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Can We Really (All) Work Longer?

Trends in Healthy Life Expectancy According to Social Stratum in Germany

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Abstract: Against the background of raising the retirement age to 67 years and the associated lengthening of working lifetimes in higher age groups, this article examines the question of the extent to which this political objective is covered by the health assets of the population. Here, we will first trace trends in "healthy" life expectancy among the total population for different points in time 1989, 1999 and 2009 on the basis of the data from the Socio-Economic Panel Study (SOEP) and analyse these against the background of social strata indicators such as income and educational levels. Among others, one significant result is the fact that social differences have a far greater effect on healthy life expectancy than on general life expectancy and that these differences increase further over the course of time. This effect can be found particularly in men. One mandatory uniform working lifetime for all persons would however not do justice to these findings of socially highly unequally distributed life opportunities. Instead, the findings support a flexible arrangement of retirement age limits.

Keywords: Healthy life expectancy · Social stratum · Compression of morbidity · Social change · Working lifetime

1 Introduction

Against the background of raising the retirement age to 67 years and the associated lengthening of working lifetimes in higher age groups, this article examines the question of the extent to which this political objective is covered by the health assets of the population. Setting the retirement ages at 67 years can, by contrast to earlier provisions, be described as a re-standardisation (*Sackmann* 2008) or alignment to a fixed age limit that is valid for everybody. Of course, relevant provisions on the working lifetime are only expedient if the older population is physically and mentally able to work longer (*Lehr/Kruse* 2006). Although a number of studies have

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been published proving that the state of health of the population in Germany has generally improved (e.g. *Kroll/Ziese* 2009; *Unger* 2006), a standardised retirement age is also inevitably accompanied by problems based on *individual* differences in the state of health of the older population. Not all people reach an advanced age in good health. These individual differences in ageing are frequently disregarded in the current debates on lengthening working lifetimes (*Höpflinger* 2007: 308).

Individual health differences are also an expression of different socio-economic influences, which are reflected, for example, in material circumstances, in health behaviour, and in health care. If we look at the economic developments in Germany, the income disparity, for instance, has rather increased in recent decades than decreased. For example, between 1992 and the mid-1990s there was an increase in income disparity, followed by a slight recovery, and since about 2000 a repeated increase, whereby the development in Eastern Germany shows a similar pattern but on a lower level than in Western Germany (*Goebel et al*. 2007). Against this background, the question arises whether the growing income disparity is also accompanied by a growing health disparity. In the following analyses, we will therefore investigate the health trends of various population groups and then whether all population groups profit equally from an improvement in health over the course of time. The article focuses *exclusively* on the role of health for employability of people of advanced ages and disregards economical aspects of labour force demand, the skills of potential workers, and possible vocational stress caused by the demands of the work.

Following a review of the state of research (Section 2) and an analysis of the data basis and method employed (Section 3), we will first trace trends in "healthy" life expectancy among the total population for different spans of time on the basis of the data from the Socio-Economic Panel Study (SOEP) from 1984-2009 and analyse these against the background of social strata indicators such as income and educational levels (Section 4). Since the analysis of life expectancy or healthy life expectancy refers to the total population, we will also examine how the state of health of the employed and the non-employed has changed over the course of time and whether indications can be found for mobility processes, such as leaving the work force (in good health) that show that the state of health of the non-employed but not of the employed has improved over the course of time. In the conclusion we will discuss the results (Section 5).

2 State of Research

Studies on health development are conducted primarily with regard to the emerging controversy about the "compression of morbidity." They question whether increasing life expectancy is also accompanied by an increasing number of healthy life years or rather whether longer life expectancy merely lengthens the phase of life with health impairments. In the literature, the majority answers this question in favour of the former alternative: the years gained are in general also healthy years, as empirical studies on the change in healthy life expectancy in some countries

show. For example, *Brønnum-Hansen* (1998) for Denmark, *Perenboom et al.* (1993) for the Netherlands, *Crimmins et al.* (1997) for the USA, *Bebbington* (1988) for the United Kingdom, and *Pinheiro* and *Krämer* (2009) for the German state of North-Rhine Westphalia predominantly ascertain an increase in healthy life expectancy over time.[1] Further studies have shown that this gain in healthy years of life is also dependent on the definition of health and/or disease: with regard to grave health impairments a distinct gain in healthy life expectancy is recorded for younger birth cohorts. This gain is lesser in the case of moderate and minor impairments (*Cambois/Robine* 1996; *Robine et al.* 2003; *Unger* 2006).

There are also numerous studies concerning the correlation between socio-economic status and life expectancy and/or healthy life expectancy, whereby with a higher compared to a lower status (higher income and higher education) not only more years of life, but also more healthy years of life are anticipated (e.g. *Crimmins/Saito* 2001; *Crimmins et al.* 1996; *Guralnik et al.* 1993; *Katz et al.* 1983; *Land et al.* 1994; *Valkonen et al.* 1997). These studies also showed that both educational differences (*Sihvonen et al.* 1998; *Valkonen et al.* 1997) and income disparities (*Kaneda et al.* 2004) are of greater significance for healthy life expectancy than for general life expectancy. For example, the difference in life expectancy between persons with at most 9 years schooling and at most 13 years schooling is 6.3 years for men and 3.2 years for women. By contrast, the difference in healthy life expectancy is 10-13 years for men and 7-11 years for women depending on the health indicator used (*Valkonen et al*. 1997). Moreover these differences are considerably greater for men broken down by social stratum than for women (*Sihvonen et al.* 1998).

Income, education, and employment status are considered the most important dimensions explaining the stratum-specific distribution of health. Income is usually associated with material circumstances such as housing conditions (*Feinstein* 1993), but also diet (*Hummer et al*. 1998) if it is subject to material restrictions. There is also the dimension of income dependence when making use of the medical care system (*Klein/Unger* 2001). Educational levels on the contrary mainly emphasize different lifestyles, such as health-relevant behaviours like smoking habits and alcohol consumption as well as eating habits, but also better access to health-relevant information (*Sihvonen et al*. 1998). Due to their correlation with vocational status, income and education are also associated with working conditions (*Siegrist/Dragano* 2006). However little is known about how these socio-economic influences have changed over the course of time. There are hardly any studies, in particular for Germany, whereby most of them ascertain an enlargement of health disparity over time (*Kroll/Lampert* 2010; *Lampert/Kroll* 2008). An explanation of the change in the cited stratum-specific influences on health is only rudimentarily discussed in these studies. One explanation for the change in these socio-economic influencing factors is that of *Wilkinson* (2001), who cites a rather psychological aspect of the effect of disparate incomes with the subjective feeling of relative deprivation. Nonetheless,

[1] Inconsistent trends were only ascertained for the female population in Denmark (*Brønnum-Hansen* 1998) and the male population in the Netherlands (*Perenboom et al.* 1993).

there has been so far no satisfactory explanation for the change in health disparity from a macro-structural perspective.

In order to answer the empirical question of whether all population groups in Germany equally profit from improved health over the course of time, we will conduct calculations of general life expectancy and of healthy life expectancy for the three years 1989, 1999, and 2009 for three income levels and three educational levels. Since the analysis of healthy life expectancy covers both the employed and the non-employed, we will also examine how the prevalence of disease has changed over the course of time among the employed and the non-employed. This can also provide evidence of (health-related) mobility processes.

3 Data and Method

This study is based on the Socio-economic Panel (SOEP), which has been conducted since 1984 as an annually repeated survey of initially approximately 12,000 persons from the age of 16 years in private households by the German Institute for Economic Research (Deutsches Institut für Wirtschaftsforschung (DIW)) in Berlin (*SOEP Group* 2001). All of the household members surveyed for the SOEP were drawn upon for this analysis. The sample of high-income recipients (Sample G) was excluded from the ensuing analysis, since we assume that income disparities at that level do not have any significant effects on the probability of disease.

The probabilities of death and the prevalence of disease are the base measures for modelling healthy life expectancy and were calculated for the years 1989, 1999, and 2009. Table 1 provides an overview of the distributions of the socio-demographic and socio-economic variables. The analysis of disease is based here on the subjective assessment of the state of health, which was surveyed with the question: "How satisfied are you with your health?" (translated by CPoS). The assessment is based on an 11-stage scale from 0 ("not at all satisfied") to 10 ("altogether satisfied"), the variable was dichotomised and the values of 0-4 were assessed as the occurrence of disease. Subjective health assessments have been employed for numerous studies on the analysis of healthy life expectancy (e.g. *Brønnum-Hansen* 2005; *Sihvonen et al.* 1998). These have shown that the subjective health assessments differ to a similar extent according to socio-economic positions, such as extended illnesses or functional aspects of disease (*Sihvonen et al.* 1998; *Valkonen et al.* 1997). Nevertheless, it must be noted that in the intertemporal comparison conducted here the subjective health assessments may also be determined by period- and cohort-specific concepts of health, which can also vary according to age and gender. We cannot, however, make a comparison with functional aspects of disease, since they were neither continuously nor identically surveyed in the SOEP.

The recoding produces a sufficiently large number of cases for the analysis of disease while also mapping a group of people that assesses its present state of

health by approx. 70 % and thus predominantly as "not so good" or "poor."[2] The different stratum influences were operationalised via the needs-weighted relative income position and the years of education. The so-called equivalent income is calculated based on the net household income and the number of household members and enables a comparison of income positions among different household sizes since the calculation takes into consideration the cost savings resulting from joint housekeeping, for example from the sharing of fixed expenses (such as electricity and rent), and the more economical consumption conditions (for example purchasing less expensive large packages).[3] The ascertained needs-weighted equivalent income was correlated relative to the average income of the corresponding year for the comparison over the different survey waves of the SOEP.

Tab. 1: Distribution of the socio-demographic and socio-economic variables of the sample (n = 250,569 person years)

	Mean	Standard deviation	Minimum	Maximum
Survey year	1999.13	7.21	1984	2009
Gender[1]	0.521		0	1
Age	57.579	20.892	40	104
Relative income position[2]	91.677	51.497	0.028	399.714
Years of education[3]	9.891	1.469	8	13
Employment status[4]	0.136		0	1
Satisfaction with health[5]	0.205		0	1
Deaths	0.017		0	1

1 Men = 0, women = 1.

2 Relative income position in percent.

3 No school-leaving certificate = 8 years, lower secondary school certificate = 9 years, secondary school certificate = 10 years, university of applied sciences degree = 12 years, university-entrance diploma (Abitur) = 13 years.

4 Not gainfully employed = 0; gainfully employed = 1.

5 Satisfied with health = 0; unsatisfied with health = 1.

Source: SOEP (1984-2009)

2 The computation is based on a five-level subjective health grading with the categories "very good," "good," "satisfactory," "not so good" and "poor." Alternatively taking into account multilevel disease definitions, which for example also separately account for "moderate" health is, by contrast, probably less clearly classifiable, especially in an intertemporal comparison, than "poor" health.

3 When calculating the needs-weighted equivalent income, the net household income is divided by needs weights. The weights are 1 for the head of the household, 0.5 for every additional person aged at least 14 years in the household and 0.3 for each person younger than 14 years (new OECD equivalence scale). The needs-weighted equivalent income can also be interpreted as individual prosperity level.

Healthy life expectancy was calculated using the prevalence rate method by *Sullivan* (1971), whereby the survivors of the survival functions are weighted according to the prevalence of disease. The probabilities of death were calculated by means of event analysis while the prevalence of disease was calculated using logistic regressions models. To model the healthy life expectancy for the years 1989, 1999, and 2009 each of the probabilities of death and the prevalence of disease were analysed over all waves of the SOEP (1984-2009) according to age and year of the survey, so that by using the respective year the age-specific probabilities of death or the age-specific prevalence can be gained for 1989, 1999, and 2009 and from this the healthy life expectancy can be determined for each of these three points in time. In the analysis of healthy life expectancy according to social stratum a consistency is assumed for the corresponding relative position in the social stratum over the entire life course.

One advantage of the instrument of healthy life expectancy over other health indicators is that both the stratum-specific differences in the mortality risk as well as the morbidity risk are taken into account. Since the analysis of healthy life expectancy refers to the total population, logistical regressions are also used to examine how the prevalence of disease has changed for the employed and the non-employed over the course of time.

4 Results

4.1 The change in healthy life expectancy

Table 2 first shows the risks on which healthy life expectancy is based. For instance, the table shows (in Model 1) that the mortality risk of men (women) increases by 10.2 % (11.5 %) with each year of age and decreases again for every ensuing calendar year by 2.9 % (2.7 %). With regard to the strata differences (Models 2 and 3) it shows that the mortality risk drops both for men and for women along with higher income and higher education, for instance for men by 0.4 % for each increase in the relative income position by 1 percentage point and by 14.6 % for each additional year of education. No interaction effects were ascertained between the stratum influences and the year, i.e. across all calendar years the stratum influences equally reduce the mortality risk or equally increase life expectancy.

The morbidity risk for men and women overall (Model 4) proves that the *odds* of prevalence of disease among men (women) rises by 2.6 % (3.2 %) per year of age and drops for every ensuing calendar year by 0.4 % (1.0 %). With regard to the strata differences there are – unlike the mortality risks – interaction effects with the year. This means that among men the prevalence of disease decreases more strongly in the higher income groups over time than in the lower income groups (Model 5), while for women with the educational level of university-entrance diplomas (*Abitur*) (Model 6) the prevalence of disease even increases over time. For women with no school-leaving certificates or with secondary school certificates it also declines.

Tab. 2: Change in overall mortality and morbidity risks and according to social stratum for men and women (mortality: relative risks; morbidity: odds ratios)

	Mortality			Morbidity		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
			Men			
Constants	47.678***	55.245***	44.230***	5.819***	15.521***	-1.378
Age	1.102***	1.101***	1.101***	1.026***	1.027***	1.024***
Year	0.971***	0.968***	0.974***	0.996***	0.991***	0.999
Income[1]		0.996***			1.138**	
Years of education[2]			0.854***			0.886***
Income[1]*year					0.999**	
Years of education[2]*year						
Episodes	101183	100318	91493			
Incidence	1510	1473	1381			
Log-Likelihood	-6799.439	-6622.417	-6151.116			
Number of cases				117674	117674	117674
			Women			
Constants	42.552***	48.108***	39.455***	16.801***	36.801***	67.218***
Age	1.115***	1.114***	1.113***	1.032***	1.032***	1.031***
Year	0.973***	0.971***	0.975***	0.990***	0.980***	0.966***
Income[1]		0.997***			0.995***	
Years of education[2]			0.877***			0.002***
Income[1]*year						
Years of education[2]*year						1.003***
Episodes	112409	109615	103230			
Incidence	1377	1337	1306			
Log-Likelihood	-6148.413	-5957.988	-5805.602			
Number of cases				128609	128609	128609

1 Relative income position in percent.

2 No school-leaving certificate = 8 years, lower secondary school certificate = 9 years, secondary school certificate = 10 years, university of applied sciences degree = 12 years, university-entrance diploma (Abitur) = 13 years.

With an error probability of +p < .10; *p < .05; **p < .01; ***p < .001.

Source: SOEP (1984-2009)

Table 3 contains the results of the later life expectancies and the healthy life expectancies, calculated from Table 2, for men and women both for age 40 and according to the survey period. At first, for men there is great consistency in the comparison of life expectancies from the official mortality tables with the life expectancies calculated using the SOEP. The deviation is very low in the year 1989 (34.7 versus 34.3 years), rises slightly in the year 1999 (36.5 versus 37.1 years), and somewhat more in the year 2009 (38.6 versus 39.9 years).[4] All in all, using the SOEP

4 The comparative value of the latest available official mortality table at the third survey period refers to the period of 2007/2009 and thus is one year prior to the corresponding (higher) value of the SOEP in the year 2009.

Tab. 3: Life expectancy and healthy life expectancy of men and women at the age of 40 according to social stratum

	Later life expectancy in years				Later healthy life expectancy in years				Percentage			
	1989	1999	2009	Change 2009 to 1989 in years[2]	1989	1999	2009	Change 2009 to 1989 in years[2]	1989	1999	2009	Change 2009 to 1999 in percentage points
							Men					
Mortality table[1]	34.7	36.5	38.6	+3.9	—	—	—	—	—	—	—	—
SOEP												
Overall	34.3	37.1	39.9	+5.6	26.9	29.2	31.4	+4.5	78.5	78.6	78.6	+0.1
50 % of average income	32.5	35.6	38.8	+6.3	23.8	26.6	29.6	+5.7	73.3	74.8	76.3	+3.0
100 % of average income	34.3	37.4	40.6	+6.3	26.4	29.5	32.8	+6.7	77.1	79.0	80.7	+3.7
200 % of average income	37.9	41.0	44.2	+6.3	31.6	35.2	38.8	+7.2	83.4	85.7	87.7	+4.3
No school-leaving certificate	32.0	34.6	37.2	+5.1	24.4	26.1	27.8	+3.5	76.0	75.5	74.9	-1.1
Secondary school certificate	35.1	37.7	40.3	+5.2	27.9	29.8	31.6	+3.7	79.5	79.0	78.5	-1.0
University-entrance diploma	39.7	42.3	44.8	+5.1	33.3	35.3	37.2	+3.9	83.9	83.5	83.1	-0.8
							Women					
Mortality table[1]	40.4	41.8	43.3	+2.9	—	—	—	—	—	—	—	—
SOEP												
Overall	38.8	41.2	43.6	+4.8	28.9	31.2	33.4	+4.5	74.5	75.6	76.6	+2.1
50 % of average income	37.6	40.3	42.9	+5.3	25.9	28.9	32.1	+6.2	68.8	71.9	74.8	+6.0
100 % of average income	38.9	41.6	44.2	+5.3	28.6	31.7	34.8	+6.2	73.4	76.2	78.7	+5.3
200 % of average income	41.5	44.2	46.7	+5.2	33.7	36.8	39.8	+6.1	81.1	83.2	85.2	+4.1
No school-leaving certificate	37.3	39.5	41.8	+4.5	26.8	28.9	31.0	+4.2	71.9	73.1	74.2	+2.3
Secondary school certificate	39.7	41.9	44.1	+4.4	30.5	32.2	33.8	+3.3	76.9	76.8	76.7	-0.2
University-entrance diploma	43.2	45.4	47.5	+4.3	35.9	37.1	38.1	+2.2	83.0	81.6	80.2	-2.8

1 The mortality tables of the Statistische Bundesamt are based on the periods 1988/1990, 1998/2000 and 2007/2009.

2 Deviations possible due to rounding.

Source: SOEP (1984-2009); calculation based on data from table 2.

data over the time period of 20 years examined here there is a rise in the (period-related) life expectancy at the age of 40 from 34.3 years to 39.9 years and therefore by 5.6 years. At the same time, the later healthy life expectancy at the age of 40 rose from 26.9 years to 31.4 years and therefore by 4.5 years in the corresponding time period. According to this, the male population will not only get older, but will also experience more years of life in health. This finding is consistent with other international studies according to which the increased life expectancy and thus the "gained" years are predominantly also "healthy" years (*Cambois/Robine* 1996; *Robine et al.* 2003). If, however, we look at the share of healthy life expectancy in total life expectancy, it is striking that this remains almost constant at 78.6 % over the entire time period. Hence, although more healthy years of life are experienced *in absolute terms*, but this rise is not greater than that of total years of life. The *relative* share remains constant. How great healthy life expectancy is or how greatly the share of healthy years in life expectancy increases all in all is primarily dependent upon the indicator of disease or disability used (*Jagger et al.* 2011). For younger cohorts the rise is greater with minor health impairments than with serious health impairments (*Unger* 2006).

Among women there is also great consistency in the comparison of the life expectancies in the official mortality tables with the life expectancies calculated using the SOEP, although the deviation in the year 1989 is at first greater (40.4 versus 38.8 years) and drops by the year 2009 (43.3 versus years 43.6). Overall the life expectancy of women rises in the 20-year time period considered here by 4.8 years, while healthy life expectancy increases almost to the same magnitude with 4.5 years. As with the men, women are not only getting older, but are experiencing more years of life in health, whereby unlike the men this share also increases *relatively* (from 74.5 % to 76.6 %).

To answer the question of whether all population groups equally profit from an improvement in health over the course of time, the calculations for general life expectancy and for healthy life expectancy were conducted for three income levels and three educational levels. The findings clearly prove that life expectancy is considerably linked to both income and educational level. For example, for the men (women) in the year 2009 the difference in life expectancy between the lowest income group (50 % of the average income) of 38.8 (42.9) years and the highest income group (200 % of the average income) of 44.2 (46.7) years was 5.4 (3.8) years and therefore is somewhat lesser than the gain of 6.3 (5.3) years of life in every income group in the past 20 years! The differentiation according to educational levels shows a similar pattern. In the year 2009, men (women) with no school-leaving certificates can expect to live another 37.2 (41.8) years, while the life expectancy of men (women) with university-entrance diplomas is another 44.8 (47.5) years and thus additional 7.6 (5.7) years. The gain in years of life in the past 20 years of approx. 5.2 (4.4) years for the individual education groups is somewhat lesser than for the individual income groups. The uniform rise in years of life in the income and education groups is due to the fact that the mortality risk for all income and education groups drops to the same extent over time (cf. Table 2). Therefore, all income and educational classes profit equally from a longer life. The results furthermore confirm the finding

from other studies whereby both educational differences and income disparities are considerably more significant for the life expectancy of men than of women (*Kaneda et al.* 2004; *Sihvonen et al.* 1998). The greater strata differences among men might be explained by the fact that for men the income position or years of education attained may be more greatly associated with vocational stress than in the case of women, since a considerably smaller share of women are employed.

Yet to answer the initial question it is essential to know whether healthy life expectancy has also developed similarly for all social strata. First, the extent of healthy life expectancy varies distinctly more between the individual income and educational levels than the extent of general life expectancy, as *Sihvonen et al.* (1998) ascertained for various educational levels. For example, among the men (women) in the year 2009 the difference in later healthy life expectancy between the lowest income group of 29.6 (32.1) years and the highest income group of 38.8 (39.8) years is 9.2 (7.7) years, but in general life expectancy however "only" 5.4 (3.8) years. The difference of the later healthy life expectancy between the group of men (women) with no school-leaving certificates of 27.8 (31.0) years and with university-entrance diplomas of 37.2 (38.1) years is 9.4 (7.1) years, however "only" 7.6 (5.7) years for general life expectancy.

The gain in healthy years of life also varies for the individual income groups. While for men in the lowest income category there was an increase in the past 20 years from 23.8 years by 5.8 years to 29.6 years, the number of healthy years of life in the upper income group rose from 31.6 years by 7.2 years to 38.8 years. There are less differences in the education groups, in which the healthy life expectancy for men with no school-leaving certificates rose by 3.4 years and for the men with university-entrance diplomas by 3.9 years. The fact that healthy life expectancy develops differently depending on the social stratum is also seen in the development of the share of healthy life expectancy in general life expectancy, which rises more quickly for the men in the higher income groups than in the lower income groups, or drops less in higher education groups than in the lower education groups. Among women the scenario is, in part, dissimilar. While there were practically no income disparities in the healthy life expectancy in a comparison of the years 1989 and 2009 (it rose steadily by approx. 6.2 years), there are distinct differences among the educational levels, whereby women with no school-leaving certificates experience a greater increase in healthy years of life with 4.2 years compared to 2.2 years for women with university-entrance diplomas. In women, educational influences are more significant than economic influences. This can probably be attributed to the fact that the income has been generated in the household context and therefore, the income of women consists mainly of the (earned) income of the men.

Overall we can assert that for the male population in Germany both the lower income and education groups can expect considerably fewer healthy years of life than the upper income and education groups. Nevertheless *all* social strata profit from a gain in healthy years of life, whereby the upper income group profits to a considerable degree. However, the gain in healthy years of life is far more similar for the different education groups. We can assert that for the female population also *all* income and education groups profit from a gain in "healthy" years of life, whereby –

by contrast to the men – the different income groups profit to the same degree and the lower education group profits more than the higher education group.

Overall, with regard to the initial question these findings suggest that a rise in the standard retirement age should *not* involve one mandatory age for all persons. Since apart from the fact that social differences have a far greater effect on healthy life expectancy than on general life expectancy these also *increase* over the course of time. Hence, over time, health disparity according to social stratum increases. This effect occurs in particular for men since in their case the educational and income positions correlate more strongly with the vocational burden resulting from employment than among women. Moreover, healthy life expectancy with its differentiation according to social stratum is far more suited for revealing the ability to work than life expectancy. One possible option for designing age limits could be to align it to a ratio of healthy to unhealthy life expectancy determined differently depending on the social stratum. One mandatory uniform working lifetime for *all* persons would however not do justice to these findings of socially highly unequally distributed life opportunities. Instead, the findings support a flexible arrangement of retirement age limits.

4.2 The change in the prevalence of disease among the non-employed and the employed

Since the analysis of later life expectancy and healthy life expectancy refers to the total population, it does not yet conclusively clarify whether the state of health of the employed also improved over the course of time or whether, for example, mobility processes resulted in an increase in people leaving work in good health, after which only the state of health of the non-employed improved over the course of time and perhaps contributed to an improvement in the health of the total population. It must also be taken into account that the group of older non-employed persons is quite heterogeneous (also with regard to their state of health). For example, the duration of non-employment may vary and for women family-related issues may play a greater role than for men. In this respect, the state of health of the non-employed is characterised by a number of causal correlations, which may also change over time.

For this purpose, the changes in age-specific prevalence of disease among non-employed and employed men and women (Model 1 and 4) and according to social stratum (Models 2-3 and 5-6) were calculated. The results of the logistical regressions are shown in Table 4. The overall effect of the year shows that the prevalence of disease for both non-employed and employed men and women declines (or is not significant) with each ensuing year, regardless of whether it was controlled for social stratum.

Since the parameters calculated on the *logit* are difficult to interpret, the example of the 40th year of age is used to better evaluate the development. The corresponding prevalence of disease for the non-employed and employed men and women are shown according to social stratum in Figures 1a and 1b. Initially a reduction in prevalence is ascertainable both for the non-employed (25.1 % versus 23.3 %), and

Tab. 4: Change in the prevalence of disease overall and according to social stratum for men and women (logistic regressions, odds ratios)

	Non-employed			Employed		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
			Men			
Constants	7.982**	24.897***	63.532**	6.531*	-7.385	0.390
Age	1.005***	1.005***	1.005***	1.025***	1.030***	1.023***
Year	0.995**	0.987***	0.969**	0.995**	1.002	0.999
Income[1]		1.153*			1.273***	
Years of education[2]			0.001**			0.925***
Income[1]*year		0.999*			0.999***	
Years of education[2]*year			1.003**			
-2 Log-Likelihood						
Number of cases	55693	55693	55693	55693	55693	55693
			Women			
Constants	5.161*	34.042***	38.138+	31.503***	46.462***	138.8***
Age	1.024***	1.025***	1.024***	1.024***	1.027***	1.021***
Year	0.996**	0.982***	0.980+	0.983***	0.976***	0.932***
Income[1]		0.893*			0.997***	
Years of education[2]			0.016+			0.001***
Income[1]*year		1.001*				
Years of education[2]*year			1.002+			1.006***
-2 Log-Likelihood						
Number of cases	61981	61981	61981	61981	61981	61981

1 Relative income position in percent.

2 No school-leaving certificate = 8 years, lower secondary school certificate = 9 years, secondary school certificate = 10 years, university of applied sciences degree = 12 years, university-entrance diploma (Abitur) = 13 years.

With an error probability of +p < .10; *p < .05; **p < .01; ***p < .001.

Source: SOEP (1984-2009)

for the employed male population (11.4 % versus 10.5 %). Even when differentiated according to income, there is a reduction in prevalence both for the non-employed and for the employed, whereby the prevalence decreases slightly more with increasing income. To some extent, another scenario is apparent among the educational levels: There is also a (albeit only) slight drop in prevalence among the employed, whereas among the non-employed the prevalence decreases only in the group of those with no school-leaving certificates, while it even increases among those with university-entrance diplomas.

Due to the ascertained improvement in the health of the non-employed and the employed, the observed improvement in the healthy life expectancy of the overall male population can therefore probably not be explained solely with mobility processes between these two groups. Rather, it seems that the working conditions of the employed in the income and education groups examined here (with the exception of those with university-entrance diplomas) have also improved. Additionally, the fact that the state of health of the non-employed improved over the course

Fig. 1a: Prevalence of disease among men at the age of 40 according to survey year and social stratum

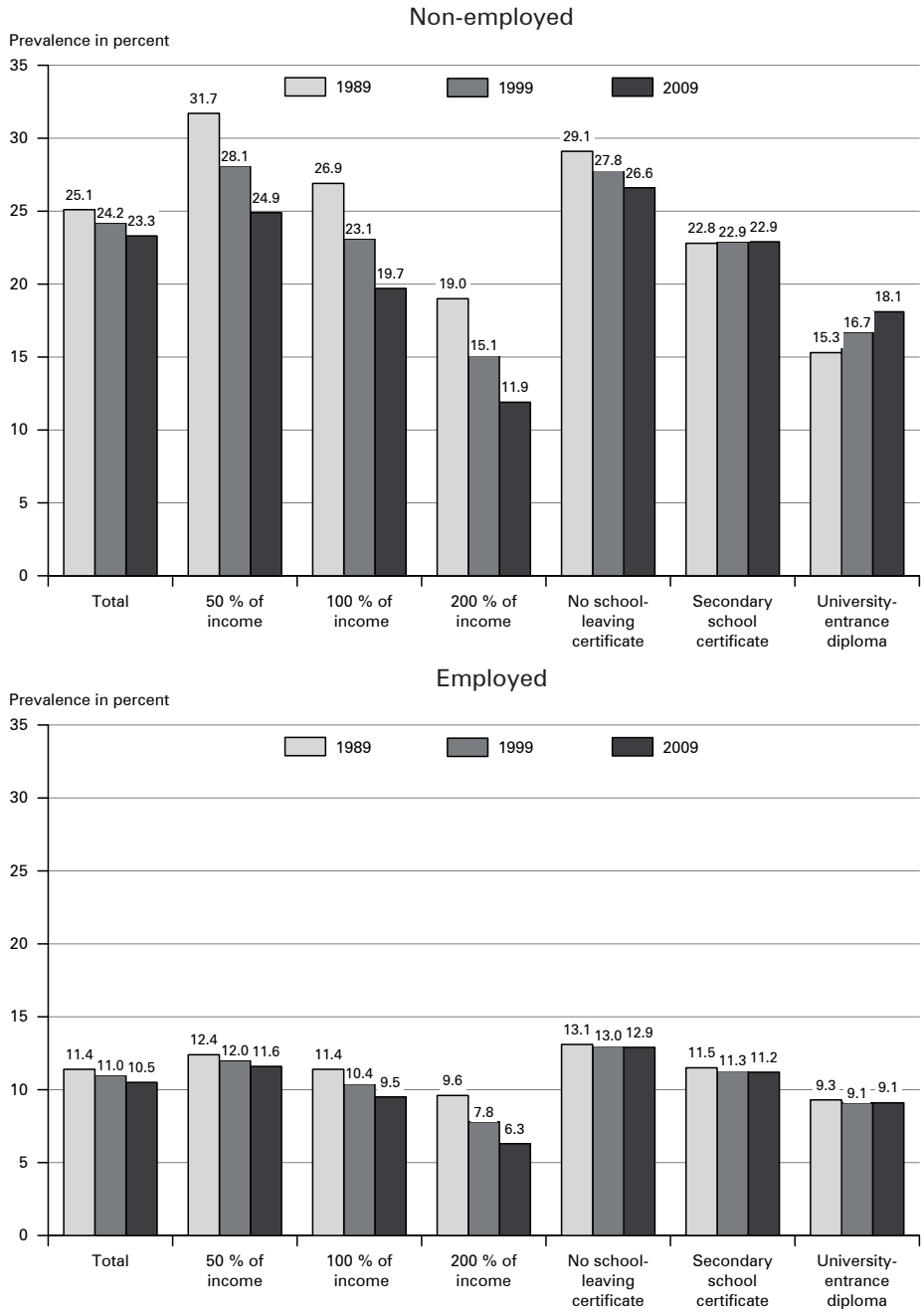
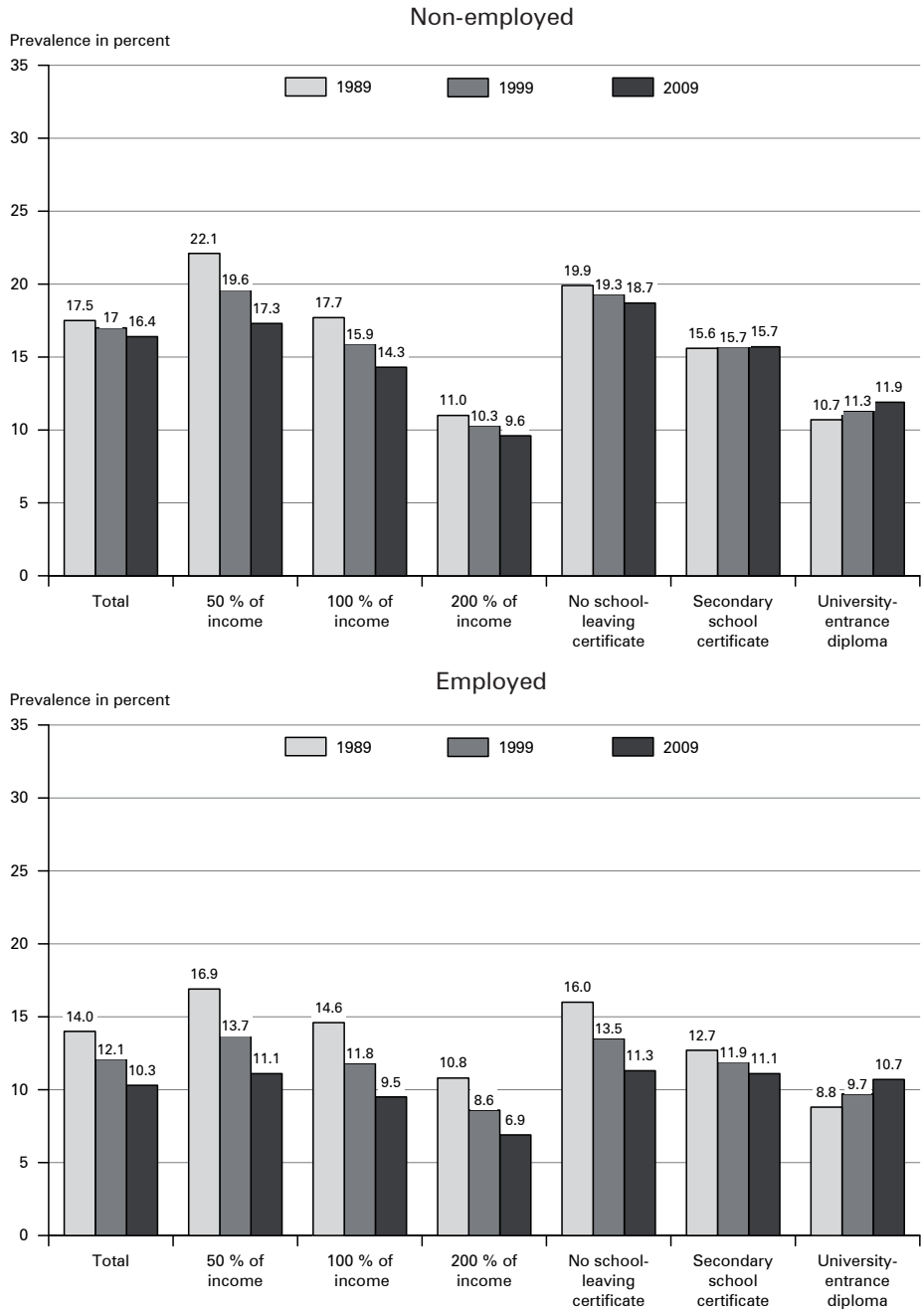


Fig. 1b: Prevalence of disease among women at the age of 40 according to survey year and social stratum



Calculation based on data from table 4.

Source: SOEP (1984-2009)

of time speaks against the alternative explanation of a growing influence of selection processes that lead to more healthy people being employed to an increasing degree thereby contributing to an improvement in health over the course of time. However, the fact that the prevalence among the non-employed drops more quickly than among the employed may also indicate that mobility processes should not be entirely neglected.

On principle, the scenario of an improvement in the health both among non-employed and employed women is similar, which speaks – like the findings for men – more for a reduction in workloads than for particularly pronounced (health-related) mobility processes between these groups. While, however, for the men the prevalence among the non-employed drops more strongly than among the employed, the reduction in prevalence for women is greater among the employed than the non-employed. This finding might be explained by differing health-related mobility processes for men and women, according to which, for instance, men tend to leave employment while in good health and women while in poor health.

5 Discussion

This article investigates the question of whether lengthening working lifetimes is a realistic perspective against the background of the changes in health in the past 20 years. Overall, it was shown that the number of healthy years of life increased both among men and among women. Although *all* social strata profit from the gain in healthy years of life, it was also shown that an improvement in health among the male population in the lower social strata cannot be said to equal that in the higher social strata. The upper income groups particularly profit from a gain in "healthy" years of life. The differences are less distinct among the educational levels. Nevertheless, the upper educational levels here also profit to a greater extent than the lower educational levels. Among the female population all income groups profit to the same extent from additional healthy years of life, while – unlike the men – the lower educational levels experience more additional healthy years of life than the higher. One reason for the greater income dependence of the change in healthy life expectancy among the men compared to the women is probably the higher correlation between income and the burden associated with the vocational situation for men. The analyses also revealed that the social differences in healthy life expectancy are to some extent far more distinct than general life expectancy. Therefore, people of the lower social strata are not only disadvantaged through their social position, but in fact this disadvantage increases further over the course of time. One mandatory working lifetime for *all* persons would therefore not do justice to these findings of socially highly unequally distributed life opportunities. One possible option for designing age limits, for instance, could be to align it to a ratio of healthy to unhealthy life expectancy determined differently depending on the social stratum. Hence, the findings support a flexible arrangement of retirement age limits.

Furthermore, this study ascertained that the lengthening of healthy years of life is also reflected in an improvement in health of both the employed and the non-

employed population. In this respect, the improvement in the health of the general population appears not to be caused primarily by health-related mobility processes, but rather also by a reduction in workloads for instance. Presumably this study was unable to identify particularly disadvantaged population groups in the strata differentiation according to income and schooling conducted here, since they are, for example, exposed to particularly stressful working conditions. Due to the small number of cases, the necessary differentiation for this in different vocational groups could not be carried out in this study using data from the Socio-economic Panel. Besides belonging to specific vocations, different employment biographies should also be considered. For instance, the careers of women are often characterised by interruptions for child-raising or other kinds of family support. For this purpose, we suggest referring to other data sources such as those provided by the Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung (IAB)) for instance.

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