Differences in health expectancy indicators in Belgium by region

by

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Abstract

Objective: *The purpose of the paper is to compare the health status of the population of the Flemish and the Walloon Region of Belgium using a set of health expectancy indicators: the Healthy Life Expectancy (HLE), the Disability Free Life Expectancy (DFLE) and the Mental Life Expectancy (MLE).*

Methods: *The Sullivan method was used to calculate the health expectancies combining data of the 1997 health interview survey with the National Mortality Database. The information on subjective health (WHO-Europe instrument) and mental well-being (GHQ-12) was obtained through the self-administrated questionnaire. The instrument to measure disability (WHO-Europe instrument) was part of the face-to-face interview of the 1997 health interview survey. The variance on the differences in the health expectancies was estimated in order to make statistical inference.*

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Results: *Among men at age 25 year, the difference observed between the two regions is more than two years in life expectancy (LE$_{Flem}$: 50.4 year –vs– LE$_{Wall}$: 48.1 year) and in disability free life expectancy (DFLE$_{Flem}$: 39.1 year –vs– DFLE$_{Wall}$: 37.0 year). The differences are even greater, respectively 4.4 years and 5.3 years, for the mental life expectancy (MLE$_{Flem}$: 38.6 year –vs– MLE$_{Wall}$: 34.2 year) and for the healthy life expectancy (HLE$_{Flem}$: 39.5 year –vs– HLE$_{Wall}$: 34.2 year). In women at age 25 years the life expectancy and all 3 health expectancy indicators are greater in the Flemish region. The differences are respectively 1.1 years (LE$_{Flem}$: 56.1 year –vs– LE$_{Wall}$: 55.0 year) and 3.8 years (DFLE$_{Flem}$: 40.4 year –vs– DFLE$_{Wall}$: 36.6 year), 6.3 years (MLE$_{Flem}$: 39.1 year –vs– MLE$_{Wall}$: 32.8 year); HLE$_{Flem}$: 39.8 year –vs– HLE$_{Wall}$: 33.5 year). All these differences were statistically significant.*

Conclusions: *Overall, compared to the Walloon region, people living in the Flemish region not only live longer but also tend to be healthier while doing so: they live more years in good perceived health, more years without functional limitations and more years in good mental wellbeing. Not only socio-economic differences but especially differences in life style (among others smoking, leisure time physical activity, nutritional habits) may be potential factors causing the described differences.*

Introduction

During the 2002 budgetary discussion on the social security system in Belgium much debate was given to the differential cost of the health care system between the northern region (the Flemish Region) and southern region (the Walloon Region) of the country. The political intention of such debates is often a search toward a change in power in this matter from the Federal government to more decentralised authorities. However politicians give in general little or no attention to the probable difference in health status in Belgium by region.

Recently, the mortality database on the follow-up of the 1991-census made it possible to study the difference in mortality experience between the two regions taking into account other important determinants. In general, after adjustment for socio-economic status, the mortality rate was higher in all Walloon districts compared to the Flemish districts (1). The 1997-National Health Interview Survey[1] also identified that for several domains of health (among others: self-perceived health, chronic diseases, functional limitations, mental well-being) and life style factors (among others: dietary habits, tobacco, physical leisure time activity) the data are most often not in favour of the Walloon Region (2).

The purpose of this paper is to describe the health status of the Belgian population by region (Flemish versus Walloon region) using a set of health expectancy indicators. Health expectancy indicators are composite health measures combining both mortality and morbidity (3). They are a generalisation of the life expectancy including information on the prevalence of ill health. Health expectancies are independent of the size and age structure of populations and allow direct comparison of the different groups that make up populations (e.g. gender, socio-professional categories, regions or countries).

For this paper health expectancy indicators have been calculated using 1) self-perceived health: the Healthy Life Expectancy (HLE); 2) functional limitations: the Disability Free Life Expectancy (DFLE) and 3) mental well-being: the Mental Life Expectancy (MLE). Through this set of 3 indicators, different dimensions of health are described. The HLE provides a holistic approach to the concept of health It is the subjective internal assessment on the overall situation. The area of self-perceived health is important being an independent predictor of survival (4, 5) and of disability (6, 7). Self-perceived health is associated with a number of other health outcomes and the use of health services (8). Self-perceived health is considered to be one of the best health indicators. The level of perception of bad health in the population is, at a global level, a clear indication of unmet needs, services and health care (9). DFLE defines the physical health and the functional limitations as a consequence of chronic diseases and chronic health conditions. Disability corresponds to any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being. The International

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[1] For detail see: http://www.iph.fgov.be/epidemio/epinl/index4.htm (in Dutch) or http://www.iph.fgov.be/epidemio/epifr/index4.htm (in French).

Classification of Functioning, Disability and Health (ICF) conceives functioning and disability as dynamic interactions between health conditions and contextual factors including both personal and environmental factors (10). Although there is no generally agreed definition of mental health, it can been seen as the positive sense of well-being The mental ill health domain is very large and includes depression and anxiety disorders due to their high prevalence and psycho-geriatric disorders, such as dementia, that are likely to increase significantly in prevalence in parallel with population ageing. Mental disorders are recognized as one of the principal causes of disability, consuming a significant proportion of the health budget. Mental disorders are high on the ranking of the burden of disease in industrialized countries (11) and also in Belgium (12). Health surveys have not commonly included instruments to measure specific mental health conditions but most often use generic instruments measuring the mental well-being in the population.

Although the paper focuses on differences by region, it also provides each region with baseline information for later follow-up. The major strength and relevance of the health expectancy indicators lies in their ability to simultaneously assess the evolution of mortality, morbidity and disability and thus to assess the likelihood of different health scenarios which have been proposed. This may be important since there is evidence that the aging process of both populations in Belgium will be different and the greying of the population will be much more pronounced in the northern part of the country (13).

Data and methods

In order to calculate health expectancies by region, data on the probability of death and health status are needed by age and sex for each region. The mortality data by region were given by the five years follow-up of the total Belgian population of the 1991 census. Using the National Register data it was possible to follow all persons who were registered by the census through 1996. The vital statistic data were matched by the census data to construct the National Mortality database (14). For this paper, the probability of death over the 5-year follow-up was estimated by 5 years age groups and was used to calculate the life expectancy. The prevalence of the health status was provided by the 1997 National Health Survey. The participants were selected from the National Population Register using a multistage sampling scheme (15). All interviews were

done at home by trained interviewers. Next to a household questionnaire, the health interview survey consisted of a face-to-face interview and a self-administrated questionnaire[2].

The information on subjective health and mental well-being were obtained through the self-administrated questionnaire; the instruments measuring functional limitations were part of the face-to-face interview. The subjective health was defined by comparing those indicating their health as very good or good (good subjective health), to those who experienced their health as very bad, bad or fair (subjective ill health) when answering to the standard question "How is your health in general?" (16). The General Health Questionnaire-12 was used to evaluate the mental health (17). Strong or weak agreements with negatively presented items and strong or weak disagreements with positively presented items (symptom present) were scored "1", and all other responses (symptoms absent) "0". Subjects having a total score of zero or one were considered to be in good mental health compared to those with a score of 2 through 12 (mental ill health) (18). The prevalence of functional limitations was estimated using the WHO-instrument (16). The instrument evaluates 7 ADL-functions (transfer in and out bed or in and out a chair, dressing, washing of hands or face, feeding, going to the toilet and urinary continence), mobility, seeing and hearing. For each function the respondent was asked if he/she can do the function without difficulties, with difficulties or only with the help of another person. Hearing is evaluated against the ability to follow a TV-programme with the volume acceptable for others. Seeing is evaluated against the ability to recognise a person within a distance of 1 and 4 meters. People are defined to be moderately limited if they have difficulties doing one of the ADL-functions or if they can not follow a TV-programme with the volume acceptable for others or if they can not recognise a person from a distance of 4 meters or if their maximal walking distance is 200 meters. People are severely limited if they can only do one of the ADL-functions with the help of a person or if they cannot follow a TV programme even with the volume turned up or if they cannot recognise a person within a distance of 1 meter or the walking distance is only a few steps (16).

The health expectancy indicators were calculated using the Sullivan's method using abridged life tables (19, 20). This method is based on the present health state of the population using the current age specific morbidity rates. $_nL_x$, the expected number of years lived within each five-year

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age group, x to x + n, was calculated by standard life table methods (21). Using the age specific prevalence rate of ill health, the expected number of years lived in ill health and in good health within each five-year age group, x to x + n were computed. The estimates at age x of the life expectancy, of the expectation of life in ill health and in good health were obtained by summing-up the number of years lived over all age groups and dividing them by the size of the life table cohort at age x. The variance of the health expectancy was calculated to estimate the 95% confidence interval and to test the statistical significance of the difference in health expectancy between the two regions (21, 22). As the part of the variance in the health expectancy due to the mortality data is so small compared to the part of the variance due to the survey data, it has been shown that it suffices to take only the latter into account (23).

The healthy life percentage was calculated as a percentage by dividing the health expectancy indicator by the life expectancy.

Results

Annex 1 to 5 provide the baseline data by region sex and age, – the probability of death and the prevalence data of subjective health, functional limitations and mental well-being –, used to construct the life tables, together with the health expectancy indicators for Belgium.

At any age in both males and females the life expectancy (LE) is higher in the Flemish region. The difference ranged from 2.35 years in males and 1.10 years in females at the age of 25 years to respectively 0.20 and 0.18 years at age 85 years (Fig 1, 2).

Table 1 summarizes the data with respect to the healthy life expectancy (HLE). At age 25 years the HLE was 39.47 years in males in the Flemish region compared to 34.19 years in the Walloon region. At that age the expected years to live in ill perceived health was respectively 10.95 years and 13.87 years. Therefore the healthy life percentage was greater in the Flemish region (78.28%) compared to the Walloon region (71.14%). In females, the HLE at age 25 was 39.82 years or 71.03% of the remaining life in the Flemish region compared to 33.48 years (60.92%) in the Walloon region. The years expected to live in ill perceived health were respectively 16.24 years and 21.48 years. At any age, with the exception of males aged 85 years, the expected years of life in good perceived health were greater in the Flemish region. E.g. the difference in healthy life expectancy at age 25 year is 5.28 years in men and 6.34 years in

Fig. 1: Differences (in years) in life expectancy (Lexp), healthy life expectancy (Hlexp), disability free lifexpectancy (Dflexp) and mental life expectancy (Mlexp) among males between the Flemish and the Walloon Region, Belgium, 1997
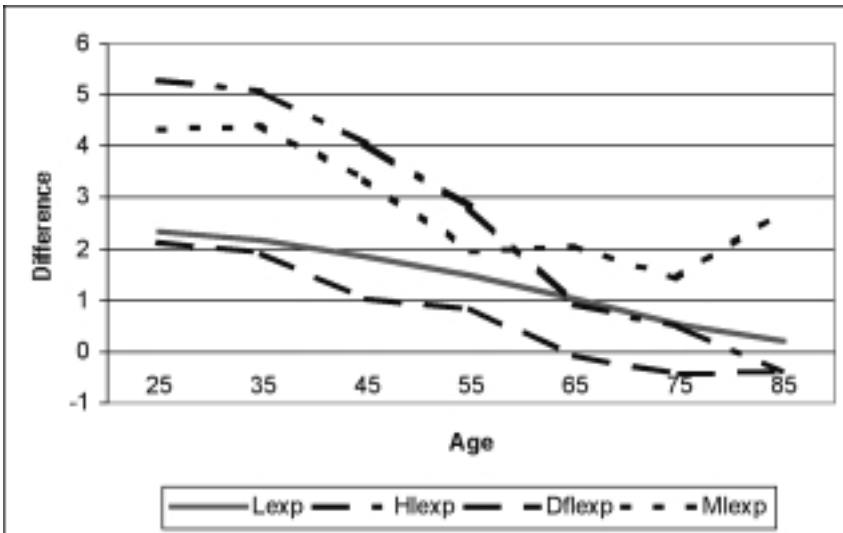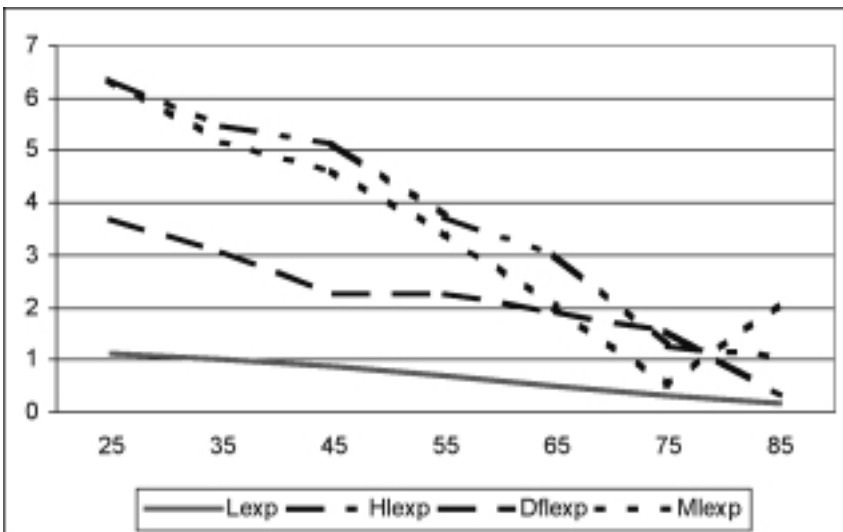

Fig. 2: Differences (in years) in life expectancy (Lexp), healthy life expectancy (Hlexp), disability free lifexpectancy (Dflexp) and mental life expectancy (Mlexp) among females between the Flemish and the Walloon Region, Belgium, 1997

TABLE 1

Life expectancy, health expectancy (healthy life expectancy: HLE), life expectancy in ill health in years calculated by using self-perceived health as the indicator for ill health, by region and sex in Belgium, 1997

	Flemish region				Walloon region			
	Life expectancy	Healthy life expectancy	Life expectancy in ill health	Healthy life percentage	Life expectancy	Healthy life expectancy	Life expectancy in ill health	Healthy life percentage
Males								
At age 25	50.42	39.47	10.95	78.28	48.07	34.19	13.87	71.14
At age 35	40.92	30.55	10.36	74.68	38.77	25.48	13.29	65.71
At age 45	31.57	22.19	9.38	70.30	29.71	18.15	11.55	61.10
At age 55	22.78	14.48	8.30	63.57	21.29	11.69	9.60	54.91
At age 65	14.93	8.55	6.38	57.28	13.90	7.62	6.28	54.84
At age 75	8.70	4.31	4.39	49.58	8.18	3.80	4.38	46.48
At age 85	4.42	2.27	2.15	51.43	4.22	2.65	1.57	62.72
Females								
At age 25	56.06	39.82	16.24	71.03	54.96	33.48	21.48	60.92
At age 35	46.28	30.87	15.41	66.71	45.27	25.39	19.88	56.09
At age 45	36.74	23.67	13.07	64.42	35.86	18.55	17.31	51.74
At age 55	27.56	16.36	11.20	59.35	26.85	12.62	14.23	47.00
At age 65	18.85	9.96	8.90	52.82	18.36	6.97	11.39	37.96
At age 75	11.18	5.00	6.18	44.74	10.86	3.76	7.10	34.61
At age 85	5.36	2.73	2.63	50.91	5.18	1.66	3.52	32.05

women. The differences were, especially at young ages, substantially greater than the differences in life expectancy (Fig. 1, 2). The differences in HLE by region were statistically significant up to the age of 55 years in males and up to the age of 65 years in women (Table 2). Up to the age of 55 years in men and at any age above 25 years in women, people in the Flemish region also lived less years in ill perceived health. Combining both the differences in LE and in HLE indicates that the percentage of the remaining life in good perceived health is smaller in the Walloon region compared to the Flemish region with the exception of males at the age of 85 years.

At the age of 25 years the disability free life expectancy (DFLE) was 39.11 years in males in the Flemish region compared to 36.97 years in the Walloon region (Table 3). At that age among males in the Flemish region the expected number of years to live with limitations was about 11.31 years of which 2.27 years with severe limitations. In the Walloon region the disability expectancy in men was 11.09 years with 2.76 years with severe limitations. The healthy life percentage was respectively 77.57% and 76.91%. In absolute years, the disability free life expectancy in males is greater in the Flemish region up to the age of 55 years (Fig. 1). The difference is only statistically significant up to the age of 35 years (Table 4). However the number of years with limitations in the Flemish region is greater in all age groups, especially due to the fact of a higher expectation of life with moderate limitations as the years with severe limitations are higher in the Walloon region. Relatively, there is not much difference in the healthy life percentage up to age of 55 years. In older men the healthy life percentage is higher in the Walloon males.

Among women at the age of 25 years, the disability free life expectancy is 40.35 years in the Flemish region and 36.65 years in the Walloon region. The expected years with limitations is less in the Flemish region (15.70 years) compared to the Walloon region (18.31 years). This is especially due to less expected years with severe limitations (4.04 versus 7.32 years), as the expectation of life with moderate limitations is higher in the Flemish region (11.66 versus 10.99 years). This implies that at age 25 years, a woman in the Flemish region has a higher healthy life percentage (71.98%) compared to a woman in the Walloon region (68.68%). In contrast to men, we observe in women a similar picture at any age. The difference in DFLE ranged from 3.70 years at the youngest age to 0.30 years at the oldest age. These differences were statistically significant up to the age of 75 years (Fig. 2, Table 4). At any age the proportion of life without disability is greater in women living in the Flemish region.

TABLE 2

Statistical inference on the difference between the Flemish and de the Walloon region, in healthy life expectancy (HLE) in years calculated by using self-perceived health as the indicator for ill health, Belgium, 1997

	Flemish region		Walloon region		Difference in HLE	Z*-score
	HLE	95% CI	HLE	95% CI		
Males						
At age 25	39.47	(38.30 – 40.64)	34.19	(32.92 – 35.47)	5.28	5.98
At age 35	30.55	(29.41 – 31.71)	25.48	(24.24 – 26.72)	5.07	5.90
At age 45	22.19	(21.10 – 23.28)	18.15	(16.98 – 19.32)	4.04	4.94
At age 55	14.48	(13.43 – 15.53)	11.69	(10.61 – 12.76)	2.79	3.64
At age 65	8.55	(7.58 – 9.52)	7.62	(6.71 – 8.54)	0.93	1.37
At age 75	4.31	(3.32 – 5.31)	3.80	(2.88 – 4.73)	0.51	0.73
At age 85	2.27	(1.12 – 3.43)	2.65	(1.23 – 4.06)	-0.38	-0.40
Females						
At age 25	39.82	(38.37 – 41.27)	33.48	(31.99 – 34.98)	6.34	5.97
At age 35	30.87	(29.46 – 32.29)	25.39	(23.96 – 26.82)	5.48	5.34
At age 45	23.67	(22.34 – 24.99)	18.55	(17.22 – 19.89)	5.12	5.32
At age 55	16.36	(15.11 – 17.60)	12.62	(11.43 – 13.81)	3.74	4.26
At age 65	9.96	(8.82 – 11.10)	6.97	(5.96 – 7.97)	2.99	3.85
At age 75	5.00	(3.90 – 6.10)	3.76	(2.85 – 4.67)	1.24	1.71
At age 85	2.73	(1.55 – 3.90)	1.66	(0.78 – 2.54)	1.07	1.43

*: Z-score difference: Critical value of $Z_{0.95}$ = 1.96 for α = 0.95.

TABLE 3

Life expectancy, health expectancy (disability-free life expectancy), life expectancy with ill health (with moderate and severe limitations) in years calculated by using the functional limitation as the indicator for ill health, by region and sex in Belgium, 1997

	Flemish region					Walloon region				
	Life expectancy	Disability free life expectancy	Life expectancy with moderate limitations	Life expectancy with severe limitations	Healthy life percentage	Life expectancy	Disability free life expectancy moderate limitations	Life expectancy with severe limitations	Life expectancy with	Healthy life percentage
Males										
At age 25	50.42	39.11	9.04	2.27	77.57	48.07	36.97	8.33	2.76	76.91
At age 35	40.92	30.08	8.62	2.22	73.51	38.77	28.15	7.91	2.71	72.61
At age 45	31.57	21.01	8.33	2.22	66.55	29.71	20.00	7.04	2.67	67.32
At age 55	22.78	13.26	7.41	2.10	58.21	21.29	12.40	6.40	2.49	58.24
At age 65	14.93	7.07	5.77	2.09	47.35	13.90	7.14	4.15	2.62	51.37
At age 75	8.70	2.80	4.57	1.33	32.18	8.18	3.24	2.20	2.75	39.61
At age 85	4.42	0.57	2.46	1.39	12.90	4.22	0.98	0.78	2.47	23.22
Females										
At age 25	56.06	40.35	11.66	4.04	71.98	54.96	36.65	10.99	7.32	66.68
At age 35	46.28	31.05	11.28	3.96	67.09	45.27	27.98	10.29	7.00	61.81
At age 45	36.74	22.57	10.52	3.65	61.43	35.86	20.30	9.27	6.30	56.61
At age 55	27.56	14.70	9.26	3.60	53.34	26.85	12.44	8.23	6.19	46.33
At age 65	18.85	8.18	7.33	3.35	43.40	18.36	6.26	6.20	5.90	34.10
At age 75	11.18	3.65	4.46	3.07	32.65	10.86	2.13	4.43	4.30	19.61
At age 85	5.36	1.03	2.68	1.65	19.22	5.18	0.73	1.14	3.31	14.09

TABLE 4

Statistical inference on the difference between the Flemish and de the Walloon region, in disability free life expectancy (DFLE) in years calculated by using the functional limitation as the indicator for ill health, Belgium, 1997

	Flemish region		Walloon region		Difference in DFLE	Z^*-score
	DFLE	95% CI	DFLE	95% CI		
Males						
At age 25	39.11	(37.96 – 40.25)	36.97	(35.81 – 38.13)	2.14	2.57
At age 35	30.08	(28.96 – 31.20)	28.15	(27.02 – 29.29)	1.93	2.36
At age 45	21.01	(19.90 – 22.12)	20.00	(18.90 – 21.09)	1.01	1.27
At age 55	13.26	(12.20 – 14.32)	12.40	(11.35 – 13.46)	0.86	1.12
At age 65	7.07	(6.11 – 8.03)	7.14	(6.23 – 8.05)	–0.07	–0.10
At age 75	2.80	(1.89 – 3.71)	3.24	(2.34 – 4.13)	–0.44	–0.67
At age 85	0.57	(0.00 – 1.38)	0.98	(0.00 – 2.14)	–0.41	–0.56
Females						
At age 25	40.35	(39.00 – 41.71)	36.65	(35.32 – 37.99)	3.70	3.80
At age 35	31.05	(29.71 – 32.39)	27.98	(26.70 – 29.27)	3.07	3.23
At age 45	22.57	(21.28 – 23.86)	20.30	(19.09 – 21.51)	2.27	2.52
At age 55	14.70	(13.49 – 15.91)	12.44	(11.32 – 13.56)	2.26	2.69
At age 65	8.18	(7.11 – 9.25)	6.26	(5.35 – 7.16)	1.92	2.70
At age 75	3.65	(2.69 – 4.61)	2.13	(1.39 – 2.87)	1.52	2.45
At age 85	1.03	(0.23 – 1.83)	0.73	(0.11 – 0.34)	0.30	0.59

*: Z-score difference: Critical value of $Z_{0.95}$ = 1.96 for α = 0.95.

TABLE 5

Life expectancy, health expectancy (mental life expectancy: MLE), life expectancy in ill health in years calculated by using the GHQ-12 as the indicator for ill health, by region and sex in Belgium, 1997

	Flemish region				Walloon region			
	Life expectancy	MLE	Life expectancy in ill health	Healthy life percentage	Life expectancy	MLE	Life expectancy in ill health	Healthy life percentage
Males								
At age 25	50.42	38.55	11.87	76.46	48.07	34.22	13.85	71.18
At age 35	40.92	31.87	9.04	77.90	38.77	27.46	11.31	70.82
At age 45	31.57	25.10	6.46	79.52	29.71	21.77	7.94	73.28
At age 55	22.78	18.03	4.75	79.15	21.29	16.09	5.19	75.60
At age 65	14.93	12.20	2.73	81.68	13.90	10.15	3.75	73.02
At age 75	8.70	7.19	1.50	82.70	8.18	5.78	2.41	70.60
At age 85	4.42	3.95	0.47	89.43	4.22	1.18	3.04	27.91
Females								
At age 25	56.06	39.10	16.96	69.75	54.96	32.76	22.21	59.60
At age 35	46.28	32.11	14.17	69.39	45.27	26.95	18.32	59.53
At age 45	36.74	26.05	10.69	70.90	35.86	21.44	14.42	59.79
At age 55	27.56	19.58	7.98	71.03	26.85	16.15	10.70	60.16
At age 65	18.85	12.89	5.96	68.39	18.36	10.89	7.46	59.34
At age 75	11.18	7.45	3.73	66.61	10.86	6.97	3.89	64.17
At age 85	5.36	4.33	1.03	80.78	5.18	2.28	2.90	44.05

TABLE 6

Statistical inference on the difference between the Flemish and de the Walloon region, in mental life expectancy (MLE) in years calculated by using the GHQ-12 as the indicator for ill health, Belgium, 1997

	Flemish region		Walloon region		Difference in HLE	Z*-score
	MLE	95% CI	MLE	95% CI		
Males						
At age 25	38.55	(37.35 – 39.75)	34.22	(32.94 – 35.49)	4.33	4.85
At age 35	31.87	(30.79 – 32.95)	27.46	(26.30 – 28.62)	4.41	5.45
At age 45	25.10	(24.14 – 26.07)	21.77	(20.73 – 22.80)	3.33	4.62
At age 55	18.03	(17.16 – 18.89)	16.09	(15.20 – 16.98)	1.94	3.05
At age 65	12.20	(11.46 – 12.94)	10.15	(9.37 – 10.94)	2.05	3.72
At age 75	7.19	(6.46 – 7.93)	5.78	(5.00 – 6.56)	1.42	2.58
At age 85	3.95	(3.24 – 4.67)	1.18	(0.00 – 2.49)	2.77	3.65
Females						
At age 25	39.10	(37.64 – 40.56)	32.76	(31.21 – 34.30)	6.34	5.84
At age 35	32.11	(30.74 – 33.49)	26.95	(25.51 – 28.39)	5.16	5.08
At age 45	26.05	(24.79 – 27.31)	21.44	(20.12 – 22.77)	4.61	4.93
At age 55	19.58	(18.44 – 20.72)	16.15	(14.98 – 17.32)	3.43	4.10
At age 65	12.89	(11.85 – 13.93)	10.89	(9.91 – 11.88)	2.00	2.73
At age 75	7.45	(6.46 – 8.44)	6.97	(6.08 – 7.86)	0.47	0.70
At age 85	4.33	(3.42 – 5.23)	2.28	(1.35 – 3.22)	2.05	3.08

*: Z-score difference: Critical value of $Z_{0.95} = 1.96$ for $\alpha = 0.95$.

The life expectancy in good mental well-being was at age 25 year lower in the Walloon region (respectively 34.22 years and 32.76 years in men and women) compared to the Flemish region (respectively 38.55 years and 39.10 years) (Table 5). At that age the expected years to live in ill health, i.e. in ill mental health, was greater in the Walloon region (respectively 13.85 years and 22.21 years in men and women) than in the Flemish region (respectively 11.87 years and 16.96 years). The healthy life percentage was thus lower in the Walloon region. In men this difference is 5% of the remaining life (71.18% –vs– 76.46% in respectively the Walloon and Flemish region). In women the difference is 10% (respectively 59.6% –vs– 69.75%). In absolute years, the MLE is in both men and women greater in the Flemish region at any age between 25 years up to the age of 85 (Fig. 1, 2). The difference is statistically significant at any age, except the age of 75 years among women (Table 6).

Conclusions

The paper combines the mortality with morbidity information to compare the health status of the Flemish and Walloon region in Belgium. Three different dimensions of health were used: the perceived health, the functional health and the mental well-being. The overall findings are that, compared to the Walloon region, people living in the Flemish region not only live longer but also tend to be healthier while doing so: they live more years in good perceived health, more years without functional limitations and more years in good mental well-being.

As the participation rate in the Health Interview Survey was similar in both regions (61%), differential selection by region is not likely to be an important explanation of the observed differences.

Among men at age 25 years, the difference is more than two years in LE and DFLE. The difference is even greater for the MLE (> 4 years) and HLE (> 5 years). At that age, all differences were statistically significant. At older ages the differences decrease and for some of the health expectancy indicators the sign of the differences changes. This is the case in men from the age of 65 years on for the DFLE and from the age of 85 years on for the HLE. The latter differences are however not statistically significant. In women, at all ages the LE and all 3 health expectancy indicators are greater in the Flemish region. The differences are at age 25 years respectively 1.1 years (LE) and 3.7 years (DFLE), 6.3 years (HLE, MLE) and still 0.49 years (LE), 1.92 years (DFLE), 2 years

(MLE) and 2.99 years (HLE) at age 65 years. In women, the differences by region remain statistical significant at least up to the age of 65 years.

Geographical variations in health expectancy indicators have been looked at in several countries among others Canada (24), Australia (22), Great Britain (25, 26) and Spain (27). These results suggest that places with the shorter life expectancies tend to have the greatest amount of morbidity and the largest expected number of years in ill health (3). The current paper confirms the regional inequity in health as described in an earlier publication (20). In the previous publication only data on perceived health were available. Using cross-sectional mortality data and the 1989-90 Eurobarometer survey data the shorter life expectancy and shorter healthy life expectancy in the Walloon region was described. In this paper we were able to add information on functional limitations and mental well-being.

Although the health expectancy indicator is conceptually easy to understand, the inference on differences and especially the identification of determinants of these differences is more complex. First of all, the indicator combines both the mortality and morbidity experience of the different cohorts who, especially for the oldest ones, are determined by a cumulative lifetime accumulation of exposures. Proper inference requires knowledge on the dynamics of population health over a long period. During the 20th century the lower mortality in the Walloon region in the beginning of century evolved to a higher mortality in the second half of the century. There is no information on the relative evolution of the morbidity status between the two regions over the whole period. Although the differences in DFLE at age 65 and at older ages was not statistically significant the change of the sign of the difference is worthwhile further investigation. Next to random sample variation that can not be excluded the lower prevalence of functional limitation among older men in the Walloon Region is either a result of the fact that those men are survivors of cohorts that throughout their life and especially in their youth have been healthier (see the lower mortality in the beginning of the century) or they are the survivors of cohorts with a higher mortality among those with morbidity (see higher mortality in the second part of the century). Data on morbidity and survivorship by cohort over time would be necessary to explore further both hypotheses.

Secondly the interaction between mortality and morbidity potentially leads to a large set of differences that could be considered both absolute and relative statistics: years in good health, years in ill health and the percentage of remaining life in good (bad) health. Similar to the other

international publications on geographical variation in health expectancy indicators, this paper mostly focused on absolute differences in good health expectancy. A third limitation in the inference on differences in health expectancy indicators is a result of combining both incidence (mortality) and prevalence (morbidity) data. Most of the discussion on this issue has been related to the evaluation of trends over time. The conclusion of those discussions was that the effect of the prevalence bias should be small in a steady state situation without rapid changes in incidence of mortality or morbidity (28). However, e.g. differential survival bias cannot be totally excluded, although the effect is possibly minimal.

Six years after the first publication on regional differences in healthy life expectancy in Belgium a main question remains: how to translate current information into policy action. There is no indication of substantial differences in health resources indicators between the two regions in Belgium and if any the differences are not negatively directed towards the Walloon region. Further it has been shown that e.g. the DFLE is independent of health resource indicators when controlling for other health determinants (27). Therefore it was suggested that health expectancy indicators are appropriate measures for resources allocation as they measure the population social and health needs independent of resources and uses of social and health services (27). Socio-economic gradient is a strong determinant of health (29). Several studies within countries have described socio-economic inequalities by means of calculation of health expectancy indicators by educational attainment (30), income (24) or occupation (31). In Belgium educational attainment has been shown to be a factor associated with inequity in health. Especially the LE, HLE, DFLE and MLE are consistently lower in subjects with a lower educational level (32). Few studies have evaluated socio-economic differences by geographical units as a cause of geographical differences in health expectancies as have been done for mortality. Socio-economic differences between the Flemish and Walloon region explains part of the differences between the mortality experience between the two regions (33, 34). Social class (level of education and unemployment rates) was an important explanatory factor of the provincial differences in DFLE both at birth and at older age in Spain (27). Social-economic indicators by regions were also a main determinant of differences in healthy life expectancy in England and Wales (26).

Health promotion may provide another gateway for initiative, as several lifestyles are associated with longevity and morbidity. E.g. both smoking and lack of physical activity is causing shorter life expectancy and shorter disability free life expectancy (35). The 1997 Health Interview

Survey in Belgium identified that by and large the negative health behaviour and attitudes such as smoking, physical activities, nutritional habits, are more frequent in the Walloon region (2). These differences in lifestyle potentially contribute to differences in life expectancy and healthy life expectancy and disability free life expectancy.

Of special attention is the difference in mental life expectancy between the two regions. Mental health problems are currently high in the ranking of the burden of diseases in industrialised countries and are expected to take even a more dominant place in the near future (11). There are several indications of a lower mental health status in the Walloon region. E.g. the suicide rate and the suicide attempt rate is higher in the Walloon region (36, 37); the consumption of psychotropic drugs is higher (2). A worse socio-economic climate with higher unemployment rates could be a contributing factor. However the differences in mental life expectancy remain very high in the oldest ages and these older cohorts have experienced a more favourable socio-economic period during their adult life. Differences in life style (lower physical activity, worse nutritional habits) and a less favourable perceived social support have been suggested as potential reasons for the differences in mental health status between the two regions (38).

The differences in health expectancy indicators are substantial and should stimulate public health policy makers in their discussion on how to improve the health of the Belgian population taking into account the regional inequity. Although some points for action are suggested, more knowledge is warranted to have more insight in the essential question "Why are some people healthy and others not" (39).

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SUPPLEMENT 1

Age-specific probability of death by gender and region.
National mortality database, 1991-1996, Belgium (1)

Age group	Males		Females	
	Flemish region	Walloon region	Flemish region	Walloon region
25-34	0.010863	0.016202	0.004415	0.006075
35-44	0.018108	0.027330	0.011132	0.014933
45-54	0.044732	0.061390	0.025783	0.031399
55-64	0.112473	0.143445	0.055723	0.066524
65-74	0.286995	0.334918	0.151337	0.165685
75-84	0.611763	0.649197	0.427525	0.447269
85-	0.907183	0.919463	0.840692	0.852431

SUPPLEMENT 2
Age-specific prevalence of perceived ill health.
Health Interview Survey, 1997, Belgium (2)

Age group	Males		Females	
	Flemish region	Walloon region	Flemish region	Walloon region
25-34	7.05	8.00	9.00	17.29
35-44	11.64	20.81	24.95	28.44
45-54	14.78	26.17	21.81	35.77
55-64	27.67	45.01	28.72	37.06
65-74	37.26	39.78	39.00	58.77
75-84	50.87	57.11	57.60	64.47
85-	48.57	37.28	49.09	67.95

SUPPLEMENT 3
Age-specific prevalence of functional limitations.
Health Interview Survey, 1997, Belgium (2)

Age group	Flemish region		Walloon region	
	Moderate disability	Severe disability	Moderate disability	Severe disability
Males				
25-34	5.18	0.75	5.55	1.00
35-44	4.42	0.34	10.79	1.12
45-54	12.76	2.20	10.64	3.46
55-64	24.07	2.58	30.33	2.61
65-74	28.80	13.04	31.71	9.34
75-84	51.72	11.41	28.75	28.09
85-	55.65	31.36	18.38	58.43
Females				
25-34	4.38	1.00	7.71	3.64
35-44	8.78	3.51	11.67	7.98
45-54	15.19	1.41	13.17	3.09
55-64	23.95	4.55	25.13	6.95
65-74	37.78	7.94	26.89	24.92
75-84	36.10	26.18	47.51	30.87
85-	50.05	30.73	22.00	63.96

SUPPLEMENT 4
Age-specific prevalence of ill mental health.
Health Interview Survey, 1997, Belgium (2)

Age group	Males		Females	
	Flemish region	Walloon region	Flemish region	Walloon region
25-34	29.40	27.42	28.57	40.11
35-44	27.19	36.36	36.13	41.37
45-54	19.64	31.50	29.46	41.18
55-64	24.39	21.13	24.14	38.40
65-74	19.04	25.42	29.81	45.38
75-84	18.95	19.97	38.75	28.63
85-	10.57	72.09	19.22	55.95

SUPPLEMENT 5
Life expectancy and health expectancies, Belgium 1997 (32)

Age group	Life expectancy	Healthy life expectancy	Disability free life expectancy	Mental life expectancy
Males				
25	49.54	37.39	38.10	36.73
35	40.12	28.60	29.15	29.99
45	30.89	20.65	20.48	23.64
55	22.25	13.47	12.86	17.15
65	14.59	8.09	6.92	11.36
75	8.55	4.14	2.89	6.65
85	4.38	2.47	0.71	3.23
Females				
25	55.65	37.66	39.12	36.46
35	45.91	29.05	30.05	29.97
45	36.42	21.97	21.83	24.15
55	27.32	15.16	14.03	18.15
65	18.71	9.14	7.61	12.05
75	11.12	4.95	3.09	7.25
85	5.34	2.55	0.89	3.57