

# Composite health measures in Belgium based on the 2001 census

by

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## Abstract

**Objective:** *The objective of the paper is to present the health status of the population using a set of composite health measures. Health expectancy indicators are calculated: healthy life expectancy (HE), the life expectancy free of chronic morbidity (MFLE) and the disability free life expectancy (DFLE). A severity level (moderate (MDLE) and severe (SDLE)) is considered for the expected years with disability.*

**Methods:** *The Sullivan method was used to calculate the health expectancies. The health questions in the 2001 census include information on subjective health, the presence of longstanding diseases and restriction in daily activities. The total variance of the health expectancy estimates, taking into account the variance related to the mortality and the variance due to the census data, was estimated.*

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**Results:** *At birth, the life expectancy (LE) for females is 81.7 years. The HE, MFLE and DFLE are respectively 59.5, 63.4 and 66.1 years. The MDLE and SDLE are 7.8 and 7.7 years. The LE for males is 75.4 years with a HE, MFLE and DFLE of respectively 58.0, 59.7 and 62.8 years. The years with moderate and severe disability are 6.6 and 6.0 years. In all regions, women live longer than men and can expect to live more years in good health. They live on average more years in bad subjective health, with longstanding morbidity and with moderate and severe disability. At birth the health status is worse in the Walloon Region. There they experience a shorter life with fewer years in good health and have more years to live with ill health. A similar but smaller difference is observed comparing the Brussels Region to the Flemish Region. However at older ages the different health indicators are more favourable in the Brussels Region.*

**Conclusion:** *Health expectancy indicators are summary measures of the current health of a population. They allow to assess and monitor patterns of health and to identify differences by gender and by region.*

**Key words:** *Health expectancy, Life expectancy, Disability free life expectancy, Morbidity free live expectancy, Healthy life expectancy, Belgium*

## **Introduction**

As the length of life is increasing it is important to evaluate whether the lengthening in life expectancy is accompanied by an increase in time lived in bad health. Composite measures such as health expectancy indicators divide the life expectancy into time spent in various health states (1). A health expectancy indicator takes into account both mortality and the health status of the surviving population and provides information on the length of life (adding years to life), and the healthfulness of life (adding life to years) and thus focuses on the quality of life rather than on the quantity of life. Because health expectancy indicators are a generalization of life expectancy, they share important attractive properties with life expectancy, such as their independence from the age structure of the population and their measurement in expected years of life. They allow direct comparison of the different groups that make up populations such as the different genders, socio-economic categories, regions and countries.

Since the first estimation in 1971 by Sullivan (2) health expectancies have been calculated for the majority of the European Member States. Moreover the European Union (EU) decided to take up the health

expectancy and more specifically, the disability free life expectancy (DFLE) at birth as one of the structural indicators<sup>1</sup> that are to be used at the highest policy level and to be reported on a yearly basis to the heads of states. This is to be done for the first time in 2005. It has to be noted that the health expectancy is the only health indicator among the structural indicators. The importance given by the EU to the health expectancy indicators is evident by the fact that it figures on the short list of the European Community Health Indicators (ECHI), that it is included in the list of sustainable development indicators (DFLE at birth and at age 65) and that it is one of the 18 so-called Laeken indicators for social inclusion, adapted at the European Council in Laeken, Belgium in 2001. Although the EU describes the overall policy objective of the DFLE as 'to monitor the health of a population as a productivity and economic factor', the public health relevance of health expectancy indicators reaches much further. First of all, it is based on a general model of health transitions that allows a direct assessment of the health consequences of the increasing survival (3). Next, it is an important instrument in the monitoring of the health transitions observed in populations (4,5). Last but not least, health expectancy indicators contain the information necessary to evaluate different future health scenarios with either a compression of morbidity, an expansion of morbidity or an equilibrium (5-9).

In recent years, several papers have been published reporting the results of health expectancy estimation for Belgium, either by gender, by region or by socio-economic status (10-11). These estimations were based on combining the National Mortality Database, a 5-year follow-up of the 1991 census, and the 1997 Health Interview Survey. The purpose of this paper is to describe the health status of the Belgian population by gender and by region using a set of health expectancy indicators that are calculated with the census 2001 data as the source of the morbidity status information. The census questionnaire covers 3 health domains: self perceived health, longstanding morbidity and related disability (12).

## Methods

Since health expectancies combine information on both mortality and morbidity two types of data are necessary. The data on mortality were obtained from Statistics Belgium. The information was provided in the form of 1 year-life tables starting at age 0 with a last closed year at age

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<sup>1</sup> <http://europa.eu.int/comm/eurostat/structuralindicators>

105 years. The life tables were constructed by gender for the country and for each of the 3 regions. The life table was transformed to an abridged table with 5-year age intervals and a last closed interval starting at age 100. The variance of the life expectancies and the 95% confidence interval (CI) were estimated (13).

The 2001 census was the first Belgian census containing health and health related questions. The health questions had previously been used in the Belgian 1997 and 2001 Health Interview Survey<sup>2</sup>. The subjective health was defined by comparing those respondents indicating their health as very good or good (subjective good health) to those who experienced their health as very bad, bad or fair (subjective ill health) upon answering the standard question: 'How is your health in general?' (14). People were defined to have longstanding morbidity when they answered yes to the question: 'Do you suffer from one or more longstanding diseases, chronic conditions or handicaps?'. Among those answering yes, the presence and the severity of disability were estimated using the following question: 'Are you restricted in your daily activities due to this (these) illness(es), chronic condition(s) or handicap(s)?' Those answering 'continuously' were defined to be severely limited; those answering 'every now and then' were defined to be moderately limited, while those answering "not or seldom" or those who were without any longstanding morbidity were defined to be without limitations. The census had one additional question related to confinement in bed. Subjects reporting longstanding morbidity were supposed to answer this question after replying the one on activity restrictions. However, due to probable unclear instructions and layout problems, 19% of the eligible subjects did not reply compared to a 7% non-response to the previous question. It was therefore decided not to include this information for this analysis. The questions allow the estimation of the healthy life expectancy of (He), the life expectancy free of chronic morbidity (MFLE), the disability-free life expectancy (DFLE) and the life expectancy with moderate (MDLE) and severe (SDLE) disability.

The census did not collect health information for the infants under the age of 5 years. To obtain estimates of health expectancy indicators at birth the prevalence of the health status in the age group 0 to 4 years is assumed to be the same as in the age group 5 to 9 years.

Health expectancies are estimated using the Sullivan method. This means that the age specific prevalence ( $\pi_{i+i+n}$ ) of a health state is applied to the number of person years lived by the life table cohort in that age

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<sup>2</sup> <http://www.iph.fgov.be/epidemie/epien/index4.htm>

group<sub>i-i+n</sub>, in order to obtain the number of years lived in the particular health state. By adding up all those person-years of all ages  $j$  (with  $j \geq i$ ) and dividing this sum by the number still alive at age <sub>$i$</sub>  we obtain the expectation of life in the particular health state at age <sub>$i$</sub> . Health expectancy is thus the average number of years a member of a population can expect to live in a health state if there is no future change in the mortality and morbidity experience of a population. Detailed examples of calculations have been published (15) and can be consulted on the web ([www.reves.net](http://www.reves.net)).

In estimating the variance of the health expectancy one can in general ignore the part of the variance related to mortality and only take into account the part of the variance due to the morbidity data as those are survey data sampled from the much larger population providing the mortality data (16-17). As the health data are provided by the census, this is no longer the case so that the total variance had to be estimated. E.g. the variance of a health expectancy indicator such as the DFLE was estimated for an abridged life table with ages  $x, x+n, \dots$  and  $x=0, (\dots), W$  as:

$$S^2(DFLE_{x=i}) = \frac{1}{l_i^2} \sum_{x=i}^{W-n} l_i^2 [(1-a_i)n(1-\pi_i) + DFLE_{i+n}]^2 S^2(p_i) + \frac{1}{l_i^2} \sum_{x=i}^{W-1} L_i^2 S^2(1-\pi_i)$$

The estimation of the variance of the life expectancy with disability (DLE) is given by

$$S^2(DLE_{x=i}) = \frac{1}{l_i^2} \sum_{x=i}^{W-n} l_i^2 [(1-a_i)n\pi_i + DFLE_{i+n}]^2 S^2(p_i) + \frac{1}{l_i^2} \sum_{x=i}^{W-1} L_i^2 S^2(\pi_i)$$

where:

- $l_i$ : the number of people alive at age  $i$
- $a_i$ : the fraction of the interval lived by those who died in the age interval  $(i, i+n)$
- $n$ : the width of the age interval
- $W$ : the last closed interval
- $S^2(p_i)$ : the variance of the survival probability in the age interval  $(i, i+n)$

$$S^2(p_i) = \frac{p_i(1-p_i)^2}{D_i} \quad \text{with } D_i \text{ the number of observed deaths in the age interval } (i, i+n)$$

$$S^2(\pi_i) = S^2(1-\pi_i) \quad \text{is the variance of the prevalence of the health status in the age interval } (i, i+n)$$

$$S^2(\pi_i) = \frac{\pi_i(1-\pi_i)}{N_i} \quad \text{with } N_i \text{ the number of subjects in the survey in the age interval } (i, i+n).$$

## Results

An overview of the prevalence of the health status is given in table 1. The prevalence of good subjective health in Belgian women ranged from 98% in the age group 5 to 9 years old to 22% in the age group 85 to 89 years old. Among men the prevalence of good subjective health was respectively 97% and 26%. The proportion of people without long-standing morbidity decreases with age to 38% and 42% in females and males in the 85-89 years old. A similar age trend is observed in the prevalence of being without disability, which in the oldest age group is 42% for females and 48% for males. The prevalence of severe disability is 42% in 85 to 89 years old women and 35% in men of this same age group. This is much higher than the prevalence of moderate disability, which is respectively 16% and 18% in this age group.

Figure 1 gives, from a 5-year abridge life table at birth up to 100 years, the life expectancy and the different health expectancy indicators for males and females in Belgium. At selected ages, the estimates and their 95% confidence interval (CI) are presented in tables 2 to 4. In 2001, the LE at birth for women is 81.67 years. The HE, MFLE and the DFLE are respectively 59.46, 63.38 and 66.14 years. This means that at birth, a woman can on average expect to live 73% of her life in good subjective health, 78% without chronic morbidity and 81% without limitations. The years she will live with limitations are almost equally divided over the severity level of the limitations: 7.81 years with moderate disability and 7.72 years with severe limitations. At the age of 65 years, the LE for a woman in Belgium is 20.23 years of which she will live 7.05 years (35%) in good subjective health, 10.12 years (50%) without long-standing morbidity and 11.16 years (55%) without disability. At older ages, the number of the remaining years with severe disability (5.33 years) is larger than the number of years with moderate disability (3.74 years). As the expected number of years in ill health (either subjective or with chronic diseases or with disability) does not decrease in the same rate as the LE (Figure 1b), the proportion of the remaining life in good health drops drastically: depending on the indicator from around 70-80% at birth to 34-55% at age 65 years.

For Belgian males the LE at birth in 2001 is 75.42 years. The proportion of life in good subjective health is 77% (58.00 years), while it is 79% (59.70 years) without longstanding morbidity and 83% (62.82 years) without disability. Of the years lived with disability, the majority (6.62 years) are years with mild disability (severe disability accounting for 5.98 years). At age 65 years, the male LE is 16.24 years. The LE at that age consists of 6.57 years (40%) in good subjective health or 8.55 years (53%)

TABLE 1.  
The prevalence of different health indicators in selected age groups by region and gender, Belgium, 2001

Age group	Good subjective health		No chronic morbidity		No disability		Moderate disability		Severe disability	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
<u>Flemish Region</u>										
5 - 9	0.98	0.98	0.95	0.96	0.97	0.98	0.02	0.01	0.01	0.01
25 - 29	0.92	0.93	0.90	0.92	0.94	0.94	0.04	0.04	0.02	0.02
45 - 49	0.80	0.78	0.81	0.80	0.85	0.83	0.09	0.10	0.06	0.06
65 - 69	0.57	0.55	0.64	0.65	0.71	0.71	0.17	0.18	0.12	0.12
85 - 89	0.27	0.23	0.43	0.39	0.49	0.43	0.19	0.16	0.33	0.41
<u>Brussels Region</u>										
5 - 9	0.95	0.96	0.94	0.95	0.96	0.97	0.03	0.02	0.02	0.01
25 - 29	0.88	0.87	0.88	0.9	0.92	0.93	0.05	0.05	0.03	0.02
45 - 49	0.73	0.69	0.77	0.76	0.82	0.80	0.10	0.11	0.08	0.09
65 - 69	0.49	0.46	0.61	0.60	0.69	0.66	0.16	0.18	0.15	0.15
85 - 89	0.26	0.25	0.43	0.43	0.51	0.47	0.17	0.16	0.32	0.37
<u>Walloon Region</u>										
5 - 9	0.96	0.97	0.94	0.96	0.96	0.97	0.02	0.02	0.02	0.01
25 - 29	0.89	0.89	0.88	0.90	0.91	0.92	0.06	0.05	0.03	0.02
45 - 49	0.70	0.67	0.74	0.75	0.78	0.78	0.12	0.11	0.10	0.10
65 - 69	0.41	0.37	0.53	0.54	0.59	0.59	0.18	0.19	0.23	0.22
85 - 89	0.22	0.19	0.39	0.36	0.44	0.40	0.16	0.15	0.39	0.45
<u>Belgium</u>										
5 - 9	0.97	0.98	0.94	0.96	0.96	0.97	0.02	0.02	0.02	0.01
25 - 29	0.91	0.91	0.89	0.91	0.93	0.93	0.05	0.05	0.02	0.02
45 - 49	0.76	0.73	0.78	0.78	0.83	0.81	0.1	0.11	0.07	0.08
65 - 69	0.52	0.49	0.6	0.61	0.67	0.67	0.17	0.18	0.15	0.15
85 - 89	0.26	0.22	0.42	0.38	0.48	0.42	0.18	0.16	0.35	0.42

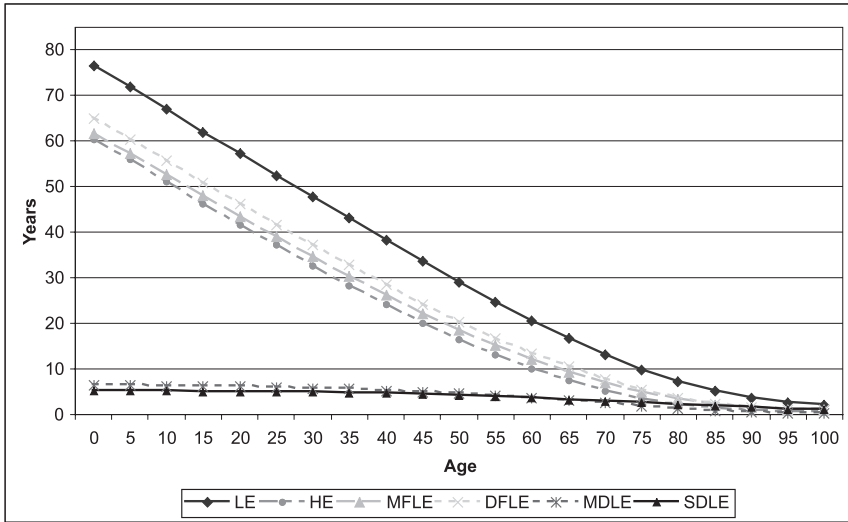


Figure 1a. Life expectancy (LE), healthy life expectancy (HE), morbidity-free life expectancy (MFLE), disability-free life expectancy (DFLE), life expectancy with moderate (MDLE) and severe (SDLE) disability, males, Belgium, 2001

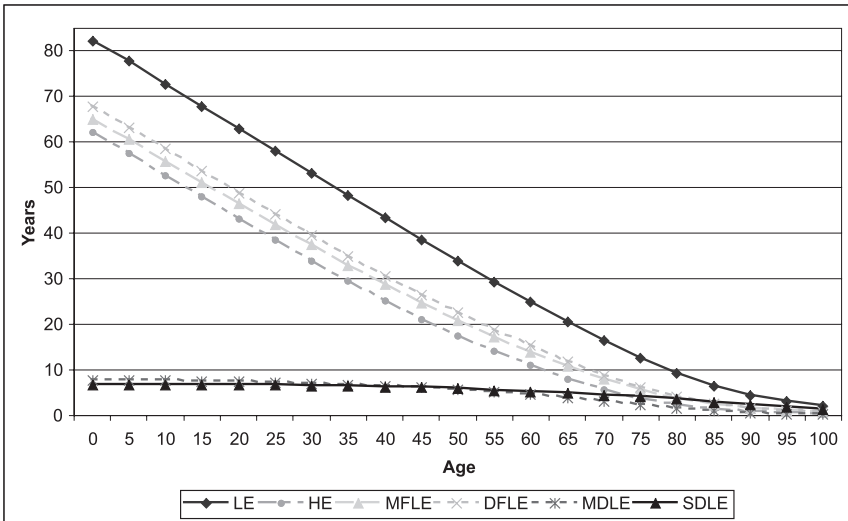


Figure 1b. Life expectancy (LE), healthy life expectancy (HE), morbidity-free life expectancy (MFLE), disability-free life expectancy (DFLE), life expectancy with moderate (MDLE) and severe (SDLE) disability, females, Belgium, 2001



without longstanding morbidity or 9.67 years (60%) without disability. At age 65, the remaining years with moderate and severe disability are respectively 3.01 (18%) and 3.55 (22%).

For selected ages, the differences between the LE and the health expectancy indicators in women compared to men are given in table 5. Women have a LE at birth that is more than 6 years higher than men. At age 65 and 85 years the LE is respectively still 4 and 1.3 years higher. At birth, they have an expectation of life in good subjective health that is 1.5 years larger while the MFLE and the DFLE are respectively 3.7 and 3.3 years larger. In their longer life, women have to live 2.9 more years with disability of which 1.7 with severe disability. The number of years a woman lives longer with disability accounts for almost 47% of her longer life.

Table 1 presents the prevalence of the health status for the 3 regions in Belgium. The prevalence of the positive health indicators is generally lower in the Walloon Region compared to the two others but the difference is substantial from the age group 45-59 onwards. Figure 2 and tables 2 to 4 provide information at selected ages for the different health expectancy indicators by region. In each of the regions, a similar gender difference in LE and the health expectancy indicators is observed. Women live longer than men and can also expect more years in good health (good subjective health, chronic morbidity free and disability free) but at the same time women will on average live more years in bad subjective health, with longstanding morbidity and with moderate and severe disability.

Figure 3a-3c graphs the difference by sex between the regions for the different health expectancy indicators. Comparing the Flemish Region with the Walloon Region we observe that, at birth, the differences for males are 2.83, 6.33, 5.39 and 5.78 years for respectively LE, HE, MFLE and DFLE. Compared to their Flemish compatriots, Walloon men cannot only expect a shorter life with less years in good health at birth; they also will live more years in ill health: e.g. they will live 3 more years with disability of which 2.4 years with severe disability. The observations are similar when comparing the LE and the health expectancy indicators of Flemish and Walloon women. The LE of women in the Walloon Region is not only 1.64 years shorter at birth, women also experience substantial years less in good health (7.08 years in good subjective health, 4.71 years without longstanding morbidity and 4.47 years without disability) and they also live 3 more years with disability of which 2.71 years with severe disability.

Comparisons between the Brussels Region and the Walloon Region indicate that in the Walloon Region, for both males and females, the life

TABLE 2.  
Life and healthy life expectancy at different ages with 95% confidence interval,  
Belgium, 2001

	Region	Life expectancy	Healthy life expectancy	% of remaining life in good subjective health
<u>At age 0</u>				
Males	Flemish	76.44 (76.29 - 76.59)	60.41 (60.31 - 60.50)	79.02
	Brussels	75.34 (74.96 - 75.72)	56.36 (56.14 - 56.58)	74.81
	Walloon	73.61 (73.39 - 73.83)	54.08 (53.96 - 54.20)	73.47
	Belgium	75.42 (75.30 - 75.54)	58.00 (57.93 - 58.08)	76.91
Females	Flemish	82.30 (82.16 - 82.44)	62.23 (62.15 - 62.32)	75.62
	Brussels	81.36 (80.98 - 81.74)	57.20 (56.99 - 57.41)	70.30
	Walloon	80.66 (80.46 - 80.86)	55.16 (55.06 - 55.25)	68.38
	Belgium	81.67 (81.56 - 81.78)	59.46 (59.40 - 59.52)	72.81
<u>At age 5</u>				
Males	Flemish	71.90 (71.76 - 72.04)	55.89 (55.80 - 55.98)	77.73
	Brussels	70.76 (70.39 - 71.13)	51.92 (51.72 - 52.12)	73.37
	Walloon	69.09 (68.89 - 69.29)	49.62 (49.51 - 49.72)	71.81
	Belgium	70.88 (70.77 - 70.99)	53.51 (53.45 - 53.57)	75.49
Females	Flemish	77.69 (77.56 - 77.82)	57.62 (57.55 - 57.69)	74.17
	Brussels	76.86 (76.51 - 77.21)	52.75 (52.57 - 52.93)	68.64
	Walloon	76.06 (75.88 - 76.24)	50.58 (50.49 - 50.66)	66.49
	Belgium	77.08 (76.98 - 77.18)	54.88 (54.83 - 54.93)	71.20
<u>At age 65</u>				
Males	Flemish	16.65 (16.56 - 16.74)	7.41 (7.37 - 7.45)	44.50
	Brussels	16.28 (16.02 - 16.54)	6.62 (6.51 - 6.73)	40.64
	Walloon	15.47 (15.35 - 15.59)	4.99 (4.94 - 5.03)	32.25
	Belgium	16.24 (16.17 - 16.31)	6.57 (6.54 - 6.60)	40.45
Females	Flemish	20.59 (20.50 - 20.68)	8.00 (7.97 - 8.04)	38.87
	Brussels	20.31 (20.07 - 20.55)	7.24 (7.15 - 7.34)	35.65
	Walloon	19.59 (19.47 - 19.71)	5.33 (5.29 - 5.37)	27.21
	Belgium	20.23 (20.16 - 20.30)	7.05 (7.02 - 7.07)	34.83

TABLE 3.  
Life and life expectancy free of longstanding morbidity at different ages  
with 95% confidence interval, Belgium, 2001

		Life expectancy	Life expectancy without chronic morbidity and 95% CI		% of remaining life without longstanding morbidity
<u>At age 0</u>					
Males	Flemish	76.44	61.64	(61.53 - 61.75)	80.64
	Brussels	75.34	59.43	(59.18 - 59.69)	78.88
	Walloon	73.61	56.25	(56.11 - 56.39)	76.42
	Belgium	75.42	59.70	(59.61 - 59.78)	79.15
Females	Flemish	82.30	65.07	(64.97 - 65.17)	79.06
	Brussels	81.36	62.55	(62.30 - 62.79)	76.87
	Walloon	80.66	60.60	(60.48 - 60.72)	75.13
	Belgium	81.67	63.38	(63.31 - 63.45)	77.61
<u>At age 5</u>					
Males	Flemish	71.90	57.27	(57.18 - 57.37)	79.66
	Brussels	70.76	55.08	(54.84 - 55.31)	77.83
	Walloon	69.09	51.91	(51.78 - 52.03)	75.13
	Belgium	70.88	55.34	(55.26 - 55.41)	78.07
Females	Flemish	77.69	60.56	(60.48 - 60.65)	77.95
	Brussels	76.86	58.18	(57.96 - 58.40)	75.69
	Walloon	76.06	56.12	(56.02 - 56.23)	73.79
	Belgium	77.08	58.90	(58.84 - 58.97)	76.42
<u>At age 65</u>					
Males	Flemish	16.65	9.28	(9.23 - 9.34)	55.76
	Brussels	16.28	8.85	(8.70 - 8.99)	54.35
	Walloon	15.47	7.11	(7.05 - 7.18)	45.99
	Belgium	16.24	8.55	(8.51 - 8.59)	52.64
Females	Flemish	20.59	10.83	(10.78 - 10.88)	52.59
	Brussels	20.31	10.49	(10.36 - 10.62)	51.65
	Walloon	19.59	8.79	(8.73 - 8.85)	44.86
	Belgium	20.23	10.12	(10.08 - 10.16)	50.02

TABLE 4.  
Life expectancy and disability free life expectancy (DFLE) and life expectancy with moderate (MDLE) and severe (SDLE) disability at different ages with 95% confidence interval, Belgium, 2001

		DFLE	% <sub>1</sub>	MDLE	% <sub>2</sub>	SDLE	% <sub>3</sub>
<u>At age 0</u>							
Males	Flemish	64.85 (64.74 – 64.97)	84.84	6.44 (6.41 - 6.47)	8.42	5.15 (5.11 - 5.18)	6.74
	Brussels	63.01 (62.74 – 63.29)	83.64	6.50 (6.41 - 6.58)	8.63	5.83 (5.73 - 5.93)	7.74
	Walloon	59.08 (58.93 – 59.23)	80.26	6.99 (6.94 - 7.04)	9.50	7.54 (7.48 - 7.60)	10.24
	Belgium	62.82 (62.73 – 62.90)	83.29	6.62 (6.59 - 6.65)	8.78	5.98 (5.95 - 6.01)	7.93
Females	Flemish	67.87 (67.77 – 67.97)	82.47	7.68 (7.64 - 7.72)	9.33	6.75 (6.71 - 6.80)	8.20
	Brussels	65.78 (65.51 – 66.04)	80.85	7.95 (7.86 - 8.04)	9.77	7.63 (7.52 - 7.74)	9.38
	Walloon	63.16 (63.04 – 63.29)	78.31	8.04 (7.99 - 8.08)	9.97	9.46 (9.39 - 9.53)	11.73
	Belgium	66.14 (66.07 – 66.22)	80.99	7.81 (7.78 - 7.84)	9.56	7.72 (7.68 - 7.75)	9.45
<u>At age 5</u>							
Males	Flemish	60.42 (60.31 – 60.52)	84.03	6.38 (6.35 - 6.42)	8.87	5.1 (5.07 - 5.14)	7.09
	Brussels	58.57 (58.31 – 58.84)	82.78	6.40 (6.31 - 6.49)	9.04	5.78 (5.68 - 5.88)	8.17
	Walloon	54.67 (54.53 – 54.80)	79.12	6.91 (6.87 - 6.96)	10.00	7.51 (7.45 - 7.57)	10.87
	Belgium	58.38 (58.31 – 58.46)	82.37	6.55 (6.52 - 6.58)	9.24	5.94 (5.91 - 5.97)	8.38
Females	Flemish	63.30 (63.21 – 63.39)	81.48	7.65 (7.61 - 7.68)	9.85	6.74 (6.69 - 6.78)	8.68
	Brussels	61.35 (61.11 – 61.58)	79.82	7.89 (7.80 - 7.99)	10.27	7.62 (7.51 - 7.73)	9.91
	Walloon	58.63 (58.51 – 58.74)	77.08	7.98 (7.93 - 8.03)	10.49	9.45 (9.39 - 9.52)	12.42
	Belgium	61.60 (61.54 – 61.67)	79.92	7.77 (7.74 - 7.80)	10.08	7.71 (7.67 - 7.74)	10.00
<u>At age 65</u>							
Males	Flemish	10.44 (10.38 – 10.49)	62.67	3.08 (3.06 - 3.11)	18.50	3.13 (3.10 - 3.16)	18.80
	Brussels	10.25 (10.08 – 10.41)	62.94	2.76 (2.69 - 2.83)	16.95	3.28 (3.19 - 3.36)	20.15
	Walloon	8.11 (8.04 - 8.18)	52.44	2.95 (2.91 - 2.99)	19.07	4.41 (4.36 - 4.46)	28.51
	Belgium	9.67 (9.63 - 9.72)	59.56	3.01 (2.99 - 3.03)	18.53	3.55 (3.53 - 3.58)	21.86
Females	Flemish	11.91 (11.86 – 11.97)	57.86	3.85 (3.82 - 3.87)	18.70	4.83 (4.79 - 4.87)	23.46
	Brussels	11.73 (11.58 – 11.87)	57.73	3.62 (3.56 - 3.69)	17.82	4.96 (4.86 - 5.06)	24.42
	Walloon	9.69 (9.62 - 9.75)	49.45	3.62 (3.58 - 3.65)	18.48	6.28 (6.23 - 6.34)	32.06
	Belgium	11.16 (11.12 – 11.20)	55.15	3.74 (3.72 - 3.76)	18.49	5.33 (5.30 - 5.36)	26.35

%<sub>1</sub> : percentage of remaining life without disability

%<sub>2</sub> : percentage of remaining life with moderate disability

%<sub>3</sub> : percentage of remaining life with severe disability

expectancy is shorter, with fewer life years in good health but more life years in ill health, especially with severe disability.

Comparing the LE and the health expectancy indicators between the Flemish and Brussels Region shows a different pattern by age. At younger ages, the LE and the positive health expectancy indicators are larger in the Flemish Region while e.g. the SDLE is smaller. At older ages (around 80 years in men and 75 years in women) we observe a shorter LE in the Flemish Region and fewer years in good health.

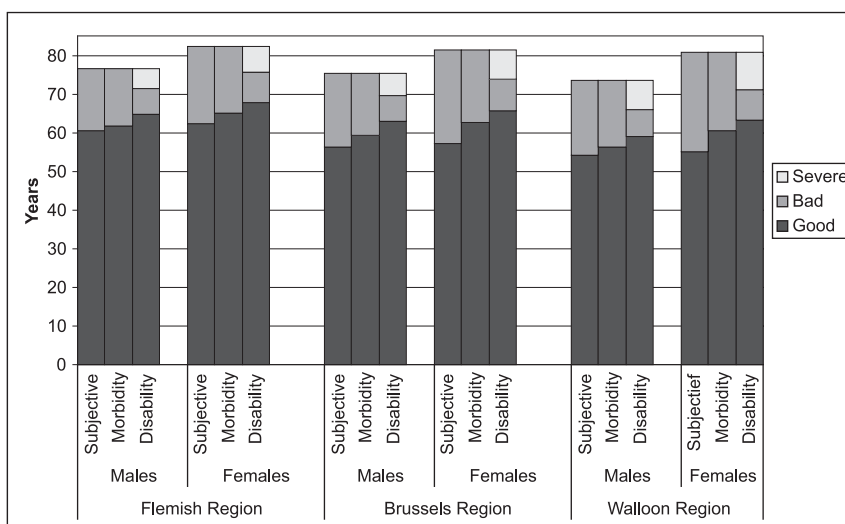


Figure 2. Health expectancy indicators at birth by gender and by region, Belgium, 2001

TABLE 5.  
Differences\* in health expectancy indicators at selected ages  
between females and males, Belgium, 2001

At age	Life expectancy	Healthy life expectancy	Morbidity free life expectancy	Disability free life expectancy	Life expectancy with moderate disability	Life expectancy with severe disability
0 year	6.25	1.46	3.69	3.33	1.19	1.73
25 years	5.88	1.12	3.13	2.83	1.23	1.82
45 years	5.29	0.81	2.52	2.35	1.15	1.79
65 years	3.99	0.48	1.57	1.48	0.73	1.77
85 years	1.32	0.06	0.26	0.22	0.07	1.03

\* Z-score of all the differences is at least 2.70 or higher.

## Discussion

In this paper information on mortality and morbidity is combined and comparisons are made by gender and region. Three different concepts of health are used: subjective health, longstanding morbidity and disability. It is the first time in Belgium that information on health is collected for the total population. Although self-administered, the quality of the census data was evaluated to be acceptable. As already mentioned in the introduction, the results on the question with a substantial item non-response were not included. The observed prevalence

of the different health indicators was overall not deviant from those in surveys such as the 2001 Health Interview Survey and the European Community Household Panel.

The overall findings for Belgium and the different regions is that women not only live longer but that they also tend to live more healthy years (good perceived health, without chronic morbidity and without disability). However, the number of healthy years of life they gain over men are only a fraction of the differences in LE. Therefore women can also be expected to live more years in ill health. The proportion of the gain in life expectancy of women over males that is occupied by years of ill health increases with age. At birth, of the 6.25 years difference, 76% are years in bad subjective health, 41% are years with chronic conditions and 46% are years with disability of which most with severe disability. At the age of 65 the difference in LE is 4 years of which 88% years with ill subjective health, 61% years with longstanding morbidity and 63% with disability.

When comparing the regions by gender, the Walloon Region does not show a similar mortality-morbidity interaction as observed in the gender difference, since people in the Walloon Region not only have a shorter average life but also experience less years in good health and more years in ill health.

These observations of gender differences and regional differences are in line with previous publications (10-11).

A major question is how we can explain these persistent major differences in health expectancy indicators by gender and by region in Belgium. A first element to consider, especially when using the morbidity-free life expectancy, is the increasing medicalisation with an earlier and more frequent diagnoses of several conditions virtually shorten the period of life without longstanding morbidity, and as a result of the earlier diagnoses and of better treatment outcomes, the number of years lived with disability will increase. This could be one of the explanations for the gender differences (18). Health care differences and access to health care do not suffice to explain the regional differences. In Spain, it has been shown that e.g. the DFLE is independent of health resource indicators and the indicator was therefore proposed as an appropriate measure for resource allocation (19). The socio-economic gradient in societies is a strong determinant of health (20). It could however not explain all differences in the mortality experience between the regions (21). Similar to other countries where differences in health expectancy indicators were described by different socio-economic indicators, we published differences in the LE, HE and DFLE by educational attainment (22). However it is clear that the interaction between the socio-

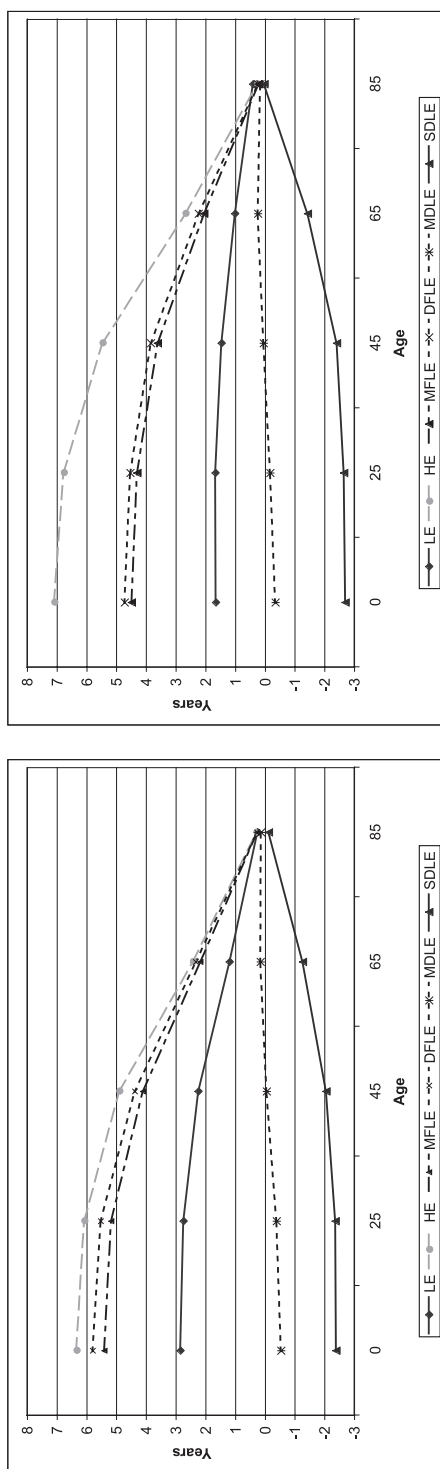


Figure 3a. Differences in health expectancy indicators at selected ages between the Flemish and the Walloon Region, Belgium, 2001 HEX???

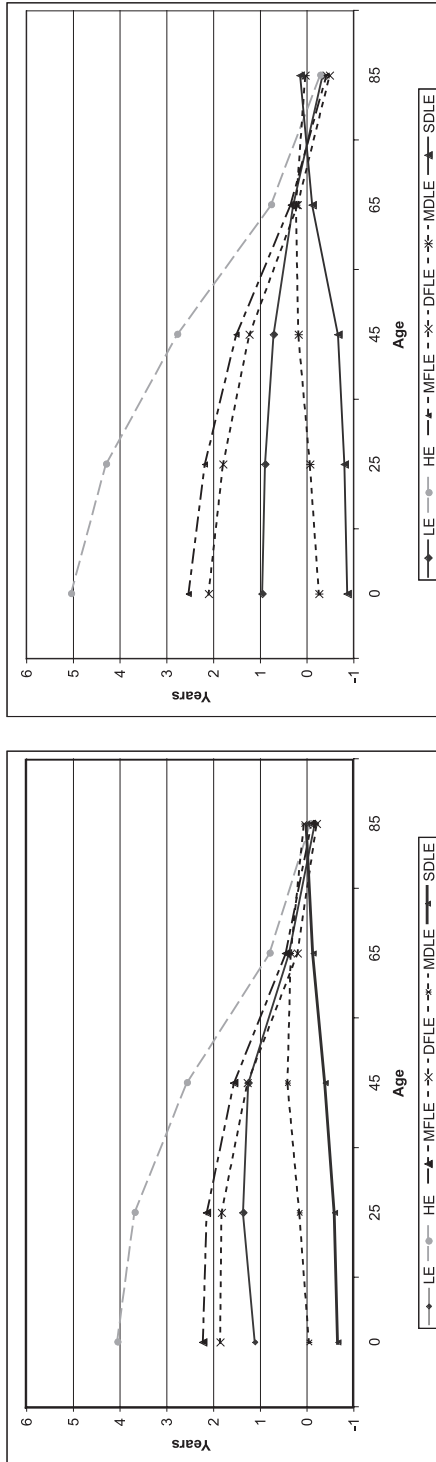


Figure 3b. Differences in health expectancy indicators at selected ages between the Flemish and Brussels Region, Belgium, 2001



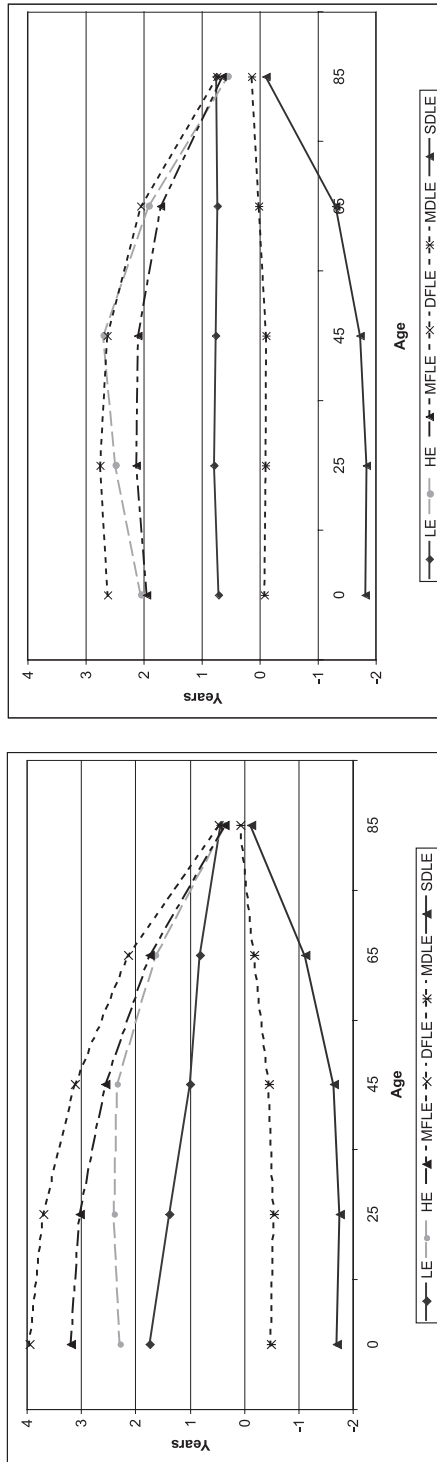


Figure 3c. Differences in health expectancy indicators at selected ages between the Brussels and the Walloon Region, Belgium, 2001

economic position and health is complex. One can expect a direct effect as e.g. the educational level enhances the access to information and the level of proficiency in benefiting from new knowledge (23). On the other hand, the socio-economic position obtained through high education provides indirect health protection through employment, work fulfillment, exposure to psycho-social stressors (24). There is a strong positive association between the socio-economic position and healthy life styles such as leisure time physical activity, non-smoking, positive nutritional habits and non-overweight (25). An evaluation of the contribution of specific diseases to the educational differences in DFLE at age 30 years in Belgium was performed (26). Of the 8 years difference in DFLE by educational level in men, 26% and 16% could be attributed to long-standing back pain and arthritis and 19% and 15% could be attributed to heart disease/stroke and asthma/COPD. In women a differences of 5.9 years in DFLE was attributable by 37%, 27% and 25% to arthritis, heart disease/stroke and asthma/COPD. The impact of other major chronic diseases such as cancer and diabetes was much less. Unhealthy lifestyles are related to cardiovascular diseases and pulmonary diseases such as COPD, and the prevalence of unhealthy lifestyles is found to be consistently higher in the Walloon Region than in the 2 other regions (27-28). The impact of unhealthy lifestyles on the LE and health expectancy indicators has been clearly demonstrated. E.g. the combination of smoking and a lack of physical activity not only causes a shorter life time but it is also related to a shorter disability free life expectation (29).

## **Conclusion**

These data based on the total population allow the estimation of health expectancy indicators by gender and region. A clear gender gap is observed which is in favour of the female population that, however, has to face a longer period of life in ill health. Regional differences in health are confirmed where the population of the Walloon Region not only experiences less time of their lives in good health but also more years of their lives in ill health.

Future calculation in this domain should either take into account the definitions currently used or recalculate previous estimates using current definitions to strengthen the possibility of having longer time trends. Also the impact of conditions on the LE and DFLE by gender and by region could be estimated using the 1997 and 2001 Health Interview Survey. To refine this method a follow-up of the Health Interview Surveys for mortality is necessary.

For the public health policy in Belgium, both the gender gap and regional differences ask for action. One can expect the greatest impact by far

from health promotion and prevention. On the other hand, we should discuss with researchers from other disciplines such as health economists, how public health policy planners could use the results of this study in e.g. the planning of health care organisation.

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