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HEALTHY WORKING LIFE EXPECTANCIES AT AGE 50 IN EUROPE: A NEW INDICATOR

A. LIEVRE[1,2], F. JUSOT[1,2], T. BARNAY[1,3], C. SERMET[1,2], N. BROUARD[2], J.M. ROBINE[4], M.A. BRIEU[5], F. FORETTE[5]

1. IRDES, Institut de Recherche et Documentation en Economie de la Santé,10, rue Vauvenargues,75010 Paris-FRANCE; 2. INED, Institut National d'Etudes Démographiques, 133, Boulevard Davout,75980 Paris cedex 20-FRANCE; 3. ERUDITE, Faculté de sciences économiques et de gestion, Université Paris 12 Val de Marne, Mail des mèches - route de Choisy, 61, avenue du Général de Gaulle 94010 Créteil-FRANCE; 4. INSERM, Equipe Démographie et Santé, Centre Val d'Aurelle - Parc Euromédecine, 34298 Montpellier Cedex 5; 5. ILC-France, International Longevity Center- Alliance for Health and the Future, 49 rue Mirabeau 75016 Paris - Corresponding author : Françoise Forette-E-mail address: francoise.forette@brc.aphp.fr

Abstract: *Objectives:* The absence of disease or disability and active involvement in society are considered as essential dimensions of successful ageing. To assess these concepts, we propose a new indicator the Healthy Working Life Expectancy (HWLE) that associates health status and productive engagement, in order to compare various situations in Europe. *Design:* The study population is drawn from the European Community Household Panel (ECHP) which is the unique source of longitudinal data, providing comparable information between 1995 and 2001 on health and work statuses for a sample of some 60,000 household's representative of the population of: Austria, Belgium, Denmark, Finland, France, Germany, the United Kingdom, Greece, Italy, the Netherlands, Portugal, and Spain. Based on the multi-state life table approach conventionally used for calculating healthy life expectancies, the HWLE corresponds to the number of years spent between the ages of 50 and 70 both in good health and at work. *Results:* In average, among the 20 years available between age 50 and age 70, the HWLE is 7.5 years for men and 4.8 years for women, ie, one half and one third respectively of the number of years spent in good health (14.1 and 13.5 years). The countries where the healthy working life expectancy of seniors is the highest are also the countries where the levels of employment of seniors are higher. Conversely, health status has only a weak influence on the HWLE indicator. *Conclusion:* These findings suggest the existence of a reservoir of healthy years which can be used to increase the length of the working life expectancy. They underline also the essential role that employment maintenance and retirement policies should have to increase the number of healthy years spent at work, and therefore guaranty a successful ageing for the seniors in Europe.

Key words: Life expectancy, successful ageing, working status, health status.

Introduction

The population ageing and the increase in the number of years that people can expect to live after the age of 60 has led gerontological research over the last twenty years to take an increasing interest in the quality of life associated with these extra years of life expectancy. Three elements are considered as necessary for guaranteeing a successful ageing (1, 2): the absence of disease and disabling conditions, maintaining physical and cognitive capacities, and the active involvement of seniors in society.

With this in mind, recent gains in life expectancy do not constitute gains in quality of life for seniors unless they are associated with a satisfactory health status, numerous interpersonal relationships and an ability to maintain a productive social role. This productive involvement of seniors in social life is usually thought of in terms of volunteer work in the community or family caregiving, but it also includes the participation of seniors in the labour market (3). It has been demonstrated that the well-being of seniors depends to a great extent on their ability to play a role in the labour market when they choose to do so (4-6).

In addition to the contribution it makes to their quality of life, this productive involvement of seniors in society is also a way of insuring the financial equilibrium of Social Security systems throughout Europe, an equilibrium that is jeopardised by the fact that the post-war generations are reaching retirement age, combined with increases in life expectancy and the decrease in the age of withdrawal, i.e. the age at which people cease professional activities (7).

The European Union has committed itself firstly to promoting the health status of seniors by introducing a Healthy Life Years Indicator (8;9) into its battery of structural indicators, and secondly to promote active ageing policies, in order to increase their employment rate. The recommendations that came out of the European Council in Stockholm in 2001 illustrate this commitment, by establishing an objective of employment rate of 50% for the 55-64 age group by the year 2010 (10). In 2005, while the employment rate of 15-64 year-olds is relatively uniform across the different European countries (11) (63.8% on average), the differences are much greater at the start and at the end of professional careers. Between 55 and 64 years of age, employment rate varies greatly between the European countries, going from 31.4% in Italy to 59.5 % in Denmark. In 2005, France (37.9%), despite a recent upward trend, still remains six points behind the European average (EU 15) of 44.1 % (12).

In order to assess successful ageing, it is important to

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provide indicators that associate longevity, health status and productive engagement. Up until now, the only indicators that have met this objective partially are those that measure healthy life expectancy, such as the healthy life years indicator, which measures the quality of the additional years gained with the increase in life expectancy (13;14). These indicators have provided precious information for debates on the evolution of morbidity among the elderly (15-17) and for comparing this evolution between different countries (18;19). Alongside this, working life expectancies have already been calculated (20-22) but without taking health conditions into account.

What we propose to do here is to construct a synthetic indicator of Healthy Working Life Expectancy which defines the number of years lived between the ages of 50 and 70 both in good health and employment. Based on the observation that the levels of employment and conditions of health are very different between European countries, we use this indicator to compare the various situations.

Population and Methods

Population

We use data from the European Community Household Panel (ECHP) which is the unique source of longitudinal data providing information on health and employment statuses for a sample of some 60,000 households representative of the population of several countries in Europe. This annual harmonised longitudinal survey was conducted between 1994 and 2001 in Belgium, Denmark, France, Germany, the United Kingdom, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, and Spain. Austria and Finland joined the project in 1995 and 1996 respectively (European Commission, 1999). Germany, Luxemburg and the United Kingdom conducted only the first three waves of the original ECHP survey. In order to obtain data for the entire period for those countries, harmonised data have been derived from already existing national panels (German Socio Economic panel (GSOEP) for Germany, Panel Socio Economic Liewen zu Lëtzebuerg (PSELL) for Luxemburg and British Household Panel Survey (BHPS) for the United Kingdom).

Variables

The Healthy Working Life Expectancy indicator (HWLE) is based on the combination of two variables, health and employment statuses.

Concerning health, persons are classified as 'unhealthy' if they declare that they 'have any chronic physical or mental health problem, illness or disability' and also 'to be hampered severely or to some extent in their daily activities by this physical or mental health problem, illness or disability'; otherwise they are classified as 'healthy'

A binary working status is constructed based on the question "Are you at present working in a job or business normally involving at least 15 hours of work a week?". If the answer is yes, the persons are classified as working. Persons classified as 'non-working' include unemployed, retired, other non-active or persons working less than 15 hours a week.

Any individuals who entered an institution between two waves are classified as unhealthy and non-working.

Using these two variables, we define for each individual a four-class status: 'healthy and working', 'healthy and non-working', 'unhealthy and working', 'unhealthy and non-working'. To build up the HWLE indicator, we focus on the "healthy and working" status.

Methodology

Based on the hypothesis that all the individuals aged at least 50 years old would survive to the age of 70, we divided this 20-year period according to the time spent in each of the four above-mentioned statuses. The Healthy Life Expectancy corresponds to the number of years spent over those 20 years in good health without taking the working status into account. The Working Life Expectancy corresponds to the number of years spent over those 20 years in employment without taking the health status into account. The Healthy Working Life Expectancy (HWLE) corresponds to the number of years spent over those 20 years in the status "healthy and working".

The HWLE was estimated using a multi-state life table approach (21;23) in order to obtain an indicator that reflects the current conditions of health and employment. Mean duration is calculated from the transition probabilities between states estimated using a Markov chains in discrete-time model. We used the IMaCh ("Interpolation of Markov Chains") program(24) (25)modified to estimate partial life expectancies between 50 and 70 years. This program estimates the parameters of the transition probabilities between an initial status and a final work-health status by fitting a logistic multinomial model, and then calculates the HWLE.

An additional calculation was made to obtain the estimates for Germany and United Kingdom. Because of anticipated stop of the survey for these countries, we can calculate the estimates only over the period 1995-1996 whereas for the other countries, the healthy working expectancies can be estimated for 1995-2001. In order to guarantee the comparability of the estimates, we undertook to calculate a correcting factor which, once applied to the healthy working expectancies calculated over 1995-96, would give the estimates for 1995-2001. This corrective factor was calculated on the basis of the trend of healthy working life expectancies between the periods 1995-96 and 1997-2001, as estimated from the SOEP and BHPS national surveys (26;27). We carried out separate analyses for men and women.

Study sample

As the wording on the disability question changed between the first and the second wave of the ECHP, we decided to exclude the 1994 data in the calculations. All the calculations are made using the 1995-2001 panels. Finally, we selected 12

countries in our analysis, Luxemburg and Ireland being excluded because of their too small sample size.

In these selected countries, 50,506 individuals aged 50-70 who answered at least once during the period 1995-2001. Since the calculations are based on transitions, we excluded the participants who had only one interview (6,820 persons, corresponding to 13.5%). The resulting sample is therefore constituted of 21,026 men and 22,660 women who answered at least 2 interviews (Tables 1a and 1b). For individuals who participated at least twice, the number of interviews is 5 on average, i.e. 4 transitions.

The mean age of the study sample is 60.8 years.

Results

The results encompass the mean percentages over the 7-year period of healthy, working and healthy and working subjects observed in the panel (table 1a and 1b) and the calculated life expectancies (table 2).

Health status

In terms of health status, the results display no significant gender differences but underline huge disparities between countries.

The percentage of healthy people varies from 47.9% in Finland to 80.3% in Italy for men and from 44.3% to 78.4% for women. More than 70% of the population reports to be in good health in Italy, Greece and Belgium whereas less than a half in Finland.

Working status

Men are more frequently working (41.4%) than women (20.9%).

Among the male population, the percentage of working people varies from 30% in Belgium to 54.8 % in Portugal. The percentage of working women ranges from 11.4% in Belgium to 37% in Finland.

Healthy and working status

In these countries, 33.3% of men and 15.9% of women are both healthy and working. United Kingdom is the country where the percentage of healthy and working men is the highest with 47.8%, followed by Greece, with 41.4% and Portugal with a broadly similar rate. Conversely, only 24.5% of Finnish and 24.8% of French men are both healthy and working. The highest rates of healthy and working women are observed in the United Kingdom (28.6%) and Denmark (25.3%) and the lowest in Spain (9.2%) and Belgium (10.1%).

Healthy Life Expectancy

Between 50 and 70, men on average have a healthy life expectancy of 14.1 years (table 2). Of the 12 European countries studied, Italy comes out on top with 16.4 years, followed by Greece, 15.9 years and Belgium with 15.4 years. On the other hand, healthy life expectancy is lowest in Finland, 10.9 years, in Germany with 12.4 years and Portugal with 12.9 years.

Overall, between 50 and 70 years old, women have a healthy life expectancy of 13.5 years, 0.6 years less than men. The healthy life expectancy of women is particularly high in Italy, 16.1 years, Belgium, 15.7 years, Austria, 14.7 years and Greece, 14.6 years. On the other hand, it is lowest in Finland with 10.6 years, Portugal 11.3 years and Denmark with 11.5 years.

Working Life Expectancy

Between 50 and 70, the working life expectancy of men in Europe is 9.4 years (table 2). It is the Danish who have the

Table 1a

Demographic data over the 7-year follow-up by country. ECHP, Men aged 50-70, 1995-2001

	Austria	Belgium	Denmark	Finland (**)	France	Germany	Greece	Italy	Portugal	Spain	The Netherlands	United-Kingdom	Total
Total number of respondents	1414	1090	994	1641	2373	2346	2392	3419	2311	2879	2020	1534	24413
Including :													
Subjects with only one interview (N)	198	177	177	238	317	262	309	382	299	450	380	198	3387
Subjects with at least two interviews (N)	1216	913	817	1403	2056	2084	2083	3037	2012	2429	1640	1336	21026
(%)	86	83,8	82,2	85,5	86,6	88,8	87,1	88,8	87,1	84,4	81,2	87,1	86,1
(*) Average number of interviews	5,2	4,8	4,9	4,4	5	5,4	5,2	5	5,2	4,9	4,7	5,4	5
(*)Mean Age (years)	59,9	60,9	60,3	59,5	60,9	60,2	61,4	60,9	61	61,1	59,9	60,8	60,7
(*)Healthy subjects (%)	66,8	73,8	65,1	47,9	66,1	66,4	75,7	80,3	63,6	65,6	64,2	72,1	68,2
(*)Working subjects (%)	34,8	30	50,8	37,3	31,6	44,2	47,7	37	54,8	37	38,6	56,1	41,4
(*)Healthy and working subjects (%)	27,8	26	39,7	24,5	24,8	33,9	41,4	32,6	41,3	30	29,9	47,8	33,3

(*)Calculations are made on individuals who answered at least twice during 1995-2001; (**)Calculations are made for the period1996-2001

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Table 1b
Demographic data over the 7-year follow-up by country. ECHP, Women aged 50-70, 1995-2001

	Austria	Belgium	Denmark	Finland (**)	France	Germany	Greece	Italy	Portugal	Spain	The Netherlands	United-Kingdom	Total
Total number of respondents	1526	1187	1008	1603	2632	2367	2554	3523	2676	3106	2121	1790	26093
Including :													
Subjects with only one interview (N)	208	176	164	206	355	277	316	383	302	444	373	229	3433
Subjects with at least two interviews (N)	1318	1011	844	1397	2277	2090	2238	3140	2374	2662	1748	1561	22660
(%)	86,4	85,2	83,7	87,1	86,5	88,3	87,6	89,1	88,7	85,7	82,4	87,2	86,8
(*) Average number of interviews	5,2	5	5	4,4	5	5,3	5,1	5,1	5,4	5	4,8	5,4	5.1
(*)Mean Age (years)	60,2	61,3	60,1	59,7	61,3	60,5	61,6	61,1	61,1	61,2	60,5	61,3	60,9
(*)Healthy subjects (%)	68,9	73	55,7	44,3	64,7	67,9	72,3	78,4	55,5	62,8	62,9	68,6	65,6
(*)Working subjects (%)	16,8	11,4	36,1	37	19,6	23	17,7	12,2	31,9	12,4	15	33,7	20,9
(*)Healthy and working subjects (%)	12,8	10,1	25,3	23,1	15,4	17,7	14,8	10,6	22	9,2	11,4	28,6	15,9

(*) Calculations are made on individuals who answered at least twice during 1995-2001; (**)Calculations are made for the period1996-2001

Table 2
Repartition of the 20 years lived between age 50 and 70 according to the labour force and health status : Working Life Expectancy, Healthy Life Expectancy, Healthy working Life Expectancy and Unhealthy Nonworking Life Expectancy. ECHP, 1995-2001

	Men						Women						differences between genders for the HWLE (*)
	HWLE in years	Rank	WLE in years	Rank	HLE in years	Rank	HWLE in years	Rank	WLE in years	Rank	HLE in years	Rank	
Austria	6,1	11	7,3	10	14,2	6	3,9	10	4,7	11	14,7	3	2,2
Belgium	6,2	10	7	12	15,4	3	5	8	5,5	8	15,7	2	1,2
Denmark	8,8	2	11,4	1	13,3	8	6,1	2	8,9	2	11,5	10	2,7
Finland	6,3	9	9	8	10,9	12	6,2	1	9,4	1	10,6	12	0,1
France	5,5	12	7,3	11	13,1	9	5,2	5	6,9	6	13,3	8	0,3
Germany	7,3	7	10,3	5	12,4	11	6	3	8,8	3	12	9	1,3
Greece	9,7	1	10,9	4	15,9	2	3,9	11	4,8	10	14,6	4	5,8
Italy	7,2	8	8,1	9	16,4	1	2,9	12	3,3	12	16,1	1	4,3
Portugal	8,3	5	11	2	12,9	10	5,2	6	7,5	5	11,3	11	3,1
Spain	8,4	4	10	6	14,4	5	4,2	9	5,4	9	13,5	6	4,2
The Netherlands	7,4	6	9,5	7	13,5	7	5,1	7	6,7	7	13,3	7	2,3
United-Kingdom	8,8	3	11	3	14,4	4	5,8	4	8,1	4	13,6	5	3
European average	7,5		9,4		14,1		4,8		6,4		13,5		2,7

HWLE : Healthy/working life expectancy; WLE : Working life expectancy; HLE : Healthy life expectancy; (*) Additional number of years that men can expect to live in employment and in good health compared to women

longest working life expectancy with a total of 11.4 years, followed by the Portuguese and the British, with 11 years, and the Greeks, 10.9 years. On the other hand, working life expectancy reaches only seven years in Belgium and 7.3 years in Austria and France.

Women have a shorter working life expectancy than men: the average is 6.4 years across Europe as a whole, no fewer than 3 years less than men. The working life expectancy of women is highest in Finland, with 9.4 years, followed by Denmark, 8.9 years, Germany with 8.8 years and the United Kingdom, 8.1 years. The shortest working life expectancies are to be observed in Italy, with 3.3 years, Austria, with 4.7 years and Greece, with 4.8 years.

Healthy Working Life Expectancy (HWLE)

Combining health and working statuses between 50 and 70 years, the mean HWLE is 7.5 years for men in Europe (table 2). Greece has the highest healthy working life expectancy for men with 9.7 years, followed by Denmark and the United Kingdom with 8.8 years, Spain with 8.4 years and Portugal with 8.3

years. France holds the record for the shortest HWLE for men, with 5.5 years. This figure is also low in Austria, 6.1 years, Belgium, 6.2 years and Finland, 6.3 years.

For women, HWLE is 4.8 years on average. It is highest in Finland and Denmark, with 6.2 and 6.1 years respectively, followed by Germany with 6 years. Conversely, Greece, Austria and Italy all have healthy working life expectancies of less than 4 years, with 3.9 years for Greece and Austria and only 2.9 years in Italy.

Discussion

The synthetic HWLE indicator measures the number of years lived between the ages of 50 and 70 both in good health and employment. It provides aggregate information on this particular part of the life cycle. It is a period indicator, calculated from a multistate model based on changes in individual employment and health statuses. It therefore provides an estimation of HWLE over the period under consideration that is more reliable and robust than calculations obtained by cross-sectional prevalence methods(24). Longitudinal studies enable transition probabilities between the statuses. Therefore they allow taking into account current working and health conditions, whereas cross-sectional surveys also reflect conditions accumulated in the past.

This study provides the first estimations for HWLE in Europe. Two studies carried out in Finland also looked at comparable issues, but did not consider this combination of working and health statuses (22;28).

The construction of the HWLE indicator was carried out on the ECHP data, currently the only source of longitudinal data in Europe. However, like all longitudinal surveys, the ECHP is subject to considerable level of attrition, which is a potential source of selection biases. The poor reporting of deaths led us to not consider mortality in our calculations of HWLE and to focus only on work and health conditions.

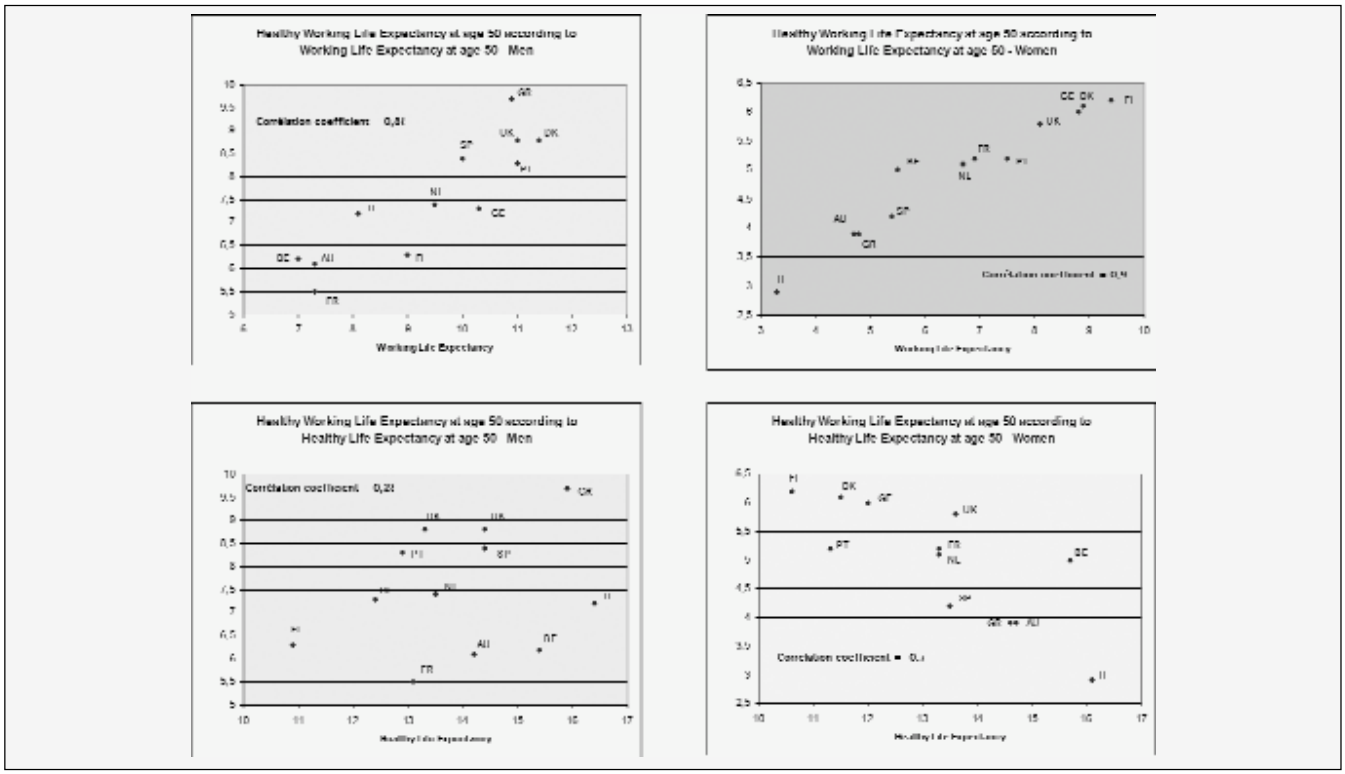
Indeed, the ECHP provides the only harmonised data across Europe and therefore allow comparative analyses. Moreover a previous study demonstrated that health and working indicators based on non-harmonised national surveys are not comparable (29). However, this harmonisation has some limits (30). For example, the exact wording of the questions or their place in the questionnaire varied from one country to another, which may have an effect on the answers (31-33).

This survey uses a self-reported assessment of health. This raises the issue of the comparability between countries (34). The answers may vary according to country and culture (35). They may also depend on retirement and handicap compensation policies (36-38). At the individual level, a person without employment may wish to justify his/her situation by more frequently self-reporting a poor health status (39).

However, our ranking of countries in terms of healthy life expectancies is consistent with that obtained considering the life expectancy at 50 years for each sex and is very similar to

Figure 1

Healthy Working Life Expectancy according to Healthy Life Expectancy and Working Life Expectancy, ECHP 1995-2001



the ranking of the Eurostat healthy life years indicator, calculated on the basis of a cross-sectional exploitation of the same panel (40).

The observed results in terms of working status are also consistent with the available data in the literature. The working life expectancies ranking of countries is similar to the average age of retirement ranking observed by the OECD for the period 1994-1998 (41).

There are major differences in HWLE between countries (fig.1.). In most cases, a longer HWLE is correlated with longer periods of working. The health status rarely has an independent influence.

For men, the HWLE is positively correlated with working life expectancy (correlation coefficient: 0.89). Greece, the UK and Denmark, where the HWLE are the longest, also have the longest working life expectancies. The dominant position of Greece and, to a lesser extent, the UK, is reinforced by a very good reported health status. At the other end of the scale, the HWLE in France, Austria and Belgium, which are the lowest in Europe, are associated with a low working life expectancy, despite of rather good healthy life expectancies.

In women, we observe the same positive correlation between HWLE and working life expectancy (correlation coefficient: 0.97). Furthermore, we see a negative correlation with the healthy life expectancy (correlation coefficient: -0.786). This underlines the weak influence of health on the HWLE indicator. The three countries with the longest HWLE, Finland, Denmark and Germany are those which have both long working life expectancies and short healthy life expectancies. Conversely, Italy, Greece and Austria, which have the shortest HWLE, come last in terms of employment whereas they are well situated in terms of health.

In all countries, the HWLE are longer for men than for women, with an average difference of 2.7 years. However, comparing the ranking of countries for men and women reveals three groups of countries.

In the first group, the difference in HWLE between men and women is very high, greater than 4 years in favour of men (Greece, Spain, Italy) (table 2). In the second group, this difference is between 2 and 4 years (Denmark, UK, the Netherlands, Austria and Portugal). In the third group, this difference is much smaller, less than 2 years (Finland, France, Germany and Belgium).

These differences between genders are once again for the most part due to differences in the levels of employment between men and women. The first group, made up of countries in southern Europe, has low levels of female employment, much lower than for men. The third group, on the other hand, is made up of countries where the level of female employment is relatively high, whereas that of men is relatively low, although higher than that of women. The second intermediary group is made up of countries where men and women rank similarly in terms of employment.

These results demonstrate that the differences in HWLE in Europe reflect more on the differences in the levels of employment of seniors, women and men, than differences in health status.

Our results confirm that the differences in the health status of populations can not explain the differences in employment rates across Europe (42), whereas on an individual level, studies have demonstrated that age related deterioration of health status plays an important role in the premature exit of the labour market (43).

The employment rates of seniors are much more influenced by institutional differences (pay-as-you-go system, early retirement schemes, disability pensions, etc.) and the national labour market specificities (management of careers ends into companies, economic growth, adult learning, etc.). The high replacement rates made possible by the disability pension schemes in the Netherlands and Sweden, with their very flexible conditions of eligibility, have played a role in making disability the main means for achieving early exit from the labour market. Other countries such as France or Germany have favoured premature exits from the labour market by unemployment systems (for example unemployment allowances and pre retirement systems in France).

Conclusion

This article puts forward a new and innovative healthy working life expectancy indicator. It also offers a means of looking at the notion of successful ageing, combining two essential dimensions: the absence of disease and disability and the employment of seniors, which is one of the major elements of their active involvement in society. The construction of this indicator is based on calculation methods conventionally used for healthy life expectancies.

By applying this methodology to the European Community Household Panel data, we were able to compare the number of years lived between 50 and 70 years in good health and employment in 12 countries.

In average in Europe, among the 20 years available between 50 and 70 years old, men spend 14.1 years in good health (70.5%), of which about one half at work, and women 13.5 years (67.5%) in good health, of which about one third (35%) at work. Therefore, in order to promote successful ageing and to comply with Stockholm targets, it should be possible, under favourable labour market conditions, to increase the working life expectancy between 50 and 70 years old, without keeping unhealthy people to work longer. In addition, the countries where healthy working life expectancy of seniors is the highest are also the countries where the levels of employment of seniors are very high. These results underline the essential role that employment maintenance and retirement policies have on the number of years spent healthy and at work. Furthermore, the major differences in health between the countries also suggest that health policies have an important role to play to prevent disability linked to age related diseases which severely

impairs the quality of life of the senior population and lead to very high cost of long term care.

This indicator, used for international or chronological comparisons, will enable European ageing conditions to be monitored, just as healthy life expectancy indicators do with regard to health status alone. It could also be applied to the forthcoming data from the SILC survey, a longitudinal European survey based on the experience of the European panel, thus enabling employment and health policies to be oriented towards improving the employment and health of seniors.

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References

1. Rowe JW, Kahn RL. Successful aging. Gerontologist 1997 August;37(4):433-40.
2. Bowling A. Aspirations for Older Age in the 21ST Century: What is Successfull Aging? Int J Aging Hum Dev 2007;64(3):263-97.
3. O'Reilly P, Caro FG. Productive aging: an overview of the literature. J Aging Soc Policy 1994;6(3):39-71.
4. Bellaby P. Can they carry on working? Later retirement, health, and social inequality in an aging population. Int J Health Serv 2006;36(1):1-23.
5. Choi NG. Relationship between life satisfaction and postretirement employment among older women. Int J Aging Hum Dev 2001;52(1):45-70.
6. Warr P, Butcher V, Robertson I, Callinan M. Older people's well-being as a function of employment, retirement, environmental characteristics and role preference. Br J Psychol 2004 August;95(Pt 3):297-324.
7. Keese, Mark. Ageing and employment in Europe : a summary of oecd evidence and perspectives. OECD;ILC-France; 2007.
8. Eurostat. Healthy Life Years in the core of the Lisbon strategy. Eurostat 2007;Available from: URL: http://ec.europa.eu/health/ph_information/indicators/lifeyears_en.htm
9. Robine J-M. Summarizing health status. In: Pencheon D,Guest C,Melzer D,Muir Gray JA, editors. Oxford Handbook of Public Health Practice.New York: OUP: 2006. p. 160-8.
10. Consilium Europa. Stockholm European Council: presidency conclusions, 24/03/2001 n°100/1/2001. consilium europa 2007;Available from: URL: http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/00100-r1.%20ann-r1.en1.html
11. Eurostat. Employment rates in Europe. Eurostat, 2007;Available from: URL: http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=fr&product=STRIND_EMPLOI&root=STRIND_EMPLOI/emploi/em011
12. Eurostat. Employment rates of older workers. Eurostat 2007;Available from: URL: http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,39140985&_dad=portal&_schema=PORTAL&screen=detailref&language=fr&product=STRIND_EMPLOI&root=STRIND_EMPLOI/emploi/em014
13. Crimmins EM, Hayward MD, Saito Y. Differentials in active life expectancy in the older population of the United States. J Gerontol B Psychol Sci Soc Sci 1996 May;51(3):S111-S120.
14. Laditka SB, Hayward MD. The evolution of demographic methods to calculate health expectancies. In: Robine JM, Jagger C., Mathers CD, Crimmins EM, Suzman R, editors. Determining health expectancies.West Sussex, UK: John Wiley and Sons; 2003. p. 221-34.
15. Fries JF. Aging, natural death, and the compression of morbidity. N Engl J Med 1980 July 17;303(3):130-5.
16. Gruenberg EM. Epidemiology of senile dementia. Adv Neurol 1978;19:437-57.
17. Kramer M. The rising pandemic of mental disorders and associated chronic disease and disabilities. Acta Psychiatr Scand 1980;62 (suppl.285):282-97.
18. Robine, J. M. and Romieu, I. Healthy active ageing : Health Expectancies at age 65 in the different parts of the world. Montpellier : INSERM, Démographie et Santé, REVES; 1998 May.
19. Robine JM, Michel JP. Looking forward to a general theory on population aging. J Gerontol A Biol Sci Med Sci 2004 June;59(6):M590-M597.
20. Brouard N. Espérance de vie active, reprise d'activité féminine : un modèle. Revue Economique 1980;6(Novembre 1980):1260-87.
21. Hoem, J. and Fong, G. A Markov Chain model of Working Life Tables. Report n°1. A new method for the construction of tables of working life. University of Copenhaguen,Dennmark; 1976.
22. Nurminen MM, Heathcote CR, Davis BA, Puza BD. Working life expectancies: the case of Finland 1980-2006. Journal of the Royal Statistical Society A 2005;168(3):567-81.
23. Rogers R, Rogers A, Belanger A. Disability-free life among the elderly in the united states. Aging and Health 1992;4:19-42.
24. Lièvre A, Brouard N, Heathcote CR. The estimation of health expectancies from cross-longitudinal surveys. Mathematical Population Studies 2003;10:211-48.
25. Hoem, J. and Fong, G. A Markov Chain model of Working Life Tables. Report n°1. A new method for the construction of tables of working life. University of Copenhaguen,Dennmark; 1976.
26. European Health Expectancy Monitoring Unit. Technical Report, Vol 1. EHEMU 2007;Available from: URL: http://www.ehemu.eu/pdf/EHEMU_Technical_Report_2005_1.pdf
27. European Health Expectancy Monitoring Unit. Technical Report, vol 2. EHEMU 2007;Available from: URL: http://www.ehemu.eu/pdf/EHEMU_Technical_Report_2005_2.pdf
28. Kaprio J, Sarna S, Fogelholm M, Koskenvuo M. Total and occupationally active life expectancies in relation to social class and marital status in men classified as healthy at 20 in Finland. J Epidemiol Community Health 1996 December;50(6):653-60.
29. Barnay T, Jusot F, Rochereau T, Sermet C. Les mesures de la santé et de l'activité sont-elles comparables dans les enquêtes européennes ? In: LAVALLEE P, editor. Méthodes d'enquêtes et sondages : Pratiques européenne et nord-américaine. Paris : Dunod; 2006. p. 107-11.
30. Eurostat. The European Community Household Panel (EHCP):Survey methodology and implementation, volume 1. 1996.
31. Crossley TF, Kennedy S. The reliability of self-assessed health status. J Health Econ 2002 July;21(4):643-58.
32. Clarke PM, Ryan C. Self-reported health: reliability and consequences for health inequality measurement. Health Econ 2006 June;15(6):645-52.
33. Clark AE, Viacard A. Conditions de collecte et santé subjective : analyse sur données européennes. Economie et Statistiques 2007.
34. Lindeboom M, van Doorslaer E. Cut-point shift and index shift in self-reported health. J Health Econ 2004 November;23(6):1083-99.
35. Shmueli A. Socio-economic and demographic variation in health and in its measures: the issue of reporting heterogeneity. Soc Sci Med 2003 July;57(1):125-34.
36. Dahl S-AN, Oivind A, Vaage K. Work or retirement ? Exit Routes for Novegian Elderly. Applied Economics 2000;32(14):1865-76.
37. Jurges H. True health vs response styles: exploring cross-country differences in self-reported health. Health Econ 2007 February;16(2):163-78.
38. Jylha M, Guralnik JM, Ferrucci L, Jokela J, Heikkinen E. Is self-rated health comparable across cultures and genders? J Gerontol B Psychol Sci Soc Sci 1998 May;53(3):S144-S152.
39. Bound J. Self-Reported versus Objective Measures of Health in Retirement Models. The Journal of Human ressources 1990;26(1):107-37.
40. Eurostat. Healthy Life Years, 1997. Eurostat 2007;Available from: URL: http://epp.eurostat.ec.europa.eu/portal/page?_pageid=0,1136184,0_45572595&_dad=portal&_schema=PORTAL
41. Scherer, Peter. Age of withdrawal from the Labour Force in OECD Countries. 2001. Report No.: n°49.
42. Barnay T, Debrand T. L'état de santé comme facteur de cessation d'activité en Europe. Santé, Société et Solidarité 2006;(2):119-31.
43. Lindeboom M. Health and Work of Older Workers. In: Jones AM, editor. Elgar Companion to Health Economics.Amsterdam: Elsevier; 2006. p. 26-35