are relevant for this study were identical. Self-rated health was measured by answers to the question, "How do you rate your present state of health in general?" The five original response categories (very good, good, fair, poor, and very poor) were dichotomized into "good" and "fair or poor". Longstanding illness was measured by answers to the question, "Do you suffer from any longstanding illness, longstanding after-effect of injury, any handicap, or other longstanding condition?" All interviewees were also asked questions about restrictions in daily activities. Thus, a person was considered to suffer from long-lasting difficulties or restrictions if he/she answered "yes" to the questions, "Within the past two weeks, has illness, injury or ailment made it difficult or impossible for you to carry out your usual daily activities (work outside the home or domestic work, spare time activities etc.)?" and "Have these difficulties/restrictions been of a more chronic nature? By chronic is meant that the difficulties/restrictions have lasted or are expected to last six months or more."

Data on levels of schooling, vocational training and further education were combined to derive three levels of education: "low" for persons with a maximum of 10 years of schooling and only semi-skilled training, basic vocational training or business school (first year); "medium" for persons with either a maximum of 10 years of schooling and further vocational or other training or with post-secondary schooling but no higher education; and "high" for persons with any type of higher education. Table I shows the numbers of interviewees by period and educational level. Table II shows the prevalence of self-rated fair or poor health, longstanding illness and long-lasting restrictions by period and educational level.

Educational level-specific life tables for 1993–94, 1999–2000 and 2004–2005 were constructed by linking data from Statistics Denmark registers on vital status and education for all Danish inhabitants. As information on education was not available for people aged over 72 years in 1994, death rates in 1995 and 1996 were used for persons aged 73 and

Table I. Numbers of interviewees aged 30 years or over who participated in the Danish Health Interview Surveys 1994, 2000 and 2005 by sex and educational level.

Year	Level of education	Number of participants			
		Men		Women	
		N	%	N	%
1994	High	375	22.8	406	22.0
	Medium	815	49.4	702	38.0
	Low	458	27.8	739	40.0
	All	1,648	100.0	1,847	100.0
2000	High	1,700	26.8	1,810	27.1
	Medium	3,171	50.0	2,769	41.5
	Low	1,468	23.2	2,089	31.3
	All	6,339	100.0	6,668	99.9
2005	High	1,763	30.4	2,044	32.5
	Medium	3,017	52.0	2,639	42.0
	Low	1,020	17.6	1,600	25.5
	All	5,800	100.0	6,283	100.0

74 years in order to calculate life tables for 1993–94. The mortality rates were assumed to be equal after the age of 74 years for all educational groups.

Health expectancy was estimated for 30-year-olds by assuming that most people had finished their education by that age. Sullivan's method [9] was used, in which the expected number of years lived in the age intervals 30–34, 35–39, ..., 70–74, ≥ 75 years were calculated on the basis of the life-table figures and multiplied by age-specific proportions of healthy people taken from the health survey data. Health expectancy for 30-year-olds was then calculated by adding these years for all age groups and dividing the sum by the number of survivors at age 30 years. By relating health expectancy to life expectancy, a

measure of the proportion of lifetime in good health was established.

Results

Life expectancy

Life expectancy at age 30 years for men with a high educational level was 46.6 years in 1994 and 49.3 years in 2005 (Table III). For men with a low educational level, life expectancy increased from 42.5 years in 1994 to 44.4 years in 2005. Thus, 30-year-old men with a high educational level gained 0.8 more years of expected lifetime than men with a low educational level. During the same period, the gap in life expectancy between 30-year-old women

Table II. Prevalence of self-rated fair or poor health, longstanding illness and long-lasting restrictions among interviewees aged 30 years or over who participated in the Danish Health Interview Surveys 1994, 2000 and 2005 by sex and educational level.

Year	Level of education	Self-rated fair or poor health (%)		Longstanding illness (%)		Long-lasting restrictions (%)	
		Men	Women	Men	Women	Men	Women
		1994	High	12.8	16.3	32.0	34.0
	Medium	20.7	22.7	39.4	40.5	6.3	7.1
	Low	29.0	42.5	45.0	55.8	7.6	13.7
	All	21.2	29.2	39.3	45.2	6.1	9.5
2000	High	14.9	15.2	36.2	38.2	3.5	5.8
	Medium	23.1	24.6	44.0	42.0	6.4	8.5
	Low	34.4	40.2	51.7	54.1	9.1	13.4
	All	23.5	26.9	43.7	44.7	6.3	9.3
2005	High	14.7	15.3	36.3	36.5	4.3	5.4
	Medium	19.5	23.5	39.5	43.8	5.3	9.6
	Low	34.4	39.6	49.7	54.7	9.3	12.7
	All	20.6	24.9	40.3	44.2	5.7	9.0

Table III. Life expectancy, expected lifetime in self-rated good, fair or poor health and proportion of expected lifetime in self-rated good health at age 30 years in Denmark in 1994, 2000 and 2005 by educational level.

Year	Level of education	Life expectancy (years)	Expected lifetime in self-rated good health (years)		Expected lifetime in self-rated fair or poor health (years)		Proportion of expected lifetime in self-rated good health	
			N	95% CI	N	95% CI	%	95% CI
Men								
1994	High	46.6	40.1	(38.3; 41.9)	6.5	(4.7; 8.4)	86.0	(82.0; 89.9)
	Medium	44.6	34.1	(32.8; 35.5)	10.5	(9.1; 11.9)	76.5	(73.4; 79.5)
	Low	42.5	30.7	(28.9; 32.4)	11.8	(10.1; 13.6)	72.2	(68.1; 76.2)
2000	All	44.0	34.0	(33.1; 34.9)	10.0	(9.1; 10.9)	77.3	(75.2; 79.3)
	High	48.2	39.6	(38.6; 40.6)	8.6	(7.5; 9.6)	82.2	(80.0; 84.3)
	Medium	45.9	34.9	(34.3; 35.6)	11.0	(10.3; 11.7)	76.1	(74.6; 77.6)
2005	Low	43.8	29.6	(28.6; 30.6)	14.2	(13.1; 15.2)	67.7	(65.3; 70.0)
	All	45.6	34.5	(34.0; 35.0)	11.1	(10.6; 11.6)	75.7	(74.6; 76.7)
	High	49.3	41.1	(40.1; 42.1)	8.2	(7.2; 9.2)	83.4	(81.4; 85.4)
2005	Medium	47.1	37.5	(36.9; 38.2)	9.5	(8.9; 10.2)	79.7	(78.3; 81.2)
	Low	44.4	29.7	(28.5; 31.0)	14.7	(13.4; 16.0)	67.0	(64.1; 69.8)
	All	46.7	36.8	(36.3; 37.3)	9.9	(9.5; 10.4)	78.7	(77.7; 79.8)
Women								
1994	High	50.5	40.4	(38.0; 42.8)	10.0	(7.6; 12.5)	80.1	(75.2; 84.9)
	Medium	49.5	36.1	(34.1; 38.0)	13.4	(11.5; 15.4)	72.9	(68.9; 76.8)
	Low	48.0	28.9	(27.2; 30.6)	19.1	(17.4; 20.8)	60.2	(56.6; 63.8)
2000	All	48.8	33.4	(32.4; 34.5)	15.3	(14.3; 16.4)	68.6	(66.5; 70.7)
	High	51.6	41.5	(40.2; 42.8)	10.1	(8.8; 11.4)	80.4	(77.9; 82.9)
	Medium	50.5	35.6	(34.6; 36.6)	14.9	(14.0; 15.9)	70.4	(68.6; 72.3)
2005	Low	48.5	30.3	(29.3; 31.4)	18.2	(17.2; 19.2)	62.5	(60.4; 64.6)
	All	49.7	35.4	(34.9; 36.0)	14.3	(13.7; 14.8)	71.3	(70.2; 72.4)
	High	52.7	43.1	(41.9; 44.3)	9.6	(8.4; 10.8)	81.8	(79.5; 84.1)
2005	Medium	51.5	38.4	(37.4; 39.3)	13.1	(12.1; 14.0)	74.6	(72.7; 76.4)
	Low	49.5	30.3	(29.0; 31.6)	19.2	(17.8; 20.5)	61.2	(58.5; 64.0)
	All	50.9	37.7	(37.1; 38.2)	13.3	(12.7; 13.8)	73.9	(72.8; 75.0)

CI, confidence interval.

with a low and a high educational level increased by 0.7 years.

Expected lifetime in self-rated good health

The difference in expected lifetime in self-rated good health between people with a high and a low educational level was 9.4 (40.1–30.7) years for men and 11.5 (40.4–28.9) years for women in 1994, and 11.4 (41.1–29.7) years and 12.8 (43.1–30.3) years in 2005, respectively (Table III). Thus, expected lifetime in self-rated good health improved more among people with a high than a low educational level: 2.0 (11.4–9.4) years for men and 1.3 (12.8–11.5) years for women. The social gap in expected lifetime in self-rated fair or poor health grew by 1.2 years for men and 0.6 years for women. Table III also shows that the proportion of expected lifetime in self-rated good health tended to decline for men with a low educational level and to increase for men with a medium educational level. Overall, the proportion of expected healthy life years increased for women, but not statistically significantly so for any

educational group. Figure 1 summarizes the results shown in Table III and presents secular trends in life expectancy and expected lifetime in self-rated good and fair or poor health for each educational group.

Expected lifetime without longstanding illness

The disparities in expected lifetime without longstanding illness according to educational level also grew between 1994 and 2005. Thus, the expected lifetime without longstanding illness for 30-year-old men with a high educational level increased by half a year, from 29.5 to 30.0 years, during the period, whereas it declined by one year, from 23.9 to 22.9 years, for men with a low educational level (Table IV). For men with a medium educational level, the average lifetime spent without longstanding illness increased by 2.4 (28.3–25.9) years, corresponding the gain in life expectancy. Women with a high educational level gained 1.8 years without longstanding illness, those with a medium educational level gained 0.7 years, and no change

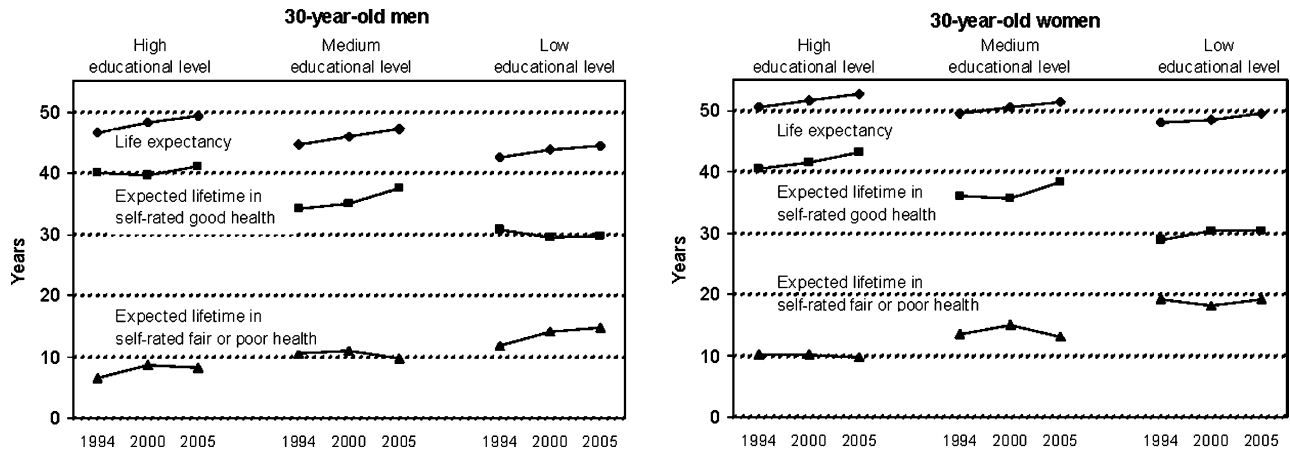


Figure 1. Trends in life expectancy and expected lifetime in self-rated good and in fair or poor health in Denmark by educational level.

was seen for women with a low educational level (Table IV; Figure 2).

Expected lifetime without long-lasting restrictions due to illness, injury or ailment

On average, 30-year-old men could expect to live for almost three years with long-lasting restrictions, and expected lifetime without long-lasting restrictions did not decrease for any educational group (Table V). The social gradient did not disappear, but (as for other measures of health expectancy) men with a medium educational level were the most fortunate, with a tendency to a raised proportion of expected lifetime with no long-lasting restrictions. Overall, 30-year-old women could expect almost five years of life with long-lasting restrictions. As for men, the differences between educational groups increased between 1994 and 2005, and, at the end of the period, women with a low educational level could expect to live twice as long with long-lasting

restrictions as women with a high educational level, in spite of having 3.2 fewer years of life expectancy (Table V; Figure 3).

Discussion

Our results show that social inequality in health expectancy has widened since the mid-1990s, with a striking consistency in differences between people with a low and a high educational level, whatever indicator was chosen. The health expectancy of people with a medium educational level was consistently in between that of people with a low and a high level.

No systematic change in the proportion of expected lifetime in good health was seen. In particular, the life years gained during the period 1994–2005 were in general not exclusively years in good health. The results suggest, however, a tendency for compression of morbidity for men with a medium educational level, and a tendency for

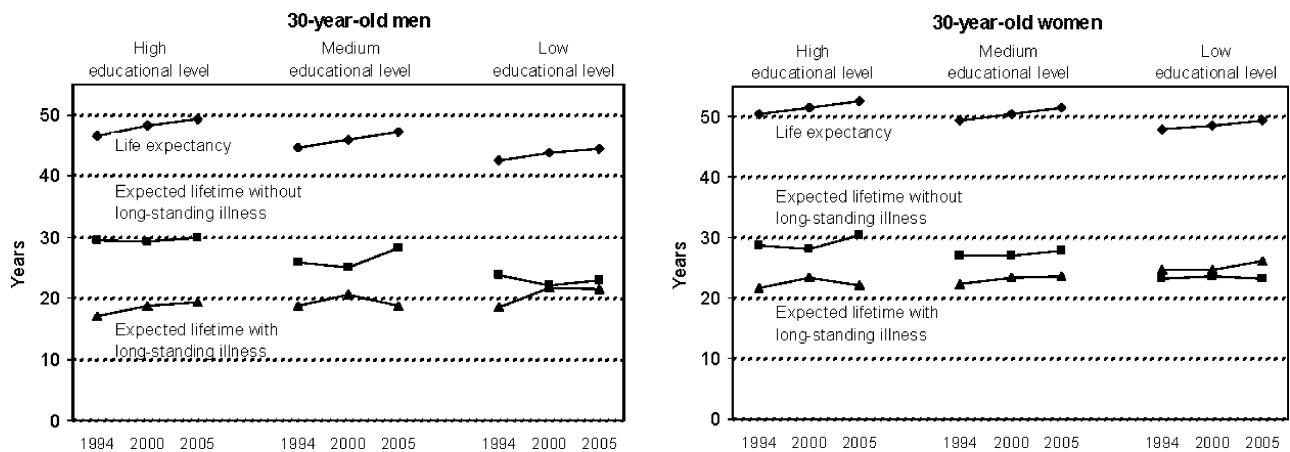


Figure 2. Trends in life expectancy and expected lifetime without and with long-standing illness in Denmark by educational level.

Table IV. Life expectancy, expected lifetime without and with longstanding illness and proportion of expected lifetime without longstanding illness at age 30 years in Denmark in 1994, 2000 and 2005 by educational level.

Year	Level of education	Life expectancy (years)	Expected lifetime without longstanding illness (years)		Expected lifetime with longstanding illness (years)		Proportion of expected lifetime without longstanding illness	
			N	95% CI	N	95% CI	%	95% CI
Men								
1994	High	46.6	29.5	(27.1; 32.0)	17.1	(14.6; 19.5)	63.4	(58.1; 68.6)
	Medium	44.6	25.9	(24.4; 27.5)	18.7	(17.1; 20.2)	58.2	(54.7; 61.6)
	Low	42.5	23.9	(21.9; 25.8)	18.6	(16.7; 20.6)	56.1	(51.6; 60.7)
	All	44.0	26.0	(25.0; 27.1)	18.0	(17.0; 19.1)	59.1	(56.7; 61.5)
2000	High	48.2	29.3	(28.1; 30.6)	18.8	(17.6; 20.1)	60.9	(58.3; 63.5)
	Medium	45.9	25.2	(24.4; 26.0)	20.8	(20.0; 21.6)	54.8	(53.0; 56.5)
	Low	43.8	22.2	(21.1; 23.3)	21.6	(20.5; 22.7)	50.7	(48.1; 53.2)
	All	45.6	25.2	(24.6; 25.7)	20.4	(19.8; 20.9)	55.2	(54.0; 56.5)
2005	High	49.3	30.0	(28.8; 31.2)	19.3	(18.1; 20.5)	60.8	(58.4; 63.3)
	Medium	47.1	28.3	(27.5; 29.1)	18.8	(18.0; 19.6)	60.1	(58.3; 61.8)
	Low	44.4	22.9	(21.5; 24.3)	21.5	(20.1; 22.9)	51.6	(48.5; 54.6)
	All	46.7	27.6	(27.1; 28.2)	19.1	(18.5; 19.7)	59.1	(57.9; 60.4)
Women								
1994	High	50.5	28.7	(25.8; 31.7)	21.7	(18.8; 24.6)	57.0	(51.2; 62.8)
	Medium	49.5	27.2	(25.1; 29.2)	22.3	(20.3; 24.4)	54.9	(50.7; 59.1)
	Low	48.0	23.2	(21.4; 24.9)	24.8	(23.0; 26.5)	48.3	(44.7; 52.0)
	All	48.8	25.5	(24.4; 26.6)	23.2	(22.2; 24.3)	52.3	(50.1; 54.6)
2000	High	51.6	28.2	(26.8; 29.7)	23.4	(21.9; 24.9)	54.7	(51.8; 57.5)
	Medium	50.5	27.1	(26.1; 28.1)	23.5	(22.4; 24.5)	53.6	(51.6; 55.6)
	Low	48.5	23.8	(22.7; 24.8)	24.8	(23.7; 25.9)	49.0	(46.7; 51.2)
	All	49.7	26.5	(25.9; 27.1)	23.2	(22.6; 23.8)	53.4	(52.2; 54.5)
2005	High	52.7	30.5	(29.1; 32.0)	22.2	(20.7; 23.6)	57.9	(55.2; 60.7)
	Medium	51.5	27.9	(26.8; 28.9)	23.6	(22.5; 24.7)	54.1	(52.1; 56.2)
	Low	49.5	23.2	(21.8; 24.6)	26.2	(24.8; 27.6)	47.0	(44.2; 49.8)
	All	50.9	27.9	(27.3; 28.5)	23.0	(22.4; 23.6)	54.8	(53.6; 56.0)

CI, confidence interval.

compression of lifetime in self-rated fair or poor health for women.

Several studies have shown that life expectancy and expected lifetime in poor health are longer for women than for men. Our results also confirm that the social disparities in terms of health expectancy tend to be larger for women than for men, while the social gap in life expectancy is largest for men.

As the health indicators are based on the same questions asked in all three health interview surveys, trends in population health could be evaluated. Sullivan’s method is not, however, the most suitable for detecting sudden changes in population health [10,11], and secular trends in health expectancy should be interpreted cautiously. Health prevalence data derived from cross-sectional surveys reflect past

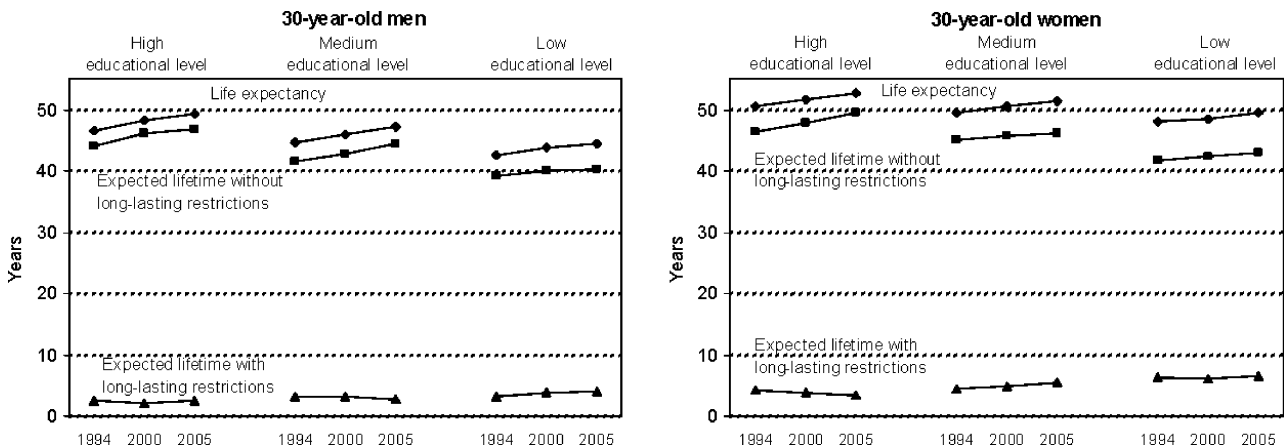


Figure 3. Trends in life expectancy and expected lifetime without and with long-lasting restrictions in Denmark by educational level.

Table V. Life expectancy, expected lifetime without and with long-lasting restrictions and proportion of expected lifetime without long-lasting restrictions at age 30 years in Denmark in 1994, 2000 and 2005 by educational level.

Year	Level of education	Life expectancy (years)	Expected lifetime without long-lasting restrictions (years)		Expected lifetime with long-lasting restrictions (years)		Proportion of expected lifetime without long-lasting restrictions	
			N	95% CI	N	95% CI	%	95% CI
Men								
1994	High	46.6	44.0	(42.6; 45.3)	2.6	(1.3; 4.0)	94.4	(91.5; 97.3)
	Medium	44.6	41.4	(40.6; 42.3)	3.2	(2.3; 4.0)	92.9	(91.0; 94.8)
	Low	42.5	39.3	(38.2; 40.3)	3.2	(2.2; 4.3)	92.5	(90.0; 94.9)
2000	All	44.0	41.1	(40.6; 41.7)	2.9	(2.4; 3.4)	93.4	(92.2; 94.7)
	High	48.2	46.2	(45.6; 46.7)	2.0	(1.4; 2.5)	95.9	(94.7; 97.0)
	Medium	45.9	42.7	(42.3; 43.2)	3.2	(2.8; 3.6)	93.0	(92.1; 94.0)
2005	Low	43.8	40.0	(39.3; 40.6)	3.8	(3.2; 4.4)	91.3	(89.9; 92.7)
	All	45.6	42.6	(42.3; 42.9)	3.0	(2.7; 3.3)	93.5	(92.9; 94.1)
	High	49.3	46.7	(46.1; 47.4)	2.6	(1.9; 3.2)	94.8	(93.5; 96.1)
2005	Medium	47.1	44.5	(44.1; 44.9)	2.6	(2.2; 3.0)	94.4	(93.6; 95.3)
	Low	44.4	40.4	(39.6; 41.1)	4.1	(3.3; 4.9)	90.8	(89.0; 92.6)
	All	46.7	44.0	(43.7; 44.2)	2.8	(2.5; 3.1)	94.0	(93.4; 94.7)
Women								
1994	High	50.5	46.3	(44.5; 48.1)	4.1	(2.3; 5.9)	91.8	(88.2; 95.3)
	Medium	49.5	45.1	(43.8; 46.4)	4.4	(3.1; 5.7)	91.1	(88.4; 93.8)
	Low	48.0	41.7	(40.5; 42.9)	6.3	(5.1; 7.5)	86.9	(84.4; 89.4)
2000	All	48.8	43.8	(43.1; 44.5)	4.9	(4.3; 5.6)	89.9	(88.4; 91.3)
	High	51.6	47.9	(47.0; 48.8)	3.7	(2.8; 4.6)	92.8	(91.1; 94.5)
	Medium	50.5	45.6	(45.0; 46.3)	4.9	(4.2; 5.6)	90.3	(89.0; 91.6)
2005	Low	48.5	42.3	(41.6; 43.1)	6.2	(5.5; 6.9)	87.2	(85.8; 88.7)
	All	49.7	44.9	(44.5; 45.2)	4.9	(4.5; 5.2)	90.2	(89.5; 91.0)
	High	52.7	49.4	(48.7; 50.2)	3.3	(2.5; 4.0)	93.8	(92.3; 95.2)
2005	Medium	51.5	46.1	(45.4; 46.8)	5.4	(4.7; 6.0)	89.6	(88.3; 90.9)
	Low	49.5	43.0	(42.0; 43.9)	6.5	(5.5; 7.4)	86.9	(85.0; 88.8)
	All	50.9	46.2	(45.8; 46.6)	4.7	(4.4; 5.1)	90.7	(89.9; 91.4)

CI, confidence interval.

transitions between state of health and changes in mortality rates only implicitly. Thus, population health changes might bias Sullivan health expectancy estimates because of time lags in these changes.

Health expectancy reflects expected lifetime in a specific health state at the individual level. Therefore, in applying the results to understand trends in population health, account should be taken of changes in the size of the educational subpopulations. Although inter-group mobility at the individual level is almost completely eliminated, because very few persons change educational level after the age of 30 years, the increase in the general level of education during the study period not only raised the educational level within the educational groups but also moved the distribution from lower to higher educational level during the period. Because the direction of change is upwards on the educational ladder, one might expect that people with a low educational level are increasingly disadvantaged, whereas groups with medium and high education level are "attenuated". The unfavourable trend in health expectancy for people with a low educational

level might partly reflect the fact that this diminishing group is increasingly composed of people who have been marginalized to the least attractive employments.

The strength of our study is that the death rates by educational level are based on data for all Danish inhabitants under the age of 75 years, derived from national registers by linkage at the individual level through the unique personal identification number. As sex- and age-specific death rates were calculated precisely for each educational level, life tables could be constructed, except for the elderly. The lack of information on elderly persons did not introduce an appreciable bias into this study, as it is due to the systematic data collection procedure at Statistics Denmark and not to social characteristics. The assumption that mortality rates after age 74 years were equal for all educational groups might imply that the social differences were slightly underestimated. Another possible reason for underestimation of differences in health expectancy between educational levels would arise if persons in poor health were more likely to be non-respondents and

non-respondents with a high educational level were healthier than non-respondents with a low educational level.

Caution must be exercised in making international comparisons of population health, as health status indicators vary according to the health survey questions asked and the categories and wording of answers. Thus, it is more or less impossible to make international comparisons of the absolute number of years in various states of health; however, directions of time trends and changes in social inequalities can be compared. In one study, disability-free life expectancy was estimated among French men in 1980 and 1991, categorized into three major occupational groups, with the conclusion that the inequalities were maintained during the 1980s [12]. During the same period, expected lifetime without "limitation in normal activity" increased for persons in the USA with a high educational level and for all educational groups of white men, but decreased for African-Americans with a low educational level, for white females with a low educational level, and for African-American females with some high-school education [13]. In New Zealand, a widening of social differentials was seen during the 1980s [14]. In The Netherlands, morbidity-free life expectancy decreased for men and women in all of four socioeconomic groups during the 1990s, and the gap between upper and lower socioeconomic groups decreased; however, social differentials in mortality trends were not taken into account [15]. Another indicator that combines length of life and a generic measure of health status is quality-adjusted life years, which was used in a Swedish study to estimate trends for different socioeconomic groups. It was found that socioeconomic inequality increased between 1980 and 1997 [16].

The increasing gap in life expectancy and health expectancy among social groups partly reflects greater improvements for socially advantaged than for socially disadvantaged groups and partly reflects worsening health for disadvantaged groups. The development is a consequence of various trends among social groups in the prevalence of lifestyle-related risk factors and living conditions. Social inequalities in health could be reduced by health promotion targeting high-risk subpopulations and reforms in social welfare and the labour market for the benefit of socially disadvantaged groups.

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