

Healthy Life Expectancy in the EU15

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Introduction

The European Health Expectancy Monitoring Unit (EHEMU) is a project funded by the EU Public Health Programme. The main aim of EHEMU is to provide a central facility for the coordinated analysis and synthesis of life and health expectancies. This joint analysis of health and life expectancies adds a quality dimension to the quantity of life lived by the European populations. The results will provide evidence of inequalities between MS in terms of health gaps and highlight potential targets for public health strategies both nationally and at a pan-European level.

EHEMU will contribute to improving and developing the European health monitoring system through collaboration with initiatives aimed at improving the quality and comparability of EU data, through its specific objectives to:

- undertake analysis of health expectancies from current harmonized data;
- co-ordinate the dissemination of results, through paper and web-based reports;
- act as repository for past and current data on EU health expectancies;
- undertake regular transfers of meta-information to European databases;
- develop web-based training material for interpreting and calculating health expectancies for a wide audience;
- promote harmonization of practice.

In particular, EHEMU is contributing to the development of a new EU Structural Indicator: « *Healthy Life Years* » (HLY). This report on Healthy Life Expectancy in the EU15 describes comparisons using current, though not optimally harmonised, data on disability from the European Community Household Panel, providing an example of how ageing in the European Union might be monitored in the future.

Monitoring Population Ageing

Recent studies have shown that life expectancy at birth has, steadily increased by 3 months per year since the 1970s in high-income countries and there are no signs that the trend is slowing (Oeppen and Vaupel, 2002; White, 2002; Robine et al, 2003; Robine and Paccaud, 2005). This phenomenon has led to a widening of the gap in life expectancy between the European Union (EU) and the central and eastern European countries over the period 1970 to 1995. This worrying situation was emphasized by the Regional Office for Europe of the World Health Organization (WHO) in its health report of 1997 (WHO, 1997). In 1970, the difference between the average life expectancy for the EU and that for the 12 countries of the formerly centrally planned economies of central and eastern Europe (CCEE) and the 15 newly independent states after the dissolution of the USSR (NIS) was around 2.5 years. By 1995, NIS countries lagged behind the EU average by over 10 years whilst the difference between CCEE and the EU average was over 5 years. The gap between the countries with the lowest and the highest life expectancies in the Region was about 15 years in 1995 compared to about 7 years in 1970 (WHO, 1997).

Over a long period of time, increases in life expectancy at birth have been used to infer improvements in the health of populations and indeed this was a plausible assumption whilst infectious diseases were the main cause of death. However, now that chronic diseases have replaced, or are progressively replacing, infectious diseases, and the risk of becoming ill is not solely linked to the risk of dying, monitoring the increase in life expectancy is no longer sufficient to infer population health (Riley, 1990). Indeed, with a constant recovery rate, if the risk of dying diminishes more than the risk of becoming ill, the risk of being ill increases. In other words, the prevalence of chronic disease in the population can increase as a result of a lengthening of duration of survival if the decrease in fatality is not compensated for by an equivalent decrease in incidence.

In the absence of pertinent data on change in morbidity, the relationships that can exist between the changes in these risks have been theoretically debated, gradually focusing on three theories. The first anticipates an improvement in the state of health or a '*compression of morbidity*' (Fries, 1980, 1989 and 2002; Hubert et al, 2002), the second a decline or an '*expansion of morbidity*' (Gruenberg, 1977; Kramer, 1980; Olshansky et al., 1991), and the third, a '*dynamic equilibrium*', a kind of *status quo* (Manton, 1982), where, though the prevalence increases as mortality falls, the prevalent states are on average less severe.

These three theories require supplementary concepts such as the severity of prevalent states or that of disability. Indeed, chronic diseases have many varied consequences but the international classifications, International Classification of Impairments, Disabilities, and Handicaps (ICIDH) and the International Classification of Functioning, Disability and Health (ICF) (WHO, 1980 and 2001) places disability at the centre of these consequences. Disability is, at the same time, an indicator of the severity of morbid states and an indicator of the quality of years lived. Its introduction permitted a considerable improvement in models of health and, the breakdown of life expectancy into years lived with or without disability provides the necessary tools to confirm which of the three scenarios the health of any population is following.

Health expectancies, of which disability-free life expectancy (DFLE) is one, provide a means of dividing life expectancy into life spent in various states of good and bad health. These measures represent the increasing focus on indicators of the quality of life lived (life spent in a healthy state) rather than, as previously, on the quantity (life expectancy). Health

expectancies extend the concept of life expectancy to morbidity and disability. Health expectancies address whether or not the lengthening in life expectancy is being accompanied with an increase in time lived in bad health.

Whilst data on mortality for the calculation of life expectancy is fairly readily available, DFLE requires in addition age and sex specific prevalence of disability from a population survey. Today, more than 50 countries worldwide have estimates of health expectancy, with a number of European countries having chronological series (Austria 1978-1998, Denmark 1987-2000, Finland 1978-1986, France 1981-1991, Germany 1986-1995, Italy 1994-1999, the Netherlands 1983-2000, Spain 1986-1991, Sweden 1975-1990, and the United Kingdom 1976-2000), attesting to the widespread use and understanding of health expectancies (Euro-REVES, 1998). However a major problem in comparing these between countries is the harmonization of methods of calculation as well as the concepts of disability or health used.

For the time being the only harmonized data available are those issued from the European Community Household Panel (ECHP). This report therefore presents a comparison of DFLE at birth and at age 65 years among the EU 14 contributing to the ECHP over the time period 1995-2003. In the discussion and conclusions we rehearse whether the differences found in DFLE between genders and countries is real or artefactual and discuss how cross-national comparisons in healthy life expectancy might be improved in order to comprehensively and accurately monitor population ageing throughout the EU.

Data and methods

Health expectancy combines information on mortality and morbidity into a single summary measure. For the analysis we use the Sullivan methods (Euro-REVES, 1997). This method combines mortality data from population life table and age specific prevalence of disability obtained separately from health surveys.

Life tables

Life tables for 14 European Union Member States MS (the EU 15, with the exception of Luxemburg) over the period 1995-2001 were supplied by Eurostat. There was a small amount of missing data and linear regressions were fitted to the age specific mortality rates over time to fill in gaps. Values were derived only through interpolation and not extrapolation to periods before or after complete data.

Prevalence of disability

The country, age and sex specific prevalence of disability was obtained from the European Community Household Panel (ECHP). The ECHP is a longitudinal, multi-subject survey covering many aspects of daily life with the sample covering some 60 000 households (130 000 adults aged 16 or over at 31 December of the previous year). The first wave took place in 1994. Although data from the ECHP would theoretically provide harmonized data, changes over time and differences between countries in the survey design and question wording have required some adjustments to be made before calculations. Disability was inferred from the question “*Are you hampered in your daily activities by any physical or mental health problem, illness or disability?*”. As the form of the question changed between the first wave (1994) and second wave (1995), data for 1994 has been ignored.

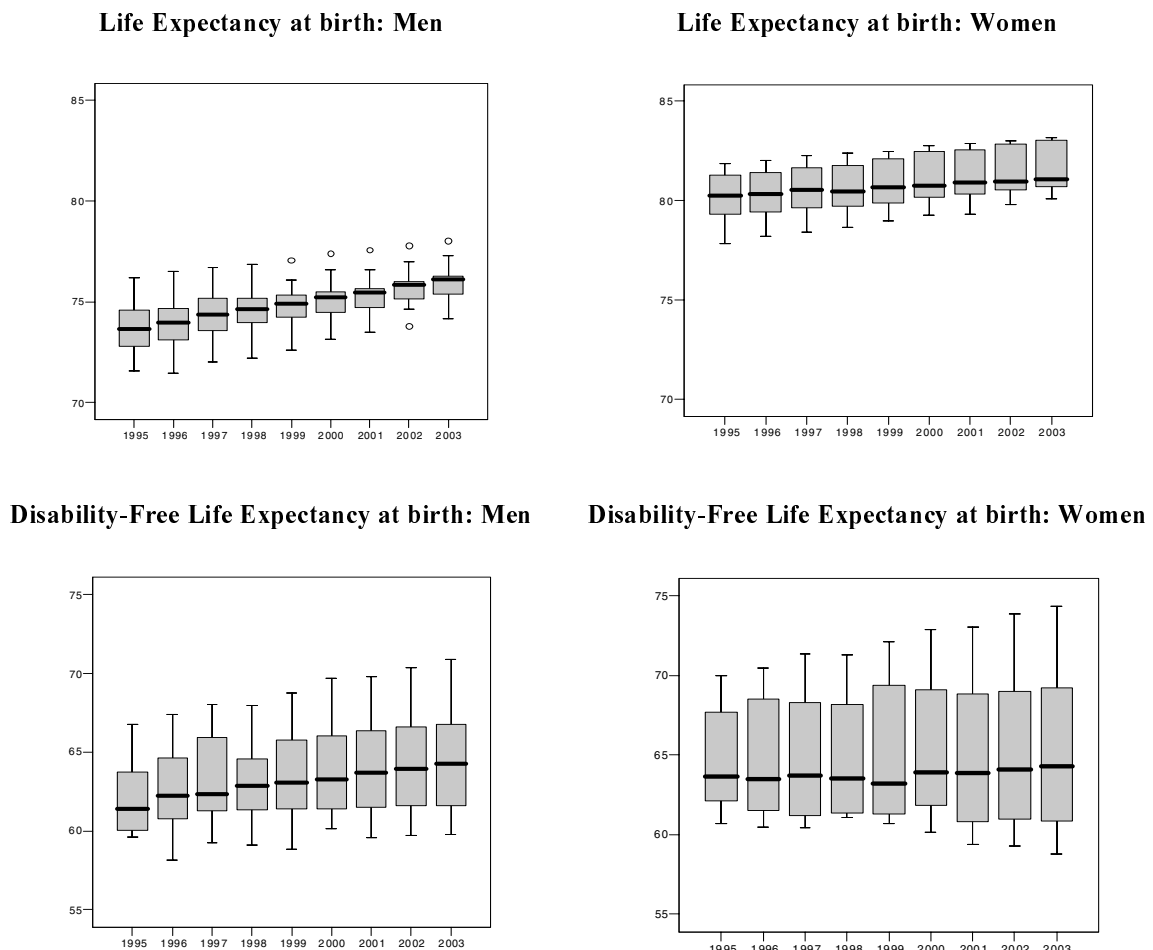
As for mortality data, adjustment and models were used to compensate missing data and changes in survey design. Briefly, odd missing values within the time period 1995-2001 were interpolated from linear regressions on the age specific prevalence from the surrounding available values. Values for 2002 and 2003 when the ECHP was no longer carried out were estimated through extrapolation of the trends. Full details of the methods for both the disability prevalence and mortality data are available (Robine et al, 2004).

Results

Life expectancy and DFLE at birth in the EU14, 1995-2003

By 2003 LE at birth in the EU14 ranged from 74.2 (Portugal) to 78 (Sweden) years for men and 80.1 (Denmark) to 83.2 (France) years for women, following a steady increase from 1995 (Figure 1). The increasing trend was more pronounced for men than women. By 2003, the distribution of LE across MS was positively skewed for men but negatively skewed for women. Compared to LE, trends in DFLE were more variable although gender differences were smaller (Figure 1). However women's DFLE at birth was more variable across MS than men's. Between 1995 and 2003 the gain in LE for men exceeded the gain in DFLE suggesting an expansion of disability as extra years were not all disability-free. In women the gain in LE and DFLE were smaller but similar.

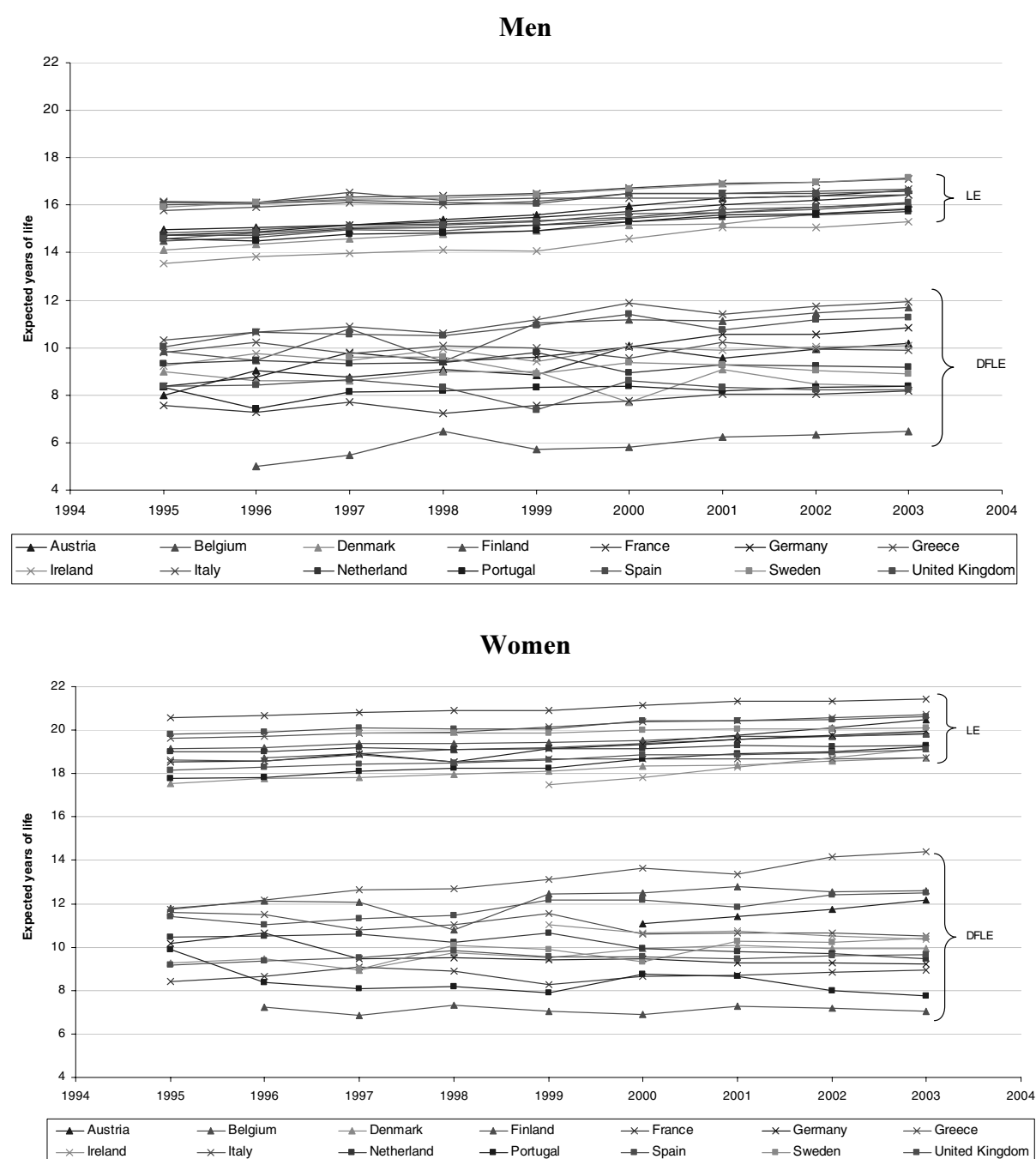
Figure 1: Distribution of LE and DFLE at birth for EU14, 1995-2003 by gender



Life expectancy and DFLE at age 65 in the EU14, 1995-2003

Life and health expectancy at birth are influenced by mortality in early life. To monitor healthy ageing, life and health expectancies at age 65 years (or even older) are more appropriate. As for LE and DFLE at birth, LE at age 65 in the EU14 showed less variation across MS than did DFLE at age 65 (Figure 2). In the main MS retained their ranking in LE at age 65 over the time period but this was not true for DFLE, possibly due to disability measurement in surveys with both methodological limitations and cultural differences that could impact on self-reported disability. We return to this issue in the discussion. However for both men and women, Denmark shows the lowest years disability-free at age 65 consistently over the time period, with little evidence of the gap between it and other MS reducing.

Figure 2: Trend in LE and DFLE at age 65 years for EU14, 1995-2003 by gender



For both men and women there seems to be slight gains in LE and DFLE at age 65 years between 1995 and 2003, suggesting that the population is ageing healthily. However, to better appreciate the relationship between LE and DFLE over time and whether gains in LE are greater or less than gains in DFLE, we can calculate the proportion of remaining life spent disability-free.

Countries appear to fall into three groups with regard to the trends in the proportion of life spent free of disability between 1995 and 2001¹ (Table 1 and Figure 3): those where the proportion increases (relative variation $\geq 5\%$) suggesting a compression of disability (men: Austria, Belgium, Finland, Germany, and Italy; women: Belgium, Italy and Sweden); those where the proportion is constant (men: France, Greece, Ireland and Spain; women: Austria, Denmark, Finland, France, Spain and the UK); and the remainder where the proportion decreases (relative variation $\leq -5\%$) suggesting an expansion of disability (men: Denmark, the Netherlands, Portugal, Sweden and the UK; women: Germany, Greece, Ireland, the Netherlands and Portugal). Although there is some consistency between the genders with Italy and Belgium showing compression for men and women and the Netherlands and Portugal showing expansion for both, there is considerable heterogeneity between the genders.

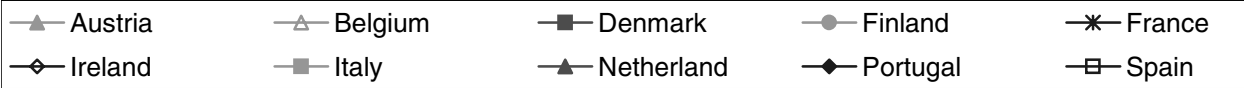
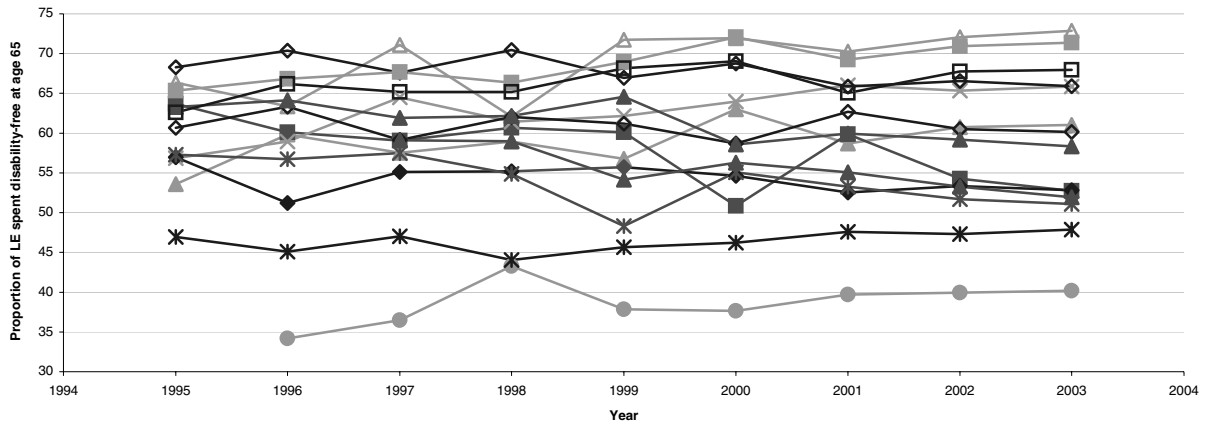
Table 1: Country-specific trends in the proportion of life spent disability-free at age 65 by gender, 1995-2001

%DFLE/LE trends	Men	Women
<u>%DFLE/LE increases</u> variation $\geq 5\%$	Austria Belgium Finland Germany Italy	Belgium Italy Sweden
<u>%DFLE/LE remains constant</u> -5% < variation 5%	France Greece Ireland Spain	Austria Denmark Finland France Spain UK
<u>%DFLE/LE declines</u> variation $\leq -5\%$	Denmark Netherlands Portugal Sweden UK	Germany Greece Ireland Netherlands Portugal

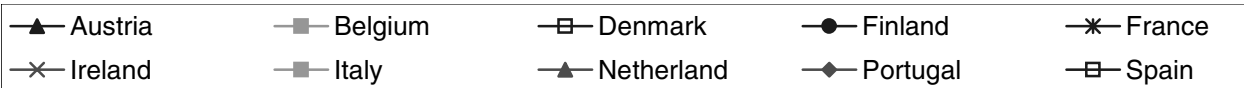
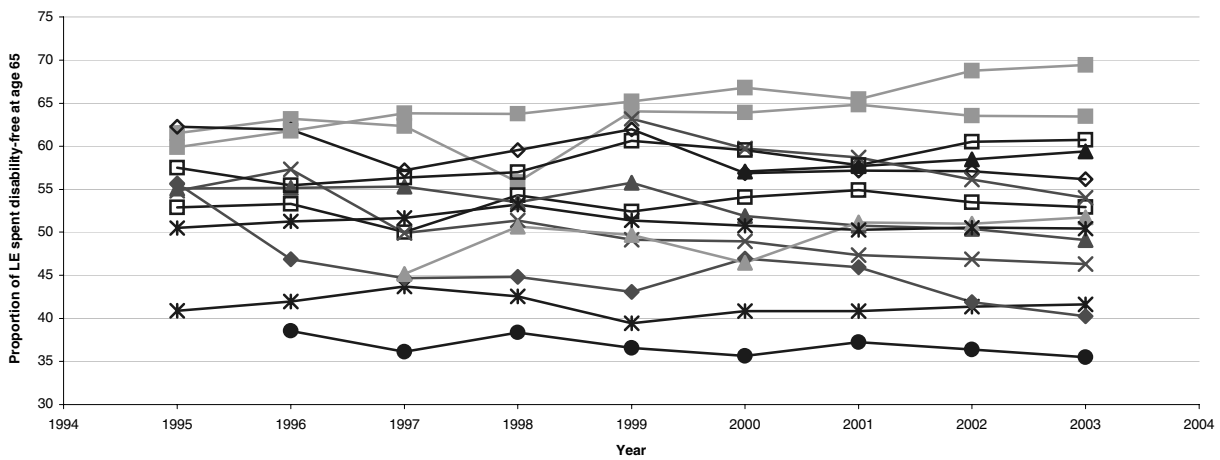
¹ The trends are considered only between 1995 and 2001 as 2002 and 2003 were extrapolations.

Figure 3: Trend in the proportion of life spent disability-free at age 65 years for EU14, 1995-2003 by gender

Men



Women



- = gain of 5% + between 1995 and 2001
- = gain or loss of less than 5% between 1995 and 2001
- = loss of 5% + between 1995 and 2001

Discussion

Our analyses have shown that there is considerable heterogeneity between EU MS in the trends in healthy life expectancy over the period 1995 to 2003. In particular some MS appear to be experiencing a compression of disability whilst others are showing an expansion or stagnation with respect to the relative change in LE and DFLE. Moreover the MS displaying a compression for men are not necessarily those where women's DFLE displays a compression. However MS are much more similar in terms of LE than DFLE with the variability in LE between MS being much smaller than the variability in DFLE.

We have stressed that these results are preliminary and serve as an example of how population ageing could be monitored in the future given more harmonised and complete data across EU MS. The currently available data has required many adjustments and modelling. Alongside these, there are other reasons why the differences found may not be real differences. There was some difference in response rates between MS; the disability question did not undergo an optimal translation process to ensure true harmonisation; there may be cultural differences in reporting of disability and confounding factors such as the distribution of socio-economic status may differ between MS. However we have been mainly concerned with trends over time and although there may be bias at any one time point, it is likely that trends will be less sensitive to these as the bias is unlikely to change with time.

In future, data will be available from the Survey of Income and Living Conditions (SILC) and this is planned to be more reliable: the overall survey design should help in collecting more comparable data; disability indicators introduced in this survey should be more robust with no screening question on long standing illness and better comparability in wording and translation. Moreover the disability indicator to be used in SILC is based on a more reliable wording to measure functional health problems and will also allow differentiation between different levels of severity in reported disability; such detailed information will also contribute to explain differences between countries or the variations in trends across Europe.

A further reason why the trends reported here may not be real is the omission of those in institutions. Institutionalisation rates greatly differ from one country to another as past and present public health policies in long term care services widely vary across Europe. Therefore both the distribution of the population between private households and institutions and the level of functional health problems in these two populations may be significantly different from one country to another. We have undertaken some sensitivity analyses for France with the 1999 data to assess the size of the bias introduced in the estimates (Table 2).

The ECHP data (with no data on institutions) gives a life expectancy with disability of 14.9 years at birth for French men. Taking into account institutionalisation rates, and assuming that all years lived in institutions are years lived with disability, increases the estimate of life expectancy with disability (DLE) by around 3 months. If we apply the actual rates before age 70 and a hypothetical rate of 20% after age 70, DLE increased by 8 months compared to the ECHP estimate (for a 10% rate institution after age 70 years, this increase is 3 months). For women, this estimate increases by 8 months when we apply a 20% institution rate after 70 years (for a 10% institution rate, a 2 month increase is produced). Alongside these differences, the part of life free of disability (DFLE) does not vary by more than 2% regardless of the assumption on institutionalisation rates.

These analyses suggest that large changes in the rate of institutionalisation may impact on the estimates of DLE rather than DFLE. The size of the impact corresponds roughly to the annual gain in LE that has been observed in France for two decades, showing the importance of including this information in the estimates. Nevertheless, there are rarely any sudden changes from year to year in institutionalisation rates and the size of the bias is not large enough to explain the large differences between countries. Finally, it is noteworthy that these results for France cannot be generalized to all the countries since we do not know how the actual rates of institutionalisation nor the level of disability in institutions vary across Europe.

Table 2: Impact of institution rate on life expectancy (LE), life expectancy with disability (DLE), and life expectancy free of disability (DFLE) at birth by gender: calculation with the 1999 French data

Men

ECHP estimations with:	DLE	DFLE	LE	%DFLE/LE
- no data on institution	14.92	60.1	75.01	80%
- 1999 age specific institutionalisation rates	15.15	59.87	75.01	80%
- 1999 age specific institutionalisation rates from age 0 to 70, 10% after age 70	15.41	59.6	75.01	79%
- 1999 age specific institutionalisation rates from age 0 to 70, 20% after age 70	15.8	59.21	75.01	79%

Women

ECHP estimations with:	DLE	DFLE	LE	%DFLE/LE
- no data on institution	19.20	63.26	82.46	77%
- 1999 age specific institutionalisation rates	19.59	62.86	82.46	76%
- 1999 age specific institutionalisation rates from age 0 to 70, 10% after age 70	19.77	62.69	82.46	76%
- 1999 age specific institutionalisation rates from age 0 to 70, 20% after age 70	20.27	62.19	82.46	75%

Conclusion

We have shown that healthy life expectancy can provide a ready way to monitor population ageing throughout Europe, differentiating between countries where LE is increasing less rapidly than DFLE, thus demonstrating a compression of disability, and those where LE is increasing more rapidly than DFLE with a resulting expansion of disability. However current data are not truly comparable across European countries and are certainly incomplete for the new members. The European “Survey on Income and Living Conditions” (SILC) aims to provide harmonized data and therefore will give the opportunity of calculating DFLE for European countries based on the same methods and similar data. Indeed a harmonized question on activity limitation has been added in the questionnaire; therefore, in future years, estimations of DFLE will be available for the 25 European countries. This, in conjunction with projects to ensure optimal translation across the European languages, will result in more reliable indicators to monitor population ageing throughout Europe.

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