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# Cross-sectional analysis of health expectancies in 2008

## Evaluation of the 2008 implementation of the greater harmonisation of the Mini European Health Module

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## Executive summary

The European Union (EU) has committed to improving the health of the population of Europe and its preferred measure is Healthy Life Years (HLY) a measure of disability-free life expectancy that combines information on quality and quantity of life. HLY measures the remaining number of years spent free of activity limitation and was included as a Structural Indicator in 2005 with the main purpose to monitor health trends and gaps in Europe.

Accurate monitoring of HLY across Member States is therefore imperative to plan for Europe's ageing population. A basic foundation for valid comparisons of HLY between countries is a harmonized measure; in the case of HLY this is the underlying Global Activity Limitation Indicator (GALI) question in the EU Statistics of Income and Living Conditions (EU-SILC) survey from which activity limitation is derived. Since the first inclusion of the GALI in the EU-SILC in 2005, there has been an ongoing effort to improve harmonization, with a particular effort at retranslation into national languages in 2008.

The aim of this report is to describe the variation in HLY across Europe in 2008 and to determine the effect of the 2008 harmonisation of the Healthy Life Years (HLY) question on the variation of health both between and within countries. Analysis comprised descriptive statistics on HLY at age 50 in 2008 and comparison of the HLY gaps and the HLY gender gaps in countries over the period 2005-2008. Formal statistical analysis of the underlying prevalence of activity limitation was undertaken to determine changes in the age and gender distribution over time in comparison to the other two health measures: self-rated health and chronic morbidity.

Key findings were:

- In 2008 HLY at age 50 for men was 17.8 years, 60% of remaining life expectancy of 29.5 years
- Women aged 50 in 2008 could expect to live 4.3 years more than men of the same age but only 0.7 HLY more than men so the majority of these extra years of life for women were spent with activity limitation
- The gap in LE at age 50 in 2008 in the EU27 for men was 8.9 years and for women was 7.0 years contrasting with the much greater gap in HLY of 14.1 years for men and 14.7 years for women
- For the EU25 countries the gap in LE and HLY fell slightly for men between 2005 and 2008 but slightly increased for women
- In general little evidence was found of systematic gender differences in trends over time although more countries had significant differences in time trends between age groups. Only one country (Slovakia) had significant differences over time in the age and gender distribution of activity limitation.
- Changes in the comparability of the national GALI question to the standard version did not explain the differences in trends over time between age groups.

Given that time trends in activity limitation were often reflected in the other measures for the majority of countries, the harmonisation of the GALI question is unlikely to be the cause of a change in the distribution of activity limitation by age over the time period.

## Introduction

The Healthy Life Years (HLY) indicator is a disability-free life expectancy, indicating the average number of remaining years lived free of activity limitation. HLY was included as a Structural Indicator in 2005 with the main purpose to

monitor health trends and gaps in Europe. Indeed the Commission stated that "increasing HLY is crucial in attracting people into the labour market" (COM 2005/24) since more HLY means a healthier workforce, less retirement due to ill health and potentially less health and social care use and is thus a means of reducing the economic and social risks associated with demographic change. Accurate monitoring of HLY across Member States is therefore imperative to plan for Europe's ageing population but also to understand the impact of national policies to increase healthy ageing.

The health assessment underlying HLY is the Global Activity Limitation Indicator (GALI) question, one of three global health questions contained in the Minimum European Health Module (MEHM) in the Statistics of Income and Living Conditions (SILC) Survey, the other two questions being self-rated health and chronic morbidity. Despite its more subjective nature, self-rated health has been shown to be a strong predictor of mortality and is one of the most frequently used health indicators[1]. In the majority of models of the disablement process, disease precedes functional limitation and activity restriction[2]. The three measures in the MEHM are therefore complementary. The trade-off in different health expectancies (self-rated health, morbidity, functioning and disability) is of particular interest, for example do some countries have greater than average years with morbidity that do not translate through to activity limitation?

The basis for all these cross-national comparisons is harmonized data. The three questions of the MEHM were developed in English from a conceptual basis and translation guidelines prepared aiming to translate to the concepts rather than simply the English version. However, initially, some translations were sub-optimal, reducing comparability of the first HLY values between countries[3]. In 2008 Eurostat organized new translations to improve harmonization (see Appendix 1). The purpose of this report is to describe the variation in health expectancies across Europe in 2008 and to determine the effect of the 2008 harmonisation of the Healthy Life Years (HLY) question on the variation of health both between and within countries.

## Aims

The aims of this report are:

1. To describe the variation in Healthy Life Years (HLY) in 2008 across Member States
2. To describe the change in HLY between 2005 and 2008 in the EU25
3. To understand the impact of the 2008 harmonisation of the GALI on HLY through:
    a. Analysis of the time trends in the prevalence of activity limitation between countries from 2005 to 2008
    b. Analysis of the time trends in the prevalence of self-rated health and chronic morbidity between countries from 2005 to 2008
    c. Investigation of age group and gender differences in the time trends in the prevalence of activity limitation within countries from 2005 to 2008
    d. Investigation of age group and gender differences in the time trends in the prevalence of self-rated health and chronic morbidity within countries from 2005 to 2008

# Methods

## Data

Activity limitation, self-rated health and chronic morbidity are the three health measures of interest in this report. Together these three measures form the Minimum European Health Module (MEHM) contained within the EU-SILC survey. The HLY indicator is based on the Global Activity Limitation Indicator (GALI) question: 'For the past 6 months or more have you been limited in activities people usually do because of health problems?' with responses yes, strongly limited/yes, limited/no, not limited. The self rated health question is 'How is your health in general?' with responses very good/good/fair/bad/very bad. Chronic morbidity data came from responses of either yes or no to the question 'Do you suffer from (have) any chronic (long standing) illness or condition (health problem)?' Health expectancies at various ages for 2008 and all countries were obtained from the EurOhex database http://www.EurOhex.eu/. Appendix 1 gives a brief resume of the harmonization of the MEHM questions.

In addition to the health expectancies for 2008 we obtained, from the same source, weighted prevalence data for each measure by age group, gender, country and year (2004/5-9). Some countries (Cyprus, Czech Republic, Germany, Hungary, Latvia, Lithuania, Malta, the Netherlands, Poland, Slovakia, Slovenia and the United Kingdom) did not have data avilable for 2004. Age was generally grouped into 5 year intervals from 15-19 years up to 80-84 with an initial group of 0-14 years and a final group of 85 years and over.

The weights were those provided by Eurostat to account for the complex sampling design of the survey and the non-response rate in order to reflect the true prevalence of the conditions in the population. An example of how the prevalence data for activity limitation in Austrian men in 2005 is provided by the EurOhex database is shown in Table 1. We obtained SILC micro data from Eurostat allowing us to analyse the responses at the individual level as we found that modelling the aggregated data and weightings underestimated the standard errors of the effects, resulting in spurious significant effects.

| Country | Year | Sex | Age | Not limited | Limited | Severely limited |
|---|---|---|---|---|---|---|
| AUSTRIA | 2005 | Men | [0-14] | 0.961 | 0.035 | 0.003 |
| AUSTRIA | 2005 | Men | [15-19] | 0.923 | 0.07 | 0.006 |
| AUSTRIA | 2005 | Men | [20-24] | 0.921 | 0.039 | 0.039 |
| AUSTRIA | 2005 | Men | [25-29] | 0.896 | 0.07 | 0.033 |
| AUSTRIA | 2005 | Men | [30-34] | 0.89 | 0.086 | 0.022 |
| AUSTRIA | 2005 | Men | [35-39] | 0.87 | 0.094 | 0.035 |
| AUSTRIA | 2005 | Men | [40-44] | 0.857 | 0.097 | 0.044 |
| AUSTRIA | 2005 | Men | [45-49] | 0.763 | 0.158 | 0.078 |
| AUSTRIA | 2005 | Men | [50-54] | 0.704 | 0.191 | 0.104 |
| AUSTRIA | 2005 | Men | [55-59] | 0.589 | 0.258 | 0.151 |
| AUSTRIA | 2005 | Men | [60-64] | 0.561 | 0.307 | 0.13 |

**Table 1: Prevalence of activity limitation for Austrian men in 2005 by age group**

## Analysis

LE and HLY at age 50 for men and women across the EU25 countries were compared between 2005 and 2008 by boxplots and scatterplots. The gender gaps in LE and HLY were calculated as (women – men) and the difference between countries are presented in bar charts.

To further evaluate the effect of harmonization on HLY we analysed the underlying prevalences for the three health measures. Firstly we produced similar boxplots of prevalence of each of the three measures to show the variation between countries over the years 2005-2009. We restricted analysis to the EU25 countries as these had data over all years. Unlike health expectancies, prevalences are sensitive to differences in the age structure of the countries so first the age- and sex-specific prevalence for each country (of each of the three measures) was standardized to the European Standard Population.

We then investigated how the prevalence of health (for each of the three measures) by age had changed over time in two ways. Firstly the prevalence by age was plotted with all years on the same graph, separately for men and women. All of the plots produced can be viewed in Appendix 2 although some are presented in the results section to illustrate trends and patterns. Formal stastistical analysis was then undertaken to test whether age and gender patterns varied across years using logistic regression. In the analyses year, age group and gender are the independent variables and the presence of the health condition is the dependent binary variable. Initially this was performed on the aggregate data available from EurOhex. However to use the weighting for the complex sampling design properly, required individual level data, otherwise the point estimates and the standard errors of the estimates are inaccurate. Producing accurate standard errors is essential because they indicate the precision of the estimates and the statistical significance of the tests performed. Most of the analysis was undertaken in SAS version 9.2. We chose to analyse only 2005-2009 since not all countries had data for 2004. For each of the analyses one of the binary dependant variables (activity limitation, severe activity limitation, chronic morbidity, fair or bad self rated health, bad self rated health) were used. The independent variables were the same for all models, namely age group, gender and year, and the country was used as the domain variable in all cases. Ages of the respondents were grouped with an intial age group of [16-19], then in five year intervals from [20-24] upto [70-74] with a final grouping of [75 and over]. More details of the logistic procedures can be found in Appendix 3. Finally we interpreted the results for AL alongside information on the level of comparability to the standard GALI question over the period 2005-2009.

# Results

We first compared EU25 countries between 2005, the first full year with HLY for all countries, and 2008, when the questions were harmonised. We investigated the gender gap at age 50 and how it had changed between 2005 and 2008. We then compared the prevalence of health standardised to the European Standard Population to account for the differing age and gender structure of the individual countries. We also investigated how the prevalence of each condition has changed over time within countries, first graphically using box plots to provide an overall view and then using line graphs to assess changes within age groups and finally through formal statistical tests by fitting logistic regression models.

## Healthy Life Years at age 50 in 2008

In 2008 male life expectancy (LE) at age 50 in the EU27 was 29.0 years of which 17.1 years (59%) were free of activity limitation (HLY) whilst female LE at age 50 was 33.9 years, almost five years more than a male LE, but of these 17.8 years (53%) were HLY. The gap in LE at age 50 in 2008 in the EU27 for men was 8.9 years (from 22.1 years in Lithuania to 31.0 years in Italy) and for women was 7.0 years ( from 29.4 years in Bulgaria to 36.4 years in France). This contrasts with a much greater gap in HLY at age 50 in 2008 of 14.1 years for men (from 9.6 in Slovakia to 23.7 years in Sweden) and 14.7 years for women (from 9.6 in Slovakia to 24.3 years in Sweden). Rankings of HLY for men and women were not identical (Figure 1).

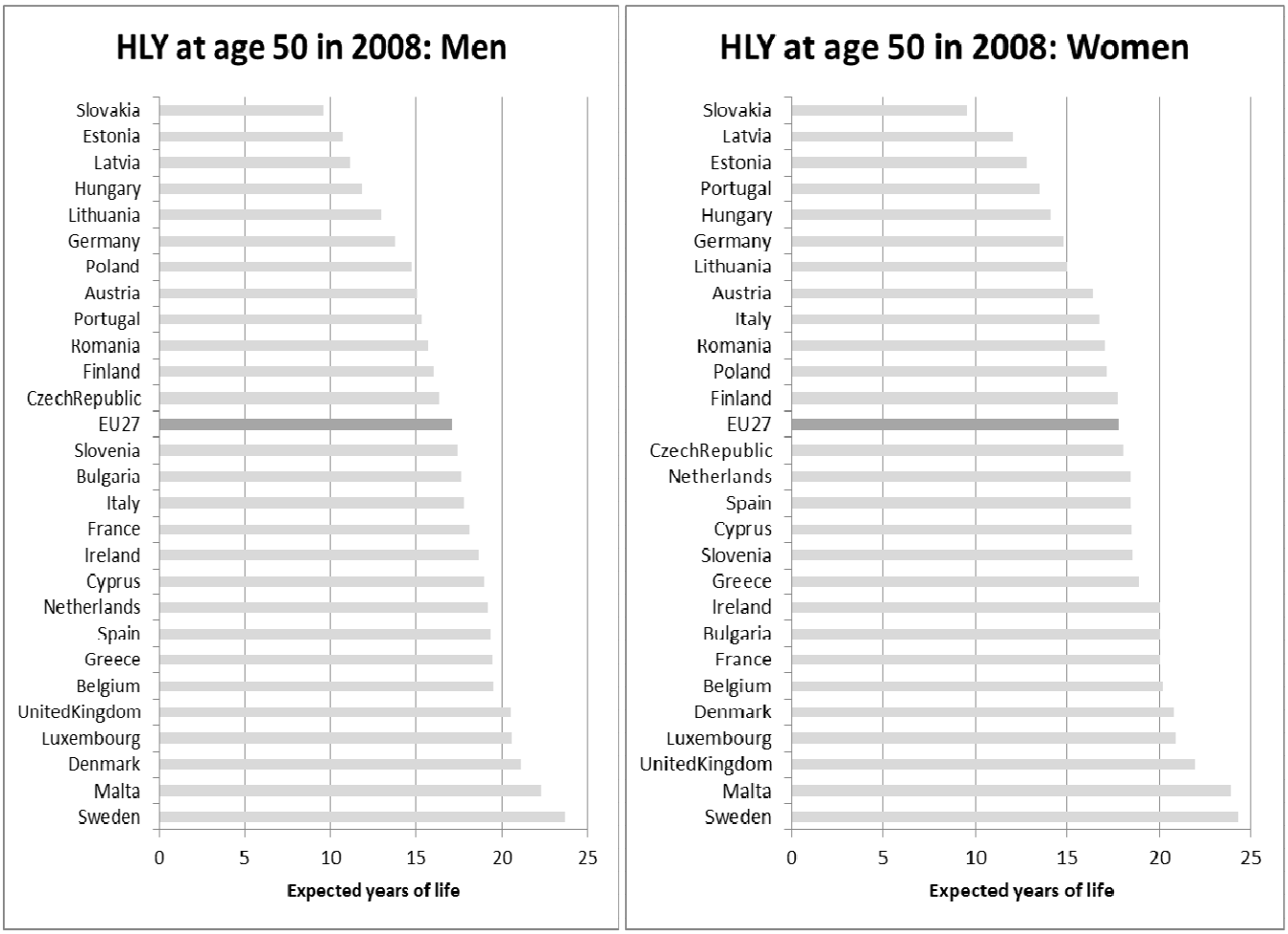


**Figure 1: HLY at age 50 for EU27 countries in 2008 by gender**

## Change in life expectancy and HLY at age 50 2005-2008

LE and HLY for 2008 in the pre-2007 EU25 countries were compared with those for 2005 to assess the effect of harmonisation of the GALI question initiated by Eurostat in 2008. Boxplots of life expectancies in 2005 and 2008 separately for men and women at age 50 are shown in Figure 2 with each boxplot representing a single LE value for each of the EU25 countries. LE for both men and women increased between 2005 and 2008: for men the median LE rose by 0.7 years to 29.5 years in 2008 whilst for women median LE rose by 0.9 years to 33.8 years. The overall range of LE values between the EU25 has remained relatively constant, the range for men reducing slightly by 0.1 years to 8.9 years whilst the range for women rose slightly by 0.2 years to 6.3 years. There was no change in the inter quartile range (IQR), which represents the middle 50% of values, for men of 4.4 years but the IQR for women decreased slightly by 0.2 years to 2.5 years.

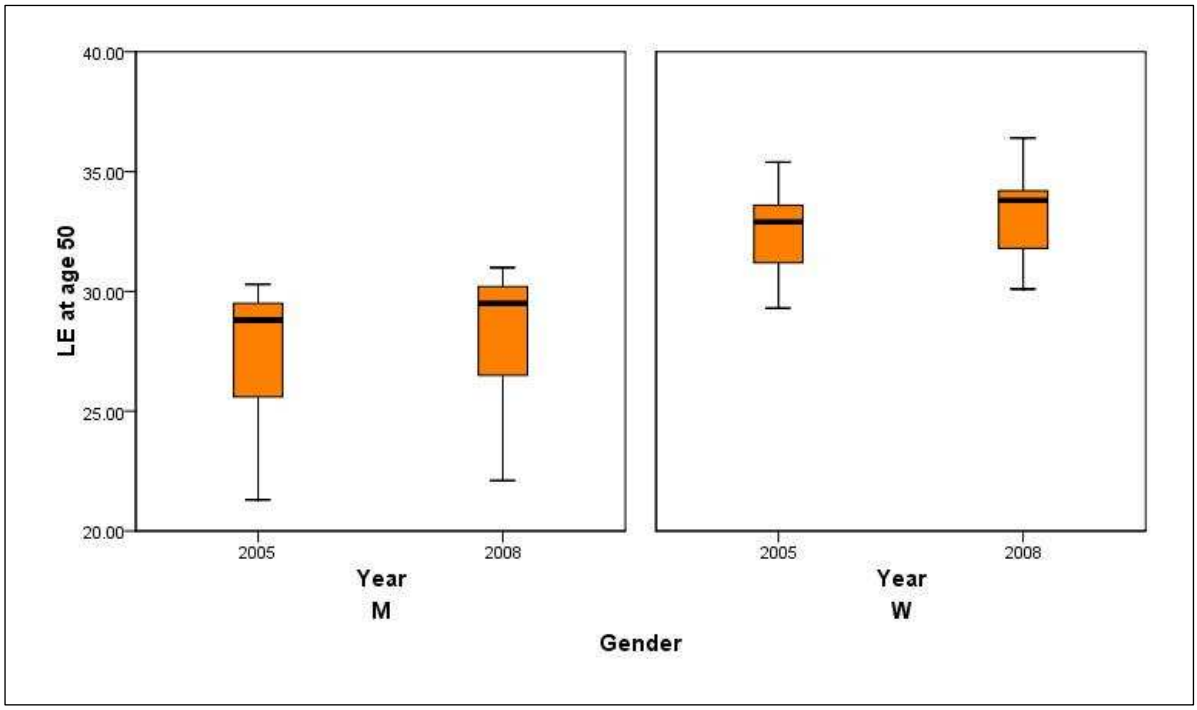


**Figure 2: Life expectancy at age 50 for EU25 countries, 2005 and 2008**

Figure 3 shows similar boxplots for HLY for 2005 and 2008 at age 50 by gender. An increase in median HLY of 1.2 years to 17.8 years can be seen for men whereas there is no increase for women, remaining at 18.5 years. The range of values for men decreased by 0.4 years to 14.1 years between 2005 and 2008 with a corresponding increase of 1.2 years to 14.7 years for women. The IQR for male HLY at age 50 decreased by 1.8 years to 5.2 years and for women by 2.0 years to 5.2 years.

In 2005 there was strong evidence for a cluster of countries, predominantly Eastern European countries who had low LE and HLY at age 50[3]. We explored whether this cluster was still evident by scatterplots for HLY and LE at age 50 for men and women in 2005 and 2008 (Figure 4). The predominantly East European countries: Latvia, Lithuania, Estonia, Hungary and Slovakia, consistently form a grouping with lower LE and HLY that was more noticeable in men. The HLY gap at age 50 was 14.5 years for men and 13.5 for women in 2005. This had reduced slightly in 2008, to 14.1 years for men but increased to 14.7 years for women. The LE gap at age 50 for 2005 was 9.0 years for men and 6.1 years for women. In 2008 this had fallen slightly to 8.9 years for men but increased slightly to 6.3 years for women. Thus the overall gap in LE and HLY at age 50 reduced for men between 2005 and 2008 but increased for women.

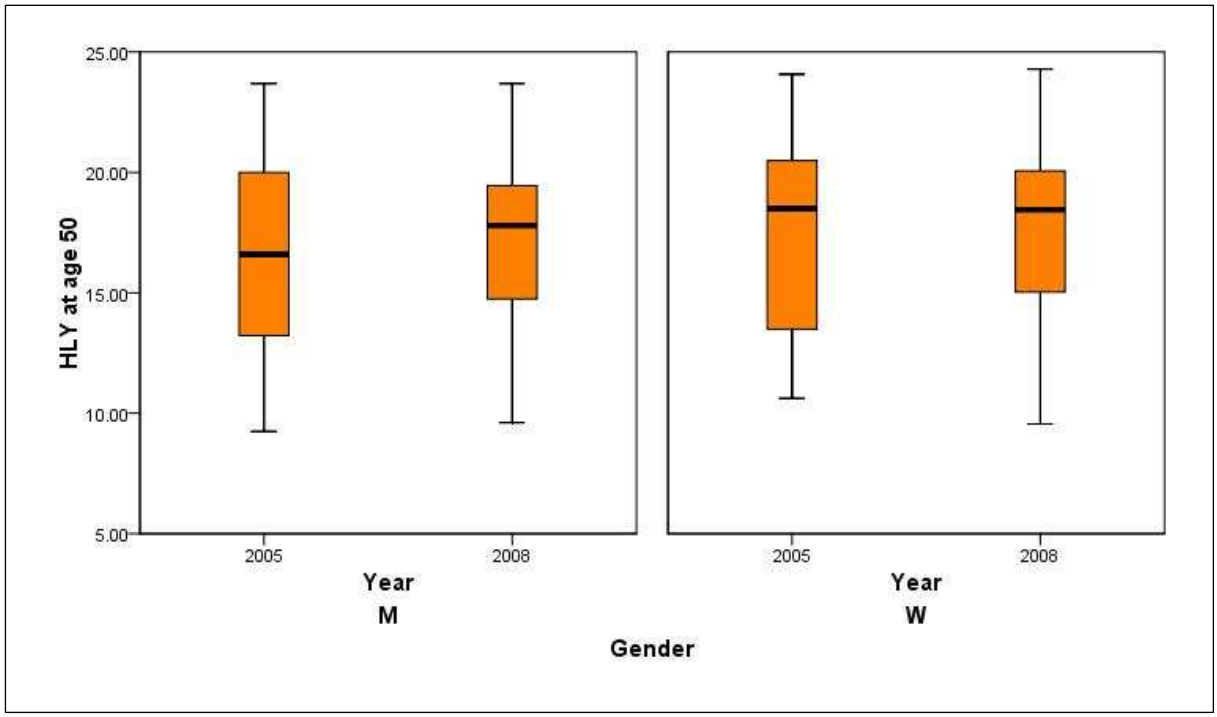


**Figure 3: Healthy life years at age 50 for EU25 countries, 2005 and 2008**

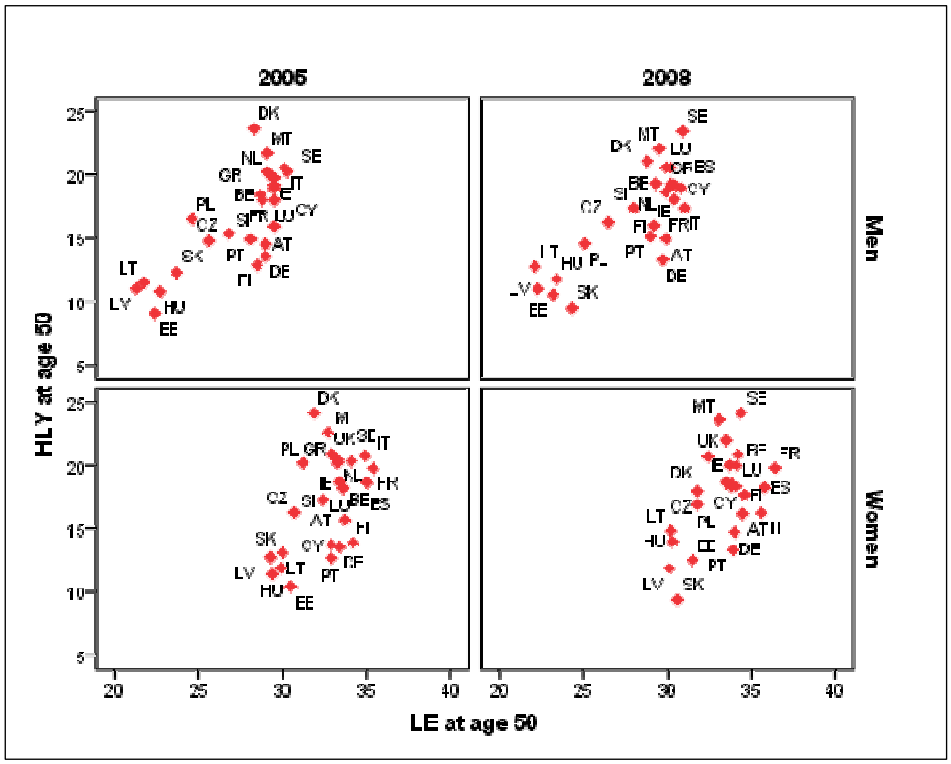


**Figure 4: Scatterplots of LE and HY at age 50 for EU25 countries in 2005 and 2008, by gender**

## Change in the gender gap in life expectancy and HLY at age 50 2005-2008

Figure 5 shows the life expectancy gender gap at age 50 years for 2005 and 2008. The countries are ranked by their 2005 value. All countries show a positive gender gap with women's LE at age 50 exceeding that of men. Lithuania had the biggest gender gap of 8.2 years in 2005 which fell slightly to 8.1 years in 2008. Cyprus had the smallest gap of 3.4 years in 2005 with a slight fall to 3.3 years in 2008.

The HLY gender gap at age 50 years for 2005 and 2008 is noticeably different to the pattern for LE with both positive and negative gender gaps (Figure 6). Poland had the largest gender gap in 2005 of 3.8 years with women expecting 20.4 HLY at age 50 compared to men's 16.6 HLY. In 2008 the gap reduced to 2.4 years (women HLY: 17.1; men HLY: 14.7). In Hungary and Lithuania the gap increased significantly between 2005 and 2008: Hungary from 0.7 years in 2005 to 2.3 years in 2008; Lithuania from 0.4 years in 2005 to 2.1 years in 2008. Note that in some countries (Spain, Cyprus and Portugal) the gap in 2005 was negative meaning that women could expect fewer healthy years than men. In 2008 those countries retained a negative gender gap but were also joined by Greece, Slovakia, Denmark, Italy and the Netherlands.

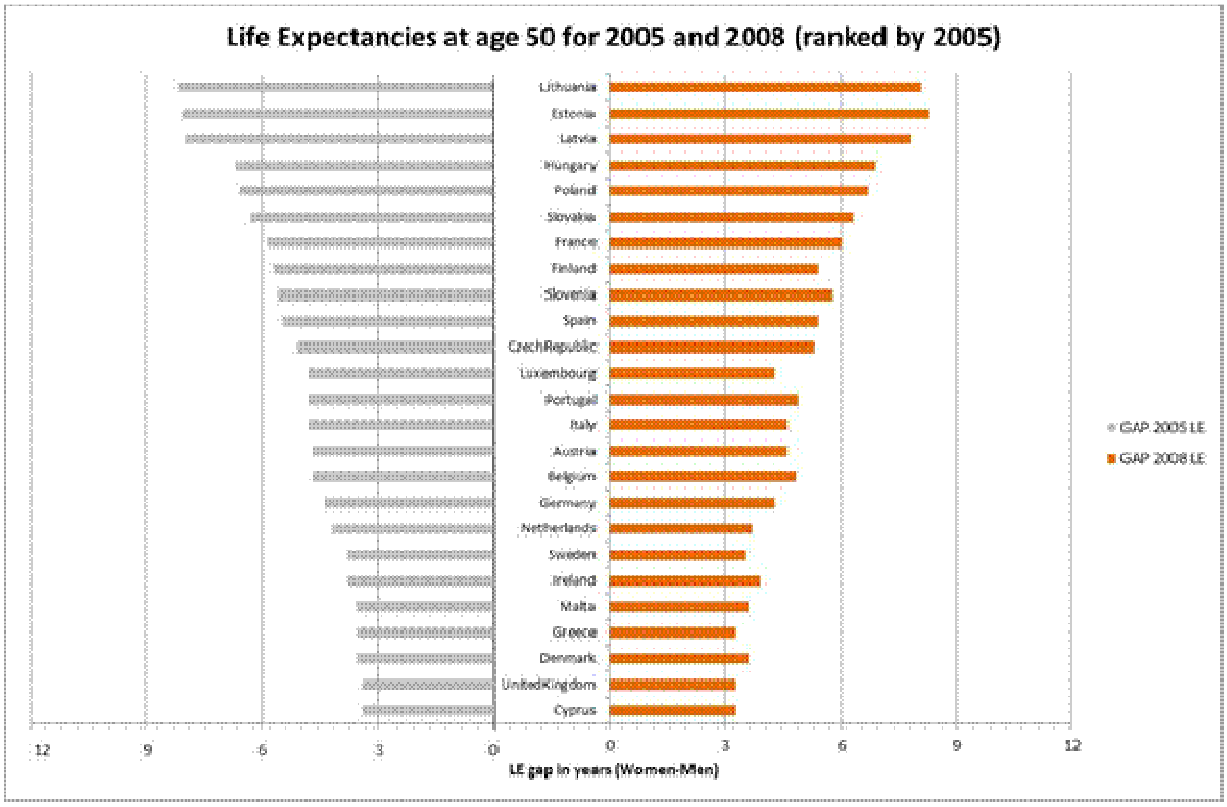


**Figure 5: Gender gap (women-men) in life expectancy at age 50 for EU25 countries, 2005 and 2008 (ranked by 2005 values)**

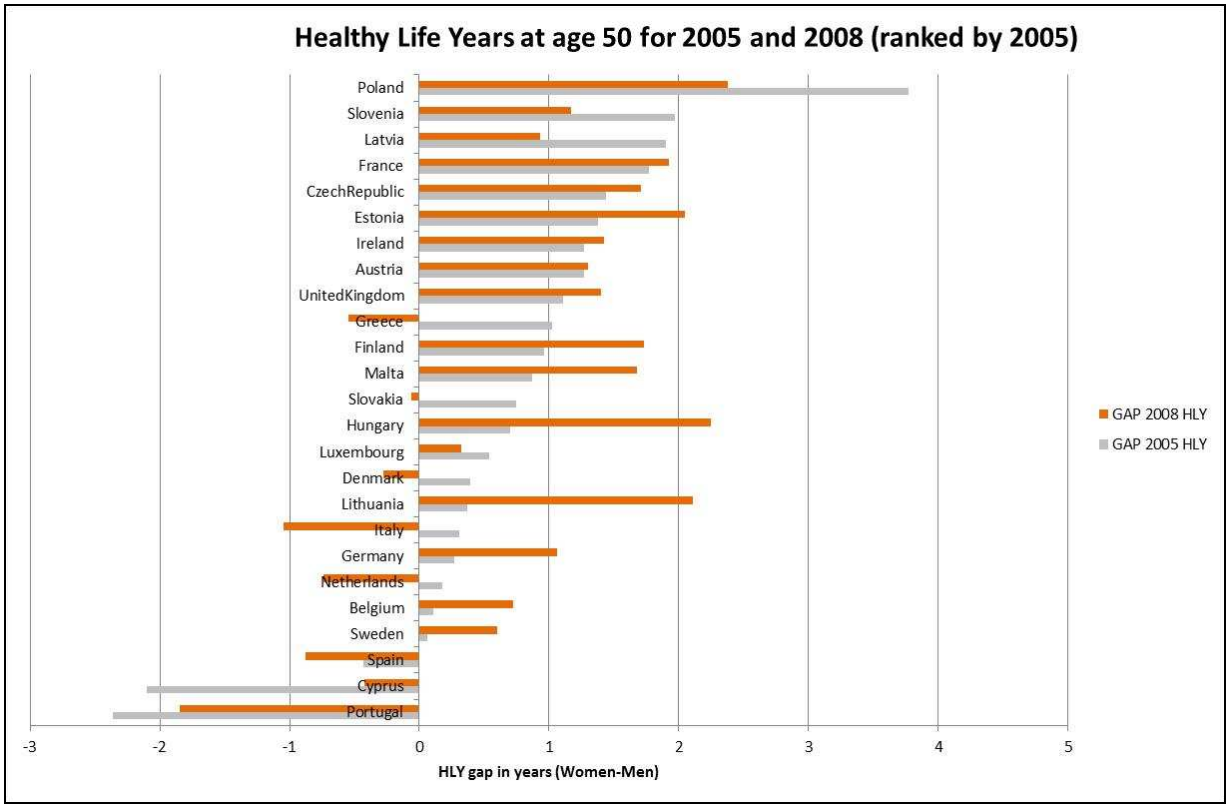


**Figure 6: Gender gap (women-men) in HLY at age 50 for EU25 countries, 2005 and 2008 (ranked by 2005 values)**

## Overall EU time trends in prevalence of health

To account for the differing age and gender structure of the individual countries we compared time trends in the prevalence of health after standardisation to the European Standard Population. Box plots were used to investigate the distribution of the prevalences of each of the 3 conditions, activity limitation (AL), chronic morbidity (CM) and respondents self rated health (SRH) across the countries. Thus each observation in the boxplot is the standardized prevalence of health for one country. Boxplots for each year (2005-2009) for the EU25 countries and separately for men and women are shown. It should also be noted that for Denmark from 2005-2007 the response to the GALI question did not allow severe AL to be differentiated.

### Prevalence of activity limitation by year

Comparison of the box plots over time (Figure 7) shows that the median prevalence is relatively constant across the years 2005-09 for both men and women though lower for men (16.1 to 16.4%) than women (17.9 to 19.2%). The interquartile range (top and bottom of box) was similar for men and women. Note the unusually low prevalence of AL reported by women in Malta in 2007 (8.2%) and unusually high prevalence reported by women in Finland (31.1%). We also investigated the distribution of severe AL across countries (excepting Denmark) (Figure 7). Reporting of severe AL was much more variable across countries than for any (mild or severe) AL. There was a decrease in the median prevalence of severe AL for both men and women, for men from 2005 to 2006, after which it remained relatively constant (5.1 to 5.4%) and for women from 2005 to 2009. In 2007 men in Malta reported an unusually small (2.4%) prevalence of severe AL whilst men in Hungary reported an unusually high (8.7%) prevalence.

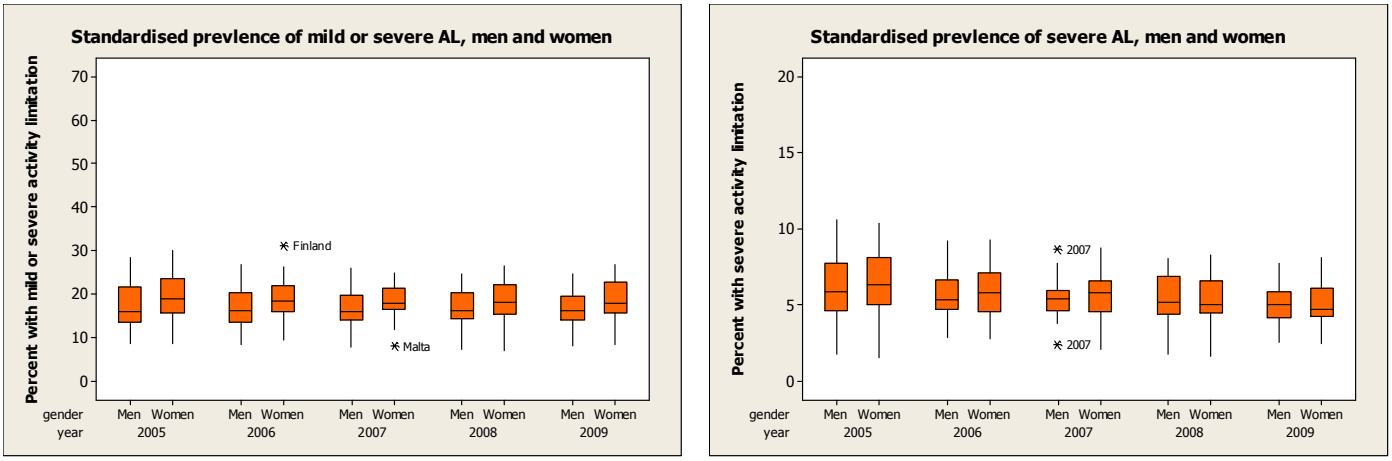


**Figure 7: Standardised prevalence of activity limitation across EU25 countries, by year, gender and severity**

## Prevalence of chronic morbidity by year

The median prevalence of chronic morbidity (CM) was relatively constant from 2005 to 2009 for both men and women, although lower for men (26.2% and 27.3% in years 2005 to 2009) than women (29.2% and 31.2%) (Figure 8). However the variation in prevalence across countries as indicated by the interquartile range reduced for men and women between 2005 and 2009. Note that in 2009 Greek women had an unusually low prevalence of CM (15.7%).

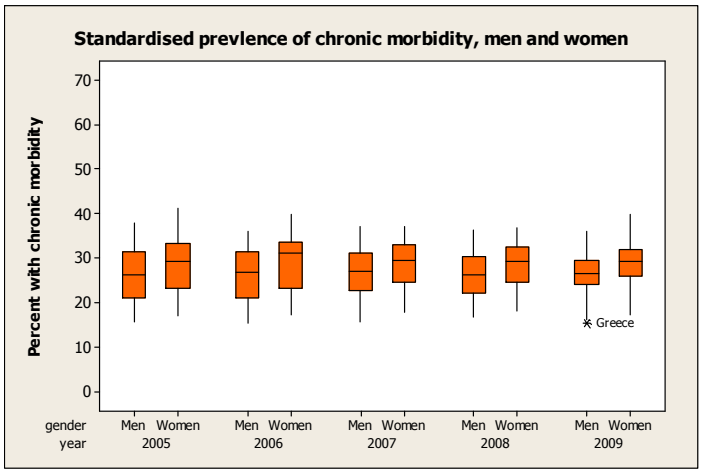


**Figure 8: Standardised prevalence of chronic morbidity across EU25 countries, by year and gender**

## Prevalence of self rated health by year

On average across countries men and women reported similar levels of fair or poor self rated health each year from 2005 to 2009 (men median: 26.1% - 27.9%; women: 26.5% - 28.7%) (Figure 9). However the spread (interquartile range) was slightly larger for men than women with the spread reducing between 2005 and 2009. Similar conclusions could also be drawn when analysis was restricted to more extreme ill-health (bad self rated health) although in this case median levels for men (6.7% - 8.1% in 2005 to 2009) were lower than those for women (7.5% - 8.4%).

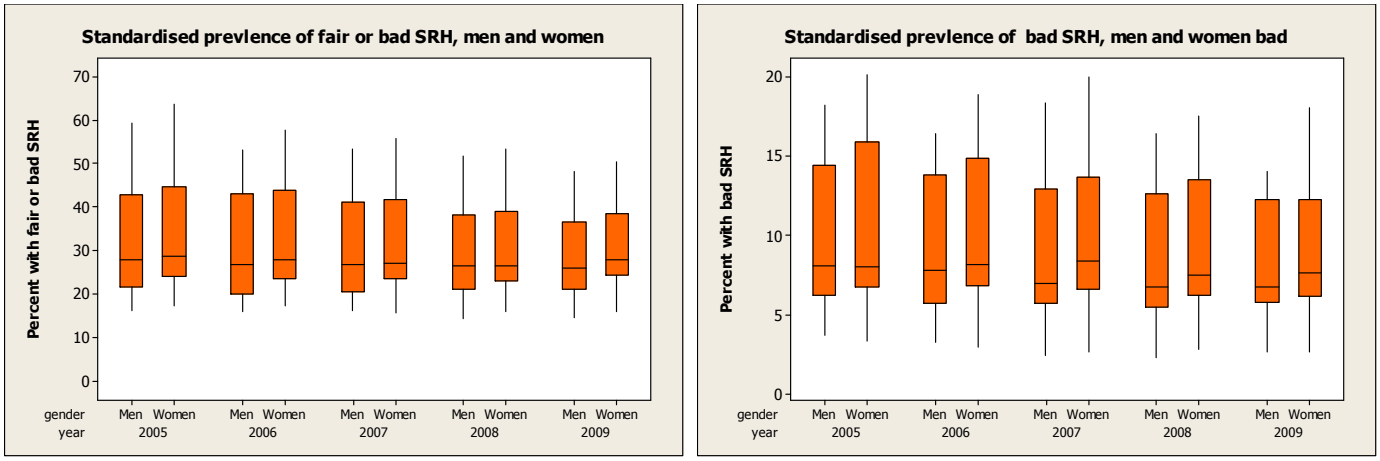


**Figure 9: Standardised prevalence of fair or bad self rated health across EU25 countries, by year and gender**

## Within country time trends

The previous plots provide information on the distibution of health across all the countries and how this has changed from 2005 to 2009. We now investigate how the prevalence of each condition has changed over time within countries, first graphically through box plots (to provide an overall view) and line graphs (to assess changes within age groups) and then through formal statistical tests. In the box plots the median is of less importance here, as it is likely that this will be different between the countries, but a large interquartile range suggests that either there has been a change to the question resulting in a change in prevalence or, less likely, change in the EU-SILC sample.

### Prevalence of mild or severe activity limitation by country

The prevalence of AL in Austria, Belgium, France, Greece, Ireland, Latvia (larger spread in women than men), Malta, Portugal, Slovenia (larger spread in men than women), Spain and UK was particularly stable over the period with very small interquartile range (Figure 10). On the other hand both men and women in Denmark, Estonia and Finland, along with women in Cyprus and Lithuania showed much more variability across time with interquartile ranges of five percentage points or more, and in many cases much higher ranges. As for all AL, the interquartile ranges for the prevalence of severe AL show similar variation over time for men and women and variation across years is small in Austria, Belgium, Denmark, Greece, Ireland, Italy, Luxembourg, Malta, Portugal, Slovakia and UK. The small dispersion observed in Denmark is partly due to only having an option to distinguish between mild and severe activity limitation from 2008. Of interest is Hungary which had small variation for all AL (<2.9 percentage points in women and 2.6 percentage points in men) but more variation in severe AL (3.7 percentage points in women and 3.2 percentage points in men) suggesting that the distribution within levels of AL had changed over time.

### Prevalence of chronic morbidity by country

The prevalence of chronic morbidity showed much less variation over time than the prevalence of AL. Smaller variation over time was evident for Denmark, Estonia, Finland, Germany, Italy, Netherlands, and Slovakia (Figure 11). On the other hand chronic morbidity in both men and women in Austria and Slovenia varied by 7.5 percentage points or more over time with Spain, Maltese and Swedish men varying by more than 5 percentage points.

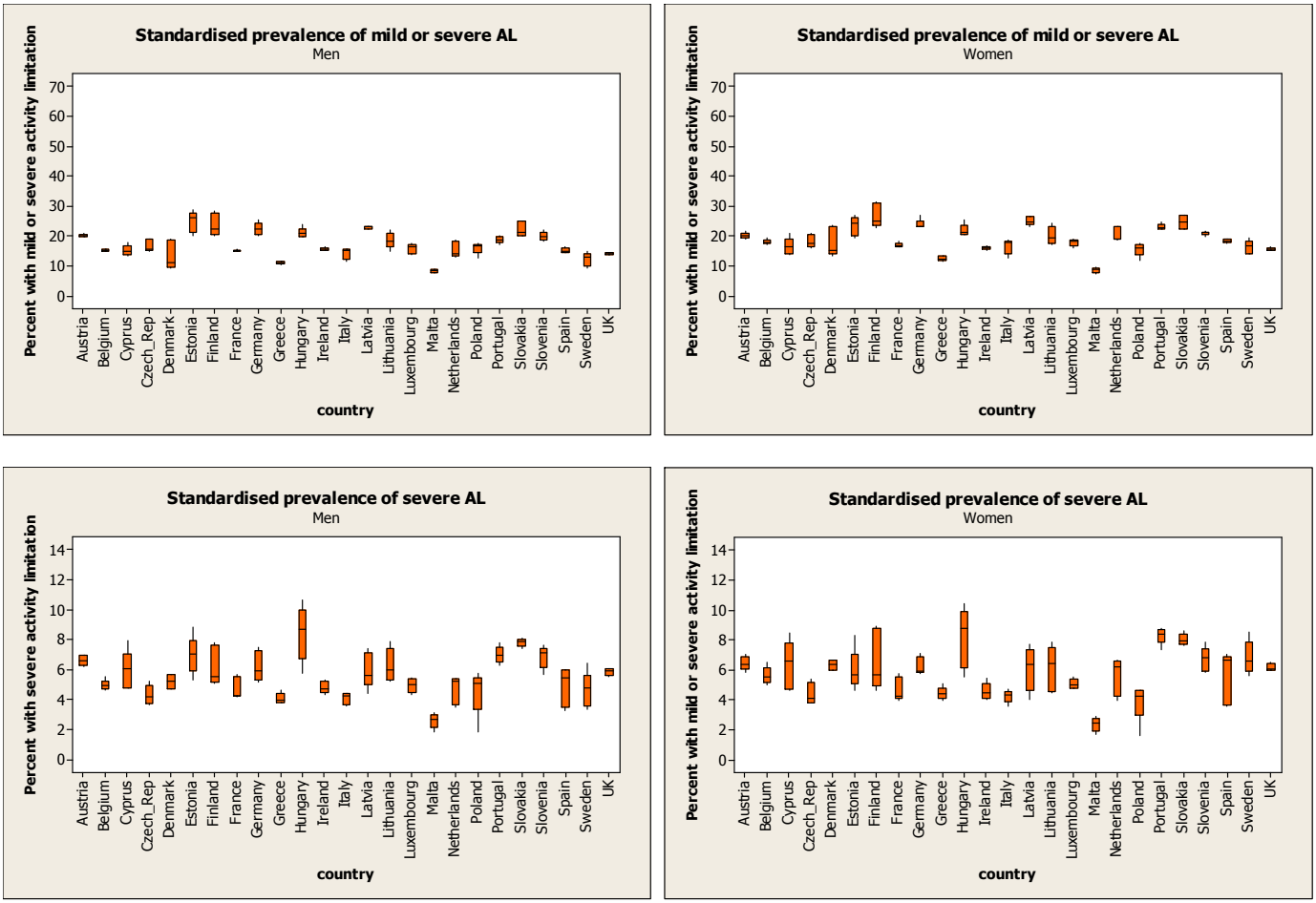


**Figure 10: Standardised prevalence of AL from 2005 to 2009, by country, gender and severity**

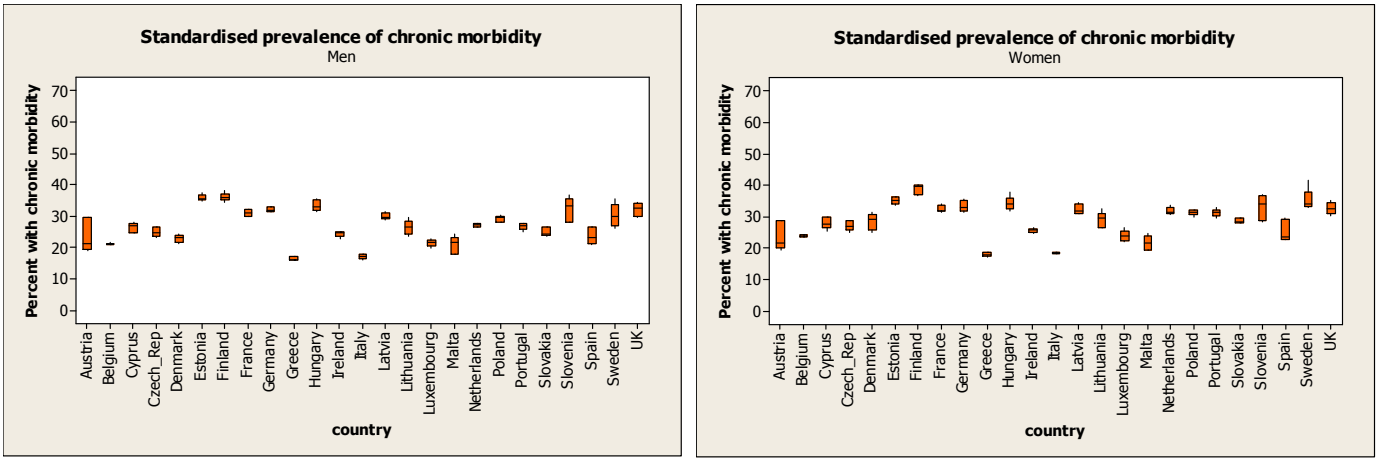


**Figure 11: Standardised prevalence of chronic morbidity from 2005 to 2009, by country and gender**

## Prevalence of fair or bad self rated health by country

As for chronic morbidity, variation over time in the prevalence of fair or bad self rated health was generally less than for AL with particularly small variation over time in Austria, Belgium, Cyprus, Finland, France, Greece, Ireland, Luxembourg and the Netherlands (Figure 12). Notable are countries with large variation over time (> 10 percentage points) : Hungary, Slovakia and to a lesser extent men in Italy (7.0%), Lithuania (8.6%) and women in Italy (6.5%), Lithuania (9.9%) and Latvia (8.9%). Variation in the prevalence of bad self rated health as evidenced from the interquartile ranges was less than five percentage points for all countries.

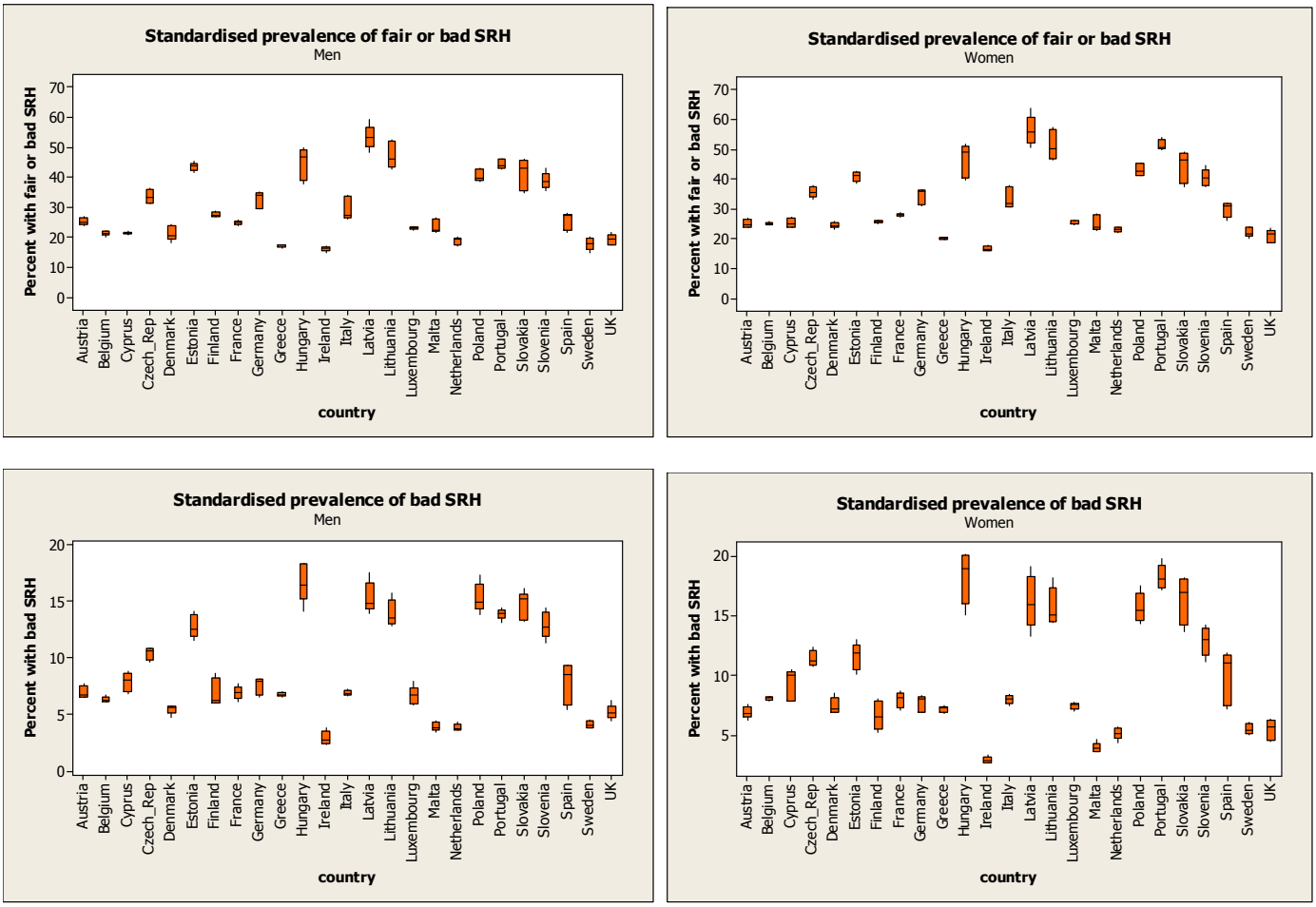


**Figure 12: Standardised prevalence of fair or bad self rated health from 2005 to 2009, by country and gender**

## Within country time trends by age and gender

In this section we explore whether trends over time vary between age groups and genders both graphically though line graphs of prevalence by age group and time and more formally by fitting logistic regression models. Using the SILC individual microdata provided by Eurostat, the logistic regression model fitted in all analyses had a binary response with a score of 1 for presence of the condition and a zero if respondent was free of the condition as the dependent variable. The independent variables used were age group, gender and year. The terms in the model were therefore gender, age group and year along with all interactions between these terms as shown in the example for activity limitation below:

*AL= year agegp gender year*agegp year*gender agegp*gender year*agegp*gender*

Similar analyses were conducted for chronic morbidity and for self rated health (fair or bad self-rated health). Only years 2005-2009 were included in the analysis as some countries were not included in EU-SILC in 2004. In addition because of the small numbers at the upper ages the final age group used in the modeling was 75+ years. SAS Proc Survey Logistic was used for all analyses with domain set as country. For more details on the procedures see Appendix 3.

### Prevalence of activity limitation

In general, the prevalence of AL increases with age with a flattening at later ages in some cases, notably in women: Cyprus (2006-2009), Estonia (2006-2009), Hungary (2006-2009), Latvia (2006-2009), Lithunaia (2005-2009), Luxembourg (2006-2009), Netherlands (2009), and in Portugual and Slovakia (men and women) in most years.

Similar results were found for the prevalence of severe AL (see Figure 13 for prevalence of AL in Portugese women and severe AL in Slovakian women as illustrations). In some cases the prevalence of activity limitation in the highest age group of 85+ showed a reduction from that seen in age group [80-84], most likely due to the smaller sample size and/or the lack of institutionalised respondents in those aged 85+. The full set of line graphs for each country are presented in Appendix 2). There was also a general consistency in the relationship between prevalence and age between men and women.

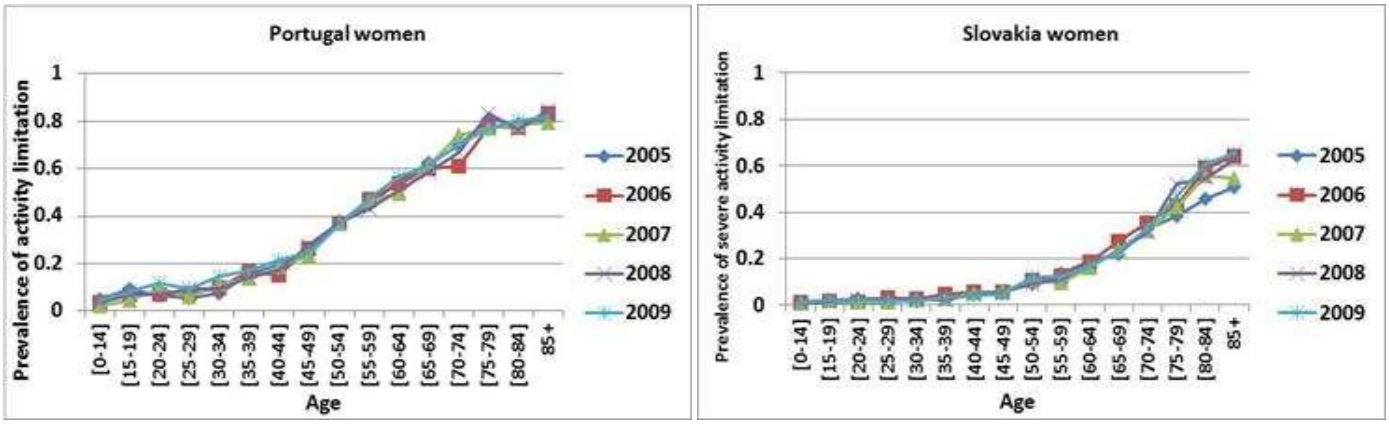


**Figure 13: Prevalence of AL by age group and year, Portugal (any AL, women) and Slovakia (severe AL, women)**

The majority of countries showed little change in prevalence of AL by age group between 2005 and 2009. Exceptions were Sweden and Denmark (a known question change in the latter), but also to a lesser extent Cyprus, Estonia, Finland, Greece and Italy (any AL) and Belgium, Cyprus, Estonia, Greece, Hungary and Sweden (severe AL). Figure 14 shows the graphs for Denmark (any AL men) and Greece (severe AL women).

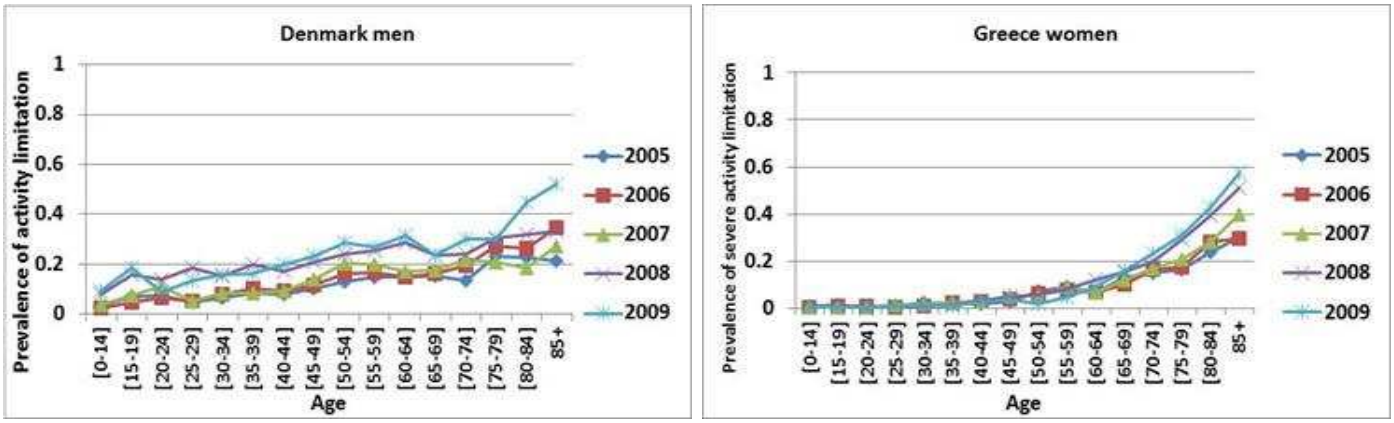


**Figure 14: Prevalence of AL by age group and year, Denmark (any AL, men) and Greece (severe AL, women)**

Table 2 shows the results of the logistic regression modelling. Not surprisingly the vast majority of countries demonstrate significant differences in prevalence by age and gender with age patterns differing by gender as shown by the agegp*gender interaction. Of interest for harmonisation is whether and how these patterns change over time. Some countries show a systematic change over time that differs between age groups (agegrp*year interaction) but not between genders (gender*year interaction not significant for all countries except Germany). No

countries show strong evidence that changes over time differ by agegroup and gender (agegp*gender*year interaction significant p<0.001) although Slovakia does shows weak evidence (p<0.05).

**Table 2: Activity limitation (mild or severe versus not limited), results of logistic regression modelling by country**

| Country | agegp | gender | agegp*gender | year | year*agegp | year*gender | year*agegp*gender |
|---|---|---|---|---|---|---|---|
| Austria | *** | NS | *** | ** | * | NS | NS |
| Belgium | *** | *** | NS | NS | NS | NS | NS |
| Cyprus | *** | * | *** | *** | NS | NS | NS |
| Czech Republic | *** | *** | ** | *** | * | NS | NS |
| Denmark | *** | *** | NS | *** | * | NS | NS |
| Estonia | *** | *** | *** | *** | *** | NS | NS |
| Finland | *** | *** | * | *** | NS | NS | NS |
| France | *** | *** | NS | NS | NS | NS | NS |
| Germany | *** | *** | *** | *** | * | ** | NS |
| Greece | *** | NS | *** | *** | *** | NS | NS |
| Hungary | *** | * | *** | *** | *** | NS | NS |
| Ireland | *** | NS | ** | NS | * | NS | NS |
| Italy | *** | *** | *** | *** | * | NS | NS |
| Latvia | *** | *** | *** | *** | NS | NS | NS |
| Lithuania | *** | *** | *** | *** | NS | NS | NS |
| Luxembourg | *** | *** | NS | * | NS | NS | NS |
| Malta^ | *** | NS | *** | *** | ** | NS | NS |
| Netherlands | *** | *** | NS | *** | NS | NS | NS |
| Poland | *** | *** | *** | *** | *** | NS | NS |
| Portugal | *** | *** | *** | *** | NS | NS | NS |
| Slovakia | *** | *** | *** | *** | *** | NS | * |
| Slovenia | *** | * | ** | *** | NS | NS | NS |
| Spain | *** | *** | *** | *** | *** | NS | NS |
| Sweden | *** | *** | * | *** | ** | NS | NS |
| UK | *** | *** | ** | NS | NS | NS | NS |

^ results from analysis using summarised data due to missing individual data

NS – Not Significant (p>0.05), * (p<0.05), ** (p<0.01), *** (p<0.001)

## Prevalence of chronic morbidity

As for AL, the prevalence of chronic morbidity generally rises strongly with age with flattening at the highest ages and, in some cases lower values for the highest age group (85+) due to lack of the institutionalised population or small sample sizes. Line charts for all countries are shown in Appendix 2. There is consistency in the age patterns between men and women in most countries.

Most graphs reveal that there has been little change in the prevalence of chronic morbidity by age between 2005 and 2009 although larger variation is seen in Austria, Denmark, Greece, Luxembourg, Malta (men), Slovenia and in particular Sweden (see Figure 15).

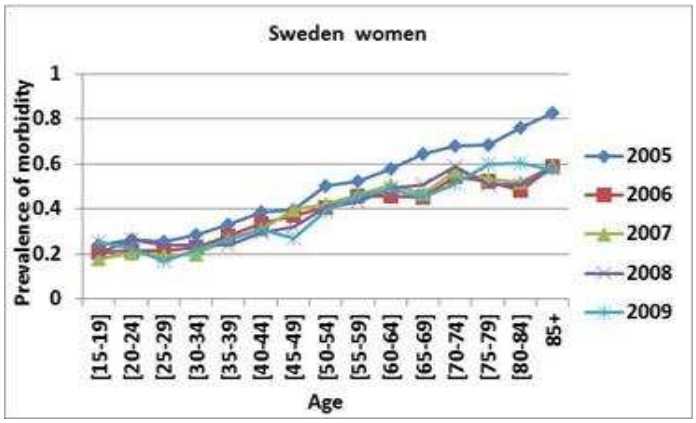


**Figure 15: Prevalence of chronic morbidity by age group and year, Sweden (women)**

Table 3 shows the results of the logistic regression modelling for chronic morbidity. Again some countries have significantly different age patterns by gender as for AL. As was the case for AL, no countries showed significance in the agegp*gender*year interaction.

**Table 3: Chronic morbidity, results of logistic regression modelling by country**

| Country | agegp | gender | agegp*gender | year | year*agegp | year*gender | year*agegp*gender |
|---|---|---|---|---|---|---|---|
| Austria | *** | NS | *** | *** | NS | NS | NS |
| Belgium | *** | *** | NS | NS | NS | NS | NS |
| Cyprus | *** | ** | *** | *** | NS | NS | NS |
| Czech Republic | *** | *** | NS | *** | NS | NS | NS |
| Denmark | *** | *** | NS | *** | NS | NS | NS |
| Estonia | *** | NS | *** | * | NS | NS | NS |
| Finland | *** | *** | NS | *** | NS | NS | NS |
| France | *** | *** | *** | *** | NS | NS | NS |
| Germany | *** | *** | *** | *** | * | * | NS |
| Greece | *** | NS | *** | *** | *** | NS | NS |
| Hungary | *** | * | *** | *** | ** | NS | NS |
| Ireland | *** | ** | NS | NS | * | NS | NS |
| Italy | *** | *** | NS | ** | *** | ** | NS |
| Latvia | *** | *** | *** | *** | *** | NS | NS |
| Lithuania | *** | *** | *** | *** | *** | NS | NS |
| Luxembourg | *** | *** | NS | ** | NS | NS | NS |
| Malta^ | *** | ** | ** | *** | ** | NS | NS |
| Netherlands | *** | *** | * | NS | NS | NS | NS |
| Poland | *** | *** | *** | *** | ** | NS | NS |
| Portugal | *** | *** | *** | *** | NS | NS | NS |
| Slovakia | *** | *** | *** | *** | *** | NS | NS |
| Slovenia | *** | * | *** | *** | NS | NS | NS |
| Spain | *** | *** | *** | *** | NS | NS | NS |
| Sweden | *** | *** | NS | *** | *** | ** | NS |
| UK | *** | NS | *** | *** | NS | NS | NS |

^ results from analysis using summarised data due to missing individual data

NS – Not Significant (p>0.05), * (p<0.05), ** (p<0.01), *** (p<0.001)

## Prevalence of fair or bad self rated health

Similar to the other health measures in all countries the prevalence of fair or bad self rated health rises strongly with age and age patterns are consistent between men and women (see Figure 16). Before middle age the prevalence of bad self rated health is close to zero in most countries. However by the oldest ages almost all the sample report fair

or bad health with prevalence rising to over 90%. Line charts for the prevalence of fair or bad self rated health are presented for men and women for each EU25 country in Appendix 2.

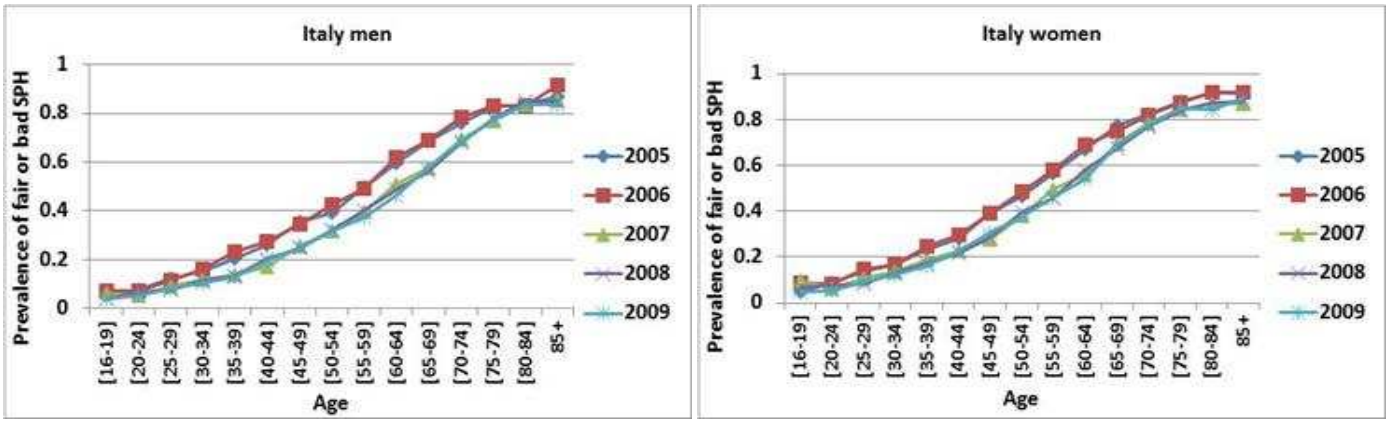


**Figure 16 : Prevalence of fair or bad self rated health by age group and year, Italy (men and women)**

Table 4 shows the results of the logistic regression modelling for fair or bad self rated health. As for the other two health measures, most countries have significantly different age patterns by gender. These age and gender patterns are not changing over time in the majority of countries, as was also observed for the other 2 health measures though there is weak evidence ($p<0.05$) for change over time in Finland.

**Table 4: Fair or bad self rated health, results of logistic regression modelling by country**

| Country | agegp | gender | agegp*gender | year | year*agegp | year*gender | year*agegp*gender |
|---|---|---|---|---|---|---|---|
| Austria | *** | NS | *** | *** | ** | NS | NS |
| Belgium | *** | *** | ** | NS | NS | NS | NS |
| Cyprus | *** | *** | *** | *** | NS | * | NS |
| Czech Republic | *** | *** | ** | *** | NS | NS | NS |
| Denmark | *** | *** | NS | *** | NS | NS | NS |
| Estonia | *** | ** | ** | *** | NS | NS | NS |
| Finland | *** | *** | *** | NS | ** | NS | * |
| France | *** | *** | ** | * | ** | NS | NS |
| Germany | *** | *** | *** | *** | NS | NS | NS |
| Greece | *** | *** | *** | NS | NS | NS | NS |
| Hungary | *** | *** | *** | *** | ** | NS | NS |
| Ireland | *** | NS | * | * | NS | NS | NS |
| Italy | *** | *** | *** | *** | * | NS | NS |
| Latvia | *** | *** | * | *** | * | NS | NS |
| Lithuania | *** | *** | *** | *** | *** | NS | NS |
| Luxembourg | *** | *** | *** | NS | NS | NS | NS |
| Malta^ | *** | *** | NS | *** | *** | NS | NS |
| Netherlands | *** | *** | ** | NS | NS | NS | NS |
| Poland | *** | *** | *** | *** | NS | NS | NS |
| Portugal | *** | *** | *** | *** | NS | NS | NS |
| Slovakia | *** | *** | *** | *** | ** | NS | NS |
| Slovenia | *** | *** | *** | *** | NS | NS | NS |
| Spain | *** | *** | *** | *** | NS | NS | NS |
| Sweden | *** | *** | *** | *** | NS | NS | NS |
| UK | *** | *** | *** | *** | ** | NS | NS |

^ results from analysis using summarised data due to missing individual data

NS – Not Significant (p>0.05), * (p<0.05), ** (p<0.01), *** (p<0.001)

## Comparison of time trends in all three measures

The interaction between gender and year is usually not significant (NS) for all of the three health measures (Figure 17), suggesting that in general there are few differences in trends over time between men and women. There are a few exceptions however: Germany for activity limitation (AL) and chronic morbidity (CM), Italy and Spain for CM and Cyprus for self rated health (SPH), where the interaction is significant (S).

The situation is more complicated for the interaction between age group and year (Figure 18). The age and year interaction is significant: for all 3 measures in Hungary, Italy, Malta, Sweden, Slovakia; for AL and CM in Germany, Greece, Ireland and Poland; for CM and SPH in Lithuania and Latvia; for AL and SPH in Austria; for AL only in the Czech Republic, Denmark, Estonia and Spain; for SPH only in France and United Kingdom.

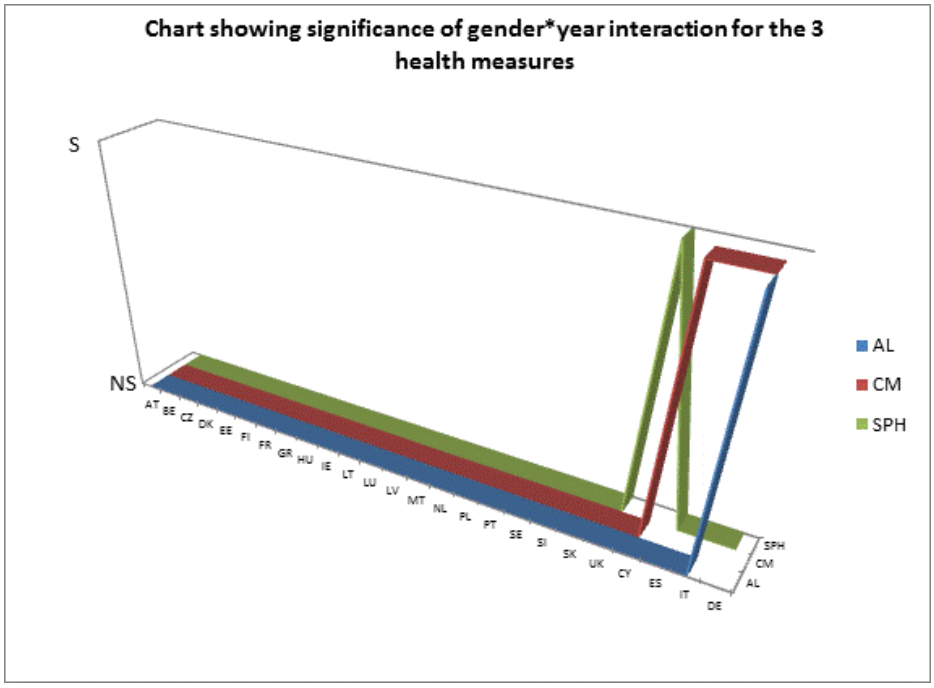


**Figure 17: Significance of the interaction between gender and year by the health measures**

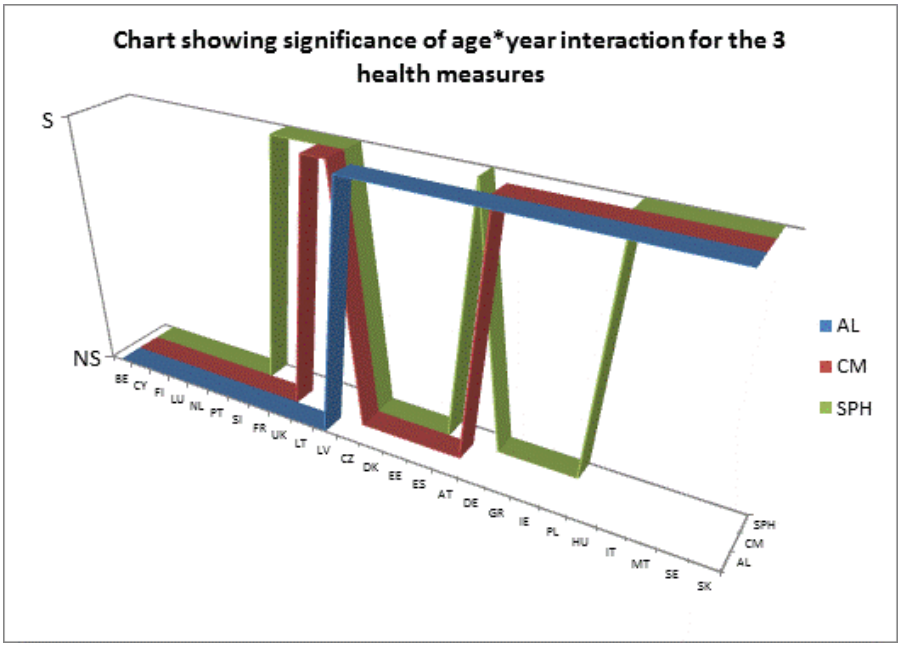


**Figure 18: Significance of the interaction between age group and year by the health measures**

## Formal assessment of comparability of GALI question

The level of harmonisation was assessed by Eurostat. In 2005 only 3 countries had their version of the national GALI question classified as 'fully comparable' to the standard version, 10 were classified as 'partially comparable', with the remaining 12 classified as 'not comparable'. By 2007, four countries were 'fully comparable', 14 'partially comparable' and the remaining seven 'not comparable'. In 2008 concerted efforts were made to improve the comparability and as a result 11 countries were assessed to be 'fully comparable', 9 'partially comparable' and only

five assessed as 'not comparable'. The situation again improved in 2009, with 13 countries 'fully comparable', eight 'partially comparable and five remaining 'not comparable'.

The status of some countries did not change with respect to comparability over the 2005-09 period. Belgium, France and Ireland were assessed as 'fully comparable' to the standard GALI question throughout the period, Greece (changed question in 2008), Lithuania (changed question in 2006, 2007, 2008), Luxembourg (no changes), the Netherlands (changed question in 2008) and Portugal (changed question in 2005 & 2008), remained 'partially comparable' and Germany (changed question in 2008), Malta (no changes), Slovenia (no changes) and UK (changed question in 2008), remained 'not comparable'.

Table 5 shows the results of the logistic regression modelling for the countries whose comparability changed over the period 2005-9 and with 'year' replaced by level of comparability for that year. (The reference category used for the comparability of the GALI question in this analysis is 'not comparable', so significant results are with respect to this).

Most countries show significant differences in prevalence between age and gender, with variation in age patterns between genders, shown by the agegp*gender interaction. These results are almost identical to those when the actual year rather than the comparability of the question was included in the model.

Of interest for harmonisation is how these patterns change relative to the degree of comparability of the national questions to the standard GALI version. Replacing year by comparability in the model gave very similar results for those countries where comparability changed over time, in particular comparability did not have a different effect on prevalence of AL in men and women (Table 5). However comparability did have a differential effect on prevalence by age group in the majority of countries. This is in contrast to the remaining countries in Table 2 where comparability did not change over time and who mostly did not have differential trends in prevalence by age group.

**Table 5 : Activity limitation (mild or severe versus not limited), results of logistic regression with comparability in the model by country**

| Country | agegp | gender | agegp*gender | Comparable | comp*agegp | comp*gender | comp*agegp*gender |
|---|---|---|---|---|---|---|---|
| Austria | *** | NS | *** | * | *** | NS | NS |
| Cyprus | *** | NS | *** | *** | * | NS | NS |
| Czech Republic | *** | *** | * | *** | ** | NS | NS |
| Denmark | *** | *** | NS | *** | *** | NS | NS |
| Estonia | *** | ** | *** | *** | NS | NS | NS |
| Finland | *** | *** | * | *** | NS | NS | NS |
| Hungary | *** | * | *** | *** | *** | NS | NS |
| Italy | *** | *** | *** | *** | *** | NS | NS |
| Latvia | *** | *** | *** | NS | *** | NS | NS |
| Poland | *** | *** | *** | *** | NS | NS | NS |
| Slovakia | *** | *** | *** | *** | *** | NS | NS |
| Spain | *** | *** | *** | NS | *** | NS | NS |
| Sweden | *** | *** | ** | *** | * | NS | NS |

NS – Not Significant (p>0.05), * (p<0.05), ** (p<0.01), *** (p<0.001), - reference category not comparable

## Conclusions

In 2008 male life expectancy at age 50 in the EU27 was 29.0 years of which 17.1 years (59%) were HLY (free of activity limitation) whilst female LE was 33.9 years, almost five years more, but of these 17.8 years (53%) were HLY. In 2008 the gap between the EU27 countries was 8.9 years for male LE at age 50 and 7.0 years for female LE contrasting with the much greater gap in HLY of 14.1 years (male HLY) and 14.7 years (female HLY). The size of the gaps in 2008 were the same if analysis was restricted to the pre-2007 EU25 countries (for comparison with 2005). However, when compared to 2005 values, the gap in LE and HLY was slightly reduced in 2008 for men but slightly increased for women.

Changes in HLY could be obscured by changes in LE therefore we investigated changes in the prevalence of activity limitation between 2005 and 2008 and the extent that these were reflected in changes in self-rated health and chronic morbidity. In general there was little evidence of systematic gender difference in trends over time and no countries, except Slovakia ($p<0.05$) had significant differences over time in the age and gender distribution of the actvitity limitation. Around half of the countries showed significant changes over time in the prevalence of activity limitation by age. When all three health measures were compared together however, time trends in activity limitation were often reflected in the other measures for the majority of countries.

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