HEALTHY LIFE EXPECTANCY IN THE CURRENT CZECH POPULATION*⁾

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Abstract: In this article the author deals with the current state of health of the Czech population, which she analyses using the indicator of disability (disability-free life expectancy) – based on a combination of life tables and the prevalence of health status indicators.

Keywords: healthy life expectancy, temporary life expectancy, self-perceived health, chronic disease, limitations on everyday activities

The extension of life expectancy at birth was in the past a relatively accurate indicator reflecting the improvement of health in different populations. Later, when life expectancy at birth exceeded 70 years of age, discussions surfaced on whether the extension of human life is not just the addition of years spent in illness. The strength of the statistical correlation between mortality and morbidity began to weaken in advanced countries. Three theories (scenarios) of the historical relationship between mortality and morbidity were formulated in this connection: 1) **the compression of morbidity theory**, which claims that the reduction of the intensity of mortality is accompanied by an improvement in the state of health (*Fries*, 1980, 1989, 2002), 2) **the expansion of morbidity hypothesis**, according to which the additional years are primarily spent in poor health (*Gruenberg*, 1977; *Kramer*, 1980; *Olshansky et al.*, 1991) and 3) **the theory of dynamic equilibrium**, which assumes that the share of additional years of life spent in morbidity out of the total additional years of life neither increases nor decreases, or the increased prevalence of morbidity relates only to less severe states of health (*Manton*, 1982).

Once the occurrence of infectious diseases declined, chronic illness began to be an integral and unpleasant part of the lives of many people. These diseases are long-term, they do not necessarily interfere with a person's independence, and they may not even be the primary cause of death. What is important is the degree of severity of the deterioration of a person's state of health. In this regard the need arose to quantify this new reality with the aid of some conventional indicator, and therefore today, in addition to traditional mortality and morbidity indicators (life tables and incidence or prevalence rates), another characteristic is emerging on the scene – **disability**, as **an indicator of health limitations**. Disability is an indicator of both of **the severity of illness and the quality of life**. The disability indicator actually reflects a content shift in how health is defined by the *World Health Organisation*, which today does not view health as just the absence of disease, but as "a state of physical, mental, and social well-being", thus viewing it in terms of the concept of the quality of life. The number of **disability-free** years remaining in a person's life is becoming a generally accepted measure of the state of health of individual populations. The indicator of the absence of disability, DFLE (disability-free life expectancy), is based on a combination of life tables and the prevalence of good health. This indicator expresses the average number of years a person can

expect to live without health disabilities, and it is usually calculated at birth and at age 65, separately for men and women. DFLE is intended to become a structural (routine) indicator that will be calculated and published in the Eurostat under the Environment section (http://europa.eu.int/estatref/info/sdds/en/health/hlye_base.htm). This indicator is also coming to be referred to as HLY (Healthy Life Years).

The main problem in calculating the DFLE, as well as other health indicators, is ensuring the comparability of the data. Data on the state of health can be drawn from registers or from sample surveys, but it is necessary that when collecting data individual countries employ the same definitions of health and that the content of the questions formulated in relation to prevalence or incidence is the same. One European survey that examined the state of health within the EU in one of its survey modules was the **European Community Household Panel** (ECHP). The ECHP was a panel (longitudinal) survey, repeated each year since 1994 in EU countries. It covered the population aged 16 and over, and data collection was conducted using uniform methodology. Another source of data on health is the **Eurobarometer** – a survey in which in 2002 a module was introduced that focuses on three areas of health status: **self-perceived health, chronic morbidity**, and **limitations on everyday activities**. This module also served as a test module, as the three concepts of health it introduced were later included in the **European Survey on Income and Living Conditions** (SILC). The SILC has currently replaced the ECHP.

In the Czech Republic the *Czech Statistical Office* conducted a large-scale representative survey of households in 2001 called the Social Situation of Households Survey, the content and methodology of which were based on the ECHP. As of 2005 the Czech Republic is also included in the internationally comparative SILC within the framework of the EU.

Methodology for calculating health indicators and source data

Numerous experts and organisations have published work on health indicators and methods of calculating them (*Crimmins et al.*, 1997; *Jagger et al.*, 2001; *Robine et al.*, 2001). Today this issue is mainly focused on by the EURO-REVES team under the European Health Expectancy Unit (EHEMU). The goal of this project is to coordinate calculations, analyse the quality of data, examine methodology, and mediate information on the health status of European populations. It is funded under the European Health Programme 2004–2007. Thus far the team has calculated and analysed the DFLE for the period between 1995 and 2003 for fourteen EU countries (not including Luxembourg), separately for men and women, at time of birth and at age 65 (EHEMU, Technical Report 2, July 2005). Two questions posed in the ECHP were used to measure the prevailing health status: PH002: *Do you have any chronic physical or mental health problem, illness or disability?* and PH003: *Are you hampered in your daily activities by this physical or mental health problem, illness or disability*.

The DFLE was calculated from a combination of mortality indicators (life tables) and the prevalence of a given category of health status using the simple Sullivan method (*Sullivan*, 1971; *Jagger et al.*, 2001), the data requirements of which are not too demanding (other methods are, e.g., at: http//www.demografie.info/?cz_detail_clanku&artclID=107; *Rychtaříková*, 2000). According to Sullivan's method, the number of life years at a given age L_x is multiplied by the percentage of people $s_{x,i}$ with the given health status (i) at the given age (x), which is then calculated as $e_{x,i}$ and additively divided by health categories (i).

$$e_{x,i} = [\Sigma(s_{x,i} * L_x)]/l_x$$

The lower limit of the sum is x and the upper limit is usually the maximum age.

This indicator will be calculated once the results of the SILC survey for the EU 25 and for Island, Norway, the United States, and Japan are known.

In this article the **Generations and Gender Survey** (GGS) that was conducted in 2005 in the Czech Republic is used to study the health status of the Czech population. The GGS is an international survey coordinated by the United Nations Economic Commission for Europe in Geneva (http: //www.unece.org/ead/pau/ggp/Welcome.html). Among other things it enables an analysis of health status using the same questions as the ECHP, SILC or the Eurobarometer. The main Czech coordinator of the Generations and Gender Programme (GGP), of which GGS is a primary component, is the *Faculty of Science of Charles University in Prague* (*J. Rychtaříková*) and the co-coordinator is the *Research Institute for Labour and Social Affairs* (*V. Kuchařová*). The field data collection was carried out by the SC&C agency. The sample contained 10 006 respondents of Czech nationality aged 18–79 during 2005. The survey was funded under the National Programme for Research TP-5 "Modern Society and Changes" theme (registration no. 1J 023/04-DP2). The module on the health status of the population contained questions on self-perceived health, chronic and long-term morbidity, and limitations on everyday activities. One constraint on evaluating health status in this survey was age, the upper limit of which was 79 years, which makes it impossible to construct a classic indicator defined by the maximum survival age. In this regard, all the indicators used capped by the 80th birthday. Health status was studied using several questions:

Self-perceived health – question no. 701 *How is your health in general?*: 1 – very good; 2 – good; 3 – fair; 4 – bad; 5 – very bad.

Chronic morbidity – question no. 702a *Do you have any long-standing illness or chronic condition?*: 1 – yes, 2 – no.

Limitations on everyday activities – question no. 703a *Are you limited in your ability to carry out normal everyday activities, because of a physical or mental health problem or a disability?*: 1 – yes, 2 – no.

The purpose of this article is: 1) to study the health status of the Czech population aged 18–79 from the perspective of the three points listed above; 2) to analyse the differences between men and women; 3) to analyse the effect of age, education, and partnership on the self-perceived health status among women and men separately.

The analysis is based on weighted data, where the weight was determined from the structure of the Czech population in the 2001 Census by gender, age, marital status, education, region, and municipality size. The variables studied in this analysis are: health status, gender, age, education, and partnership. The distribution of these variables for unweighted cases (respondents) is indicated in Table I Appendix.

Self-perceived health, chronic morbidity, and limitations on everyday activities in the Czech population in 2005

The first step in the analysis was to assess the quality of the collected data in terms of their statistical significance and logical coherence. The percentage of records in which health was missing did not exceed 2% in any of the surveyed health statuses or in the category of education. Age, sex, and partnership were always indicated. The combination (based on weighted cases) of the variable of self-perceived health status and the variable for long-standing or chronic illness showed a strong association (Figure 1). Those who were not suffering from any chronic illness indicated in 99% of cases that their self-perception of health was very good, good, and fair (in 3/4 of cases they indicated very good and good). Men evaluated their health status just slightly better than women did. Conversely, people who answered that they were suffering from some long-standing or chronic illness described their health status as fair, bad, or very bad (Figure 1). However, in this case women suffering from a long-standing or chronic illness indicated slightly less often than men that they felt bad or very bad (28.8% vs. 30.4%).

Self-perception of health

The most important determinant of health status is age, and age is connected with how well people evaluate their own health. As people grow older their health difficulties increase, and their statements on their own health move from a declared sense of very good health to good and then to fair, and then the number of respondents describing their health as bad or very bad begin to be more significant (Figure 2a, 2b). Nevertheless, up to the age of 80, three-quarters of the Czech population subjectively assessed their health in positive terms (as very good, good, or fair), and only 27% of men and 25% of women aged 75–79 described their health as bad or very bad. Young men are more optimistic and more often than women describe their health as very good.

An interesting anomaly along the gradient of changes in the declared subjective perception of health by age is the age group of 60–64 year old men (the generation born in 1941–1945) and 65–69 year old women (the generation born in 1936–1940) – Figures 2a, 2b. Both groups show no decline in the subjective perception of health and feel just as good or just slightly better than the immediately preceding age group. These men and women were born during the period of a fertility revival in the Czech Lands, and they lived most of their lives after the Second World War. We could hypothesize that in the case of men these are individuals who just entered retirement and are not threatened by unemployment, as their slightly younger

Figure 1 Association between self-perceived health and the incidence of chronic disease
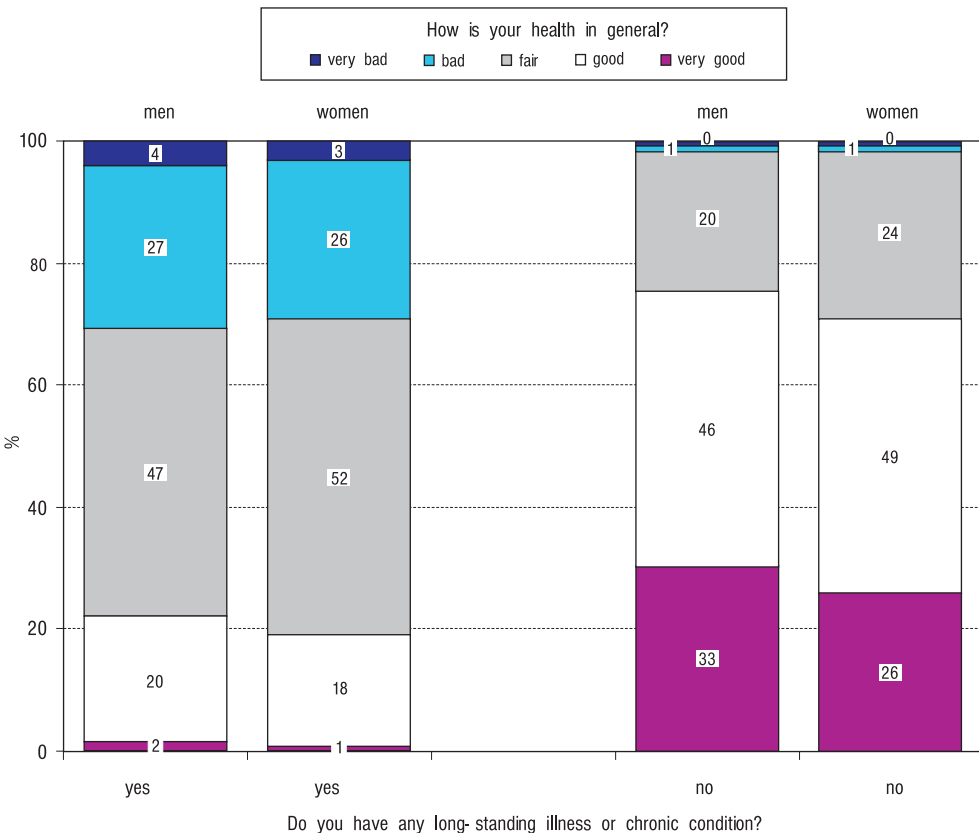
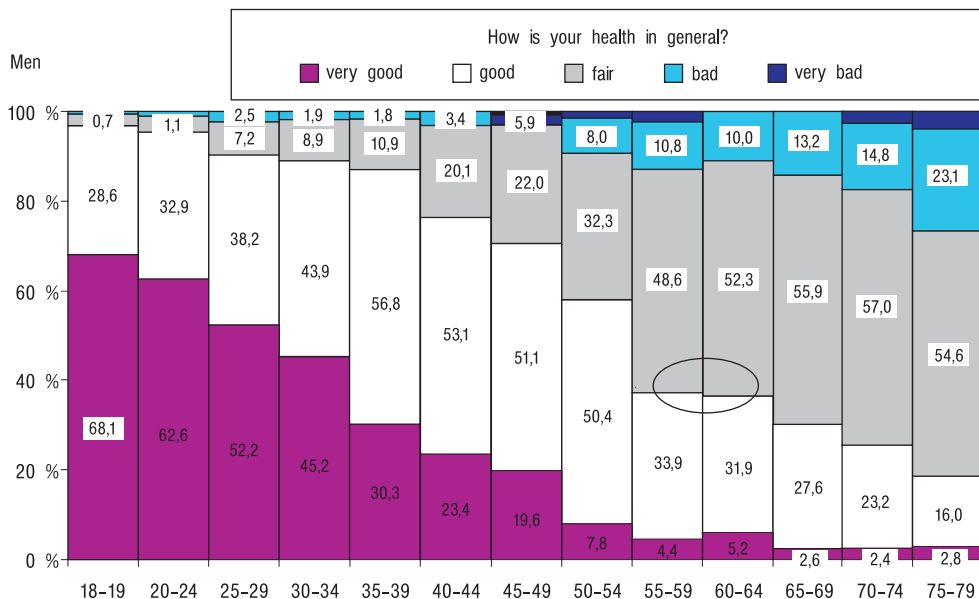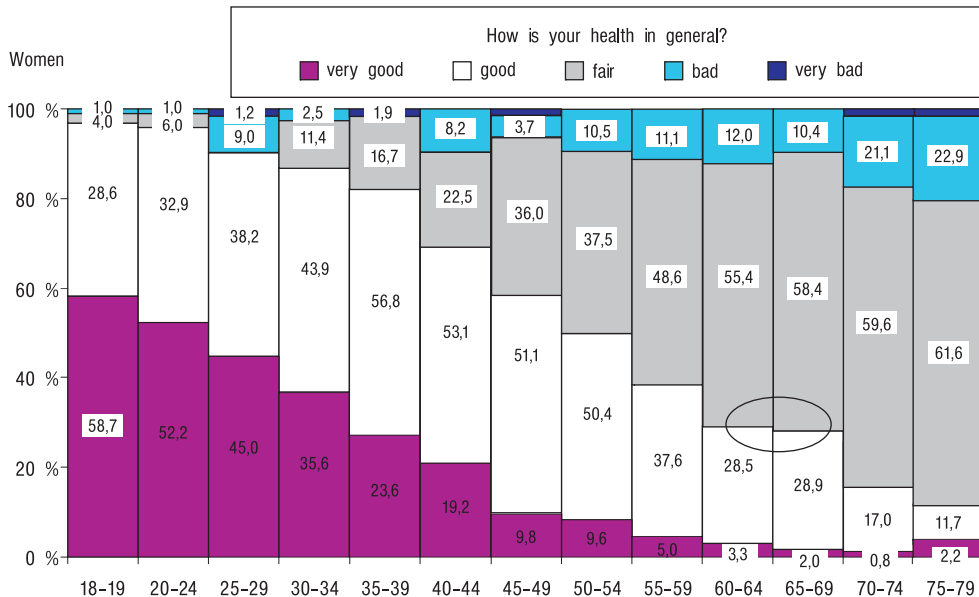**Figure 2a The decrease in good self-perceived health with age among men**

Figure 2b The decrease in good self-perceived health with age among women

Note: Categories add up to 100%, some small percentages could not for technical reasons be presented in the figure.

Figure 3a Increase in the incidence of chronic or long-standing illness with age

Do you have any long-standing illness or chronic condition?
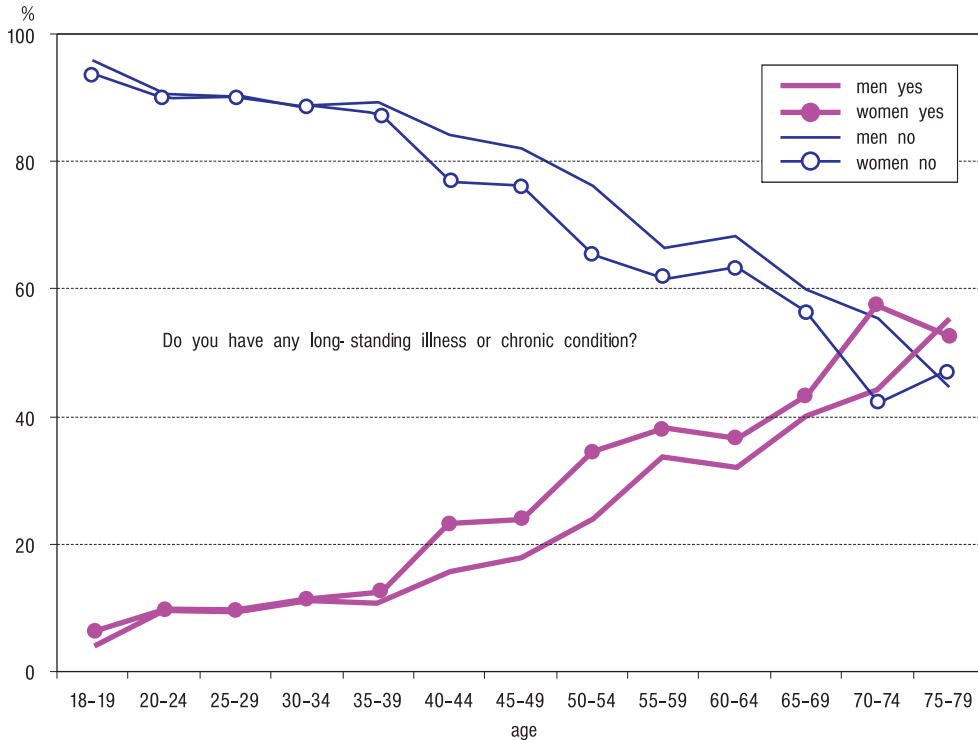
peers of pre-retirement age are, and therefore subjectively they feel better. In the case of women the situation is more complicated, but if we combine the three categories of health together (very good, good, and fair), it seems that "younger" retired women evaluates their health relatively better than slightly older and even much younger women.

Chronic and long-standing morbidity and limitations on everyday activities

Chronic and long-standing illness and limitations on everyday activities exhibit a deterioration in relation to age (Figures 3a, 3b). The gradient of change is most pronounced in the case of chronic and long-standing illness, where an almost constant increase, or decrease, can be observed (Figure 3a), while the case of limitations on everyday activities only deteriorates after the age of 70 and does so for both sexes (Figure 3b).

The relationship between limitations on everyday activities and age is less regular than in the case of chronic illness. Here again there is an anomaly similar to that observed in the self-perception of health. In the 50–59 age group the incidence of limitations on everyday activities is higher than in the 60–69 age group. This peculiarity is observed for both sexes. Again it is possible to speculate that during the period of economic transition "young" retirees not just feel better but are also more satisfied/healthier compared to the just slightly younger age group that is still economically active. There may be various reasons for this, and therefore, this finding warrants further analysis, for example, according to education, family background, and other characteristics.

Figure 3b Decrease in ability to provide daily activities with age
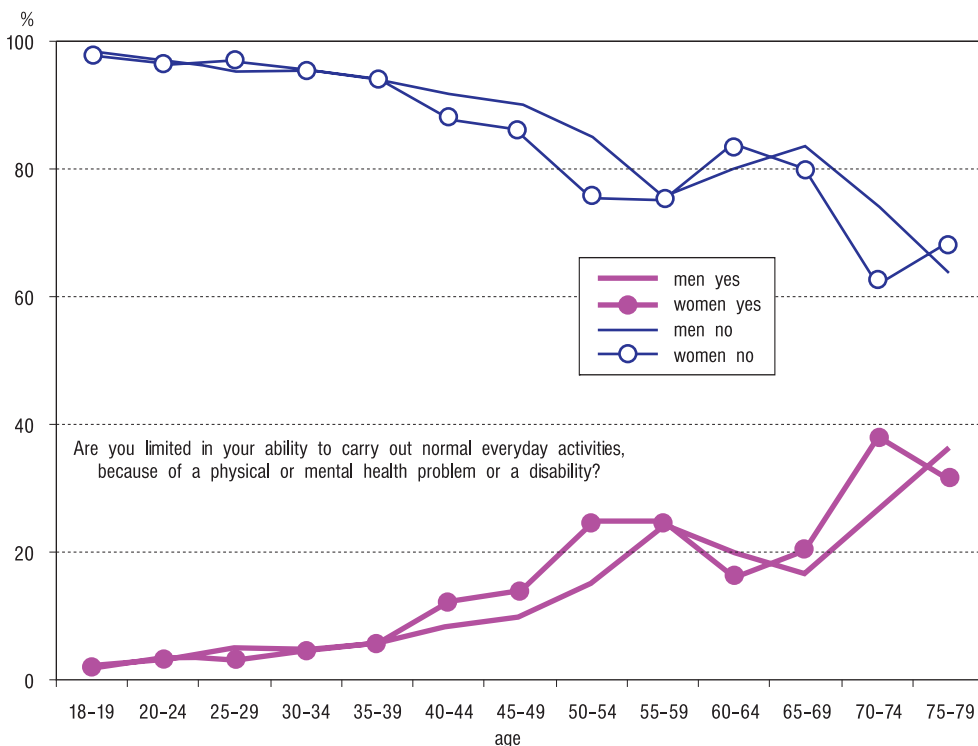
## Life expectancy by health status

Combining life tables for men and women in the Czech Republic from 2004 and the prevailing health status as based on the GGS, Sullivan's method was used to calculate the years of life expectancy in individual aspects of health studied. This means the number of years between age x and a person's 80th birthday (so-called temporary life expectancy). The calculation is made with the classic formula $\Sigma[s_{x,i}*L_x]/l_x$, but the upper limit of the sum is 79 years inclusive instead of the usual 100 or 110 years.

The average number of years remaining in the life of an individual gradually decreases with increasing age. We are primarily interested in **how the structure of those years changes, whether health status also deteriorates in a parallel and continuous manner, and whether the trends are the same for men and women**. These questions were examined within the three areas of health: **self-perceived**, in relation to **chronic morbidity**, and in relation to **limitations on everyday activities**. The **self-perception of health** was evaluated in three categories: 1) very good + good, 2) fair, and 3) bad + very bad.

The change in the average number of years of the temporary life expectancy of an x-year old until their 80th birthday was especially in younger age groups determined by trends in the categories of years lived in good or very good health, with just a negligible difference between men and women in the case of this indicator (Figure 4).

The two pairs of curves (total number of years and number of years in good health), which decreased linearly, remained parallel from age 18 to age 50. After this age the number of years of life expectancy continued to decrease linearly and the years according to self-perception of good

Figure 4 Temporary life expectancy up to the age of 80 by self-perceived health
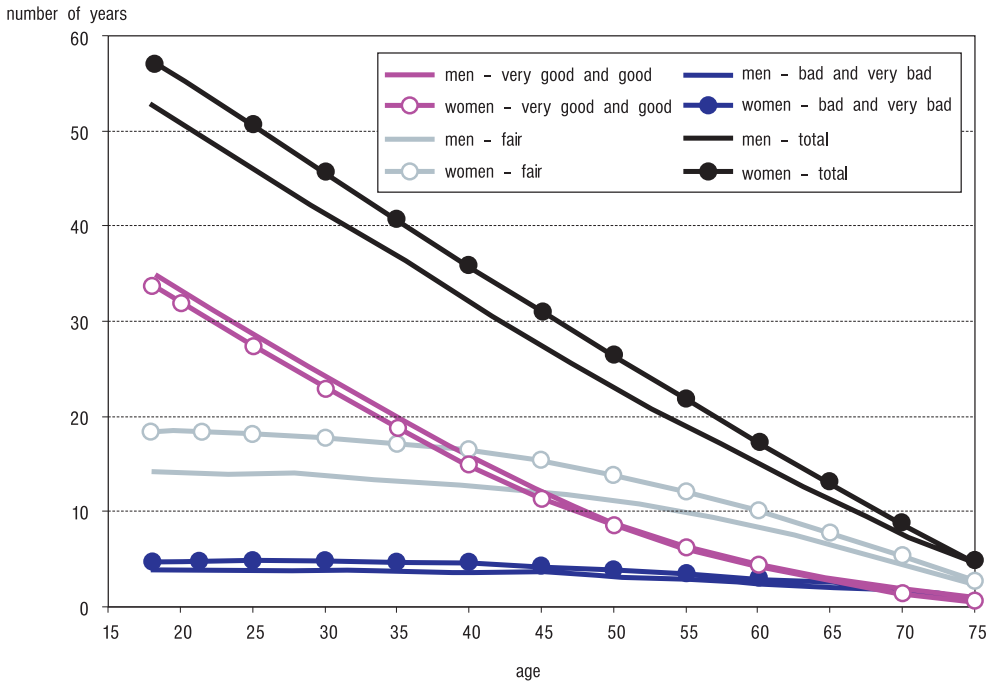

health no longer followed this trend, and the speed of their decline slowed. Years lived in bad or very bad health, which changed little in relation to age, had almost constant values. This of course means that with increasing age, and with it decreasing life expectancy, the weight of the number of years lived in bad health increases. Roughly from age 60 the number of years of temporary life expectancy in good and in bad health are the same up to age 80. The difference between men and women in bad health is negligible, just as in good health, thus both sexes have good and bad perceptions at similar year values. A difference between the life expectancy of men and women is found in the category of fair health, in which men live fewer years than women (Figure 4). Between age 40 and 45 years lived in fair health begin to dominate in the structure of temporary life expectancy, while in younger age groups good and very good health have the biggest weight.

The life expectancies **with** or **without chronic or long-standing illness** (Figure 5) are in principal similar to the course of life expectancies according to the category of self-perceived health. This finding is consistent with the previous finding that the declared self-perceived health correlates relatively well with the occurrence of chronic or long-standing illness (Figure 1).

While the differences between men and women in the case of self-perceived health described as good and very good were relatively small (Figure 4), in the **life expectancy without chronic or long-standing illness there are no gender differences** (Figure 5). It is the trend in the values for the absence of chronic or long-standing illness that mainly determine the trend of temporary life expectancy. The number of years lived with a chronic illness is higher among women than men, and this fact ultimately means that the years women live longer than men are years of illness. This fact is the source of the difference between the life expectancy of men and women. Since the 1960s the number of years lived with or without chronic illness has been roughly the same.

Figure 5 Temporary life expectancy up to the age of 80 by chronic or long-standing morbidity

number of years
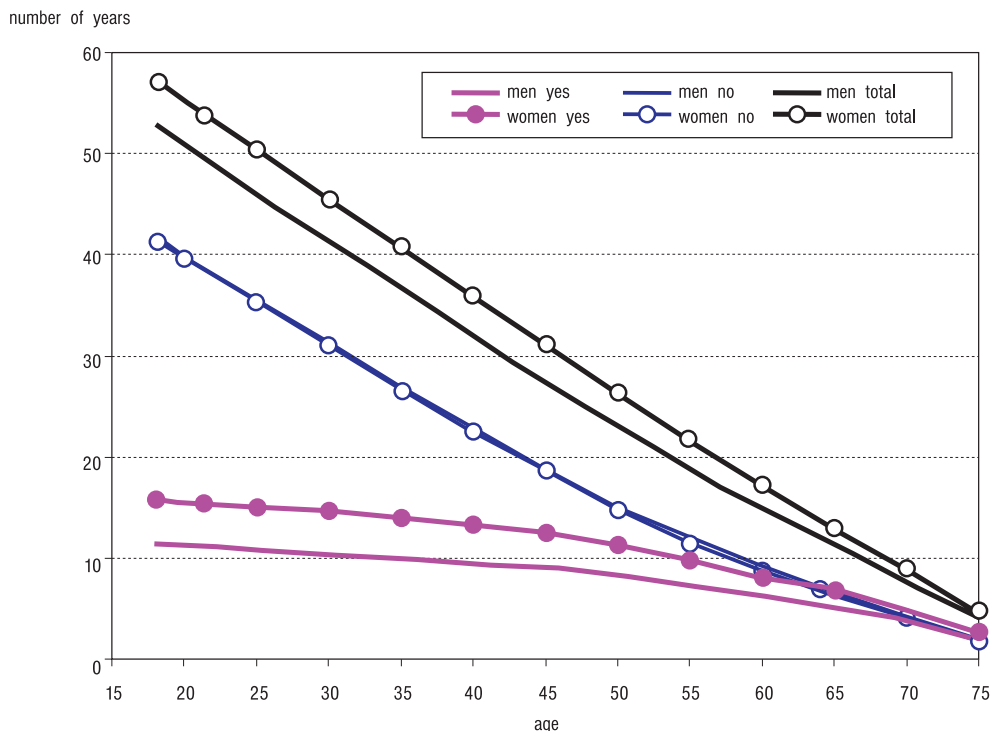
Long-standing chronic illness has the effect of limiting many people in their everyday activities. The impact and the severity of long-standing chronic morbidity is expressed in the life expectancy divided into two categories based on whether the person is or is not **limited in their everyday activities** (Figure 6).

Life expectancy without limitations on everyday activities is very similar by age to the total number of years of temporary life expectancy. Unlike chronic illness, the longer life expectancy of women here is connected with a higher number of years lived without limitations on everyday activities, and similarly men live a shorter number of years without limitations and proportionally fewer years with limitations on everyday activities. After the age of 70 the number of years of temporary life expectancy with and without limitations become similar (Figure 6).

A summary overview of the number of life years remaining to the 80th birthday of 18-year-olds and 65-year-olds structured by self-perceived health, chronic morbidity, and limitations on everyday activities is displayed in Table 1.

Between the ages of 18 and 80 men and women live 35 and 34 years, respectively, in very good and good health, and similarly between the ages of 65 and 80 they live 2.9 and 2.8 years, respectively, in this category (Table 1). A healthy self-perception of life expectancy is therefore absolutely longer in the case of men. If we contrast this finding with life expectancies without chronic illness, we can see in Table 1 that there are essentially no gender differences in the number of years (18–80: men = 41.4; women = 41.8; 65–80: 6.2 years vs. 6.3 years), or the life expectancies among men are just slightly shorter. In the case of limitations on everyday activities, the number of years of temporary life expectancy without limitations among

Figure 6 Temporary life expectancy up to the age of 80 by limitations on everyday activities

number of years
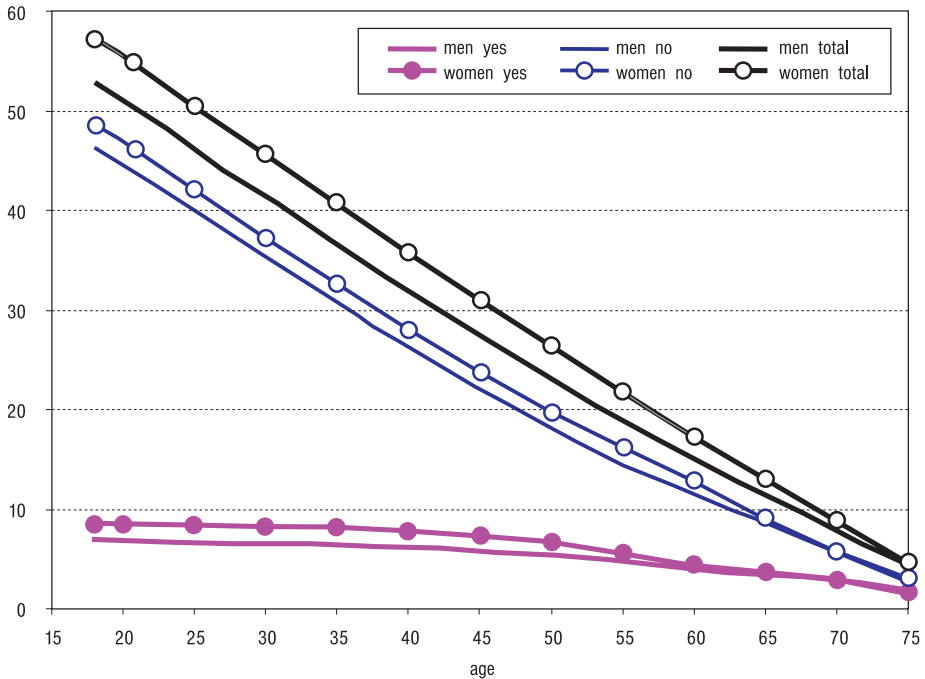
men is shorter than that of women (18–80: men = 46.5; women = 48.8; 65–80: 8.6 years vs. 9.1 years). Men are clearly more optimistic or more often describe their health as very good and good, although the indicator of chronic illness and especially limitations on everyday activities do not entirely confirm this as true. The different assessments men and women give

Table 1 Temporary life expectancies between the ages of 18 and 80 and between the ages of 65 and 80 according to different health statuses

Indicator	Men	Women	*Men*	*Women*	Men	Women	*Men*	*Women*
	18–80				65–80			
Self-perceived health	Years		%		Years		%	
Very good and good	35.0	34.0	*66.0*	*59.3*	2.9	2.8	*25.8*	*21.6*
Fair	14.1	18.5	*26.6*	*32.1*	6.4	7.7	*55.9*	*59.7*
Bad and very bad	3.9	4.9	*7.3*	*8.6*	2.1	2.4	*18.3*	*18.7*
Total	52.9	57.4	*100.0*	*100.0*	11.4	12.9	*100.0*	*100.0*
Long-standing chronic illness								
Yes	11.5	15.6	*21.7*	*27.2*	5.2	6.6	*45.3*	*50.9*
No	41.4	41.8	*78.3*	*72.8*	6.2	6.3	*54.7*	*49.1*
Total	52.9	57.4	*100.0*	*100.0*	11.4	12.9	*100.0*	*100.0*
Limitations on everyday activities								
Yes	6.5	8.7	*12.2*	*15.1*	2.8	3.8	*24.5*	*29.4*
No	46.5	48.8	*87.8*	*84.9*	8.6	9.1	*75.5*	*70.6*
Total	52.9	57.4	*100.0*	*100.0*	11.4	12.9	*100.0*	*100.0*

of self-perceived health emanate from the shift between the categories of good health and fair health, where women clearly more than men described their health as fair. The number of years remaining to the 80th birthday in bad and very bad health, or with chronic (long-standing) illness and with limitations on everyday activities is in these categories higher among women than among men, and this applies also to the proportional percentages (Table 1). These findings confirm the fact that the additional years of life of women in the Czech Republic are a period of reduced quality of life.

Factors of perceived health

The self-perception of health changes not just in relation to age but also in relation to a number of other lifestyle factors. It can depend on whether a person has a partner or not, and even the level of a person's education can indirectly say something about a person's lifestyle. Evidence of the relationship between the categories of self-perceived health, age, partnership and education can be derived from a multinomial logistic regression. The dependent (explained) variable was the four categories of self-perceived health (very good, good, fair; the categories of bad and very bad were combined given the low number of cases in each). The explanatory (independent) variables (predictors) were age (categorised), partnership (the person lives with their partner in a shared household, the person does not live with their partner in a shared household, the person does not have a partner) and education (basic, secondary without GCSE, secondary with GCSE, university). Two regression models were calculated, for men and for women. Given that the interactions were statistically insignificant, the model of the main effects is presented.

The self-perception of health as good or very good statistically significantly decreases with age. The gradient of the decline is more pronounced in the category of very good health. Among men the decrease is already statistically insignificant from the age of 60 (Table 2a). Age is not a strong determinant, and if people perceive their health as bad the odds ratios are very similar and often statistically insignificant. Living with a partner in a shared household tends to give men the perception of good health, but for a sense of very good health they no longer need to be living in the same household with a partner. In the case of bad health, living in the same household as their partner is very important and significantly decreases (to 46%) the feeling of bad health. With increasing education levels men also more positively evaluate their health, and the gradient is sharper in the category of very good health. Bad health is cited statistically significantly twice as often (2.1) among men with elementary education compared to men with university education.

Women essentially perceive their health similarly to men in relation to age, that is, with a sharper gradient in the case of a sense of very good health, and statistical insignificance and no trend by age in the case of bad to very bad health. With increasing education levels the sense of the quality of life also rises, as expressed in the self-perception of health. For women living in the same household with their partner is also statistically significant for their sense of very good health, but in the opposite sense as men! A sense of very good health is reduced by the presence of a partner in the same household. In the case of bad to very bad health living with a partner reduces this sense, but less significantly than in the case of men.

Conclusion

The analysis of the current health status of the Czech population revealed similar phenomena as observed in other countries, especially with regard to the differences in the numbers of years of temporary life expectancy according to individual categories of health status. Men have shorter lives, but the extra years of women lives are spent mainly in illness or with limitations on everyday activities. The sense of good health correlates negatively with age and positively with education. Partnership is particularly important among people with bad health.

Table 2a Men: Multinomial logistic regression for the reference category of fair health; model of the main effects without interactions

Men	Self-perceived health (dependent variable)					
	Very good		Good		Bad and very bad	
(independent variable)	Sig.	Exp (B)	Sig.	Exp (B)	Sig.	Exp (B)
Age						
18–29	**0.000**	**266.5**	**0.000**	**23.7**	**0.013**	**0.47**
30–39	**0.000**	**83.9**	**0.000**	**14.9**	0.074	0.62
40–49	**0.000**	**20.0**	**0.000**	**6.7**	0.060	0.68
50–59	**0.000**	**3.8**	**0.000**	**3.3**	0.156	0.79
60–69	0.276	1.5	**0.001**	**1.7**	**0.002**	**0.59**
70–79		1		1		1
Partnership						
He lives with a partner in a shared household	0.806	0.97	**0.001**	**1.38**	**0.000**	**0.46**
He doesn't live with a partner in a shared household	0.599	1.12	0.119	1.37	0.197	0.63
He doesn't have a partner		1		1		1
Education						
Basic	**0.00**	**0.39**	**0.000**	**0.50**	**0.001**	**2.1**
Secondary school without GCSE	**0.00**	**0.39**	**0.000**	**0.51**	0.136	1.4
Secondary school with GCSE	**0.00**	**0.60**	***0.021***	***0.74***	0.837	1.1
University		1		1		1

Table 2b Women: Multinomial logistic regression for the reference category of fair health; model of the main effects without interactions

Women	Self-perceived health (dependent variable)					
	Very good		Good		Bad and very bad	
(independent variable)	Sig.	Exp (B)	Sig.	Exp (B)	Sig.	Exp (B)
Age						
18–29	**0.000**	**269.2**	**0.000**	**20.4**	***0.044***	***0.55***
30–39	**0.000**	**88.2**	**0.000**	**12.9**	0.061	0.62
40–49	**0.000**	**19.4**	**0.000**	**5.8**	0.128	0.75
50–59	**0.000**	**7.8**	**0.000**	**3.3**	0.806	0.96
60–69	0.118	1.9	**0.000**	**1.8**	**0.000**	**0.58**
70–79		1		1		1
Partnership						
She lives with a partner in a shared household	**0.002**	**0.71**	0.889	0.99	***0.035***	***0.78***
She doesn't live with a partner in a shared household	0.235	0.80	0.686	1.07	0.247	0.69
She doesn't have a partner		1		1		1
Education						
Basic	**0.000**	**0.41**	**0.000**	**0.55**	**0.000**	**3.73**
Secondary school without GCSE	**0.000**	**0.47**	**0.002**	**0.66**	**0.001**	**2.69**
Secondary school with GCSE	***0.015***	***0.68***	0.044	0.77	0.114	1.65
University		1		1		1

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APPENDIX

Table I Basic distribution of the set of respondents – unweighted cases

Age	Men	Women	Total
18–19	242	231	473
20–24	439	412	851
25–29	525	485	1 010
30–34	467	506	973
35–39	405	446	851
40–44	401	463	864
45–49	384	429	813
50–54	418	432	850
55–59	421	477	898
60–64	332	385	717
65–69	281	361	642
70–74	260	266	526
75–79	222	316	538
Total	4797	5 209	10 006
Education			
Basic	989	1 292	2 281
Sec. school without GCSE	1 732	1 548	3 280
Sec. school with GCSE	1 286	1 752	3 038
University	717	535	1 252
Not identified	*73*	*82*	*155*
Total	4 797	5 209	10 006
Does respondent have a partner?			
Yes, he/she lives with him/her in household	2 724	2 807	5 531
Yes, he/she doesn't live with him/her in household	375	434	809
No	1 698	1 968	3 666
Total	4 797	5 209	10 006
Subjective health			
Very good	1 286	1 068	2 354
Good	1 827	2 013	3 840
Fair	1 232	1 613	2 845
Bad	331	406	737
Very bad	42	44	86
Not identified	*79*	*65*	*144*
Total	4 797	5 209	10 006
Long-standing chronic morbidity			
Yes	1 100	1 402	2 502
No	3 610	3 723	7 333
Not identified	*87*	*84*	171
Total	4 797	5 209	10 006
Limitation on activities of daily living			
Yes	631	783	1 414
No	4 164	4 421	8 585
Not identified	*2*	*5*	*7*
Total	4 797	5 209	10 006