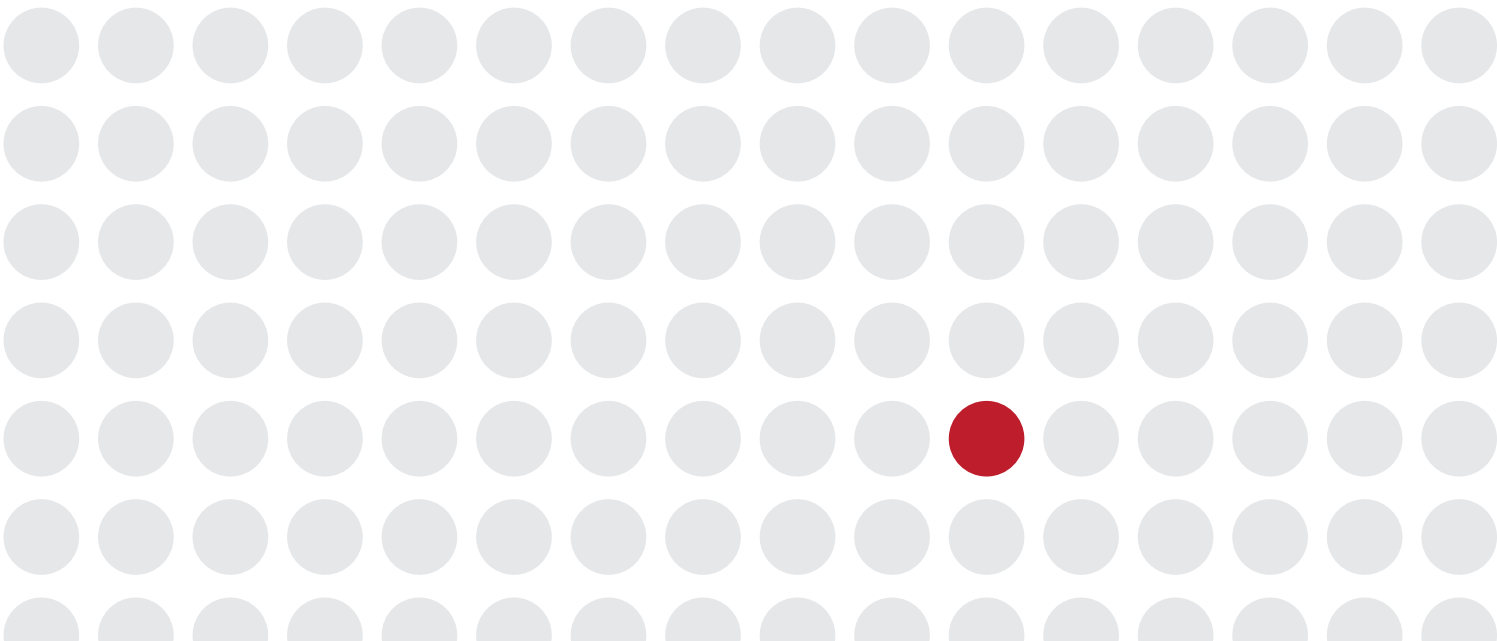


# Life expectancy



Past and future variations by socio-economic group in England & Wales





# Introduction

## by Sir Derek Wanless



Preparing for a future where more people live longer is one of society's greatest challenges. The long-term social and economic impact on health and care services as well as on the provision of pensions, annuities and insurance needs a great

deal of thought. It will require the best possible understanding of what has been happening and why, and the use of that knowledge to try to narrow the range of uncertainty about future trends.

For much of the recent past forecasts about improvements in life expectancy have been wrong. They have incorporated an assumption that we would begin to see falls in the rate of improvement in life expectancy but the opposite has occurred. Over recent decades rates of improvement have risen to historically high levels.

The Longevity Science Advisory Panel was established to bring actuarial science and epidemiology closer together to give us a better chance of understanding the past and the present and what might drive future change. The aim is to aid future forecasting.

We chose an analysis of improvements by socio-economic group as our first study and will follow it up with an analysis of improvements by gender. Despite the efforts of successive Governments to narrow the gap, differences in life expectancy by socio-economic group have continued to widen; at the same time the gap between female and male life expectancy has narrowed. Understanding the reasons for these changes should help the forecasting of life expectancy for the whole population in future.

This paper is a first step. In it we set out evidence and examine some important issues. It is being published because the Panel is keen to share its conclusions with others and to support the continuing debate about the many implications of changing demographics. In addition the Panel is very keen to hear from others working on any related research which can aid understanding and be recognised in our future work.

## Table of Contents

<b>Section 1.</b> Background	6
<b>Section 2.</b> Available Data	7
<b>2.1.</b> Historical trends in life expectancy (HMD)	7
<i>Figure 1. Male and Female Life Expectancy at Birth (E&amp;W, Total Population, HMD)</i>	7
<i>Figure 2. Male and Female Life Expectancy at Age 65 (E&amp;W, Total Population, HMD)</i>	7
<b>2.2.</b> Rates of improvement in mortality (CMI Working Papers 38 & 39, Institute and Faculty of Actuaries)	8
<b>2.2.1.</b> Concept & Definition:	8
<b>2.2.2.</b> Background & Data Sources:	8
<b>2.2.3.</b> Historical Rates of Mortality Improvement (England & Wales)	9
<b>2.2.4.</b> Historical Rates of Mortality Improvement (International Comparisons)	10
<i>Figure 3. Average annual rate of improvement in mortality for males (England &amp; Wales) by 25 year periods and age grouping</i>	10
<i>Figure 4. Average annual rate of improvement in mortality for females (England &amp; Wales) by 25 years periods and age grouping</i>	10
<i>Table 1. Comparison from 1854-2004 of the average annual rate of improvement in mortality for males (England &amp; Wales vs. 7 countries) by age grouping</i>	11
<i>Table 2. Comparison from 1854-2004 of the average annual rate of improvement in mortality for females (England &amp; Wales vs. 7 countries) by age grouping</i>	11
<i>Figure 5. Comparison of the average annual rate of improvement in mortality for males by 50 year period and age</i>	11
<i>Figure 6. Comparison of the average annual rate of improvement in mortality for females by 50 year period and age</i>	11
<b>2.2.5.</b> Projected Rates of Mortality Improvement (England & Wales)	12
<i>Figure 7. Sample projected average rates of improvement in mortality (2030-55)</i>	12
<b>2.2.6.</b> Mortality Improvement by Socio-Economic Classification (Social Class I-V)	13
<i>Figure 8. Average annual rate of improvement in mortality for males (England &amp; Wales) from 1972-76 to 2002-05 by age group and social class</i>	13
<i>Figure 9. Average annual rate of improvement in mortality for females (England &amp; Wales) from 1972-76 to 2002-05 by age group and social class</i>	13

<b>2.3.</b>	Gap in life expectancy by socio-economic group (ONS)	14
	<i>Table 3. Description of National Statistics – Socio-Economic Classification Categories</i>	14
	<i>Figure 10. Life expectancy by NS-SEC class (Males at age 65, England &amp; Wales)</i>	15
	<i>Figure 11. Life expectancy by Condensed NS-SEC class (Males at age 65, England &amp; Wales)</i>	15
	<i>Figure 12. Life expectancy by NS-SEC class (Females at age 65, England &amp; Wales)</i>	15
	<i>Figure 13. Life expectancy by Condensed NS-SEC class (Females at age 65, England &amp; Wales)</i>	15
<b>Section 3.</b>	Lifestyle: Impact and choices	16
<b>3.1</b>	Health Inequality (The Marmot Review 2010, England)	16
	Figure 14. Age standardised mortality rates by socioeconomic classification (NS-SEC) in the North East and South West regions, men aged 25-64, 2001-03	17
	Figure 15. Populations living in areas with, in relative terms, the least favourable environmental conditions, 2001-06	17
<b>3.2.</b>	Income Inequality (Report of the National Equality Panel, England & the United Kingdom)	18
	<i>Figure 16. Changes in overall income inequality measures (Households Below Average Income definition*), 1961 to 2007-08</i>	18
	<i>Table 4: Earnings, Income &amp; Wealth: Comparison between the highest and lowest 10th percentile within the UK (2006-08)*</i>	19
<b>3.3.</b>	Identification of the social determinants of health (Social Determinants of Health 2nd Edition 2006)	20
<b>3.4.</b>	Smoking by socio-economic group	21
	<i>Table 5. Cause specific mortality by smoking habit, standardised indirectly by age and study year, for all 25,346 dead male doctors born in 19th or 20th century (1851-1930) and observed 1951-2001</i>	21
	<i>Figure 17. Standardised Death Rate per 100,000 for Selected Smoking Related Causes (United Kingdom, 1985-2009)</i>	22
	<i>Table 7. Prevalence of cigarette smoking by gender/socio-economic group: England, 1974-1998.</i>	24
	<i>Figure 18. Prevalence of cigarette smoking by: By gender*,</i>	24
	<i>Table 8. Prevalence of cigarette smoking by gender and whether household reference person is in a non-manual socio-economic group: England, 1992 to 2009</i>	26
<b>3.5.</b>	Alcohol consumption by socio-economic group.	28
	<i>Figure 19. Percentage of men drinking more than 21 units a week, and women drinking more than 14 units per week: Original method</i>	28
	<i>Figure 20. England: Alcohol-related deaths (Count), 2001 to 2009</i>	29
	<i>Table 9. Alcohol-related deaths<sup>1,2</sup> by gender, 2001 to 2009</i>	30
	<i>Figure 22. Age-specific mortality rates from alcohol related causes of death by five year age group and NS-SEC, men aged 25-64, England &amp; Wales 2001-03.</i>	32

<i>Figure 23. Age-specific mortality rates from alcohol related causes of death by five year age group and NS-SEC, women aged 25-59, England &amp; Wales 2001-03.</i>	33
<b>3.6.</b> Obesity by socio-economic group.	33
<i>Figure 24. Trends in obesity prevalence 1993-2004 by Social Class I and V</i>	33
<i>Table 10. Adults: Distribution Of Body Mass Index 1993 - 2009</i>	34
<i>Table 11. Relative risk factors for obese people of developing selected diseases, by gender</i>	35
<i>Table 12. Blood pressure level by body mass index (BMI) and gender, 2007</i>	36
<b>3.7</b> Access to health services by socio-economic group.	38
<b>3.7.1.</b> Health promotion & screening	38
<b>3.7.2.</b> Access to primary care services and treatment	40
<b>3.7.3.</b> Secondary care referral and treatment	41
<b>3.8.</b> Educational attainment and its relationship with other factors discussed.	42
<b>Section 4.</b> Possible futures	44
<b>4.1.</b> Emerging basic science	44
<b>4.2.</b> How might the factors in Section 3 change in future?	45
<b>4.3.</b> Future health service improvements and public health interventions and their likely socio-economic gradient.	46
<b>4.4.</b> Information and research needs.	49
<b>Section 5.</b> Summary and conclusions	50
<b>Glossary</b>	52
<b>Appendix A.</b> Projections of Mortality Improvement from Several Countries	54
<i>Table A.1. Annual mortality improvements of various trend functions (%)</i>	54
<b>Appendix B.</b> Other measures highlighted by the Marmot Review (1 year onwards)	55
<b>Appendix C.</b> An anatomy of economic inequality in the UK (NEP 2010). Net Individual Income by Socio-Demographic Group	56
<i>C.1. Gender: Net Individual Income 2005-08 at 2008 prices</i>	56
<i>C.2. Age: Net Individual Income 2005-08 at 2008 prices</i>	56
<i>C.3. Occupational Class: Net Income by occupational social class 2005-08 at 2008 prices</i>	57

<i>C.4. Nation &amp; Region: Net Individual Income by nation and region, 2005-08 (2008 £)</i>	58
<i>C.5. Area Deprivation: Net Individual Income by area deprivation, England 2005-08 (2008 £)</i>	58
<i>C.6. Age: Total Wealth by age, Great Britain, 2006-08 (£)</i>	59
<i>C.7. Occupational Class: Total wealth by occupational social class, Great Britain, 2006-08 (£)</i>	59
<i>C.8. Nation &amp; Region: Total wealth by nation and region, 2006-08 (£)</i>	60
<i>C.9. Area Deprivation: Total wealth by area deprivation, England, 2006-08 (£)</i>	60
Inequality within socio-demographic groups (Earnings & wealth comparison, UK)	61
<i>C. 10. Inequality within each population group (90:10 ratio) by outcome (UK unless specified)*</i>	61
<b>Appendix D. Cigarette Smoking and Alcohol Consumption: More Facts</b>	62
<i>Table D.1. Prevalence of cigarette smoking by gender and socio-economic classification of the household reference person: England, 2001 to 2009</i>	62
<i>Table D.2. Prevalence of cigarette smoking by gender and socio-economic classification based on the current or last job of the household reference person: Great Britain, Persons aged 16 and over (2009)</i>	64
<i>Table D.3. Average daily cigarette consumption per smoker by sex, and socio-economic classification based on the current or last job of the household reference person</i>	65
<i>Table D.4. Age started smoking regularly by gender and socio-economic classification based on the current or last job of the household reference person</i>	66
<i>Table D.5. Age-specific mortality rates<sup>1,2,3</sup> from alcohol related causes of death by five year age group and NS-SEC classification, men aged 25-64, England &amp; Wales, 2001-03</i>	68
<i>Table D.6. Age-specific mortality rates<sup>1,2,3</sup> from alcohol related causes of death by five year age group and NS-SEC classification, women aged 25-59, England &amp; Wales, 2001-03</i>	70
<i>Table D.7. Average weekly alcohol consumption (units), by gender and socio-economic class based on the current or last job of the household reference person</i>	72
<i>Table D.8. Drinking last week, by gender, and socio-economic classification based on the current or last job of the household reference person</i>	73
<i>Table D.9. Maximum number of units drunk on any one day last week, by gender and socio-economic classification based on the current or last job of the household reference person</i>	74
<b>Bibliography</b>	76
<b>Contributors</b>	80
<b>Disclaimer</b>	81

# Life expectancy: past and future variations by socio- economic group in England & Wales

## Section 1. Background

Life expectancy has increased for many years in England and Wales. Recent decades have seen higher than average improvements. This has implications for many aspects of public policy and for the nature of society. There are variations in the figures, and in the improvements, by socio-economic group and by gender. The differences in life expectancy by socio-economic group have been considered unacceptable by all political parties and action has been proposed to narrow the gap. However, many factors influencing the differential have continued to widen it.

Actuarial science has largely been about collecting data and making projections based on numerical assumptions about future trends. The idea behind the Longevity Science Advisory Panel (LSAP) is that actuarial science and epidemiology should be integrated to help us understand better what is happening to life expectancy and why. There are many factors at work and they interact but better understanding might assist in producing projections.

LSAP was set up by Legal & General to explore the impact that a range of factors may have on future life expectancy in the UK. This includes the drivers that are enhancing life expectancy, for example, medical advances and social change, as well as the inhibitors such as aspects of lifestyle and delays in development of treatments.

LSAP intends, as a first step, to produce three positioning papers. The purpose of this, the first paper, based upon a review of population information and recent literature, is to provide a synopsis to support the Panel's consideration of the past and future differentials in life expectancy by socio-economic group. The second paper will examine the differentials by gender, where the increasing differential in favour of women has begun to reverse. In the third paper the Panel will consider whether any information available about the current health status of the population, and sub-groups, can assist in projecting future mortality.

This paper sets out in Section 2 the available data. In Section 3 the impacts of lifestyle and personal choices on life expectancy are considered. Section 4 looks at possible future influences on life expectancy and socio-economic differentials.

Comments on this paper are welcomed and should be emailed to [longevity@landg.com]. It is intended that periodic updates of this paper will be produced, drawing on new evidence available to LSAP.



## Section 2. Available Data

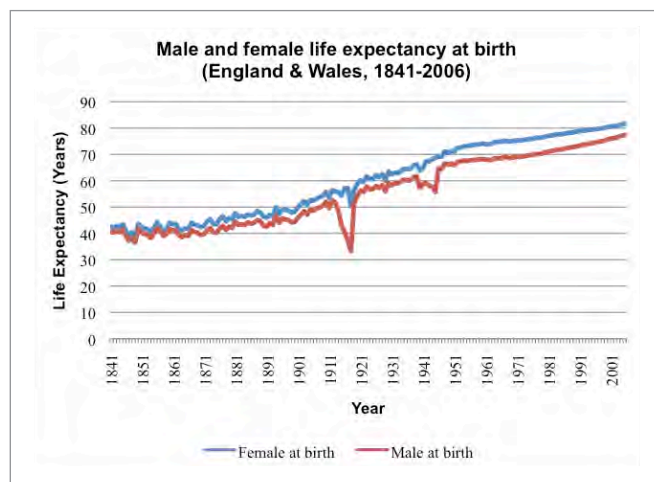
This section draws together information about historical trends in life expectancy, for the whole population and by socio-economic group.

The literature highlights inequalities within the UK population by i) health and ii) income and/or wealth. Evidence is also provided to link inequalities to differences in life expectancy. Section 2 therefore highlights: i) historical trends in improvements in longevity (Human Mortality Database); ii) trends in annual rates of improvement in mortality by gender, age group and social class (Continuous Mortality Investigation); iii) overall trends in the gap in life expectancy by socio-economic groups (Office for National Statistics).

### 2.1. Historical trends in life expectancy (HMD)

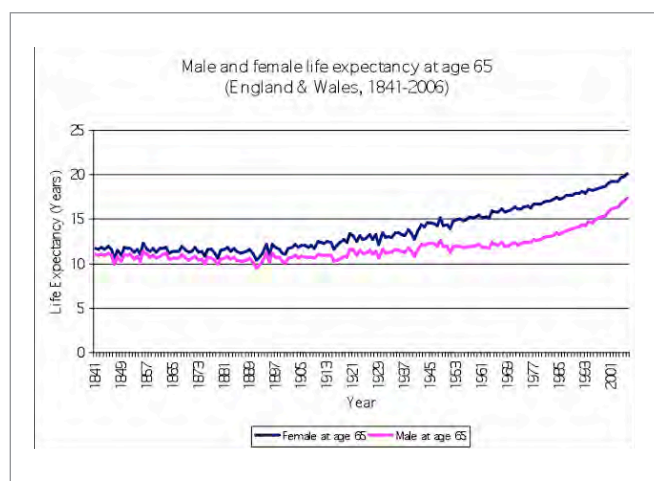
Figures 1 and 2 illustrates data from the Human Mortality Database (HMD) showing estimates of life expectancy (LE) at birth (Figure 1) and at age 65 (Figure 2) from 1841 to 2006. The figures show that LE at birth and at age 65 have increased for both males and females from 1841 to 2006. For males and females, LE at birth had increased by 36.9 and 39.1 years to 77.5 and 81.7 years (2006) respectively. Life expectancy for males and females at age 65 had increased by 6.3 and 8.4 years to 17.4 and 20.1 years (2006) respectively.

**Figure 1.** Male and Female Life Expectancy at Birth (E&W, Total Population, HMD)



Source: England and Wales, Total Population, Life tables (period 1x1), Males and Females. Last modified: 12-Dec-2008, MPv5 (May07). © Human Mortality Database. University of California, Berkeley (USA) and Max Planck Institute for Demographic Research (Germany). ([www.mortality.org](http://www.mortality.org))

**Figure 2.** Male and Female Life Expectancy at Age 65 (E&W, Total Population, HMD)



Source: England and Wales, Total Population, Life tables (period 1x1), Males and Females. Last modified: 12-Dec-2008, MPv5 (May07). © Human Mortality Database. University of California, Berkeley (USA) and Max Planck Institute for Demographic Research (Germany). ([www.mortality.org](http://www.mortality.org))

## 2.2. Rates of improvement in mortality (CMI Working Papers 38 & 39, Institute and Faculty of Actuaries)

### 2.2.1. Concept & Definition

The annual rate of improvement in mortality, in percentage terms, can be described as the 'pace of change in mortality rates' and is defined as

$$100(1 - Q_{x,t}/Q_{x,t-1})$$

where  $Q_{x,t}$  is the probability of death for a person age  $x$  over 1 year at time  $t$ .

### 2.2.2. Background & Data Sources

In 2009, the Working Party for the Continuous Mortality Investigation (CMI) published Working Papers 38 and 39 which featured a prototype (spreadsheet based) mortality improvement projection model. The model incorporated the most current actuarial experience available and provided the mechanism to blend, over time, the current (observed) rates of change with that of a long-term rate of change. The CMI's approach to developing projected rates in mortality improvement was first to assume that for the 'very short-term', the likely pace of change in mortality rates would be guided by the most recently observed actuarial experience. However, for the long-term, the CMI recognised that rates of change may be driven by forces very different from today and would be better informed by expert opinion and the analyses of long-term patterns of change. The implicit assumption was that these rates of change will continue to accelerate in the short term prior to decelerating in the longer term.

The data sources which the Working Party relied upon included the following:

- CMI datasets for assured lives (from contributing UK insurers)
- CMI datasets for life office pensioners (from contributing UK insurers)
- Club Vita (Pensioners, Self-administered Pension Schemes)
- ONS by Socio-Economic Classification (England & Wales)

Within this context, we draw upon the data/projections supplied by the CMI and the Office for National Statistics (ONS) to reflect both the historical (1854-2004) and projected (2030-55) annual rates of mortality improvement.

### 2.2.3. Historical Rates of Mortality Improvement (England & Wales)

Using data from the HMD ([www.mortality.org](http://www.mortality.org)) the Working Party conducted an analysis of past trends in mortality improvement for England & Wales and (as benchmarks for comparison) 6 other developed nations and an additional 19 developed countries. The 6 other countries were Belgium, Denmark, France, Netherlands, Norway and Sweden. They were selected due to the availability of data for the 150 year period. The 19 countries were selected due to the availability of data for the past 50 years.

Figures 3 (males) and 4 (females) show average annual rates of improvement for 10 year age bands over successive 25 year periods. To derive the rate of improvement for an age group, the Working Party first calculated the average mortality rate for the 3 year period centred on the beginning and end of each period (e.g. mortality improvement for 1979-2004 is the average annual rate of change based on the mortality rates calculated for the period 2003-05 and the period 1978-80).

Figure 3 shows that for most age groups, the rates of improvement in mortality for males have been much higher in the last 25 year period (1979-2004) than in any other period. The rapid improvements experienced within the last 25 years followed a quarter century over which there was only little to moderate change in mortality rates for ages 40 to 89. The Working Party attributes the changes to the initial “drag down” effect of smoking in the earlier period, with the corresponding increase in mortality improvement due to decreases in smoking prevalence alongside a general decrease in cardiovascular mortality.

Interestingly, for the 40 - 49 age group, the average annual rate of improvement for both men and women in 1979 - 2004 was not significantly different to the rates of improvement at that age for the previous 75 years. Smoking and cardiovascular mortality were probably less important features for this age group.

Rates of change for males aged 40-89 over the last 25 year period was 2.1% p.a.. The figure for the preceding 125 years was 0.5% p.a.. For females, Figure 4 also shows rapid increases in rates of mortality improvement in the last 25 year period as compared with the previous 25 years. Rates of change for females aged 40-89 over the last 25 year period was 1.7% p.a., 0.4% p.a. lower than for males. The figure for the preceding 125 years was 0.8% p.a., 0.3% p.a. higher than for males.

In addition, the Working Party had reiterated and confirmed previous evidence (England & Wales) showing persistent year of birth cohort features (particularly the 1931 cohort for both men and women) along with a more general increase in mortality improvement across a wide age range over the past 25 years.<sup>1</sup>

## 2.2.4. Historical Rates of Mortality Improvement (International Comparisons)

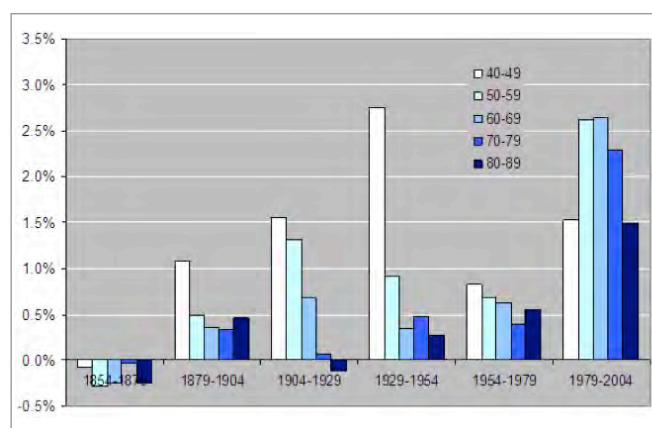
By way of comparison, Tables 1 (males) & 2 (females) show values equivalent to those provided in Figures 3 & 4 for the average of the seven countries previously mentioned. A further comparison is made with 19 countries over a 50 year period. Figures 5 (males) and 6 (females) compares the average rates of change by age of the 7 and 19 developed countries mentioned. The charts suggest that for the past 50 years at least, the improvements experienced by the group of 7 was broadly similar to the wider group of 19, indicating the global aspects of increased annual rates of improvement in mortality (males & females) for the period surveyed.

A brief perspective on long-term mortality projections/assumptions produced by the UK, USA and Canada is provided by the Working Party. Within the UK, the National Population Projections produced by the Government Actuary's Department (GAD) had assumed an approach whereby the "current" rates of mortality improvement would shift towards a long-term rate of improvement. The '2006-based' projections (released 2007) assumed annual rates of mortality improvement for most ages converged to a common rate of 1.0% p.a. in 2031, with a constant improvement at this rate thereafter (principal projection). To accommodate the cohort effect, they also assumed that those born between the years 1923 and 1940 would continue to experience higher rates of improvement in mortality, assuming rates of improvement (in and after 2031) would rise from 1.0% p.a. (for those born prior to 1923) to a peak of 2.5% p.a. (for those born in 1931) and then decline to 1.0% (for those born in 1941 or later). Within the '2004-based' projections (released 2005) the GAD

assumed that these cohort differences would vanish over time with a common rate of improvement at 1.0% for all ages by 2029.

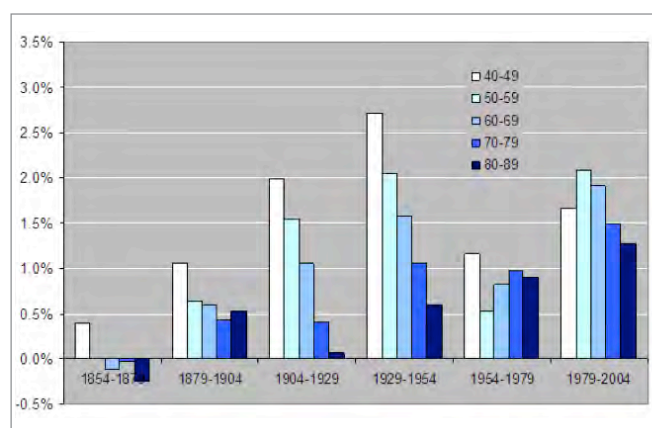
The long-term assumption (underlying the projections published by the GAD) of 1.0% p.a. was believed to be consistent with the average "pace of improvement" over the 20th century. It now appears to be low when compared with the rates of change currently being encountered by the; i) England & Wales population; ii) UK datasets of pensioners and assured lives. There have recently (October 2011) been some modest increases from that rate. For example, the ONS

**Figure 3.** Average annual rate of improvement in mortality for males (England & Wales) by 25 year periods and age grouping



Source: Reproduced from Figure 4.7. Average annual rate of improvement for males in England and Wales, successive periods of 25 years, by age group. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p.46. © 2009 Institute of Actuaries and Faculty of Actuaries

**Figure 4.** Average annual rate of improvement in mortality for females (England & Wales) by 25 year periods and age grouping



Source: Reproduced from Figure 4.8. Average annual rate of improvement for females in England & Wales, successive periods of 25 years, by age group. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p.47. © 2009, Institute of Actuaries and Faculty of Actuaries

2010-based national population (principal) projections now uses 1.2%.

Neither these nor the international comparisons contained information on socio-economic variations.

For comparison, the mortality projections produced by several countries (including the USA and Canada) had assumed much smaller or lower long-term rates of improvement. As recently as 2007, the Technical Panel on Assumptions and Methods (US Social Security Advisory Board) had recommended that "... assumed ultimate rates of mortality decline by age and sex be increased to an average of 1.00 percent per year to be

**Table 1.** Comparison from 1854-2004 of the average annual rate of improvement in mortality for males (England & Wales vs. 7 countries) by age grouping

Average Annual Rate of Improvement in Mortality		
Age Group	England & Wales	International Average (7 Countries)
40-49	1.3%	1.2%
50-59	1.0%	0.9%
60-69	0.7%	0.8%
70-79	0.6%	0.6%
80-89	0.4%	0.4%
All Ages (40-89)	0.8%	0.8%

Source: Reproduced from Table 4.1. Average annual rate of improvement for males in England & Wales and an average of seven countries, 1854-2004, by age group. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p.46. © 2009 Institute of Actuaries and Faculty of Actuaries

consistent with those observed during 1953-2003 for the total population."

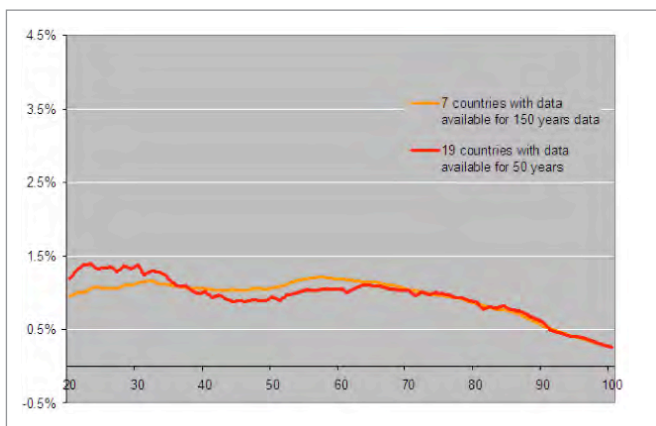
Similarly, mortality projections for the Canadian Social Security Programs have also assumed "relatively modest long-term rates of improvement." Recent projections (2008) have assumed rates of change from 2009 of 0.7% p.a. (ages up to 84), 0.6% p.a. (ages 85-90) and 0.4% p.a. (ages 90 and above). However, it is likely that, in future, changes to the assumptions underlying future rates of mortality improvement will incorporate higher increases for both the USA and Canada.

**Table 2.** Comparison from 1854-2004 of the average annual rate of improvement in mortality for females (England & Wales vs. 7 countries) by age grouping

Average Annual Rate of Improvement in Mortality		
Age Group	England & Wales	International Average (7 Countries)
40-49	1.5%	1.5%
50-59	1.1%	1.1%
60-69	1.0%	1.1%
70-79	0.7%	0.9%
80-89	0.5%	0.6%
All Ages (40-89)	1.0%	1.0%

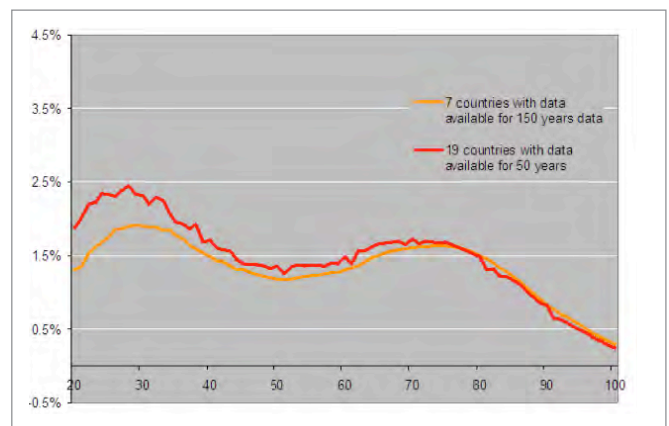
Source: Reproduced from Table 4.2. Average annual rate of improvement for females in England & Wales and an average of seven countries, 1854-2004, by age group. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p 47. © 2009 Institute of Actuaries and Faculty of Actuaries

**Figure 5.** Comparison of the average annual rate of improvement in mortality for males by 50 year period and age



Source: Reproduced from Figure 4.3. Average annual rate of improvement for males over successive periods of 50 years, by age, various groups of countries. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p.42. © 2009 Institute of Actuaries and Faculty of Actuaries

**Figure 6.** Comparison of the average annual rate of improvement in mortality for females by 50 year period and age



Source: Reproduced from Figure 4.6. Average annual rate of improvement for females over successive periods of 50 years, by age, various groups of countries. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p 45. © 2009 Institute of Actuaries and Faculty of Actuaries



### 2.2.5. Projected Rates of Mortality Improvement (England & Wales)

Figure 7 shows the average rates of improvement in mortality implicit in a large sample of projections generated by the CMI (CMI Library of Mortality Projections version 1.1). Average annual rates of improvement in mortality had been calculated by the CMI using projected mortality reduction factors for the period 2030 to 2055. Calculations were generated for each age with a further average of the resulting rates (across ages) generated for each four 20 year age groups.

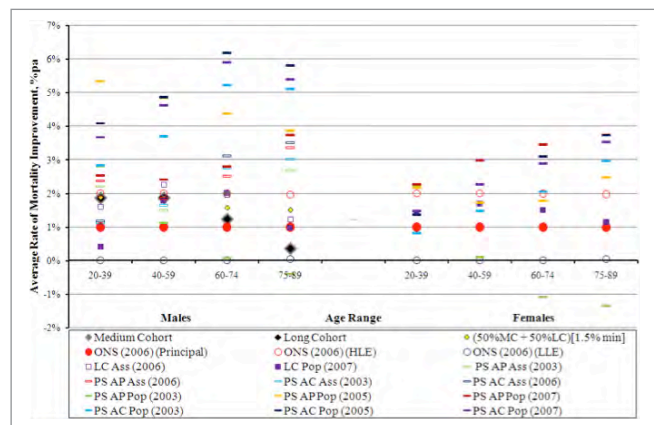
The sample of projections includes the following:

- Medium and Long Interim Cohort Projections, plus a combination of the two (with 1.5% p.a. floor)
- Principal, Higher and Lower variants using ONS published 2006 National Population Projections (England & Wales)
- Output from stochastic models applied to the population datasets for: i) England & Wales (data to 2007); ii) CMI Permanent Assurances (data to 2006) including: a) Lee-Carter models (LC); b) Age-period (AP) and age-cohort (AC) P-Spline models<sup>2</sup>

The CMI's intention was to show the great variation in long-term projections derived from the selected models. It sought to provide a picture of the range of implicit long-term rates and indicate any variation by age, gender and model type. Figure 7 achieves this. From the point of view of those using the data for future policy formulation or risk assessment, the very wide ranges of projected rates in Figure 7 do illustrate the considerable uncertainty and force attention onto the arithmetic assumptions, often rather arbitrarily built into long-term, compounded figures.

The many projections contained in Figure 7 are based on assumptions which contain no epidemiological input. In theory at least such input should provide valuable information in seeking to narrow future uncertainty. LSAP will be working to understand the extent to which these very wide ranges can be narrowed by incorporating epidemiological information and assumptions into forecasting models.

**Figure 7.** Sample projected average rates of improvement in mortality (2030-55)



Source: Reproduced from Figure 4.14. Sample projected average rates of mortality improvement over 2030-2055. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis, Institute of Actuaries and Faculty of Actuaries, 2009, p.53. © 2009 Institute of Actuaries and Faculty of Actuaries

2. Models show greater variation than Lee-Carter models when additional years are added to the model (results provided for population datasets up to 2003, 2005 and 2007 and CMI datasets up to 2003 and 2006). Issues of model risk are prevalent and its impact can be considerable. For example, Richards and Currie (2009) applied the same population data (England and Wales) to two slightly different versions of the Lee-Carter model and compared their results. They show the resulting projections were quite different, with considerable divergence in estimates (95% confidence interval) from one model to the other.

## 2.2.6. Mortality Improvement by Socio-Economic Classification (Social Class I-V)

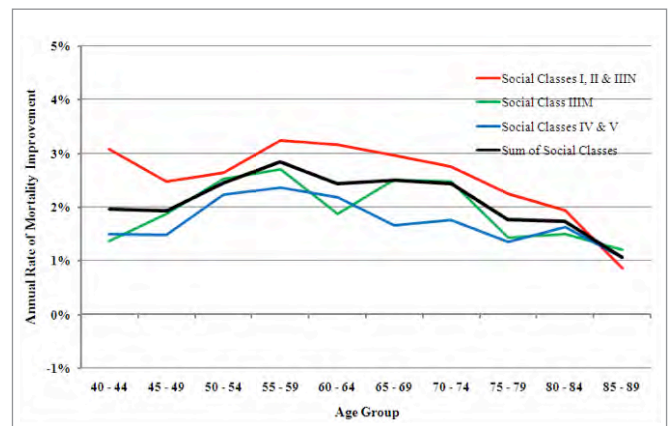
In 2007 the ONS published age-specific mortality rates by social class (1972-2005) using data from the Longitudinal Study (based upon 1% of population in England & Wales). The Social classes comprise the following:

- Class I – Professionals
- Class II – Managerial & technical intermediate
- Class IIIIN – Skilled non-manual
- Class IIIIM – Skilled manual
- Class IV – Partly skilled
- Class V – Unskilled

Figures 8 (males) and 9 (females) show annual rates of mortality improvement by age group and social class over a 30 year period. For males, Figure 8 shows a clear socio-economic differential in the average rate of improvement in mortality, with mortality falling more rapidly for the more affluent social class groupings. The CMI noted that the differentials in improvement rates (absolute terms) had been relatively constant up to ages 75-79 but subsequently decreased (to the point of no difference) at higher ages (age 80 and above). For females, Figure 9 shows that while the socio-economic gradient was generally similar to males, the pattern was much weaker.

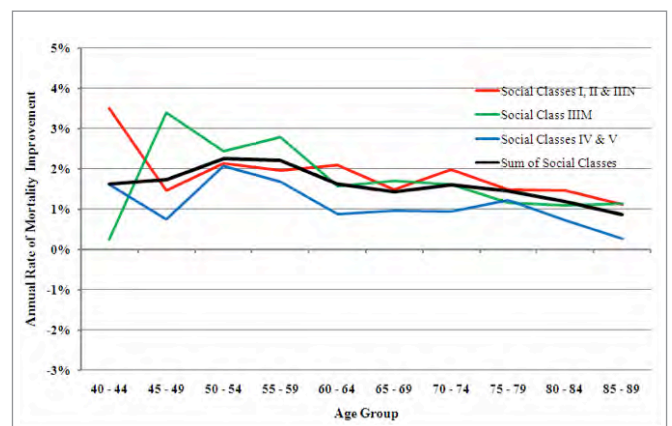
At retirement, the nature of the socio-economic classification changes as people are classified in relation to their former status when they were economically active. This means care needs to be taken when older groups are analysed by socio-economic grouping.

**Figure 8.** Average annual rate of improvement in mortality for males (England & Wales) from 1972-76 to 2002-05 by age group and social class



Source: Reproduced from Figure 3.21. Average annual rate of mortality improvement for males in England & Wales, 1972-76 to 2002-05, by age group and social class. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p.30. © 2009 Institute of Actuaries and Faculty of Actuaries

**Figure 9.** Average annual rate of improvement in mortality for females (England & Wales) from 1972-76 to 2002-05 by age group and social class



Source: Reproduced from Figure 3.24. Average annual rate of mortality improvement for females in England & Wales, 1972-76 to 2002-05, by age group and social class. Continuous Mortality Investigation Working Paper 39. A Prototype Mortality Projections Model: Part Two – Detailed Analysis. Institute of Actuaries and Faculty of Actuaries, 2009, p.32. © 2009 Institute of Actuaries and Faculty of Actuaries

## 2.3. Gap in Life Expectancy by Socio-Economic Group (ONS)

The ONS (Statistical Bulletin Feb 2011) has provided estimates of life expectancy or LE (at birth and age 65) by National Statistics Socio-economic Classification (NS-SEC) between 1982 and 2006 (men and women, England & Wales). The LE estimates by occupational

classification are seen as a measure of trends in socio-economic health inequalities (England & Wales) over the 25 year period. A breakdown of the NS-SEC classes is provided in Table 3.

**Table 3.** Description of National Statistics – Socio-Economic Classification Categories

8-Class NS-SEC (Full version)	3-Class NS-SEC (Simplified version)
1. Higher managerial, administrative & professional occupations 1.1 Large employers & higher managerial & administrative 1.2 Higher professional	1. Higher managerial, administrative & professional occupations
2. Lower managerial, administrative & professional occupations	
3. Intermediate occupations	2. Intermediate occupations
4. Small employers & own account workers	
5. Lower supervisory & technical occupations	
6. Semi-routine occupations	3. Routine & Manual occupations
7. Routine occupations	
8. Never worked and long-term unemployed	4. Never worked and long-term unemployed

Source: Adapted from Table 3. Eight-, five- and three- class versions. Standard Occupational Classification. Volume 3. The National Statistics Socio-economic Classification: (Rebased on the SOC2010) User Manual. Office for National Statistics, p.13. (<http://www.ons.gov.uk/about-statistics/classifications/current/soc2010/soc2010-volume-3-ns-sec--rebased-on-soc2010--user-manual/section-12--choosing-a-derivation-method.pdf>)

© Crown Copyright 2010.

This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

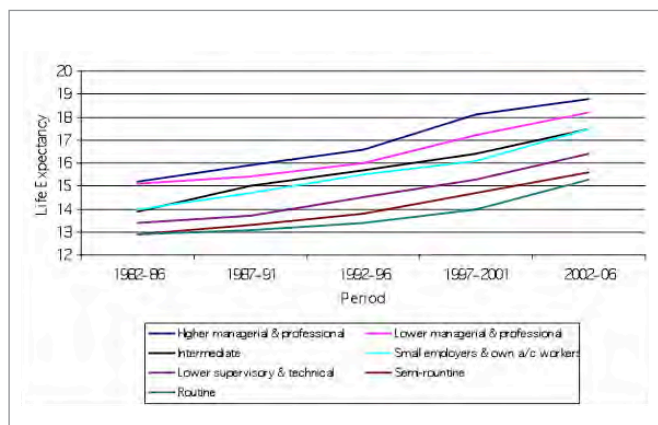
Briefly, the ONS has concluded that inequalities in male LE by socio-economic circumstances (SEC) has increased across most of the study period despite improvements over time for all classes.

Figures 10 and 11 show male LE (at age 65) using the full and condensed versions of the NS-SEC respectively. Figures show there was a clear gradient in LE at age 65 across occupational classes from the most to the least advantaged throughout the 1982-2006 period. At age 65, LE of males (2002-06)

classified by occupation as “Higher managerial and professional” was 18.8 years compared with 15.3 years for those assigned to occupations classified as “Routine”. Figures 12 & 13 show female LE at age 65 using the full and condensed versions of the NS-SEC respectively. At age 65, LE of females (2002-06) classified by occupation as “Higher managerial and professional” was 21.7 years compared with 18.5 years for those assigned to occupations classified as “Routine”.



**Figure 10.** Life expectancy by NS-SEC class (Males at age 65, England & Wales)

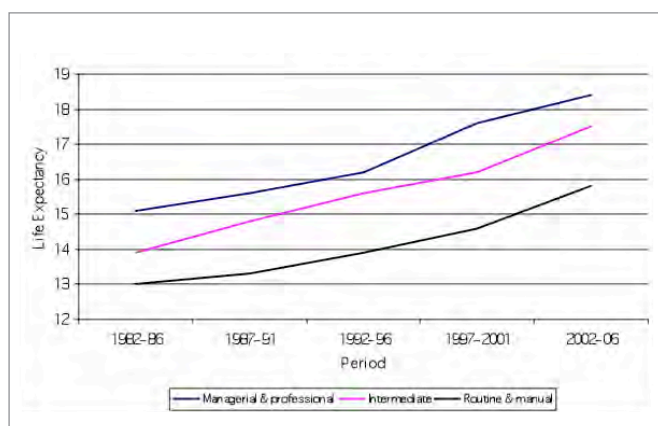


Source: Adapted from Table 1b. Life expectancy by NS-SEC class, males at age 65. Statistical Bulletin: Trends in life expectancy by the National Statistics, Socio-economic Classification 1982-2006. 22 Feb 2011. Office for National Statistics, 2011, p.6. (<http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/trends-in-life-expectancy-by-the-national-statistics-socio-economic-classification-1982-2006/index.html>)

© Crown Copyright 2011.

This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Figure 11.** Life expectancy by Condensed NS-SEC class (Males at age 65, England & Wales)

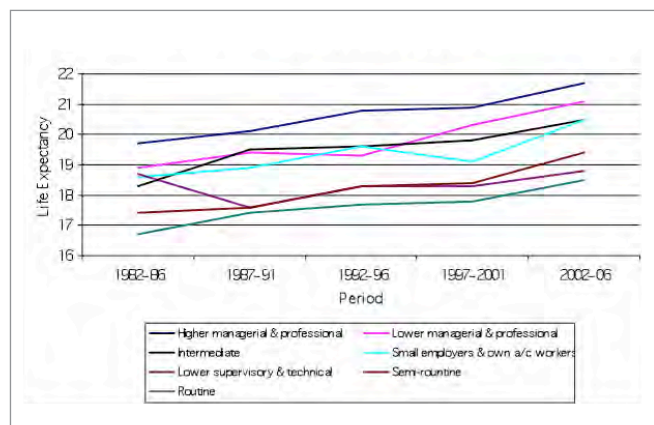


Source: Adapted from Table 1b. Life expectancy by NS-SEC class, males at age 65. Statistical Bulletin: Trends in life expectancy by the National Statistics, Socio-economic Classification 1982-2006. 22 Feb 2011. Office for National Statistics, 2011, p.6. (<http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/trends-in-life-expectancy-by-the-national-statistics-socio-economic-classification-1982-2006/index.html>)

© Crown Copyright 2011.

This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Figure 12.** Life expectancy by NS-SEC class (Females at age 65, England & Wales)

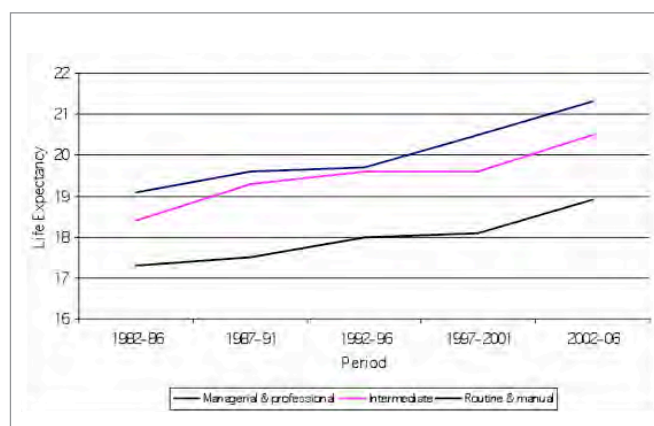


Source: Adapted from Table 4b. Life expectancy by NS-SEC class, females at birth. Statistical Bulletin: Trends in life expectancy by the National Statistics, Socio-economic Classification 1982-2006. 22 Feb 2011. Office for National Statistics, 2011, p.12. (<http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/trends-in-life-expectancy-by-the-national-statistics-socio-economic-classification-1982-2006/index.html>)

© Crown Copyright 2011.

This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Figure 13.** Life expectancy by Condensed NS-SEC class (Females at age 65, England & Wales)



Source: Adapted from Table 4b. Life expectancy by NS-SEC class, females at birth. Statistical Bulletin: Trends in life expectancy by the National Statistics, Socio-economic Classification 1982-2006. 22 Feb 2011. Office for National Statistics, 2011, p.12. (<http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/trends-in-life-expectancy-by-the-national-statistics-socio-economic-classification-1982-2006/index.html>)

© Crown Copyright 2011.

This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

## Section 3. Lifestyle: Impact and Choices

Many of the factors influencing life expectancy are aspects of lifestyle. This section acknowledges the recent work carried out to examine the ways in which lifestyle influences life expectancy, namely;

- i) analysis of health inequality within the UK (Marmot Review 2010);
- ii) analysis of income inequality within the UK (National Equality Panel Report 2010);
- iii) identification of the social determinants to health (Social Determinants of Health, 2nd ed. 2006);
- iv) smoking;
- v) alcohol consumption;
- vi) obesity;
- vii) access to health services;
- viii) educational attainment.



## 3.1. Health Inequality (The Marmot Review 2010, England)

The Marmot Review (2010) provides evidence of a social gradient in health among socio-economic classes - i.e. the lower a person's social position, the worse his or her health (The Marmot Review Executive Summary, p.9). Based upon figures submitted to the review (Frontier Economics 2009; Suhrcke M. 2009), the authors have concluded that, as a result of prevailing health inequalities, the number of persons (England) experiencing premature deaths p.a. would "otherwise have enjoyed, in total, between 1.3 and 2.5 million extra years of life."<sup>4\*</sup> Regional differences in health inequalities are also highlighted within the review. (Figures 14 and 15 show selected examples).

Overall, the review concluded that: i) inequalities in health are a result of socio-economic inequalities and ii) a sole focus on the most disadvantaged will not adequately reduce health inequalities. The phrase "proportionate universalism" is coined to highlight the assertion that in order to reduce the steepness of the social gradient within health, actions taken must be universal but "with a scale and intensity that is proportionate to the level of disadvantage." The review indicated that a reduction in health inequalities will require action on 6 policy objectives: i) give every child the best start in life; ii) enable all children, young people and adults to maximise their capabilities and have control over their lives; iii) create fair employment and good work for all; iv) ensure healthy standard of living for all; v) create and develop healthy and sustainable places and communities; vi) strengthen the role and impact of ill health prevention (The Marmot Review Executive Summary, p.9).

4. Frontier Economics. 2009. Overall costs of health inequalities. Submission to the Marmot review; Suhrcke M. 2009. The economic benefits of reducing health inequalities in England. Submission to the Marmot Review.

The review states that economic growth is not the most important measure of the country's health; rather the fair distribution of health, well-being and sustainability are important social goals in their own right. Following its release, new data was published to mark the 1st anniversary of its publication (Press Release 11 Feb 2011). Data highlights are presented in Appendix B.

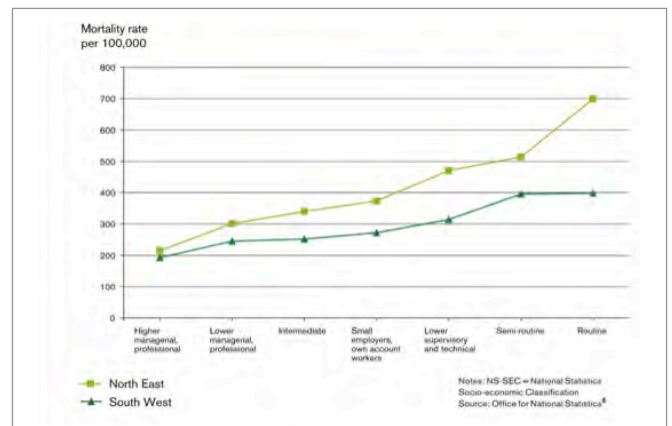
The review included some suggested indicators to support monitoring of the overall strategic direction in reducing health inequalities. The London Health Observatory and the Marmot Review Team have produced baseline figures for some key indicators of the social determinants of health, health outcomes and social inequality that correspond, as closely as is currently possible, to the indicators proposed in Fair Society, Healthy Lives.

The indicators are shown below:

- Male life expectancy
- Female life expectancy
- Slope index of inequality (SII) for male life expectancy
- Slope index of inequality (SII) for female life expectancy
- Slope index of inequality (SII) for male disability-free life expectancy
- Slope index of inequality (SII) for female disability-free life expectancy
- Children achieving a good level of development at age 5
- Young people who are not in education, employment or training (NEET)
- People in households in receipt of means-tested benefits
- Slope index of inequality for people in households in receipt of means-tested benefits.

The data is available by Region and upper tier local authority in England. Under the Coalition Government's proposals local authorities will take over responsibility for public health, which, in recent decades, has fallen under the auspices of the NHS.

**Figure 14.** Age standardised mortality rates by socio-economic classification (NS-SEC) in the North East and South West regions, men aged 25-64, 2001-03

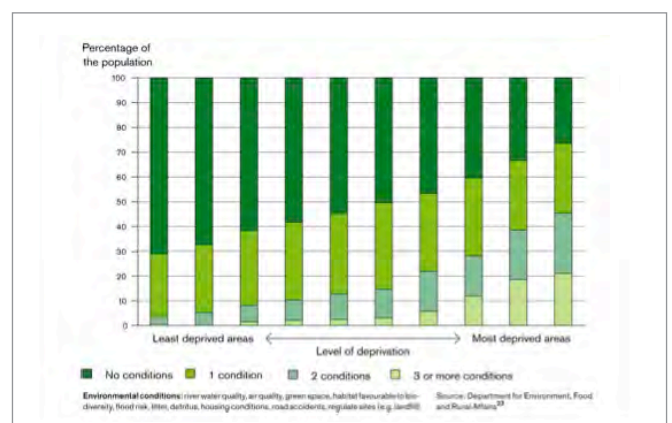


Source: Reproduced from Figure 2. Age standardised mortality rates by socioeconomic classification (NS-SEC) in the North East and South West regions, men aged 25-64, 2001-2003. Fair Society, Healthy Lives. The Marmot Review: Executive Summary, p. 11. (<http://www.marmotreview.org/AssetLibrary/pdfs/Reports/FairSocietyHealthyLivesExecSummary.pdf>)

© The Marmot Review 2010. Re-used with the permission of The Marmot Review. All rights reserved.

Original Data Source: Siegler V, Langford A and Johnson B. 2008. Regional differences in male mortality inequalities using the National Statistics Socio-economic Classification, England and Wales, 2001-03. ([http://www.statistics.gov.uk/downloads/theme\\_health/HSQ40-winter-2008.pdf](http://www.statistics.gov.uk/downloads/theme_health/HSQ40-winter-2008.pdf)). Office for National Statistics. © Crown Copyright 2008. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Figure 15.** Populations living in areas with, in relative terms, the least favourable environmental conditions, 2001-06



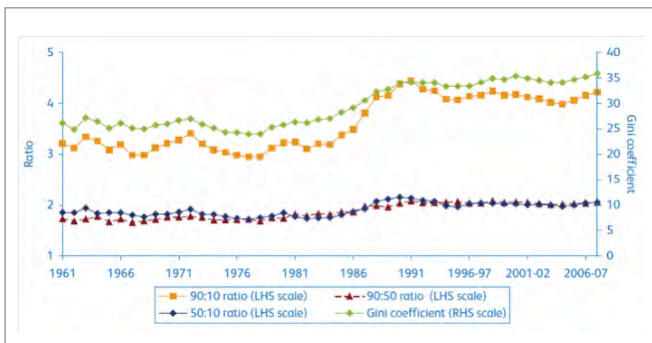
Source: Reproduced from Figure 10. Populations living in areas with, in relative terms, the least favourable environmental conditions, 2001-06. Fair Society, Healthy Lives. ©The Marmot Review 2010. (<http://www.instituteofhealththequity.org/projects/fair-society-healthy-lives-the-marmot-review>) Re-used with the permission of The Marmot Review. All rights reserved.

Original Data Source: Department for Environment, Food and Rural Affairs. ©Crown Copyright 2007. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

### 3.2. Income Inequality (Report of the National Equality Panel, England & the United Kingdom)

Publication of the Report of the National Equality Panel (NEP 2010) has provided evidence (most recent decade) that despite: i) the narrowing of earnings inequality and ii) the stabilisation of income inequality, the growth in inequality from the late 70s to early 90s has not been reversed. The 90:10 Ratio illustrates this in Figure 16.

**Figure 16.** Changes in overall income inequality measures (Households Below Average Income definition\*), 1961 to 2007-08



\*Department for Work and Pensions Household Below Average Income (HBAI) statistics presents information regarding living standards within the UK. Refer to Glossary for further information

Source: Reproduced from Figure 2.13. Changes in overall income inequality measures (HBAI definition), 1961 to 2007-08. *An anatomy of economic inequality in the UK. Report of the National Equality Panel. National Equality Panel, 2010, p.39.* (<http://sticerd.lse.ac.uk/dps/case/cr/CASereport60.pdf>)

© Crown Copyright 2010. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Original Data Source: © Institute for Fiscal Studies. (<http://www.ifs.org.uk/bns/bn19figs.zip>). Reproduced with permission from the Institute of Fiscal Studies.

The report states that the UK has income inequality in the highest quarter of industrialised countries (mid-2000s) (refer Figure S2, NEP 2010). Since late 1980s, income inequality has remained much higher than in the 1960s and 1970s; on some measures it is the highest (particularly those which look across the whole distribution) within the past 50 years; on others (including the 90:10 ratio) it has narrowed & stabilised (refer Fig S1, NEP 2010). Some of these inequalities have their origins in variations in skill levels and qualifications. Despite recent improvements in results at age 16, there is a 'long tail' of low achievement among 16 year olds (Figure S5, NEP 2010). The NEP has found that the UK lags behind other countries in the proportion of the working age population with upper secondary qualifications (Equivalent to GCSE passes at A\*-C or above) especially ages 25-34. To illustrate, Table 4 provides a comparison (UK) between the highest and lowest 10th percentile in earnings, income and wealth (2006 – 2008).

**Table 4.** Earnings, Income & Wealth: Comparison between the highest and lowest 10th percentile within the UK (2006-08)\*

Parameters	Median (£)	90:10 Ratio	Lowest 10th Percentile (£)	Highest 10th Percentile (£)
Gross Hourly Wage	9.90	3.9	5.50	21.30
Gross Weekly Wage	448	3.7	240	893
Net Individual Income	223	9.6	56	542
Equivalent Net Income (Household basis)	393	4.2	191	806
Total Wealth**	205,000	100	8,800	853,000***

\*Wages and earnings figures are from three years of pooled Labour Force Survey data, from the beginning of 2006 to the end of 2008. Using three years of data increases the sample size we can analyse, allowing us to provide more reliable statistics for relatively small population groups. Similarly, individual income figures are from three years of pooled Family Resources Survey data, from 2005-06 to 2007-08. Equivalent income figures are from the latest available Household Below Average Income (HBAI) dataset, 2007-08 apart from the figures by ethnicity, which are averages of three years of HBAI, 2005-06, 2006-07 and 2007-08. Wealth figures are from the July 2006 to June 2008 Wealth and Assets Survey. All figures are given in 2008 prices, or 2007-08 prices in the case of net individual incomes and equivalent net income. Wealth figures are cash averages for 2006-08.

\*\*Includes personal possessions, net financial assets, housing & private pension rights.

\*\*\*Highest 1% of households have total wealth >£2.6m.

Source: Adapted from data provided in *An anatomy of economic inequality in the UK – Summary. Report of the National Equality Panel*, p.7 ([http://sticerd.lse.ac.uk/dps/case/cr/CASEREport60\\_summary.pdf](http://sticerd.lse.ac.uk/dps/case/cr/CASEREport60_summary.pdf))

© Crown Copyright 2010.

Contains public sector information licensed under the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

However, some progress has been made. Of note has been the narrowing of the gap in: i) earnings between men and women, and ii) educational qualifications between different ethnic groups. However, the NEP has stated that: i) inequalities in earnings and income remain high within the UK, especially when compared with other industrialised countries and with circumstances 30 years ago; and ii) there remain deep, systematic differences in economic outcomes between social groups across all the dimensions investigated.<sup>5</sup>

The report indicated that the identification/interplay of differences both a) between and b) within the socio-demographic groups (e.g. gender, age, ethnicity etc.) have a role to play in economic inequality within the UK. It has found that the differences within each socio-demographic group are only slightly narrower than the differences between socio-demographic groups. As a result, even if “all differences between such groups were removed, overall economic inequalities would remain wide” as the inequality growth of the past 40 years has been mostly

attributable to the growing gaps within each socio-economic group (no matter how defined) (Report of the NEP Summary, p.1). For example, within education, the NEP has concluded that despite the elimination/reversal of differences in qualifications (explanatory factor in employment rates and relative pay), significant differences remain between men and women and between ethnic groups.

The report also concluded that many of the economic differences examined accumulate across the life cycle, especially those related to people's socio-economic background. “Economic advantage and disadvantage reinforce themselves across the life cycle, and often on to the next generation.” (Report of the NEP Summary, p.1). Additional data and findings (by socio-demographic groups) from the report are provided in Appendix C.

5. Dimensions analysed include: i) gender; ii) ethnicity; iii) social class; iv) regional differences (e.g. disadvantaged vs. advantaged; London vs. other parts of the country)



### 3.3. Identification of the social determinants of health (Social Determinants of Health 2nd Edition 2006)

Social Determinants of Health (2ND edition) reiterates the contention that the social gradient in health “runs from top to bottom of society” and is not confined to those in poverty. The social gradient in health is caused by a multitude of factors including social determinants and inequalities in socio-economic circumstances (“causes of the causes”). Along with the parallel publication, The Solid Facts (2nd ed. 2003), the authors provide definition to the social determinants of health and offer policy guidance. The social determinants identified include the following:

- i) Social gradient – Poor socio-economic circumstances affect health throughout life. Persons further down the social ladder run at least twice the risk of serious illness/premature death of those near the top. Effects are not confined to the poor but can be demonstrated throughout all levels of society (refer Fig. 1 Social determinants of health The solid facts 2nd ed. for further detail);
- ii) Stress conditions – Psycho-social circumstances (anxiety, insecurity etc.) can cause long term stress and accumulate through life, thereby increasing the chances of poor mental health/premature death. The lower people are in the social hierarchy of industrialised countries, the more common the problems become.
- iii) Early life circumstances - Slow growth & poor emotional support during early childhood raise the lifetime risk of poor physical health and reduce physical, cognitive and emotional function in adulthood.
- iv) Social exclusion – Relative poverty (<60% of national median income) denies people access to decent housing, education, transport etc. The greater the length of time people live in disadvantaged circumstances, the more likely they are to suffer from a range of health related problems, particularly cardiovascular disease.
- v) Work – Stress at work can contribute to the large social status differences in health, work absence and premature death. Having little control over work is strongly related to an increased risk of work absence and cardiovascular disease.
- vi) Unemployment – Job security increases health and job satisfaction. Higher unemployment rates cause greater illness and premature death.
- vii) Social support – Social isolation and exclusion are associated with increased rates of premature death and poorer chances of survival after a heart attack (refer Fig. 6 Social determinants of health The solid facts 2nd ed. for further detail);
- viii) Addiction – Alcohol dependence, illicit drug use and cigarette smoking are all associated with markers of socio-economic disadvantage (refer Fig. 7 Social determinants of health The solid facts 2nd ed. for further detail);
- ix) Food – The main dietary difference between social classes is the source of nutrients. Socio-economic conditions can result in a social gradient in diet quality that contributes to health inequalities.
- x) Transport - Social isolation and lack of community interaction are strongly associated with poorer health

### 3.4. Smoking by socio-economic group

Smoking is one of the biggest causes of death and illness in the UK. It is estimated that around 114,000 people die every year from smoking-related illnesses<sup>6</sup>. The NHS website quoted indicates that a smoker has an increased risk of developing more than 50 serious health conditions. Some may be fatal and others can cause irreversible long-term damage to health.

For example, smoking causes about 90% of lung cancers and is associated with an increased risk of cancer in many other parts of the body. In addition, in the lung, smokers have a higher incidence of chronic bronchitis (infection of the main airways in the lungs), emphysema (damage to the small airways in the lungs) and pneumonia (inflammation in the lungs). Smoking has deleterious effects on the heart and blood vessels throughout the body substantially increasing the risk of heart attack and stroke amongst other things.

Studies have investigated the impact of smoking/non-smoking status on mortality and life expectancy. A long-term study of British male doctors<sup>7</sup> with 34,439 participants collected information about their smoking habits in 1951 and periodically after that.

The cause-specific mortality of the doctors in the group was monitored for 50 years. 25,346 of the participants had died before November 2001 and the causes of death were classified.

Doll et al. (2004) reported that, over the 50 year period, smoking had offset recent medical advances by reducing the life expectancy gains for male British doctors who smoked (relative to those who did not) by about 10 years. Figures selected from their study are shown in Table 5 below. They show age-standardised all-cause mortality among current smokers (1951-2001) as 1.8 times greater than non-smokers, that is 35.40 deaths per 1,000 per year against 19.38. The study of course relates to a particular group of British male professionals.

The study also showed, for that group, the benefit from stopping smoking. As defined, smoking cessation at age 50 halved the hazards of smoking; cessation at age 30 avoided almost all of it.

**Table 5.** Cause specific mortality by smoking habit, standardised indirectly by age and study year, for all 25,346 dead male doctors born in 19th or 20th century (1851-1930) and observed 1951-2001

Cause of Death	No. of deaths (1951-2001)	Lifelong Non-Smokers <sup>1</sup>	Former Smoker <sup>1,2</sup>	Current Smoker <sup>1,2</sup>
Cancer of lung	1052	0.17	0.68	2.49
Cancers of mouth, pharynx, larynx, oesophagus	340	0.09	0.26	0.6
All other neoplasms	3893	3.34	3.72	4.69
Chronic Obstructive Pulmonary Disease	640	0.11	0.64	1.56
Other respiratory disease	1701	1.27	1.7	2.39
Ischaemic heart disease	7628	6.19	7.61	10.01
Cerebrovascular disease	3307	2.75	3.18	4.32
Other vascular (incl. respiratory heart) disease	3052	2.28	2.83	4.15
Other medical conditions	2565	2.26	2.47	3.49
External causes	891	0.71	0.75	1.13
Cause unknown	277	0.17	0.28	0.52
All Cause (No. of deaths)	25346	19.38 (2917)	24.15 (5354)	35.40 (4680)

Legend: 1 Age standardised mortality rate per 1000 men/year 2 Cigarette smokers (no other smoking habit previously reported)

Source: Adapted from data provided in Table 1. Cause specific mortality by smoking habit, standardised indirectly by age and study year, for all 25,346 men born in 19th or 20th century (1851-1930) and observed 1951-2001. Mortality in relation to smoking: 50 years' observations on male British doctors. Doll R, Peto R, Boreham J, Sutherland I., *BMJ*. 2004, p.3 of 9. (<http://www.bmj.com/content/328/7455/1519.long>)

©Doll et. al. All rights reserved. Reproduced with permission.

6. Source: National Health Service. What are the health risks of smoking? Webpage which sets out the health risks for smokers. Accessed 17 August 2011. (<http://www.nhs.uk/chq/Pages/2344.aspx?CategoryID=53&SubCategoryID=536>)

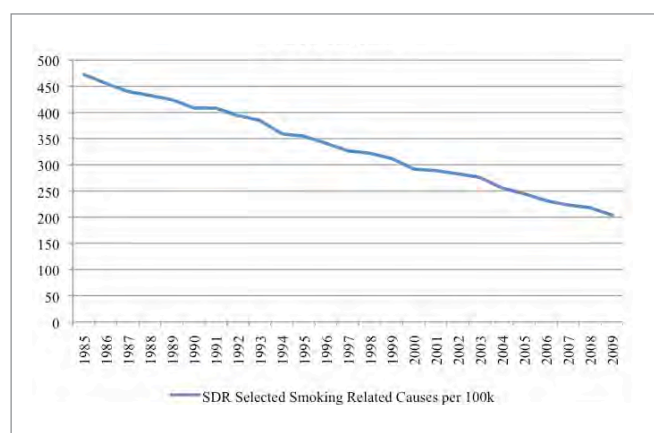
7. Doll R, Peto R, Boreham J, Sutherland I. 2004. Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ*, doi:10.1136/bmj.38142.554479. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC437139/pdf/bmj32801519.pdf>)

International comparisons have also been made between smoking and non-smoking status. Using a modified method to approximate tobacco-attributable mortality from population data, Rostron and Wilmoth (2011) estimated that smoking contributed to 45% of the difference in life expectancy for females at age 65 between the US and France (life expectancy at age 65 in 2000 was 2.14 years higher in France than in the US). They show that historical differences in national smoking trends account for a significant portion of the observed differences (between nations) in life expectancy at older ages.

In a study of people aged 80 and above, Janssen et al. (2007) examined the rates of change (1950 to 1999) in smoking/non-smoking related mortality (England and Wales) in the very old. For men, smoking related mortality has shown the greatest relative decline from 1990-99. For women, the large increases in smoking related mortality experienced during the 1960-70 period have slowed.

When standardised for age, recent figures show a decline within the United Kingdom in the mortality rate for smoking related causes. Figure 17 shows standardised death rates for smoking related causes as defined by the World Health Organization (WHO)<sup>8</sup>. It illustrates, a steady decline of the standardised death rate from 65.1 (1985) to 50.4 (2009).

**Figure 17.** Standardised Death Rate per 100,000 for Selected Smoking Related Causes (United Kingdom, 1985-2009)



Source: Data from European Health for All Databases (HF-AB). World Health Organization Regional Office for Europe. Updated July 2011. (<http://www.euro.who.int/hfad>). © World Health Organization 2010. All Rights Reserved.

8. Figures illustrate the WHO definition of selected smoking related causes as derived from the literature. The measures provide a crude indicator and should not be regarded as an estimate of smoking attributable mortality (i.e. deaths caused by smoking). Age standardised death rates (SRD) are calculated using the direct method. Conditions include: Cancers of mouth & pharynx, larynx, trachea, bronchus, lung and oesophagus; ischaemic heart disease; Cerebrovascular diseases; Chronic obstructive pulmonary disease. Diagnostic codes include: i) ICD-9: 140-149, 161, 162, 150, 410-414, 430-438, 490-496; ii) BTL: 08, 100, 101, 090, 27, 29, 323-325; iii) List 175: 45, 52, 53, 46, 90-95, 98-99 (or 196-205), 108-110; iv) ICD-10: C00-C14, C32-C34, C15, I20-I25, I60-I69, J40-J47.



When modelling life expectancy, smoking is therefore a significant factor. Where different groups have different smoking prevalence, that is an influence on expected life expectancy. It is therefore important to see how smoking varies by socio-economic group.

The General Lifestyle Survey (GLF) is part of the Integrated Household Survey launched in 2008 by the Office for National Statistics (ONS). It provides information about smoking as did its predecessor, the General Household Survey (GHS), which began in 1971. ONS produced a report “Smoking and drinking among adults, 2009” which reports, inter alia, details of smoking amongst different socio-economic groupings and is the basis of the information in this section. The report contains caveats about potential under-reporting of consumption and possibly prevalence, most likely amongst young people. It also notes that the introduction of the National Statistics Socio-Economic Classification in 2001 brought a break in classification which means that comparisons between years must be made with caution. The GLF and GHS provide information about smoking prevalence over a 35 year period. Given that smoking is identified as the leading cause of premature death and that its prevalence varies considerably by socio-economic group, the information is important in understanding inequalities in health outcome as well as future expectations.

Government has targeted reductions in cigarette smoking prevalence and included a specific target for prevalence of routine and manual groups, although that target (26% or less by 2010) remained 5% higher than the target for all adults.

Overall smoking prevalence has decreased from 45% in 1974 to 21% in 2009. Following steady reductions through the 1970s, 1980s and early 1990s, prevalence stabilised at about 27% for about a decade. Falls were then seen from 2003 to 2007, since when the reported estimate has been stable at 21% (refer Figure 19).

The differences in prevalence of cigarette smoking by socio-economic class have consistently been “striking” (ONS Smoking and Drinking among adults, 2009 p6). Not only has smoking been considerably more prevalent among those in manual groups than among those in non-manual groups, but also, in the 1974 - 1994 period, the prevalence fell more among those in non-manual groups. Table 7 shows selected data for 1974 – 1998 taken from the 1998 GNS. Differences between the groups became proportionately greater.

In the past decade that difference amongst socio-economic groups has continued to be a feature of the reported statistics. Table 8 shows the prevalence of cigarette smoking by gender and by whether the household reference person is in a non-manual socio-economic group in England from 1992 to 2009. Appendix D includes more data from the ONS work.

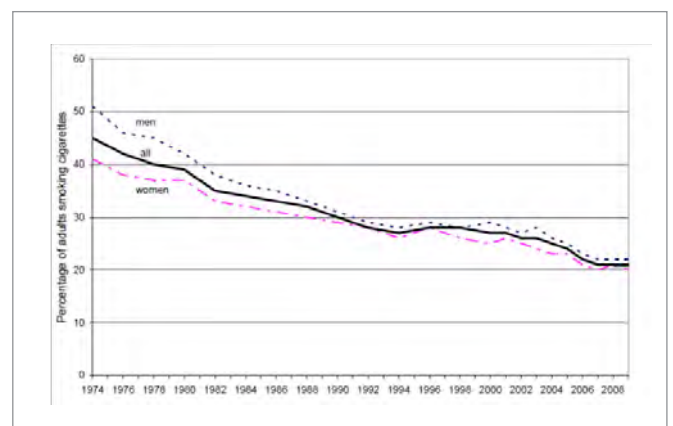
**Table 7.** Prevalence of cigarette smoking by gender/socio-economic group: England, 1974-1988

Socio-economic Group	1974	1978	1982	1986	1990	1994	1998	Base (1998) = 100%
<i>Males</i>								
Total non-manual	45	36	28	26	23	21	21	3215
Total manual	56	51	44	40	38	35	36	3151
All (aged 16 & over)	51	45	38	35	31	28	28	6579
<i>Females</i>								
Total non-manual	38	32	29	26	25	21	21	3963
Total manual	45	41	38	36	34	31	31	3528
All (aged 16 & over)	41	37	33	31	29	26	26	7830

*\*\*Socio-economic group corresponds to the present job of those currently working and to the last job of those currently not working. Married women whose husbands were in the household are classified according to their husband's occupation. Members of the Armed Forces, persons in inadequately described occupations and all persons who have never worked have not been shown as separate categories but are included in the figures shown as totals.*

*\*\*Bases for earlier years are of a similar size and can be found in General Household Survey (GHS) Reports for each year.*

*Source: Adapted from Table 8.7. Prevalence of cigarette smoking by sex and socio-economic group: 1974 to 1998. Living in Britain: Results from the 1998 General Household Survey, Office for National Statistics Social Survey Division, p.127. © Crown Copyright 2000. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)*

**Figure 18.** Prevalence of cigarette smoking by gender\*

*\*weighted data are shown from 1998 onwards.*

*Source: Reproduced from Figure 1.1. Prevalence of cigarette smoking: by sex. Smoking and drinking among adults, 2009. A report on the 2009 General lifestyle Survey. Robinson S and Harris H. Dunstan S. (ed.) Office for National Statistics. 2011, p.5. ([http://www.statistics.gov.uk/downloads/theme\\_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf](http://www.statistics.gov.uk/downloads/theme_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf)). © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)*

In 1998 22% of adults in England in a non-manual socio-economic group smoked cigarettes against 33% in the manual group. The equivalent figures in 2009 were 16% and 26% (Table 8 shows the recent trends).

When respondents to the survey are classified into three groups post-2000, i.e. “managerial and professional”, “intermediate” and “routine and manual”, the same pattern is seen. Appendix D contains more detail. Managerial and professional people reduced smoking prevalence between 2001 and 2009 from 19% to 15%; intermediate people from 27% to 19% and routine and manual people from 33% to 28%

When classified into the eight socio-economic groups now used, the 2009 figures reveal that the lowest prevalence was in the “higher professional” group (10%) and highest in the “routine” group where it was 32%.

The surveys also estimate average daily consumption of cigarettes. In 2009 the average per smoker was 13, with again a gradient by socio-economic group; the lowest of the eight groups were the “large employers and higher managerial” and “higher professional” groups at 10; the highest was the “routine” group at 15.

The 2009 figures also showed that the age at which people started smoking regularly and socio-economic group. For those who were in “managerial and professional” households, 33% of smokers started while still under 16 whereas for those in the “routine and manual” group the figure was much higher at 47%.

The fall in smoking prevalence in recent decades has been a positive factor increasing life expectancy for the whole population but the continuing high differential in smoking prevalence by socio-economic group remains an important driver of differentials in life expectancy by socio-economic class.

**Table 8.** Prevalence of cigarette smoking by gender and whether household reference person is in a non-manual socio-economic group: England, 1992 to 2009

Percentage smoking cigarettes								
	Unweighted				Weighted			
Socio-economic classification of household reference person <sup>3</sup>	1992	1994	1996	1998	1998	2000	2001	2002
<i>Men</i>								
Non-manual	22	21	21	21	22	24	22	21
Manual	35	34	35	34	35	34	34	32
Total <sup>6</sup>	29	28	28	28	29	29	28	27
<i>Women</i>								
Non-manual	23	21	22	21	22	22	20	20
Manual	30	30	33	31	31	29	31	30
Total <sup>6</sup>	27	25	27	26	26	25	25	25
<i>All persons</i>								
Non-manual	23	21	22	21	22	23	21	20
Manual	33	32	34	32	33	31	32	31
Total <sup>6</sup>	28	26	28	27	28	27	27	26

1 Figures for 1992 to 1996 are taken from Department of Health bulletin Statistics on smoking: England, 1978 onwards. Figures for 2001 to 2006 are based on the NS-SEC classification recoded to produce SEG and should therefore be treated with caution

2 Results from 2006 include longitudinal data

3 Head of household in years before 2000

4 2005 data includes last quarter of 2004/5 data due to survey change from financial year to calendar year

5 Trend tables show unweighted and weighted figures for 1998 to give an indication of the effect of weighting. Bases for earlier years can be found in GLS/GHS reports for each year

6 Respondents whose head of household/household reference person was a full time student, in the Armed forces, had an inadequately described occupation, had never worked or were long-term unemployed are not shown as separate categories but are included in the total

2003	2004	2005 <sup>4</sup>	2006 <sup>2</sup>	2007 <sup>2</sup>	2008 <sup>2</sup>	2009 <sup>2</sup>	Weighted base 2009 (000s) = 100% <sup>5</sup>	Unweighted sample <sup>5</sup> 2009
22	22	19	18	18	16	17	8908	2770
33	31	31	29	27	28	27	6852	2160
27	26	25	23	22	21	22	16765	5220
20	19	18	16	16	16	15	10491	3420
29	28	28	27	24	26	25	7288	2360
24	23	22	21	19	20	20	18991	6160
21	20	19	17	16	16	16	19400	6190
31	30	29	28	25	27	26	14140	4520
25	25	24	22	21	21	21	35756	11370

Source: Adapted from Table 1.6. Prevalence of cigarette smoking by sex and whether household reference person is in a non-manual socio-economic group: England 1992 to 2009. Smoking and drinking among adults, 2009. A report on the 2009 General Lifestyle Survey. Robinson S, and Harris H. Dunstan S. (ed.) Office for National Statistics. 2011, p.20. ([http://www.statistics.gov.uk/downloads/theme\\_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf](http://www.statistics.gov.uk/downloads/theme_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf)).

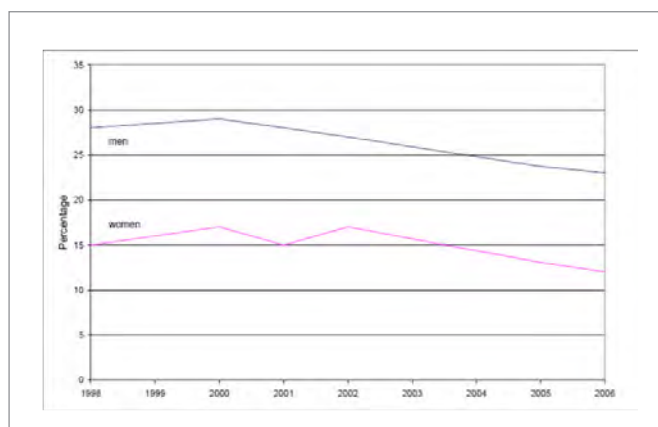
Data source: General Lifestyle Survey, Office for National Statistics.

© Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

### 3.5. Alcohol consumption by socio-economic group

The ONS surveys quoted in 3.4 above also collect information about alcohol consumption and the ONS report “Smoking and drinking among adults, 2009” is again a helpful source of trend information although it is acknowledged that obtaining reliable information is even more difficult. It is pointed out that people may consciously or unconsciously underestimate consumption and drinking at home is particularly likely to be underestimated. There were also changes in methodology which had a large impact on the estimates of units of alcohol consumed, first used in the 2006 data. Trends up to 2006 and trends since 2006 are discussed separately in the ONS report.

**Figure 19.** Percentage of men drinking more than 21 units a week, and women drinking more than 14 units per week: Original method



Source: Reproduced from Figure 2.1. Percentage of men drinking more than 21 units a week, and women drinking more than 14 units per week: Original method. *Smoking and drinking among adults, 2009. A report on the 2009 General Lifestyle Survey.* Robinson S, and Harris H. Dunstan S, (ed.). Office for National Statistics. 2011, p.48. ([http://www.statistics.gov.uk/downloads/theme\\_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf](http://www.statistics.gov.uk/downloads/theme_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf)).

© Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

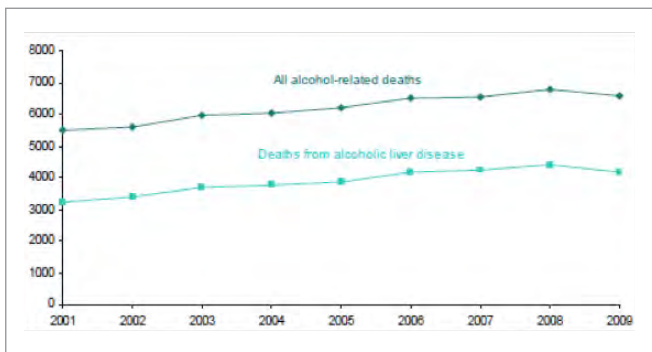
In terms of impact on life expectancy there is also one significant difference between consideration of drinking and consideration of smoking. Research about the impact of heavy drinking on health has to be differentiated from research about the impact of light drinking and, in particular, about different types of alcoholic drink. There are also differences in the impact of particular drinking levels on men and women.

Figures about alcohol consumption have been collected since 1998, following an inter-departmental review of the effects of drinking in 1995<sup>9</sup>. [That report indicated that low levels of alcohol consumption were associated with reduced risk of cardiovascular heart disease in men aged over 40 and postmenopausal women; it also stated that “men who drink more than 3 to 4 units a day run an increased significant risk of illness and death from a number of conditions, including haemorrhagic stroke, some cancers, accidents and hypertension.”

Alcohol consumption increased in the 1990s, most significantly amongst women. This century the increasing trend has reversed although the report warns that there may be an increased tendency to under-report consumption. The proportion of men drinking more than 21 units per week on average is reported to have fallen from 29% in 2000 to 23% in 2006. The proportion of women drinking more than 14 units per week fell from 17% in 2000 to 12% in 2006, as Figure 20 shows.

9. Office for National Statistics. *Smoking and drinking among adults, 2009. A report on the General Lifestyle Survey*, p.45.

**Figure 20.** England: Alcohol-related deaths (Count), 2001 to 2009



Source: Reproduced from Figure 4.5. Alcohol-related deaths, 2001 to 2009. Statistics on alcohol: England 2011, The NHS Information Centre, Lifestyle Statistics. 2011, p.62. ([http://www.ic.nhs.uk/webfiles/publications/003\\_Health\\_Lifestyles/Alcohol\\_2011/NHSIC\\_Statistics\\_on\\_Alcohol\\_England\\_2011.pdf](http://www.ic.nhs.uk/webfiles/publications/003_Health_Lifestyles/Alcohol_2011/NHSIC_Statistics_on_Alcohol_England_2011.pdf))

Copyright © 2011, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved.

Original Data Source: DH2 Mortality Statistics – Cause, Nos. 28, 29, 30, 31 and 32, 2001, 2002, 2003, 2004, 2005 and Mortality Statistic Deaths registered in 2006 to 2009, Office for National Statistics. © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Under the three-category classification of socio-economic groups, average weekly consumption in 2009 was highest in the managerial and professional group at 13.5 units and lowest at 10.7 units among the routine and manual worker households. For the intermediate group the estimate was 11.4 units. The differences were more pronounced for women. Appendix D shows more detailed data.

Alcohol consumption is positively associated with household income. The group with the highest income in the survey had the highest recorded average consumption. When people were asked about whether they had had an alcoholic drink in the last seven days, those in the managerial and professional groups had the highest percentages for both men (77%) and women (65%). The lowest figures were in the routine and manual groups, 59% for men and 44% for women.

The survey also showed that women in large employer/higher managerial households were twice as likely as those in the routine group to have drunk more than three units on any one day (44% compared with 20%), and were twice as likely to have drunk heavily on at least one day in the previous week (18% compared with 9%). A similar but less pronounced patterned was recorded for men.

Overall, the findings show that the more affluent groups consume more alcohol. As public health messages about the safety of alcohol are communicated it will be interesting to see if the present relativities change. In May 2011, the NHS Information Centre (NHSIC) published its examination (2001-09) of statistics on alcohol consumption and related deaths (Statistics on alcohol, England 2011). Based upon the ONS definition for alcohol related deaths, the study concluded there were in 2009, 6,584 deaths within England directly related to alcohol. Of these, 63% (4,154) of deaths had a cause of death classified as alcoholic liver disease. (In Table 9 there is a breakdown of alcohol-related deaths by gender and disease classification (International Classification of Disease 10)).

From 2001 to 2008, the study found that the total number of alcohol-related deaths had increased by 24% (from 5,476 to 6,768). Within the last year (2008-09) however, as Figure 21 shows, the total number of alcohol-related deaths had fallen by 2.7% (from 6,768 to 6,584), highlighting the first year-on-year decrease within the series.

The 2001 to 2008 increase was driven, in large part, by a 36% rise in deaths related to “alcoholic liver disease” (from 3,236 to 4,400) during the period. For the 2008-09 period, however, a 5.6% decrease in deaths related to alcoholic liver disease (from 4,400 to 4,154) contributed more than 100% of the fall in total number of alcohol-related deaths between 2008 to 2009 (refer Statistics on alcohol: England, 2011, p.62).

**Table 9.** Alcohol-related deaths<sup>1,2</sup> by gender, 2001 to 2009

ICD-10 Codes <sup>3</sup>	Description	2001	2002	2003
<i>All persons</i>		5,476	5,582	5,981
F10	Mental and behavioural disorders due to alcohol	484	430	433
I42.6	Alcoholic cardiomyopathy	108	122	99
K70	Alcoholic liver disease	3,236	3,392	3,697
K73	Chronic hepatitis - not elsewhere specified	70	72	58
K74	Fibrosis and cirrhosis of the liver (excluding K74.3-K74.5)	1,406	1,407	1,511
K86.0	Alcoholic induced chronic pancreatitis	33	32	32
X45	Accidental poisoning by and exposure to alcohol	126	112	127
	Other causes <sup>3</sup>	13	15	24
<i>Men</i>		3,576	3,631	3,970
F10	Mental and behavioural disorders due to alcohol	337	306	320
I42.6	Alcoholic cardiomyopathy	95	93	88
K70	Alcoholic liver disease	2,146	2,275	2,513
K73	Chronic hepatitis - not elsewhere specified	22	16	14
K74	Fibrosis and cirrhosis of the liver (excluding K74.3-K74.5)	858	835	909
K86.0	Alcoholic induced chronic pancreatitis	19	24	22
X45	Accidental poisoning by and exposure to alcohol	90	70	86
	Other causes <sup>3</sup>	9	12	18
<i>Women</i>		1,900	1,951	2,011
F10	Mental and behavioural disorders due to alcohol	147	124	113
I42.6	Alcoholic cardiomyopathy	13	29	11
K70	Alcoholic liver disease	1,090	1,117	1,184
K73	Chronic hepatitis - not elsewhere specified	48	56	44
K74	Fibrosis and cirrhosis of the liver (excluding K74.3-K74.5)	548	572	602
K86.0	Alcoholic induced chronic pancreatitis	14	8	10
X45	Accidental poisoning by and exposure to alcohol	36	42	41
	Other causes <sup>3</sup>	4	3	6

1. Deaths occurring in each calendar year.

2. Data may include non-residents.

3. Some causes linked to alcohol consumption as defined by ONS resulted in a small number of deaths per year (less than ten). These have been grouped together and listed as 'other causes'. This includes the following ICD 10 codes: G31.2, G62.1, K29.2, X65 and Y15.



	2004	2005	2006	2007	2008	2009
	6,036	6,191	6,517	6,541	6,768	6,584
	462	539	506	484	637	596
	94	75	83	75	80	98
	3,759	3,874	4,160	4,249	4,400	4,154
	63	58	68	68	62	70
	1,466	1,427	1,490	1,432	1,367	1,435
	43	52	41	48	48	41
	130	151	149	157	153	168
	19	15	20	28	21	22
	3,922	4,096	4,272	4,236	4,473	4,316
	326	400	349	321	434	424
	78	59	74	66	68	78
	2,461	2,602	2,769	2,814	2,966	2,750
	14	12	14	10	16	23
	904	869	918	865	829	880
	34	43	33	35	39	29
	91	100	96	106	110	117
	14	11	19	19	11	15
	2,114	2,095	2,245	2,305	2,295	2,268
	136	139	157	163	203	172
	16	16	9	9	12	20
	1,298	1,272	1,391	1,435	1,434	1,404
	49	46	54	58	46	47
	562	558	572	567	538	555
	9	9	8	13	9	12
	39	51	53	51	43	51
	5	4	1	9	10	7

Source: Reproduced from Figure 4.10. Alcohol-related deaths by gender, 2001 to 2009. Statistics on alcohol: England 2011, The NHS Information Centre, Lifestyle Statistics. 2011, p.76. ([http://www.ic.nhs.uk/webfiles/publications/003\\_Health\\_Lifestyles/Alcohol\\_2011/NHSIC\\_Statistics\\_on\\_Alcohol\\_England\\_2011.pdf](http://www.ic.nhs.uk/webfiles/publications/003_Health_Lifestyles/Alcohol_2011/NHSIC_Statistics_on_Alcohol_England_2011.pdf))

Copyright ©2011, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved..

Original Data Source: DH2 Mortality Statistics – Cause, Nos. 28, 29, 30, 31 and 32, 2001, 2002, 2003, 2004, 2005 and Mortality Statistic Deaths registered in 2006 to 2009, Office for National Statistics. © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

The impact of drinking on mortality by socio-economic group will depend on the distribution of excessive drinking by socio-economic group; so even though more affluent groups drink more alcohol per capita, this does not necessarily mean that the percentage of heavy drinkers is higher in that group.

Although reported drinking is higher in more affluent groups, the evidence below suggests higher mortality rates in lower socio-economic groups. More detailed investigation of richer data may be needed to assist a fuller analysis of the long-term impacts on socio-economic differences in mortality rates.

In a recent study, Siegler et al. (2011) produced for England & Wales the first analysis of social inequalities in adult alcohol related mortality based upon the National Statistics Socio-economic Classification (NS-SEC) scheme. The authors examined (2001-03) gender and age-specific alcohol related mortality rates by 5 year age groups and NS-SEC classification.

They found that substantial variation by SEC existed in adult alcohol related mortality with inequalities being similar for men (Figure 22) and women (Figure 23).

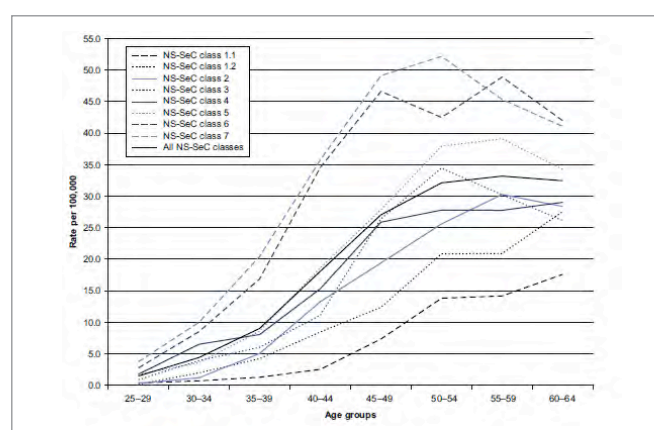
For men, the study showed that differences between the age-specific mortality rates (2001-03) had widened after the initial five year age band (25-29), but narrowed by ages 60-64\*. Those classified within the Semi-routine (Class 6) and Routine (Class 7) occupations were shown to have higher alcohol related death rates than those in the other analytic classes, particularly within the younger age groups. The study found that routine workers aged 30-44 were roughly 7 times more likely to die from alcohol related causes than men of the same age group within the Higher managerial and professional occupations (Class 1). For men, the highest age-specific alcohol related mortality rate (52.2 per 100,000) was observed for those aged 50-54 in Routine occupations (Class 7).

For women, the study showed that the differences between the age-specific mortality rates widened after ages 25-29 and began to narrow by ages 45-49. It found that women aged 30-44 classified within the

routine (Class 7) occupations were 7 to 9 times more likely to die from alcohol related causes than women classified within the Higher managerial and professional occupations (Class 1). However, the differences reduced to about 4 times at ages 55-59. For women, the highest age-specific alcohol related mortality rate within the study (42.0 per 100,000) was observed for those aged 45-49 in Routine occupations (Class 7).

The authors conclude that rates of alcohol related mortality within England & Wales have increased significantly between the early 1990s and the 21st century, with the highest increase for those within the more disadvantaged socio-economic classes. They also determine that socio-economic differences were greater at younger age groups, particularly for men aged 25-49.

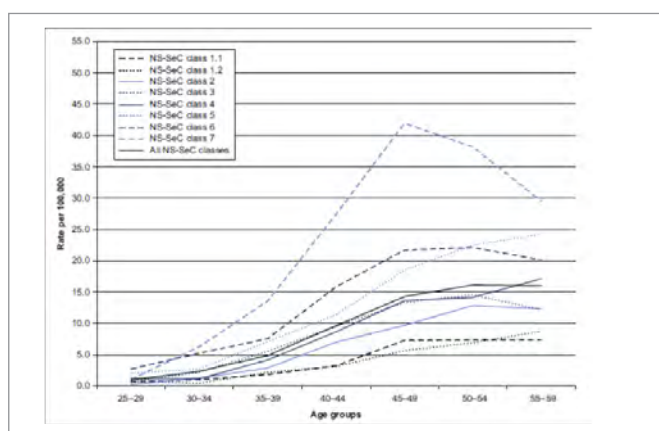
**Figure 22.** Age-specific mortality rates from alcohol related causes of death by five year age group and NS-SEC, men aged 25-64, England & Wales 2001-03.



Source: Reproduced from Figure 1. Age-specific mortality rates from alcohol-related causes of death by five-year age group and NS-SEC, men aged 25-64, England and Wales, 2001-03. Social inequalities in alcohol-related adult mortality by National Statistics Socio-economic Classification, England and Wales, 2001-03. Siegler V., Al-Hamad A., Johnson B., Wells C. Office for National Statistics. *Health Statistics Quarterly* 50 Summer 2011. 2011, p. 17. (<http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/no--50--summer-2011/health-statistics-quarterly.pdf>)

© Crown Copyright 2009. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Figure 23.** Age-specific mortality rates from alcohol related causes of death by five year age group and NS-SEC, women aged 25-59, England & Wales 2001-03.



Source: Reproduced from Figure 2. Age-specific mortality rates from alcohol-related causes of death by five-year age group and NS-SEC, women aged 25-59, England and Wales, 2001-03. Social inequalities in alcohol-related adult mortality by National Statistics Socio-economic Classification, England and Wales, 2001-03. Siegler V., Al-Hamad A., Johnson B., Wells C. Office for National Statistics. Health Statistics Quarterly 50 Summer 2011. 2011, p.19. (<http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/no--50--summer-2011/health-statistics-quarterly.pdf>)

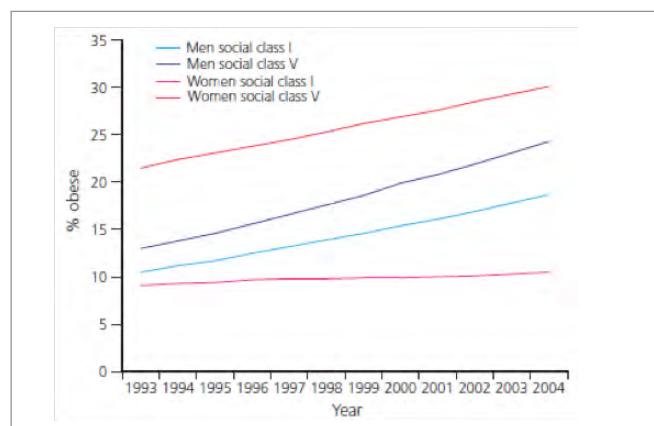
© Crown Copyright 2009. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Government recommendations are still that adult men should not regularly drink more than 3-4 units of alcohol a day and adult women should not regularly drink more than 2-3 units a day. The “Statistics on Alcohol: England 2011” report in May 2011 notes that a number of sources collect information on the number of units drunk in an average week and the amount drunk on the heaviest drinking day in the last week. However it also notes that neither of these indicators precisely measure consumption against the recommendations and it is therefore difficult to assess the likely impact on differential mortality rates by socio-economic group. Research will be desirable to assess the success, across the whole population and sub-groups, of the Public Health Responsibility Deal published by the Department of Health in March 2011.

### 3.6. Obesity by socio-economic group

Rates of obesity have more than doubled since 1980 and being overweight has become the norm (over 60% of the adult population). Figure 24 shows that, between 1993 and 2004, the percentage of obese men grew sharply across Social Classes I and V. For women there was strong growth in the lower Social Class's obesity but little change in the percentage of women in Social Class I who were obese.

**Figure 24.** Trends in obesity prevalence 1993-2004 by Social Class I and V



Source: Reproduced from Figure “Trends in Obesity Prevalence 1993-2004 by Social Class I and V”. Healthy weight, healthy lives: A cross-government strategy for England. Cross-Government Obesity Unit, Department of Health and Department of Children, Schools and Families. 2008, Chapter 1, p.2. ([http://webarchive.nationalarchives.gov.uk/20100407220245/http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/documents/digitalasset/dh\\_084024.pdf](http://webarchive.nationalarchives.gov.uk/20100407220245/http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_084024.pdf)). © Crown Copyright 2008. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Original Data Source: Foresight Tackling Obesity: future Choices – Modelling Future Trends in Obesity and Their Impact on Health. (<http://www.bis.gov.uk/assets/bispartners/foresight/docs/obesity/14.pdf>). Government Office for Science. © Crown Copyright 2007. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

The Health Survey for England 2009 shows trends in Body Mass Index (BMI) from 1993 to 2009. Table 10 below extracts data for selected years at four year intervals. The percentage of people who are classified as “normal” BMI has fallen from 45.5% in 1993 to 36.4% in 2009. After rising sharply in the 1990s the percentage of adults who are obese appears to have stabilised this century. The percentage of people who are classified as “morbidly obese” has however continued to rise, reaching 2.4% in 2009.

**Table 10.** Adults: Distribution Of Body Mass Index 1993 - 2009

All Adults	1993	1997	2001	2005 <sup>1</sup>	2009
Under-weight <sup>2</sup>	1.6	1.5	1.4	1.6	2.3
Normal <sup>3</sup>	45.5	41.6	37.0	37.9	36.4
Overweight <sup>4</sup>	38.0	38.5	39.2	37.3	38.3
Obese <sup>5</sup>	14.9	18.4	22.4	23.2	23.0
Morbidly obese <sup>6</sup>	0.8	1.6	1.7	1.8	2.4
BMI 25 or over	52.9	56.9	61.6	60.5	61.3

<sup>1</sup> All adults from core and boost samples in 2005 were included in analysis of 65-74 and 75+ age groups but only the core sample was included in the overall total.

<sup>2</sup> Underweight = BMI less than 18.5.

<sup>3</sup> Normal = BMI 18.5 to less than 25.

<sup>4</sup> Overweight = BMI 25 to less than 30.

<sup>5</sup> Obese = BMI 30 or more (includes morbidly obese).

<sup>6</sup> Morbidly obese = BMI 40 or more.

Source: Reproduced from Worksheet 4 BMI. Body mass index (BMI), by survey, age and sex in file “HSE\_09\_ADULT\_TREND\_TABLES.xls”. Health Survey for England – 2009: Trend tables.

(<http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles-related-surveys/health-survey-for-england/health-survey-for-england--2009-trend-tables>).

Copyright © 2010, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved.

The impact of obesity on life expectancy was investigated by the Clinical Trial Service Unit in Oxford which co-ordinated data from 57 long-term research studies, mainly in Europe or North America. About 900,000 people were involved<sup>10</sup> and the analysis concluded that mortality was lowest amongst those with a Body Mass Index of 23 to 24. Those with moderate obesity (defined as BMI 30 to 35), which is now common, had life expectancy reduced by about 3 years. Those with severe obesity (BMI 40 to 50), which is still uncommon, can shorten life expectancy by 10 years.

The study also reported a higher death rate amongst those with a much lower BMI than 23 to 24.

Obesity is associated with serious chronic diseases such as type 2 diabetes, hypertension and hyperlipidaemia, major risk factors for cardiovascular related mortality. It is also associated with certain cancers shows the extent to which obesity increases risks of developing certain diseases.

Table 11 shows how much the risk of certain diseases increases for obese people. For example an obese woman is 12.7 times more likely to develop type 2 diabetes than a woman who is not obese, 4.2 times more likely to have hypertension and 1.7 times more likely to have ovarian cancer.

**Table 11.** Relative risk factors for obese people of developing selected diseases, by gender

England	Men	Women
Type 2 Diabetes	5.2	12.7
Hypertension	2.6	4.2
Myocardial Infarction	1.5	3.2
Cancer of the Colon	3.0	2.7
Angina	1.8	1.8
Gall Bladder Diseases	1.8	1.8
Ovarian Cancer	-	1.7
Osteoarthritis	1.9	1.4
Stroke	1.3	1.3

\*Non-insulin dependent diabetes mellitus (NIDDM)

Source: Reproduced from Table 5. Estimated increased risk for the obese of developing associated diseases, taken from international studies. National Audit Office estimates based on literature review. Tackling obesity in England. Report of the Comptroller and Auditor General. HC 220 session 2000-2001: 15 February 2001. National Audit Office, p.14. ([http://www.nao.org.uk/publications/0001/tackling\\_obesity\\_in\\_england.aspx](http://www.nao.org.uk/publications/0001/tackling_obesity_in_england.aspx)). © Copyright 2001. Re-used with the permission of the National Audit Office. All rights reserved.

Table 12 shows that 16% of people of “normal” weight (BMI 18.5 to less than 25) have high blood pressure, against 32% of those classified as overweight (BMI 25

to less than 30) and 45% (47% men and 44% women) of those obese (BMI 30 and over).

**Table 12.** Blood pressure level by body mass index (BMI) and gender, 2007

England	Percentages				
	Total	Underweight	Normal	Overweight	Obese (includes morbidly obese)
<i>Men</i>					
Normotensive untreated <sup>1</sup>	69	*	84	68	53
Hypertensive controlled <sup>2</sup>	8	*	4	7	14
Hypertensive uncontrolled <sup>3</sup>	6	*	2	7	9
Hypertensive untreated <sup>4</sup>	17	*	10	18	24
All with High Blood Pressure	31	*	16	32	47
<i>Women</i>					
Normotensive untreated <sup>1</sup>	71	[91]	84	68	56
Hypertensive controlled <sup>2</sup>	8	[2]	4	8	14
Hypertensive uncontrolled <sup>3</sup>	7	[0]	3	8	12
Hypertensive untreated <sup>4</sup>	14	[7]	9	15	8
All with High Blood Pressure	29	[9]	16	32	44
<i>Unweighted Bases</i>					
Men	1880	20	520	760	450
Women	2270	30	820	670	550
<i>Weighted Bases</i>					
Men	2021	20	605	786	466
Women	2090	33	784	601	485

1. Normotensive-untreated: SBP<140 mmHg and DBP<90 mmHg, not currently taking any prescribed drugs that lower blood pressure
2. Hypertensive-controlled: SBP<140 mmHg and DBP<90 mmHg, currently taking medication prescribed to lower blood pressure
3. Hypertensive-uncontrolled: SBP≥140 mmHg and DBP≥90 mmHg, currently taking medication prescribed to lower blood pressure
4. Hypertensive-untreated: SBP≥140 mmHg and DBP≥90 mmHg, not currently taking any prescribed drugs that lower blood pressure
5. All figures are based on those with a valid blood pressure measurement
6. BMI categories used for classifying levels of obesity are: i) underweight = BMI<18.5; ii) normal = BMI 18.5 to <25; iii) overweight = BMI 25 to < 30; iv) obese (includes morbidly obese) = BMI ≥30
7. Total includes those without a valid BMI recorded
8. Adults aged 16 and over
9. Hypertensive controlled/uncontrolled are those who take drugs that were prescribed specifically to lower their blood pressure
10. All with high blood pressure are those who are hypertensive (BP>=140/90mmHg) or not hypertensive but on treatment that lowers blood pressure

11. Unweighted bases have been rounded to the nearest 10

\*Prevalence data not shown as base is less than 30

[ ] Results shown in brackets should be treated with caution because of the low base size (below 50)

Source: Reproduced from Figure 7.1. Blood pressure level by body mass index (BMI) and gender, 2007, Statistics on obesity, physical activity and diet: England, 2010. The NHS Information Centre, Lifestyle Statistics. The NHS Information Centre for health and social care. 2010, p.58. ([http://www.ic.nhs.uk/webfiles/publications/opad10/Statistics\\_on\\_Obesity\\_Physical\\_Activity\\_and\\_Diet\\_England\\_2010.pdf](http://www.ic.nhs.uk/webfiles/publications/opad10/Statistics_on_Obesity_Physical_Activity_and_Diet_England_2010.pdf)). Copyright © 2010, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved.

Original Data Source: Health Survey for England 2007, The NHS Information Centre for Health and Social Care. Copyright © 2010, Re-used with the permission of The Health and Social Care Information Centre. All rights reserved.



The Foresight report “Tackling Obesities: Future Choices” in 2007 made clear the future challenge<sup>11</sup>. Over half of the UK adult population could on some forecasts be obese by 2050. The recent trend observed above may make this pessimistic but the Report made clear that the complex forces driving obesity were, for many people, overwhelming. It also identified that the socially and economically disadvantaged were more vulnerable than the whole population.

It predicted that socio-economic differences in the prevalence of obesity would continue. It also indicated a generational dimension with the most significant predictor of childhood obesity being parental obesity.

The Foresight Report noted, using data from the Health Survey for England, that the prevalence of obesity showed a marked gradient in relation to socio-economic group. It observed that the prevalence of obesity among men in 2004 was about 18% in Social Class I and 28% in Social Class V. For women that year the gap was larger, with prevalence of 10% in Social Class I and around 25% in Social Class V. The disparity for women was noted to be longstanding but the disparity for men had become more pronounced.

The Report acknowledged that the factors underpinning the gradient are poorly understood and that the links between socio-economic status and obesity may be associated with the degree of relative social inequality.

The Report indicated that there was no evidence that social class differences in the prevalence of obesity in future would increase further than already existed, with one possible exception. Prevalence of obesity

amongst Social Class I women, aged 20 - 60, was forecast to be only 15% by 2050 (10% at the time of the Report) whereas the forecast for women in Social Class V was 62% (up from 25%) There are wide confidence levels on these forecasts (quoted in the Report as +/- 10%). For men the differential is forecast to remain close to the 10% mentioned above (52% of Social Class I men against 60% in other Classes).

The rise in obesity prevalence seems to be continuing unabated in most countries and putting a brake on improvements expected in life expectancy<sup>12</sup>, but in some countries there is very recent evidence of a reduction in the rate of increase and very tentative indications of a flattening of the trajectory. This is especially true for younger people. In England and Wales, for example, men under the age of 40 are demonstrating some inconclusive recent evidence of no further rise in obesity levels. Clearly if this is a permanent cohort effect it could ultimately affect the rising morbidity (especially diabetes and CVD) currently threatening trends in life expectancy. This is being closely modelled but it is too early to say whether improvements in life expectancy will be significantly increased by changing obesity levels and in particular whether social class difference will or will not be exacerbated.<sup>13</sup>

As with other issues identified as affecting health inequalities, this implies that efforts to counter inequalities should take account of obesity while action on obesity must also take account of socio-economic issues.

11. Butland B., Jebb S., Kopelman P., McPherson K., Thomas S., Mardell J., Parry V. 2007. *Foresight Tackling obesities: Future choices – Project report (2nd ed.)* Government Office for Science.

12. Boyd A Swinburn, Gary Sacks, Kevin D Hall, Klim McPherson, Diane T Finegood, Marjory L Moodie, Steven L Gortmaker *Lancet* 2011; 378: 804–14.

13. *Health and economic burden of the projected obesity trends in the USA and the UK.* Y Claire Wang, Klim McPherson, Tim Marsh, Steven L Gortmaker, Martin Brown *Lancet* 2011; 378: 815–25.

### 3.7. Access to health services by socio-economic group

The House of Commons Health Committee investigated health inequalities and reported on 26 February 2009.<sup>14</sup> One of the issues it considered as a cause of health inequalities was access to healthcare. It concluded that some specific aspects of inequalities in health are attributed to differential access to, and standards of, health care. The Committee concentrated essentially on the local provision of healthcare (and public health provision) and the extent to which it matched - or failed to match - need. It referred to the role of the NHS in tackling health inequalities, in particular the interventions that service providers can offer to support different aspects of the patient care pathway such as i) health promotion and screening, ii) access to primary care and treatment, iii) secondary care referral and treatment. We briefly examine each aspect:

#### 3.7. 1. Health promotion and screening

Large scale public information campaigns have often been undertaken by the NHS to promote health and changes in behaviour. The House Committee noted, however, that “while general public information campaigns have a strong positive effect on those in higher socio-economic groups, they are far less effective in changing the behaviour of deprived groups.”<sup>15</sup> They state, in fact, that “these interventions can actually widen health inequalities because richer groups respond to them so well.”<sup>16</sup>

Socio-economic differences in response to mass media and/or public health campaigns have been noted. In a study of the BBC’s mass media campaign “Fighting Fat, Fighting Fit” which targeted obesity, Wardle et al. (2001) found that although awareness of the campaign was high within all socio-economic groups, the long-term effects of the campaign among groups was variable, with the “memory for the healthy lifestyle message ... significantly poorer in those with lower levels of education”.<sup>17</sup>

14. House of Commons Health Committee. 2009. *Third report of Session 2008-09. Health inequalities*. House of Commons. HC 286 (Cm 7621). URL: <http://www.publications.parliament.uk/pa/cm200809/cmselect/cmhealth/286/28602.htm>

15. *Ibid.*, p.72.

16. *Ibid.*, p.7.

17. Wardle J, Rapoport A, Miles T, Afuape T, and Duman M. Mass education for obesity prevention: The penetration of the BBC’s ‘Fighting Fat, Fighting Fit’ campaign. 2001. *Health Education Research*; 16(3):343.



Differences in the participation of population-wide programmes such as cancer screening have also been demonstrated. For example, disparities in the uptake of community based programmes (e.g. colorectal cancer screening pilot) were illustrated by a number of studies. In an evaluation of a UK colorectal cancer (CRC) screening pilot (2nd round), Weller et al. (2007) showed that, within the study population for England, the most deprived group were about 60% less likely than the least deprived group to participate in the uptake of a CRC screen.<sup>18</sup> Power et al. (2009) found that people who complied with CRC screening tended to be less deprived and more highly educated than those who did not.<sup>19</sup> The relationships between socio-economic differences in the uptake of cancer screening and health outcomes have also been examined. In a regional study of women with invasive breast cancer (Trent Cancer Registry, 1998-2006), Cuthbertson et al. (2009) found that women in the more deprived socio-economic groups have a significantly increased risk of being diagnosed with the most advanced stage of breast cancer (Stage IV).<sup>20</sup> The authors suggest that women within lower socio-economic groups were less likely to participate in screening programmes and as a consequence

more likely to suffer the poorest prognosis. In an analysis of deaths (n=78708) having occurred within the Nottingham trial for CRC screening, Whynes et al. (2010) had concluded that participants who had accepted one or more invitations to CRC screening survived longer than either those within the control group or failing to attend.<sup>21</sup> The authors found that socio-economic deprivation was negatively associated with both screening attendance and longevity. They conclude that increased levels of deprivation had “significantly lowered the expected ages at death”.<sup>22</sup> In discussing the issues related to the uptake of colorectal cancer screening, the authors indicated that the greatest net benefit from interventions aimed at improving the uptake of CRC screening would likely be achieved by pursuing a multifactor approach – i.e., utilising multiple strategies and targeting CRC screening at the policy, organisational, provider and individual levels.<sup>23</sup> Furthermore, Jepson et al. (2010), in a ‘review of reviews’ argued that consideration of the inverse care law (the principle which states that the availability of good medical care tends to vary inversely with population need) has not always been shown in relation to the provision of local health promotion activities.<sup>24</sup>

18. Weller D, Coleman D, Robertson R, Butler P, Melia J, Campbell C, Parker R, Patnick J, Moss S. *The UK colorectal cancer screening pilot: Results of the second round of screening in England*. 2007. *British Journal of Cancer*; 97:1601-1605.

19. Power E., Miles A., von Wagner C., Robb K., and Wardle J. 2009. *Uptake of colorectal cancer screening: system, provider and individual factors and strategies to improve participation*. *Future Oncology*; 5(9):17371-88.

20 Cuthbertson S.A., Goyder E.C., and Poole J. 2009. *Inequalities in breast cancer stage at diagnosis in the Trent region, and implications for the NHS Breast Cancer Screening Programme*. *Journal of Public Health*;31(3):398-405.

21 Whynes D.K., Mangham C.M., Balfour T.W., and Scholefield J.H. 2010. *Analysis of deaths occurring within the Nottingham trial of faecal occult blood screening for colorectal cancer*. *Gut*;59:1088-1093.

22 *Ibid.*, p. 1088.

23. Power E., Miles A., von Wagner C., Robb K., and Wardle J. 2009. *Uptake of colorectal cancer screening: system, provider and individual factors and strategies to improve participation*. *Future Oncology*; 5(9):17371-88, p.82.

24. Jepson RG, Harris FM, Platt S, Tannahill C. *The effectiveness of interventions to change six health behaviours: A review of reviews*. 2010. *BMC Public Health*; 10:538.

### 3.7.2. Access to primary care services and treatment

The House Committee discussed access to primary care services by examining the availability of GP services within deprived areas. In identifying geographic inequality in the distribution of GP services one broad (if crude) measure of available access to GP services and primary care is the average GP list size (i.e. the number of registered patients divided by the number of public GPs) within a given area.

For example, Boyle (2011) found that in 2009 there were 40269 GPs (of which approximately 36000 were Whole Time Equivalent) working within 8228 practices in England. This represented an increase of around 40% WTE GPs since 1989 which led, in part, to a 29% reduction in the GP list size.<sup>25</sup> Boyle found however, that although the average list size (2009) was 1432 registered patients, geographical inequality had persisted, with problems remaining in relatively deprived areas such as the north of England (long undersupplied with physicians). Boyle estimated that GP list sizes can vary by up to 80% from 1031 (Oxford Primary Care Trust or PCT) to 1860 (Bexley PCT, a part of Greater London).<sup>26</sup>

Goddard et. al. (2010) examined the distribution of GPs per capita (adjusted for levels of need within the population) within England by applying the Gini coefficient.<sup>27</sup> When used as a measure of relative equality in the distribution of GPs, a value of 0 would indicate all areas within England having an equivalent GP to need ratio. Consequently, a value of 1 would indicate a single area amassing all available GPs. The authors showed that Gini coefficients (based either on a crude or needs adjusted population) had fallen between 1974 and the mid 1990s but has reversed its decline since then. By 2006, the Gini coefficients had equalled or exceeded the 1974 figures indicating greater inequality in the distribution of GPs per capita. Although geographic inequality in the distribution of GP services had been demonstrated by a number of studies, socio-economic differences in primary care treatment has nevertheless been shown to be less variable. For example, in a large study examining variations (England, 1995-2005) in secondary drug prevention for stroke patients within primary care, Raine et al. (2009) showed that the receipt of secondary prevention did not vary by sex or socio-economic circumstances but instead by age.<sup>28</sup> The study found that older patients ( ) were less likely than younger patients to receive lipid lowering drugs.

25. Boyle S. 2011. *United Kingdom (England): Health system review. Systems in Transition*; 13(1)1: p.226. Published by the World Health Organization on behalf of the European Observatory on Health Systems and Policies. Figure of 29% reduction in GP list size is relative to a 9% increase in population. It should be noted that figures may not account for improvements in the record upkeep of the GP lists.

26. *Ibid.*, p.232.

27. Goddard M., Gravelle H., Hole A., and Marini G. *Where did all the GPs go? Increasing supply and geographical equity in England and Scotland.*

28. Raine R., Wong W., Ambler G., Hardoon S., Petersen I., Morris R., Bartley M. and Blane D. *Sociodemographic variations in the contribution of secondary drug prevention to stroke survival at middle and older ages: Cohort study. BMJ 2009;338:b1279. doi:10.1136/bmj.b1279.*

### 3.7.3. Secondary care referral and treatment

For the patient, socio-economic differences can exist in the pathways to care from primary to secondary care. In a review of studies focussed on the use of services provided by the NHS, Dixon et al. (2007) concluded that while the utilization of GPs was broadly equitable, the utilization of secondary and specialist treatment (e.g. cardiac surgery, cancer care) was not.<sup>29</sup> Despite some discrepancies in the conclusions of the studies examined, the authors agreed that although the socio-economically disadvantaged use GP services “as much as, if not more relative to need ... Equity problems arise on referral to a specialist and the subsequent receipt of specialist treatment.”<sup>30</sup>

More recently, in a study on the referral of primary care patients with either postmenopausal bleeding, hip pain or dyspepsia McBride et al. (2010) showed that, in the absence of explicit guidance and/or potentially life threatening conditions, inequalities in referral associated with socio-economic circumstances were more likely to occur.<sup>31</sup> In addition, the authors found that older patients were less likely to be referred.

The socio-economic variation in secondary care referral provides an illustration of some of the issues confronting health policy makers. The decision to refer may be determined by: i) the GP alone; ii) patient pressure or iii) doctor-patient interaction.

In examining the utilisation of available health care services, researchers have sought to unravel the underlying factors in people's treatment preferences. Factors considered include the socio-demographic differences in the perceptions of the risk/benefit of specific interventions, the role of the GP and the nature of the doctor-patient interaction in shaping these perceptions (Raine 2009). In a systematic review, Willems et al. (2005) concluded that patients from lower social classes “receive less positive socio-emotional utterances and a more directive and less participatory consulting style” from their physician. Policies geared solely towards patient behavioural change ignore the impact of physician attitudes and the nature of the doctor-patient relationship.<sup>32</sup>

Socio-economic differences within secondary care have also been demonstrated. For example, Raine et al. (2010) showed that secondary care cancer patients from deprived areas (England, 1 April 1999 to 31 March 2006) were less likely to receive the preferred surgical procedure for rectal, breast and lung cancer.<sup>33</sup> In a study of NHS health care service utilisation within England, Morris et al. (2003) examined the use of services including: i) GP (general practitioner) consultation (primary care) and ii) outpatient visits, day cases or inpatient stays (secondary care).<sup>34</sup> They concluded that although low income individuals were more likely to consult their GPs, they were less likely to receive all forms of secondary care. Similarly, individuals with lower levels of formal qualifications were more likely to consult their GP but less likely to receive some forms of secondary care including day case treatment and inpatient stays.

Finally, the House Committee itself has warned that “in solely focussing on primary care, there is a real risk that inequalities in other NHS services will persist, and that opportunities which exist in secondary care and specialised services to tackle inequalities will be missed.”<sup>35</sup> Addressing the principle of proportionate universalism within health care should not be overlooked. The degree of success in tackling these access problems will be a major test of the health and public health services in future. In terms of inequalities and changes in mortality between socio-economic groups, the resources to promote health and to offer health services must be universally applied to all groups, but directed with a “scale and intensity that is proportionate to the level of disadvantage.”<sup>36</sup> (i.e., making the provision and uptake of services available to all, while ensuring the nature of the uptake and services offered become more intensive as the needs become greater).

A careful monitoring of the results (including the routine analyses by socio-economic group, of the uptake of NHS services at critical junctures within the patient pathway) to judge their effectiveness will be necessary.

29. Dixon A, Le Grand, Henderson J, Murray R, Poteliakhoff E. *Is the British National Health Service equitable? The evidence on socioeconomic differences in utilization.* 2007. *J Health Serv Res Policy*; 12(2):104-109.

30. *Ibid.*, p.108.

31. McBride D., Hardoon S., Walters K., Gilmour S., and Raine R. *Explaining variation in referral from primary to secondary care: Cohort study.* *BMJ.* 2010 Nov 30;341:c6267. doi: 10.1136/bmj.c6267.

32. Willems S, De Maesschalck S, Deveugele M, Derese A, and De Maeseneer J. 2005. *Socio-economic status of the patient and doctor-patient communication: Does it make a difference? Patient Education and Counselling*; 56:139-146.

33. Raine R., Wong W., Scholes S., Ashton C., Obichere A., and Ambler G. *Social variations in access to hospital care for patients with colorectal, breast, and lung cancer between 1999 and 2006: Retrospective analysis of hospital episode statistics.* *BMJ* 2010; 340:b5479

34. Morris S, Sutton M, Gravelle H. *Inequity and inequality in the use of health care in England: An empirical investigation.* *CHE Technical Paper Series 27.* 2003. Centre for Health Economics. The University of York.

35. House of Commons Health Committee. *Health Inequalities. Third Report of Session 2008-09. Volume 1, p.7.*

36. *The Marmot Review. Fair Society, Healthy Lives. Key Messages.* URL: <http://www.marmotreview.org/english-review-of-hi/key-messages.aspx> (Accessed 20 October 2011).

### 3.8. Educational attainment and its relationship with other factors discussed

In the UK, studies of inequality tend to concentrate on socio-economic groupings. In contrast, in the US and Europe, educational measures are frequently used. Research published in 1998 in the UK, based on a cohort of men recruited from 27 workplaces between 1970 and 1973, showed that occupational social class was more strongly associated with overall and non-cardiovascular mortality than was the educational measure while the educational measure was more strongly associated with cardiovascular mortality than with other causes of death.<sup>37</sup>

US research has shown the explanatory power in that country of educational status.<sup>38</sup> Researchers there conclude that, despite increased attention and substantial dollars directed to groups with low socioeconomic status, within race and gender groups, the educational gap in life expectancy is rising, mainly because of rising differentials among the elderly. With the exception of black males, all recent gains in life expectancy at age twenty-five have occurred among better-educated groups, raising educational differentials in life expectancy by 30 percent. Differential trends in smoking-related diseases were estimated to explain at least 20 percent of this trend.

There is, however, evidence that not all diseases show this direction of gradient. Higher socioeconomic position has been reported to be associated with increased risk of breast cancer mortality. This study's aim was to see if this is consistently observed within 11 European populations in the 1990s. Longitudinal data on breast cancer mortality by educational level and marital status were obtained for Finland, Norway, Denmark, England and Wales, Belgium, France, Switzerland, Austria, Turin, Barcelona and Madrid. The relationship between breast cancer mortality and education was summarised by means of the relative index of inequality. A positive association was found in all populations, except for Finland, France and Barcelona. Overall, women with a higher educational level had approximately 15% greater risk of dying from breast cancer than those with lower education. This was observed both among never- and ever-married women. The greater risk of breast cancer mortality among women with a higher level of education was a persistent and generalised phenomenon in Europe in the 1990s.<sup>39</sup>

Research about the links between educational attainment and health status may be a fruitful area for future research.

37. Davey Smith G, Hart C, Hole D, MacKinnon P, Gillis C, Watt G, Blane D, Hawthorne V. 1998. Education and occupational social class: Which is the more important indicator of mortality risk? *J Epidemiol Community Health*; 52:153-60.

38. Meara ER, Richards S, and Cutler DM. 2008. The gap gets bigger: Changes in mortality and life expectancy, by education, 1981-2000. *Health Affairs*; 27(2):350-60.

39. Strand BH, Kunst A, Huisman M, Menvielle G, Glickman M, Bopp M, Borell C, Borgan JK, Costa G, Deboosere P, Regidor E, Valkonen T, Mackenbach JP, EU Working Group on Socioeconomic Inequalities in Health. 2007. The reversed social gradient: Higher breast cancer mortality in the higher educated compared to lower educated. A comparison of 11 European populations during the 1990s. *Eur J Cancer*; 43(7):1200-7.



## Section 4. Possible Futures

### 4.1. Emerging basic science

Fundamental scientific work may lead to developments which, in time, could find their way into prolonging life expectancies. The effects on longevity by socio-economic group would need assessment for each new development but there are powerful drivers which could make them increase inequality.

Recent research on telomeres (see glossary for definition) provides an example. Telomeres gradually become shorter as people age and their length can be used as an indicator of biological ageing.<sup>40</sup> In one study (15) over 500 UK civil servants in the Whitehall II cohort study aged 53 to 76 provided information. Educational qualifications were classified and participants indicated their current household income. The sample is not necessarily representative of the population as a whole but lower educational attainment was found to be associated with shorter telomere length. Interestingly, the currently used indicators of socio-economic status were not found to correlate with telomere length.

The assessment of NHS Choices about the work<sup>41</sup> is that the study adds to the scientific knowledge of what the cellular effects associated with socio-economic status might be. However, its assessment is that the findings seem unlikely to provide assistance with the practical problems of reducing health inequalities.

In addition to the correlation with telomere length, there is an increasing understanding of other aspects of the cell biology of ageing (reviewed by Partridge, 2010).<sup>42</sup> Many of the genes which have an effect on ageing in laboratory models are involved in nutrient sensing pathways with insulin/insulin-like signalling molecules as key mediators. Rapamycin, a small molecule used to prevent transplant rejection in humans, acts via these pathways and has been shown to extend the lifespan of mice (Harrison et al. 2009).<sup>43</sup> In addition dietary restriction has been known for a long time to increase the lifespan of laboratory rodents (McCay et al., 1935).<sup>44</sup> How the findings in laboratory animals apply to humans remains to be demonstrated but the prospects, based on understanding the underlying science, of intervening to affect ageing, and more particularly to delay the impact of age-related diseases, are increasing.

40. Steptoe A, Hamer M, Butcher L, Lin J, Brydon L, Kivimaki M, Marmot M, Blackburn E, Erusalimsky JD. 2011. Educational attainment but not measures of current socioeconomic circumstances are associated with leukocyte telomere length in healthy older men and women. *Brain Behav Immun*. (Epub ahead of print).

41. NHS Choices. Learning linked to slower ageing. URL: <http://www.nhs.uk/news/2011/05may/pages/education-slows-ageing-telomeres.aspx> [24 August 2011]

42. Partridge, L. (2010). The new biology of ageing. *Proc. Trans. R. Soc. B*, 365, 147-154.

43. Harrison, D.E., Strong R., Sharp Z.D., Nelson J.F., C.M. Astle et al. (2009). Rapamycin fed late in life extends lifespan in genetically heterogeneous mice. *Nature*; 460(7253): 392-395.

44. McCay C.M., Crowell M.F., Maynard L.A. (1935). The effect of retarded growth upon the length of life span and upon the ultimate body size. *The J. Nutr.*;63-79. URL: <http://jn.nutrition.org/content/10/1/63.full.pdf>



## 4.2. How might the factors in Section 3 change in future?

Epidemics of obesity and diabetes have occurred in recent decades while overall life expectancy has been increasing sharply. In both cases there are potentially widespread problems stored up for the future and the extent to which public health successes can reduce the impact is uncertain. The current impact on inequality of health outcomes is understood.

Increasing dementia is also a clear risk in the future given the better physical health which people are experiencing for longer. Assessment of socio-economic differentials in propensity to suffer dementia at particular ages might assist in understanding differentials in life expectancies amongst the older population.

Prevalence in smoking has reduced substantially from its peak and, until recently, a further reduction had been occurring. There appears to be a stalling in progress despite the efforts being made. Smoking cessation has reached a point where further progress becomes more difficult and attention is being given to harm reduction. The socio-economic gradient in prevalence remains and the targets set for reduction in the short-term did not reduce the gradient. However reductions in smoking propensity over the recent decades will still be working their way through the population in terms of improved health outcomes. Reductions have been proportionately greater in the more affluent.

Future alcohol consumption and its possible health effects are much more difficult subjects to forecast. Information about heavy drinking by socio-economic group and trends in that data would assist projections of future mortality by socio-economic group.

The public health agenda has suffered over many years from a lack of determined activity and adequate funding in relation to its potential benefits in increasing healthy lives.<sup>45</sup> Whether or not this can be successfully tackled is a major uncertainty for the future. The possibility of a widening of the health inequalities gap in the short-term seems likely to be increased by difficult economic conditions, both in their direct effects and in their impact on resources available to tackle underlying health issues. However the scale of that risk may depend on the detailed impact of low economic growth and the mix of tax and benefit policies on individual groups. Considering the risk factors, economic difficulties may increase the consumption of cigarettes, alcohol and inexpensive comfort foods.

Policies based on education or information are likely to have a differential impact as they would probably be taken up more extensively by higher socio-economic groups. Alcohol may prove to be an exception. In any programme, there would need to be special efforts to engage the groups that are hard to influence if differentials are to be narrowed.

45. Wanless D. (2004). *Securing good health for the whole population. Final Report. HM Treasury.*

### 4.3. Future health service improvements and public health interventions and their likely socio-economic gradient

The White Paper “Healthy Lives, Healthy People: Our strategy for Public Health in England” (TSO 2010) is the Government’s response to Sir Michael Marmot’s report “Fair Society, Healthy Lives”. It describes a long-term vision and a set of activities to encourage and enable people to make healthier choices. The “Public Health Responsibility Deal” published by DH in 2011 aims to harness the contribution that business, in partnership with voluntary organisations and public health professionals, can make to delivering the Government’s Public health priorities. Both documents state explicitly (and repeatedly) that one of the main aims is to tackle health inequalities. The Government must continue to develop national policy, clarify the priorities and ensure public health messages are communicated to the whole population, including hard to reach groups, where inequalities exist.

How might this work? Firstly Public Health is made a priority with the creation of Public Health England within the Department of Health and the creation of a ring-fenced budget. However one of the central themes is “localism” with the empowerment of local government and the promotion of local Public Health leadership. In principle, localism itself could have an impact on inequalities because of a greater understanding of local problems and possible solutions but budget allocations from the centre will reinforce this. The local ring-fenced budget is to be loaded for inequalities and there is to be a new health

premium reward paid for progress on specific health outcomes with disadvantaged areas receiving a greater premium, an example of “proportionate universalism” (p14).

The implementation strategy for improving health involves a ladder of interventions from the provision of information at one end of the spectrum to the elimination of choice through central legislation if the evidence indicates that this is justified. If the former approach is used, agencies will have to work hard to ensure there is an equal impact across the socio-economic groups whereas equality of application is more or less inherent with central action. A recent example of the latter is the collaboration agreed between Government, business and public health groups to reduce salt and eliminate the use of trans-fats. The results achieved by such agreements will be watched closely for their overall impact and their impact on socio-economic differences. It is such an approach to public health that the Responsibility Deal wishes to scale up in four areas, food, physical activity, alcohol and health in the workplace with a fifth work-stream of behavioural science underpinning all four.

“Healthy Lives, Healthy People” envisages the NHS continuing to play a key role in the health of the nation. It is uncertain whether the NHS can maintain its output given the need for significant savings as well as the impact any re-organisation may have. Secondary prevention and the better management of both acute episodes and chronic diseases all should have a role to play.

LSAP will be examining the evidence about the success of the Public Health Responsibility Deal through its impact on the trends in lifestyle behaviour,

diet, physical activity, alcohol and health at work and the understanding of their links with life expectancy. Global consideration is being given to the subject of non-communicable diseases through the United Nations which has reported on the “Prevention and control of non-communicable diseases” (19 May 2011). The main non-communicable diseases are cardiovascular diseases, diabetes, cancers and chronic respiratory diseases and the report asserts that such diseases could be significantly reduced and prevented. Worldwide, the report indicates that non-communicable diseases were responsible for 63% of the 57 million global deaths in 2008 and goes on to project that, in 2030, non-communicable diseases could cause nearly five times as many deaths as communicable diseases worldwide.<sup>46</sup>

If the UN report’s recommendations are followed through by Member States then national information systems should be strengthened and a body of research could be available which may assist understanding in the areas important to LSAP’s work. In a UK example, a combination of life style changes and medical and surgical treatments has had a major positive impact in recent years on CHD. University College London (UCL) research, supported by Legal & General, is addressing the issue of variation between socio-economic groups and, when findings are publicised, their implications for life expectancy forecasting will be considered by LSAP. However, diseases of the cardiovascular system (heart failure and stroke for example) remain major causes of death. If substantially effective new treatments become available and part of best practice then they will be applied uniformly across the population if there is no

differential in access to health care between the socio-economic groups.

With respect to cancers, two approaches seem likely to be pursued over the next decade namely, early detection and the development of treatments for genetically and histologically defined subclasses of tumour. National screening programmes have been in place for some time for breast and cervical cancer. There is a difference between the socio-economic groups in the effectiveness of the detection and management of breast cancer.

For example, in a study of women<sup>47</sup> diagnosed from 1998 to 2000 with invasive breast cancer, Downing et al. (2007) found that those living in more deprived areas were more likely to be diagnosed with advanced stages of breast cancer (Stage III and IV) than those living in less deprived areas. They indicate this may have been a result of later presentations and lower rates of mammography screening in areas of lower socio-economic class. The authors found that women living in more deprived areas were less likely to have surgical intervention than those living in more affluent areas. Having then received surgery, they were more likely to have a mastectomy (rather than adjuvant treatment such as radio therapy). More recently, Raine et al. (2010) showed that breast cancer patients from more deprived areas were less likely to receive the preferred surgical procedure (eg. breast conserving surgery rather than a mastectomy), than similar patients from less deprived areas.<sup>48, 49</sup>

46. *Prevention and control of non-communicable diseases. Report of the Secretary-General. Sixty-sixth session. Item 119 of the preliminary list. Follow-up to the outcome of the Millennium Summit. United Nations General Assembly 19 May 2011.* ([http://www.un.org/ga/search/view\\_doc.asp?symbol=A/66/83&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=A/66/83&Lang=E))

47. *Study population comprised of women diagnosed (between 1998 and 2000) with breast cancer and were resident in the Northern and Yorkshire regions of England (n=12768).*

48. Downing A, Prakash K, Gilthorpe MS, Mikeljevic JS, Forman D. 2007. Socioeconomic background in relation to stage at diagnosis, treatment and survival in women with breast cancer. *B J Cancer*; 96:836-40.

49. Raine R, Wong W, Scholes S, Ashton C, Obichere A, Ambler G. 2010. Social variations in access to hospital care for patients with colorectal, breast, and lung cancer between 1999 and 2006: Retrospective analysis of hospital episode statistics. *BMJ* 2010;340:b5479.

There is a national programme for screening for colorectal cancer. It was only fully rolled out in August 2010 but there have been two reports of the earlier pilots and partial coverage.<sup>50,51</sup> One of the findings was that uptake of screening fell with increasing level of deprivation and these earlier reports recommended more attention be given to involving the relatively low uptake groups (men, ethnic minorities and those in deprived areas). This programme provides an excellent opportunity to link uptake and outcome to postcode since the screening kits are sent to postal addresses.

A recent paper co-authored by the UCL team aimed to measure the extent of inequalities in the uptake of colorectal screening by SEC, gender, ethnicity and age (60-69 years).<sup>52</sup> Their findings show that uptake was 54% but showed a socio-economic gradient ranging from 35% (most deprived) to 61% (least deprived). Regression analyses confirmed an independent effect of deprivation with stronger effects in women and older people.

The Institute for Women's Health at UCL is conducting a major study of screening for ovarian cancer with reduced mortality as the target but this is not due to report until 2015. Again it may well permit a study of the effect of socio-economic status. The current method of screening for prostate cancer yields too many false positives for a national programme but may be capable of introduction when refined.

As far as new developments in cancer treatment are concerned, the approach of targeting subclasses of a given tumour will mean that reductions in mortality are likely to take place in smallish steps and the influence of socio-economic status is likely to relate more to detection and presentation than the treatment

delivered in cancer centres of which there is an effective network.

The future impact of infectious diseases is difficult to predict. The risk of a 1919-type influenza epidemic can never be discounted although the UK population is healthier now and both surveillance and the capability of responding are much increased. Excess winter deaths in the UK are measured and often reveal an increase attributable to influenza activity but no research has been found which links influenza mortality in the UK to socio-economic status. There is some evidence correlating influenza mortality with social class or educational attainment in the US, Scandinavia and Spain (discussed in Mamelund, 2005). It is complicated in some instances by the classification used being influenza and pneumonia but the difference in mortality across the groups seems to be about 1.5 times. Nowadays, the picture is further complicated by the availability of vaccine. In the UK the uptake in those over 65 is 70 – 75% (see influenza vaccination at [www.hpa.org.uk](http://www.hpa.org.uk)). The evidence about variation in uptake between socio-economic groups is conflicting (Chiatti et al., 2010, Damiani et al., 2007, Logan, 2009).

HIV/AIDS has shown that there is always the threat of something novel both in the nature of the causative agent, the resulting mortality and the segments of the population most affected. Since the start of the 19th century, deaths from infectious diseases fell consistently until the last 20 years of the 20th century when there was a slight rise due to HIV/AIDS. An illustration of the long-term trend in overall infectious disease mortality in a developed country comes from the USA<sup>53</sup> with a mortality per 100,000 of 797 in 1900 going down to 36 in 1980, then 63 in 1995 and 59 in 1996. Globally HIV/AIDS now accounts for nearly 2 million deaths worldwide out of a total of about 15 million total infectious-disease deaths.

Something as novel and severe may occur in the future but what and when is impossible to predict. Global warming may also have an impact on infectious disease in the UK but again the uncertainties are numerous. Encouragingly, the UK should be as well placed as any country to monitor and respond appropriately to emerging threats from infectious diseases.

50. The UK CRC Screening Pilot Evaluation Team. *Evaluation of the UK colorectal cancer screening pilot. Final report (February 2003, revised May 2003).*

51. Weller D, et al. *English pilot of bowel cancer screening: An evaluation of the second round. Final Report to the Department of Health. February 2006 (Revised August 2006).*

52. Von Wagner C, Baio G, Raine R, Snowball J, Morris S, Atkin W, Obichere A, Handley G, Logan RF, Rainbow S, Smith S, Halloran S, Wardle J. (2011). *Inequalities in participation in an organized national colorectal cancer screening programme: Results for the first 2.6 million invitations in England. Int J Epidemiol.; 40(3):712-718.*

53. Armstrong, G.L., Conn, L.A. and Pinner, R.W. (1999). *Trends in Infectious Diseases Mortality in the United States during the 20th Century. J. Amer. Med. Assoc.; 281(1):61-66.*

#### 4.4. Information and research needs

There is a flow of up-to-date information about mortality for the whole population and often for sub-groups. This Paper will be reviewed periodically and updated in the light of the new data.

Equally important will be the flow of new academic and research information dealing with particular aspects of the subject. That may well help us to understand why the historic figures are what they are and help estimation of future trends with greater confidence. Some of that research is funded by Legal & General.

This first Paper has revealed many areas where new information could assist the Panel in its deliberations and in forming conclusions. The Panel is keen to receive, and will be seeking out, information in the following areas:

- The degree of success of attempts to achieve “proportionate universalism” by the direction of resources and effort. For example, variations in the quality of health services by locality and the relative success in redirecting resources to disadvantaged groups.
- The uptake of NHS services by socio-economic group at critical junctures within the patient pathway.
- The degree of success, for the whole population and for sub-groups, of the Public Health Responsibility Deal which will need rigorous monitoring.
- The (re)forecasting of long-term trends in obesity in the light of up-to-date trends and any apparent attitudinal shifts.
- The impact by socio-economic group of alcohol consumption to understand more clearly the likely consequences for mortality.
- Given the huge significance of smoking as a contributor to deaths, the relative success of smoking cessation and harm prevention efforts.
- The likely time delays of adverse lifestyle features on death rates.
- Consideration of whether research about the links between educational attainment and health status is likely to be productive.
- Obtaining an increasing understanding of the physiology of humans to assess the likely rate of improvement in the long-term in mortality and the expected pattern of improvement by socio-economic group.

## Section 5. Summary and Conclusions

Life expectancy in England and Wales has been increasing for a very long time. It has close to doubled since 1841 from, in round terms, just over 40 years to almost 80. The rate of improvement has increased sharply over recent decades. For example, for males aged 40-89 over the 25 years to 2004, the annual rate of improvement was 2.1%, four times the average annual rate of 0.5% over the preceding 125 years.

Such a greatly improved rate was not predicted. Compounding the higher annual rate actually seen over a reasonably long period has had important consequences for public services and public policy and for those providing or receiving pensions, annuities and insurance products. The demographics of the population were not accurately forecast.

Many efforts have been, and continue to be, made by actuaries and statisticians to improve the forecasting of life expectancy. Given the considerable uncertainty, the recognition of past errors consistently underestimating short-term improvements in life expectancy has led to a very wide range of projections often simply based on compounding fairly arbitrary arithmetic assumptions. These rarely have any regard to the health status of the population or the impact of lifestyle on life expectancy.

The Panel will attempt to assess the drivers that are enhancing life expectancy, for example, medical advances and some social change, as well as the inhibitors such as aspects of lifestyle and delays in development of treatments. It will also seek to understand the impact of the factors on different groups, for example different socio-economic groupings.

The long-term assumption regularly used by government agencies of 1% per annum improvement now looks low compared with the rate of change observed in recent decades and there have been some modest increases from that rate. For example, the ONS now uses 1.2%.

The percentage improvement has not been uniform across socio-economic groups. The gap which already existed between life expectancies for different socio-economic groups has widened. At age 65 those in the highest group live some 3 or 3.5 years longer than those in the lowest group. The gap has been widening as rates of improvement in higher social classes, especially for men up to age 80, have continued to exceed rates in lower groups.

This widening has occurred despite efforts in terms of actions and targeting by successive Governments which have regarded the position as unacceptable. There are ready explanations of this past failure to narrow the gaps. The impact of growing socio-economic inequality of income, family histories and lifestyle variations are all contributors.



This Paper considers some powerful influences which are working to widen the gaps further. Income inequality increased in the 1980s and remains high relative to some other developed countries. The adverse gradient in propensity to smoke remains strong and the impact on health of smoking over a long period is well documented. There is also a sharp adverse gradient in obesity especially amongst women; its scale and its impact on life expectancy will become clearer over the coming years as will related issues about quality of diet which are not separately considered here. The impact by socio-economic group of alcohol consumption is less certain with some apparently contradictory evidence which should become clearer as more research becomes available. Whereas the affluent drink more alcohol, there may be more damage done to heavy drinkers in less affluent groups. Another negative is the relatively lower use of health screening programmes and of secondary and specialist treatments by lower socio-economic groups. Many of these influences change very slowly so the hypothesis that inequality in improvements in life expectancy will not narrow seems a reasonable starting point for forecasting. They also suggest that attempts to gauge the success of efforts made to narrow the gaps will need to recognise the powerful forces increasing differentials.

Monitoring and forecasting the differential rates of improvement for different socio-economic groups will also be important in providing an assessment of the likely overall rate of improvement. If it is assumed that the rates of improvement of the higher socio-economic groups will be independent of the efforts to change the differentials, then success in narrowing differentials will also lead to a greater rate of improvement across the whole population.

This Paper has essentially drawn together available information to begin to form a more detailed understanding of the socio-economic variations in life expectancy and to speculate about future trends in major drivers of health status. It is hoped it will trigger comment and further work which can be used to create better understanding and improved forecasting.

## Glossary

**90:10 ratio:** A summary measure of inequality. This is the ratio between the values of an outcome for people 10 per cent from the top and the 10 per cent from the bottom of a distribution. The greater this '90:10 ratio', the more unequal a distribution across most of its range. Alternative measures of inequality include the: i) 50:10 ratio which highlights below-median incomes; ii) 90:50 ratio which highlights the above-median incomes.

**Telomere:** Specialised and repetitive sequences of DNA located at the end of a chromosome. They protect the extremities of the chromosome (long and short arms) from deterioration (fraying) or from fusion with neighbouring chromosomes.

**Body Mass Index (BMI):** A widely accepted measure of weight (kilograms) for height (metres), the Body Mass Index (BMI) is defined as the individual's weight divided by the square of the height ( $\text{kg}/\text{m}^2$ ). Based upon the World Health Organisation (WHO) and the National Institute for Health and Clinical Excellence (NICE) classification, the following descriptions have been used to categorise the adult population (GHealth Survey for England 2009, p.116.):

<i>BMI (kg/m<sup>2</sup>)</i>	<i>Description</i>
Less than 18.5	Underweight
18.5 to less than 25	Normal
25 to less than 30	Overweight
30 or more	Obese
40 or more	Morbidly Obese

**Life expectancy at birth:** The OECD Glossary of Statistical Terms defines life expectancy at birth or at any given age as “the average number of years that a person at that age can be expected to live, assuming that age-specific mortality levels remain constant.” (<http://stats.oecd.org/glossary/search.asp>). Life expectancy at birth is the number of years that an individual or population can be expected to live after birth.

**Life expectancy at age 65:** Life expectancy at age 65 is the number of years that an individual or population can be expected to live after age 65.

**Mortality rate:** The OECD Glossary of Statistical Terms defines the mortality or death rate as “the number of deaths in a given period divided by the population exposed to risk of death in that period.” (<http://stats.oecd.org/glossary/detail.asp?ID=3628>). The rate is often expressed as the number of deaths per 1,000 (or per 100,000) individuals per year.

**HBAI:** Published by the Department of Work and Pensions, the Households Below Average Income (HBAI) statistics and commentary provide information on the income distribution in Great Britain. It examines household disposable incomes (adjusted for household size and composition) as a proxy for material living standards.

**Household reference person (HRP):** The Household Reference Person (HRP) is defined as the individual responsible for the accommodation of the household. The HRP is identified as one of the following: i) the individual with the highest income within a joint household; ii) the eldest if there are 2 or more members with the same income within the household; iii) the sole householder within a single person household.

**Gini coefficient:** The Gini coefficient is a summary indicator of inequalities. Used internationally, the coefficient is measured as either a percentage or as a value from 0 to 1. The value 0 indicates perfect equality (every household or individual having the same amount of income or wealth), while the value 100 indicates a single household/individual owning an entire country's income or wealth.

## Appendix A

### Projections of Mortality Improvement from Several Countries

The CMI Working Party had undertaken a small survey of mortality projections produced by various countries, including the US and Canada reported in 2.2.4 of this paper.<sup>54</sup>

They also report improvements foreseen by a number of Continental European countries. Projections made in some European countries for annuitants have used

more rapid long-term assumptions for mortality change. A paper describing the publication of the German annuity valuation table DAV 2004 R (2005) compares the projected rates of change with those contained in Austrian & Swiss projections. The projected long-term rates of change by age are shown in Table A.1 below:

**Table A.1.** Annual mortality improvements of various trend functions (%)

Age	Males			Females		
	Germany	Switzerland	Austria	Germany	Switzerland	Austria
20	2.25%	2.19%	1.59%	2.25%	2.19%	2.64%
25	1.81%	2.19%	1.54%	2.23%	2.19%	2.54%
30	1.62%	2.19%	1.49%	2.14%	2.19%	2.43%
35	1.58%	2.19%	1.42%	1.80%	2.19%	2.32%
40	1.57%	2.19%	1.35%	1.48%	2.19%	2.21%
45	1.56%	2.85%	1.28%	1.45%	2.19%	2.08%
50	1.50%	3.15%	1.19%	1.55%	2.19%	1.96%
55	1.47%	3.11%	1.10%	1.63%	2.46%	1.83%
60	1.42%	3.06%	1.01%	1.61%	2.75%	1.69%
65	1.51%	3.00%	0.91%	1.66%	3.00%	1.55%
70	1.68%	2.91%	0.81%	1.83%	3.17%	1.40%
75	1.65%	2.74%	0.71%	1.93%	3.21%	1.25%
80	1.38%	2.47%	0.61%	1.82%	3.04%	1.09%
85	1.03%	2.14%	0.50%	1.49%	2.57%	0.92%
90	0.75%	1.81%	0.40%	1.08%	1.85%	0.75%
95	0.75%	1.52%	0.30%	0.81%	1.15%	0.57%
100	0.75%	1.27%	0.19%	0.75%	0.68%	0.39%

1 DAV 2004 R Table (Target Trend 2nd Order). 2 ER 2000 Table. 3 AVO 1996R 2030 Table

Source; Adapted from Tables "Annual mortality improvements of various trend functions (in %, males)" and "Annual mortality improvements of various trend functions (in %, females)", *Coping with longevity: The New German Annuity Valuation Table DAV 2004 R. Presented to The Living to 100 and Beyond Symposium. Sponsored by the Society of Actuaries. Orlando, Fla. January 12-14, Pasdika U and Wolff J. 2005, p.35. URL: <http://www.actuaries.org/EVENTS/Congresses/Paris/Papers/2005.pdf>.*

© Copyright 2005 by the Society of Actuaries. All Rights Reserved.

## Appendix B

### Other measures highlighted by the Marmot Review (1 year onwards)

“We already know that by the age of 10 a child from a poorer background will have lost any advantage of intelligence indicated at 22 months; whereas a child from an affluent family will have improved his or her cognitive scores purely because of his/her advantaged background.”

Source: Professor Sir Michael Marmot

1. Average life expectancy by local authority<sup>55</sup>:
  - a. Variations in LE at birth between local authorities shown in charts is 11 years for men & 10 years for women
  - b. Inequality in male LE between the poorest & most affluent areas within each local authority > 9 years for ~50% of the authorities in England
  - c. Inequality in female LE between the poorest & most affluent areas within each local authority ~6 years for ~50% of the authorities in England
2. Disability Free Life Expectancy (DFLE)<sup>56</sup>:
  - a. Inequality in male DFLE between the poorest & most affluent areas within each local authority >10 years for ~50% of the authorities in England
  - b. Inequality in female DFLE between the poorest & most affluent areas within each local authority ~9 years for ~50% of the authorities in England
3. Children achieving a good level of development at age 5<sup>57</sup>:
  - a. 44% of all 5 year olds in England are not considered by their teachers to have a good level of development in the 1st year of school (assessment based upon national criteria of behaviour & understanding)
4. Young people (16-19 years) not in employment, education or training (NEETS)<sup>58</sup>:
  - a. Mean of 7% of young people (England) were NEETS in the 3 months to Jan 2010
5. Percent of people in households on means tested benefits<sup>59</sup>:
  - a. Mean of 16% of people (England) were in households on means-tested benefits
  - b. Inequality in the percentage of people on means tested benefits between the poorest & most affluent areas within each local authority >31% for ~50% of the authorities in England

Source: Figures adapted from Main Findings. Health Inequalities – A Challenge for Local Communities. Fair Society, Healthy Lives. Marmot Review 1 Year On Press Release FINAL COPY 090211, pp.1-3. (<http://www.marmotreview.org/media-events/one-year-on>).

The Marmot Review © Copyright 2011. Re-used with permission.

55. The Association of Public Health Observatories (APHO) has published health inequality indicators for every local authority in England, using the slope index of inequality (SII) for life expectancy at birth, for males and females. Original Data Source: Health Inequality Indicators for Local Authorities and Primary Care Organisations. (<http://www.apho.org.uk/resource/view.aspx?RID=96930>). © 2007 APHO. All rights reserved.

56. DFLE is the average number of years a person could expect to live without an illness or health problem that limits their daily activities. Original Data Source: Office for National Statistics. © Crown Copyright. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

57. Indicator is based on data collected from the Early Years Foundation Stage Profile (EYFSP). Children are normally assessed by a teacher in the year they turn 5 years of age. Data from the EYFSP are collected and published by the Department for Education, with the latest available figures for 2010: <http://www.education.gov.uk/rsgateway/DB/SFR/s000979/index.shtml>. © Crown Copyright. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

58. Data for this indicator was collected via the Connexions service, which tracks school leavers to see whether they go on to further education, work based learning, full time employment or other training/learning opportunities. The number of young people who are not in NEET is reported annually for the period from November to January. Data used for this indicator are all adjusted NEET figures that were supplied to APHO by the Department of Education. (<http://www.education.gov.uk/16to19/participation/neet/a0064101/strategies-for-16-to-18-year-olds-not-in-education-employment-or-training-neet>). © Crown Copyright 2011. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

59. Indicator is derived from the income deprivation domain of the Government's Index of Multiple Deprivation 2007. Percent figures were calculated by the London Health Observatory (LHO) on an aggregation of data for Lower Super Output Areas (LSOAs) to local authorities using published data for 2005: (<http://webarchive.nationalarchives.gov.uk/+http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/>)

## Appendix C

### An anatomy of economic inequality in the UK (NEP 2010) Net Individual Income by Socio-Demographic Group

#### C.1. Gender: Net Individual Income 2005-08 at 2008 prices (2005/08 £ per week at 2007/08 prices)

No.	Gender	Mean	90:10 ratio	10th percentile	30th percentile	Median	70th percentile	90th percentile
1	Male	360	7.7	84	192	281	396	649
2	Female	222	8.9	49	118	180	261	435
3	Overall	287	9.6	56	143	223	324	542

Source\*: Figures reproduced in part from "II0508NET 1.1-Overall" and "II0508NET 1.2-Gender" sections of the "Net Individual Income, UK (Individual Income Series 2005 to 2008 at 2008 prices)" worksheet in the Net\_Individual\_Incomes\_tables.xls file. URL: [http://sta.geo.useconnect.co.uk/docs/0508\\_Net\\_Individual\\_Incomes\\_tables.xls](http://sta.geo.useconnect.co.uk/docs/0508_Net_Individual_Incomes_tables.xls)

Government Equalities Office © Crown Copyright 2010. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

#### C.2. Age: Net Individual Income 2005-08 at 2008 prices (2005/08 £ per week at 2007/08 prices)

No.	Gender	Mean	90:10 ratio	10th percentile	30th percentile	Median	70th percentile	90th percentile
1	50-54	341	12.2	53	164	264	392	645
2	55-59	301	19.1	30	129	224	340	582
3	60-64	259	8.6	57	123	189	285	490
4	65-69	225	6.4	64	124	176	244	406
5	70-74	210	5.9	63	126	173	233	372
6	75-79	202	5.4	65	127	166	222	350
7	80-84	199	3.9	86	134	169	221	335
8	85+	199	3.4	96	133	174	225	324

Source: Figures reproduced in part from "II0508NET 1.3-Age" section of the "Net Individual Income, UK (Individual Income Series 2005 to 2008 at 2008 prices)" worksheet in the Net\_Individual\_Incomes\_tables.xls file. ([http://sta.geo.useconnect.co.uk/docs/0508\\_Net\\_Individual\\_Incomes\\_tables.xls](http://sta.geo.useconnect.co.uk/docs/0508_Net_Individual_Incomes_tables.xls)). The files have been produced by the National Equality Panel secretariat with support from the Department for Work and Pensions from the Individual Income Series based on the Family Resources Survey. Please refer to "An anatomy of economic inequality in the UK: Report of the National Equality Panel 2010 (in particular Chapters 2, 6, 9 and 10) for details.

Government Equalities Office © Crown Copyright 2010. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)



**C.3.** Occupational Class: Net income by occupational social class 2005-08 at 2008 prices, UK (2005/08 £ per week at 2007/08 prices)

No.	Occupational class	Mean	90:10 ratio	10th percentile	30th percentile	Median	70th percentile	90th percentile
1	Higher managerial and professional occupations	695	4.3	261	419	540	699	1132
2	Lower managerial & professional occupations	430	3.7	183	298	381	486	682
3	Intermediate occupations	278	3.6	125	208	257	321	449
4	Small employers and own ac workers	336	11.8	53	154	246	365	623
5	Lower supervisory & technical occupations	328	3.5	146	238	306	379	516
6	Semi-routine occupations	223	4.4	83	161	211	267	364
7	Routine occupations	236	5.5	71	162	224	289	395
8	Never worked/ long-term unemployed	104	*	0	46	85	134	218
9	Not classified	172	7.7	41	97	144	200	320

Source: Figures reproduced in part from "I10508NET 1.9-NS-SEC" section of the "Net Individual Income, UK (Individual Income Series 2005 to 2008 at 2008 prices)" worksheet in the *Net\_Individual\_Incomes\_tables.xls* file. ([http://sta.geo.useconnect.co.uk/docs/0508\\_Net\\_Individual\\_Incomes\\_tables.xls](http://sta.geo.useconnect.co.uk/docs/0508_Net_Individual_Incomes_tables.xls)). The files have been produced by the National Equality Panel secretariat with support from the Department for Work and Pensions from the Individual Income Series based on the Family Resources Survey. Please refer to "An anatomy of economic inequality in the UK: Report of the National Equality Panel 2010 (in particular Chapters 2, 6, 9 and 10) for details.

Government Equalities Office © Crown Copyright 2010. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

#### C.4. Nation & Region: Net individual income by nation and region, 2005-08 (2008 £)

Individual Net Income 2005/08 £ per week (2007/08 prices)								
No.	Nation or Region	Mean	90:10 ratio	10th percentile	30th percentile	Median	70th percentile	90th percentile
1	England	295	10.0	56	144	227	333	558
2	South East	341	11.1	58	161	255	377	648
3	South West	283	8.9	60	149	228	329	531
4	East of England	312	10.5	57	152	240	353	601
5	East Midlands	270	9.1	56	142	218	313	508
6	West Midlands	259	8.9	56	137	210	303	500
7	London	350	16.6	40	135	247	389	672
8	Yorkshire & the Humber	264	8.7	57	139	215	306	494
9	North East	248	8.4	56	134	204	291	473
10	North West & Merseyside	271	8.7	57	142	217	309	500
11	Wales	256	8.9	54	135	207	292	482
12	Scotland	275	8.6	60	144	218	312	515
13	Northern Ireland	253	8.6	55	136	211	297	479

Source: Figures reproduced in part from "II0508NET 1.4-Country/Region" section of the "Net Individual Income, UK (Individual Income Series 2005 to 2008 at 2008 prices)" worksheet in the Net\_Individual\_Incomes\_tables.xls file. ([http://sta.geo.useconnect.co.uk/docs/0508\\_Net\\_Individual\\_Incomes\\_tables.xls](http://sta.geo.useconnect.co.uk/docs/0508_Net_Individual_Incomes_tables.xls)). The files have been produced by the National Equality Panel Secretariat with support from the Department for Work and Pensions from the Individual Income Series, based on the Family Resources Survey. Please refer to "An anatomy of economic inequality in the UK: Report of the National Equality Panel 2010 (in particular Chapters 2, 6, 9 and 10) for details.

Government Equalities Office © Crown Copyright 2010. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

#### C.5. Area Deprivation: Net individual income by area deprivation, England, 2005-08 (2008 £)

Individual Net Income 2005/08 £ per week (2007/08 prices)								
No.	Area Deprivation	Mean	90:10 ratio	10th percentile	30th percentile	Median	70th percentile	90th percentile
1	Highest 10th	394	12.4	61	180	288	441	753
2	2nd 10th	350	10.9	60	166	268	398	657
3	3rd 10th	338	10.3	60	164	255	375	623
4	4th 10th	318	10.5	58	155	247	364	612
5	5th 10th	300	9.6	59	150	235	342	569
6	6th 10th	286	9.0	58	149	229	331	527
7	7th 10th	270	9.1	56	141	219	316	509
8	8th 10th	249	8.7	54	133	206	291	467
9	9th 10th	226	8.8	48	125	192	270	420
10	Lowest 10th	194	8.9	41	112	170	238	363

Source: Figures reproduced in part from "II0508NET 1.1(a)-Index of multiple deprivation" section of the "Net Individual Income, UK (Individual Income Series 2005 to 2008 at 2008 prices)" worksheet in the Net\_Individual\_Incomes\_tables.xls spreadsheet file. ([http://sta.geo.useconnect.co.uk/docs/0508\\_Net\\_Individual\\_Incomes\\_tables.xls](http://sta.geo.useconnect.co.uk/docs/0508_Net_Individual_Incomes_tables.xls)). The files have been produced by the National Equality Panel Secretariat with support from the Department for Work and Pensions from the Individual Income Series, based on the Family Resources Survey. Please refer to "An anatomy of economic inequality in the UK: Report of the National Equality Panel 2010 (in particular Chapters 2, 6, 9 and 10) for details.

Government Equalities Office © Crown Copyright 2010. Contains public sector information licensed under the Open Government License v1.0. (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

## An anatomy of economic inequality in the UK (NEP 2010)

### Wealth Inequality by Socio-Demographic Group

#### C.6. Age: Total wealth by age, Great Britain, 2006-08 (£)

No.	Age Group*	Median wealth (Highest to Lowest)	90:10 ratio	10th percentile	Median	90th percentile
1	55-64	416,100	48	19	72	95
2	65-74	306,000	37	18	62	91
3	45-54	287,800	68	13	60	92
4	75-84	225,200	46	13	52	85
5	35-44	174,900	77	9	45	83
6	85+	171,800	47	11	45	78
7	25-34	65,900	80	5	28	59
8	16-24	12,900	46	2	12	32
9	Overall	204,500	97	10	50	90

\*Age is that of 'household reference person'.

Source: Adapted from Table 8.1 All wealth, by age, GB, 2006-08 (£). An anatomy of economic inequality in the UK. Report of the National Equality Panel. National Equality Panel 2010, p.214. (<http://sticerd.lse.ac.uk/dps/case/cr/CASereport60.pdf>).

Government Equalities Office © Crown Copyright 2010. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Original Data Source: Office for National Statistics. Wealth and Assets Survey (WAS), Wave 1, 2006-08. © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

#### C.7. Occupational Class: Total wealth by occupational social class, Great Britain, 2006-08 (£)

No.	Occupational Class	Median wealth	90:10 ratio	10th percentile	Median	90th percentile
1	Large employers & higher managerial	532,500	16	35	79	97
2	Higher professional	450,500	25	27	74	96
3	Lower managerial & professional	325,000	31	21	64	93
4	Small employers & own account workers	236,600	37	17	54	88
5	Intermediate occupations	200,400	44	14	49	85
6	Lower supervisory & technical	161,100	60	10	43	79
7	Semi-routine occupations	86,700	88	6	32	72
8	Routine occupations	74,000	92	5	30	68
9	Never worked/long-term unemployed	15,000	117	3	13	59

Source: Adapted from Table 8.3 All wealth, by occupational social class, GB, 2006-08 (£). An anatomy of economic inequality in the UK. Report of the National Equality Panel. National Equality Panel 2010, p.215. (<http://sticerd.lse.ac.uk/dps/case/cr/CASereport60.pdf>).

Government Equalities Office © Crown Copyright 2010. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Original Data Source: Office for National Statistics. Wealth and Assets Survey (WAS), Wave 1, 2006-08. © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

### C.8. Nation & Region: Total wealth by nation and region, 2006-08 (£)

No.	Nation or Region	Median wealth	90:10 ratio	10th percentile	Median	90th percentile
1	England	210,600	96	10	50	90
2	South East	287,900	73	14	60	93
3	South West	277,700	62	12	59	90
4	East of England	241,300	61	13	54	91
5	East Midlands	213,700	60	12	51	88
6	West Midlands	187,700	82	10	47	87
7	London	173,400	273	5	45	91
8	Yorkshire & the Humber	172,700	73	10	45	86
9	North East	169,500	89	9	44	86
10	North West	168,200	98	9	44	87
11	Wales	150,600	93	8	42	86
12	Scotland	205,500	89	9	50	87

Source: Adapted from Table 8.4. Total and financial and physical wealth, by nation and region, GB, 2006-08 (£). An anatomy of economic inequality in the UK. Report of the National Equality Panel. National Equality Panel 2010, p.216. (<http://sticerd.lse.ac.uk/dps/case/cr/CASereport60.pdf>).

Government Equalities Office © Crown Copyright 2010. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Original Data Source: Office for National Statistics. Wealth and Assets Survey (WAS), Wave 1, 2006-08. © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

### C.9. Area Deprivation: Total wealth by area deprivation, England, 2006-08 (£)

No.	Area Deprivation	Median wealth	90:10 ratio	10th percentile	Median	90th percentile
1	Highest 10th	481,400	19	29	76	96
2	2nd 10th	394,800	23	26	70	94
3	3rd 10th	326,800	31	22	64	94
4	4th 10th	314,200	38	18	63	92
5	5th 10th	279,400	54	15	59	90
6	6th 10th	221,800	52	13	52	88
7	7th 10th	159,000	86	7	43	81
8	8th 10th	122,400	71	7	37	78
9	9th 10th	62,300	112	5	28	68
10	Lowest 10th	33,600	104	3	21	57

Source: Adapted from Table 8.6. All wealth by area deprivation, England, 2006-08 (£). An anatomy of economic inequality in the UK. Report of the National Equality Panel. National Equality Panel 2010, p.216. (<http://sticerd.lse.ac.uk/dps/case/cr/CASereport60.pdf>).

Government Equalities Office © Crown Copyright 2010. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Original Data Source: Office for National Statistics. Wealth and Assets Survey (WAS), Wave 1, 2006-08. © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**For C.10.** \*Recent analysis suggests that differences in mortality rates are in fact more closely related to wealth than they are to social class (p.382). The following chart shows the survival of the ELSA cohort (>=50 years) over a 6 year period. Survival rates are age adjusted representing the position of the cohort as a whole. Findings include the following: i) >90% of men & 95% of women in wealthiest 5th survived the 6 year period; ii) 75% of men & 81% of women in least wealthy 5th survived the 6 year period; iii) >2x as many men & ~4x as many women with low wealth died within the 6 year period than those with high wealth.

1 Original Source: Labour Force Survey (LFS) 2006-2008 at 2008 prices

2 Original Source: Individual Income Series 2005-06 to 2007-08 at 2008 prices, based on Family Resources Survey

3 Original Source: DWP from HBAI dataset, based on Family Resources Survey

4 Original source: ONS from Wealth and Assets Survey

5 Age ranges for equivalent net income are one year higher. Wealth gives the total wealth by age of the household reference person; this is only available in 10 year age bands

6 Definitions of categories vary between surveys. Net equivalent income figures are for adults within whole population distribution

7 Equivalent net income figures are for adults within whole population distribution

8 By Index of Multiple Deprivation

Source: Adapted from Table S5. Inequality within each population group (90:10 ratio), by outcome (UK, unless specified). An anatomy of economic inequality in the UK - Summary. Report of the National Equality Panel. National Equality Panel 2010, pp. 40-41. ([http://sticerd.lse.ac.uk/dps/case/cr/CASereport60\\_summary.pdf](http://sticerd.lse.ac.uk/dps/case/cr/CASereport60_summary.pdf))

Government Equalities Office © Crown Copyright 2010-2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

## Inequality within socio-demographic groups (Earnings & wealth comparison, UK)

**C.10.** Inequality within each population group (90:10 ratio) by outcome (UK unless specified)\*

No	Parameters	Hourly Wages <sup>1</sup>	Weekly Earnings (FT) <sup>1</sup>	Weekly Net Individual Incomes <sup>2</sup>	Weekly Equivalent Net Income <sup>3</sup>	Total Wealth <sup>4</sup>
1	All	3.9	3.7	9.6	4.2	97
2	Gender					
	Men	4.1	3.7	7.7	4.3	n/a
	Women	3.5	3.5	8.9	4.2	n/a
3	Age (bottom of range) <sup>5</sup>					
	16	2.5	2.7	*	3.7	46
	20	2.4	2.4	18.4	3.9	
	25	3.0	2.8	8.3	4.1	80
	30	3.6	3.3	9.9	4.5	
	35	4.0	3.7	9.7	4.4	77
	40	4.1	3.9	9.9	4.2	
	45	4.0	3.8	9.4	4.3	68
	50	4.0	3.8	12.2	4.8	
	55	3.8	3.6	19.1	5.3	48
	60	3.6	3.4	8.6	4.4	
	65	3.9	3.7	6.4	3.4	37
	70	4.0	n/a	5.9	3.1	
4	Ethnicity (selected) <sup>7</sup>					
	White British	3.9	3.7	9.2	4.1	72
	Indian	4.1	4.1	32	5.4	57
	Pakistani	3.8	3.8	**	3.6	n/a
	Bangladeshi	3.4	**	159		
	Black Caribbean	3.4	3	10.3	4.0	183
	Black African	3.4	3.1	28	4.1	n/a
	Chinese	4.7	4.3	320	6.4	n/a
5	Occupational Social Class <sup>7</sup>					
	Higher Managerial & Professional	3.3	3.4	4.3	4.1	25
	Lower Managerial & Professional	3.0	2.9	3.7	3.3	31
	Intermediate	2.4	2.4	3.6	2.9	44
	Lower Supervisory/technical	2.7	2.8	3.5	2.8	60
	Semi-Routine	2.2	2.5	4.4	3.1	88
	Routine	2.3	2.7	5.5	3.2	92
	Never Worked	3.5	4.0	**	3.6	117
6	Housing Tenure					
	Social housing	2.4	2.4	2.7	2.6-2.7	42
	Private rented	3.4	3.4	3.4	3.7-5.0	86
	Owned outright	3.9	3.9	3.8	4.6	7
	Owned with mortgage	3.9	3.9	3.7	3.8	12
7	Area Deprivation (England) <sup>8</sup>					
	Most Deprived tenth	2.8	2.9	8.9	3.3	104
	5th	3.6	3.5	9	4.1	52
	Least Deprived tenth	4.6	4.2	12.4	4.5	19

## Appendix D

### Cigarette Smoking and Alcohol Consumption: More Facts

**Table D.1.** Prevalence of cigarette smoking by gender and socio-economic classification of the household reference person: England, 2001 to 2009, Persons 16 and Over

Socio-economic classification of household reference person	Weighted (% Smoking cigarettes)				
	2001	2002	2003	2004	2005
<i>Men</i>					
Managerial & professional	21	20	20	20	18
Intermediate	29	27	28	26	24
Routine & manual	34	32	34	32	32
Total <sup>3</sup>	28	27	27	26	25
<i>Women</i>					
Managerial & professional	17	17	17	17	16
Intermediate	26	25	24	22	22
Routine & manual	31	31	30	30	29
Total	25	25	24	23	22
<i>All Persons</i>					
Managerial & professional	19	19	18	19	17
Intermediate	27	26	26	24	23
Routine & manual	33	31	32	31	31
Total	27	26	25	25	24

<sup>1</sup> Results from 2006 include longitudinal data

<sup>2</sup> 2005 data includes last quarter of 2004/05 data due to survey change from financial year to calendar year

<sup>3</sup> Respondents whose household reference person was a full time student, had an inadequately described occupation, had never worked or was long-term unemployed these are not shown as separate categories but are included in the total

<sup>4</sup> Trend tables show unweighted and weighted figures for 1998 to give an indication of the effect of the weighting. Bases for earlier years can be found in GLF/GHS reports for each year

2006	2007	2008	2009	Weighted base 2009 (000s) = 100% <sup>4</sup>	Unweighted sample <sup>4</sup> 2009
17	16	15	15	7298	2270
22	21	21	20	2761	860
32	28	31	29	5725	1810
23	22	21	22	16777	5220
14	14	14	14	7689	2490
20	18	21	18	3455	1120
28	24	27	27	6719	2180
21	19	20	20	19019	6160
15	15	14	15	14987	4760
21	20	21	19	6216	1980
29	26	29	28	12444	3980
22	21	21	21	35796	11380

Source: Reproduced from Table 1.7. Prevalence of cigarette smoking; by sex and socio-economic classification of the household person, England, 2001 to 2009. Smoking and drinking among adults, 2009. A report on the 2009 General lifestyle Survey, Robinson S, and Harris H. Dunstan S. (ed.). Office for National Statistics. 2011, p.21. (<http://www.ons.gov.uk/ons/rel/ghs/general-lifestyle-survey/2009-report/smoking-and-drinking-among-adults--2009.pdf>)

General Lifestyle Survey, Office for National Statistics © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)



**Table D.2.** Prevalence of cigarette smoking by gender and socio-economic classification based on the current or last job of the household reference person: Great Britain, Persons aged 16 and over (2009)

Socio-economic classification of household reference person <sup>2</sup>	Percentage smoking cigarettes					
	Men		Women		Total	
<i>Managerial &amp; professional</i>						
Large employers & higher managerial	12		13		13	
Higher professional	11	} 15	10	} 14	10	} 15
Lower managerial & professional	18		16		17	
<i>Intermediate</i>						
Intermediate	19	} 21	16	} 19	17	} 20
Small employers & own account	23		21		22	
<i>Routine &amp; manual</i>						
Lower supervisory & technical	25	} 30	27	} 27	26	} 29
Semi-routine	31		26		28	
Routine	34		30		32	
<b>Total<sup>2</sup></b>	<b>22</b>		<b>20</b>		<b>21</b>	
<i>Weighted bases (000s) = 100%</i>						
Large employers & higher managerial	1282		1326		2607	
Higher professional	2092		1789		3881	
Lower managerial & professional	4976		5668		10642	
Intermediate	1292		2176		3468	
Small employers & own account	1893		1859		3753	
Lower supervisory & technical	2472		2303		4775	
Semi-routine	2247		3218		5464	
Routine	2134		2388		4521	
<b>Total<sup>2</sup></b>	<b>19563</b>		<b>22150</b>		<b>41713</b>	
<i>Unweighted sample</i>						
Large employers & higher managerial	420		440		860	
Higher professional	630		590		1220	
Lower managerial & professional	1570		1870		3450	
Intermediate	400		710		1100	
Small employers & own account	600		610		1210	
Lower supervisory & technical	800		760		1550	
Semi-routine	690		1040		1730	
Routine	690		790		1480	
<b>Total<sup>2</sup></b>	<b>6140</b>		<b>7250</b>		<b>13400</b>	

1 Results for 2009 include longitudinal data

2 Respondents whose household reference person was a full time student, had an inadequately described occupation, had never worked or was long-term unemployed are not shown as separate categories but are included in the total

Source: Reproduced from Table 1.8. Prevalence of cigarette smoking: by sex and socio-economic classification based on the current or last job of the household reference person: England, 2001 to 2009. Smoking and drinking among adults, 2009. A report on the 2009 General lifestyle Survey. Robinson S, and Harris H. Dunstan S. (ed.). Office for National Statistics. 2011, p.22. (<http://www.ons.gov.uk/ons/rel/ghs/general-lifestyle-survey/2009-report/smoking-and-drinking-among-adults--2009.pdf>)

General Lifestyle Survey, Office for National Statistics © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Table D.3.** Average daily cigarette consumption per smoker by sex, and socio-economic classification based on the current or last job of the household reference person (Great Britain, Current cigarette smokers aged 16 & over, 2009<sup>1</sup>)

Socio-economic classification of household reference person <sup>2</sup>	Mean number of cigarettes a day					
	Men		Women		Total	
<i>Managerial &amp; professional</i>						
Large employers & higher managerial	12	}	9	}	10	}
Higher professional	11		10		11	
Lower managerial & professional	12		12		12	
<i>Intermediate</i>						
Intermediate	12	}	13	}	13	}
Small employers & own account	15		14		14	
<i>Routine &amp; manual</i>						
Lower supervisory & technical	15	}	13	}	14	}
Semi-routine	15		16		13	
Routine	18		13		15	
<b>Total<sup>2</sup></b>	<b>14</b>		<b>13</b>		<b>13</b>	
<i>Weighted bases (000s) = 100%</i>						
Large employers & higher managerial	151		177		328	
Higher professional	235		170		405	
Lower managerial & professional	876		890		1766	
Intermediate	241		353		594	
Small employers & own account	429		398		827	
Lower supervisory & technical	619		606		1225	
Semi-routine	691		845		1536	
Routine	719		709		1428	
<b>Total<sup>2</sup></b>	<b>4280</b>		<b>4457</b>		<b>8737</b>	
<i>Unweighted sample</i>						
Large employers & higher managerial	50		50		100	
Higher professional	60		50		110	
Lower managerial & professional	250		270		530	
Intermediate	70		100		170	
Small employers & own account	130		120		240	
Lower supervisory & technical	180		190		370	
Semi-routine	200		270		470	
Routine	220		230		450	
<b>Total<sup>2</sup></b>	<b>1240</b>		<b>1390</b>		<b>2630</b>	

1 Results for 2009 include longitudinal data

2 Respondents whose household reference person was a full time student, had an inadequately described occupation, had never worked or was long-term unemployed are not shown as separate categories but are included in the total

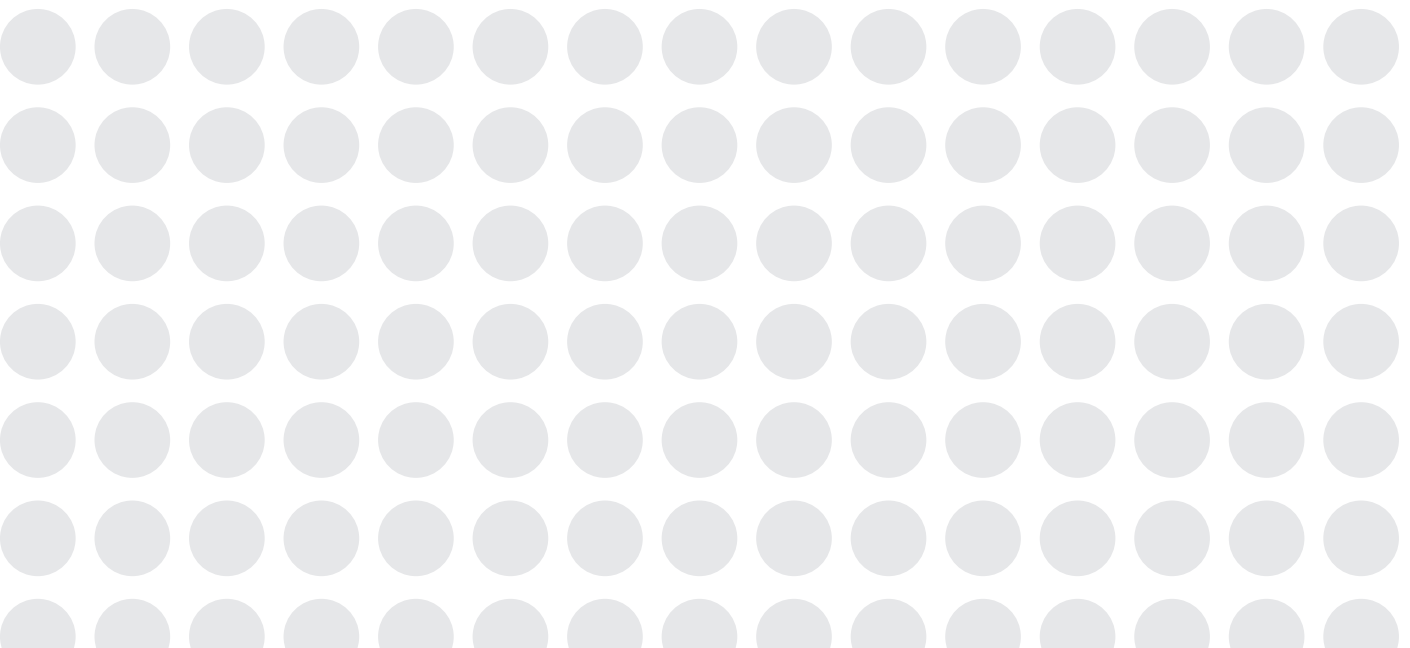
Source: Reproduced from Table 1.16. Average daily cigarette consumption per smoker by sex and socio-economic classification based on the current or last job of the household reference person. Smoking and drinking among adults, 2009. A report on the 2009 General lifestyle Survey. Robinson S, and Harris H. Dunstan S. (ed.). Office for National Statistics. 2011, p.30. (<http://www.ons.gov.uk/ons/rel/ghs/general-lifestyle-survey/2009-report/smoking-and-drinking-among-adults--2009.pdf>)  
General Lifestyle Survey, Office for National Statistics © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Table D.4.** Age started smoking regularly by gender and socio-economic classification based on the current or last job of the household reference person

Great Britain, Persons aged 16 and over who had ever smoked regularly (2009 <sup>1</sup> ): Percentage				
	Socio-economic classification of household reference person <sup>2</sup>			
Age started smoking regularly	Managerial & professional	Intermediate	Routine & Manual	Total
<i>Men</i>				
Under 16	35	38	50	42
16-17	25	28	25	26
18-19	22	15	11	16
20-24	12	14	11	12
25 & over	6	5	4	5
Weighted base (000s) = 100%	3246	1342	3333	8415
Unweighted sample	1060	440	1080	2720
<i>Women</i>				
Under 16	31	32	44	37
16-17	28	27	28	28
18-19	22	20	12	17
20-24	14	13	8	11
25 & over	6	8	8	7
Weighted base (000s) = 100%	2934	1410	3243	8058
Unweighted sample	950	460	1040	2600
<i>All persons</i>				
Under 16	33	35	47	39
16-17	26	27	26	27
18-19	22	18	11	17
20-24	13	13	9	11
25 & over	6	7	6	6
Weighted base (000s) = 100%	6180	2752	6577	16473
Unweighted sample	2000	900	2120	5320

Source: Reproduced from Table 1.26. Age started smoking regularly by sex and socio-economic classification based on the current or last job of the household reference person. Smoking and drinking among adults, 2009. A report on the 2009 General lifestyle Survey. Robinson S, and Harris H. Dunstan S. (ed.). Office for National Statistics. 2011, p.37. (<http://www.ons.gov.uk/ons/rel/ghs/general-lifestyle-survey/2009-report/smoking-and-drinking-among-adults--2009.pdf>)

General Lifestyle Survey, Office for National Statistics © Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)



**Table D.5.** Age-specific mortality rates<sup>1,2,3</sup> from alcohol related causes of death by five year age group and NS-SEC classification, men aged 25-64, England & Wales, 2001-03 (Rate per 100,000)

NS-SEC Analytic Classes		Age (years)			
		25-29	30-34	35-39	40-44
1	Higher managerial & professional	(:)	1.5 (0.9,2.5)	2.8 (2.0,4.0)	5.5 (4.2,7.1)
1.1	Large employers & higher managerial	(:)	0.7 (0.2,2.3)	1.3 (0.6,2.7)	2.6 (1.5,4.4)
1.2	Higher professional	(:)	2.0 (1.2,3.4)	4.3 (2.9,6.3)	8.5 (6.3,11.5)
2	Lower managerial & professional	0.3 (0.1,0.9)	1.2 (0.8,2.0)	5.1 (4.0,6.4)	13.3 (11.4,15.4)
3	Intermediate	0.9 (0.3,2.4)	3.9 (2.5,6.3)	6.1 (4.0,9.3)	11.1 (7.9,15.7)
4	Small employers & own account workers	1.8 (0.8,4.0)	6.5 (4.7,9.0)	8.1 (6.4,10.3)	15.3 (12.9,18.2)
5	Lower supervisory & technical	1.7 (1.0,3.1)	3.6 (2.6,5.1)	8.6 (6.9,10.8)	18.6 (15.8,21.9)
6	Semi-routine	2.8 (1.8,4.4)	8.6 (6.6,11.1)	16.9 (14.0,20.4)	34.5 (30.1,39.7)
7	Routine	3.8 (2.6,5.5)	10.0 (8.1,12.4)	20.4 (17.6,23.7)	35.7 (31.7,40.3)
	All classes	1.5 (1.2,1.9)	4.4 (3.9,5.0)	9.0 (8.3,9.8)	18.1 (17.0,19.3)
	Ratio 7:1	15.5 (3.7,65.0)	6.6 (3.9,11.3)	7.2 (4.9,10.5)	6.5 (4.9,8.7)

1. 95 per cent confidence intervals shown in parenthesis.

2. Rates were not calculated where there were fewer than 3 deaths in a cell, denoted by (:)

3. Rates calculated from fewer than 20 deaths are shown in italics.

	45-49	50-54	55-59	60-64	25-64
	9.8	17.4	17.7	23.5	8.5
	(8.0,12.1)	(14.9,20.4)	(15.0,20.9)	(19.6,28.1)	(7.9,9.2)
	7.4	13.8	14.2	17.6	6.5
	(5.3,10.3)	(10.7,17.9)	(10.8,18.6)	(12.8,24.3)	(5.7,7.5)
	12.4	20.9	20.9	27.6	10.2
	(9.5,16.1)	(17.0,25.6)	(16.9,25.9)	(22.2,34.3)	(9.2,11.2)
	19.4	25.6	30.3	28.4	13.9
	(17.0,22.2)	(22.9,28.7)	(27.1,33.9)	(24.7,32.5)	(13.2,14.7)
	26.4	34.4	30.2	26.1	14.2
	(20.8,33.6)	(28.0,42.4)	(23.9,38.3)	(19.6,34.9)	(12.8,15.8)
	25.9	27.8	27.8	29.0	19.4
	(22.6,29.7)	(24.5,31.5)	(24.5,31.5)	(25.3,33.4)	(18.3,20.6)
	27.9	37.9	39.1	34.3	19.7
	(24.1,32.2)	(33.5,43.0)	(34.4,44.4)	(29.6,39.6)	(18.6,20.9)
	46.6	42.5	48.9	42.0	28.1
	(41.0,53.0)	(37.2,48.6)	(43.1,55.5)	(36.3,48.6)	(26.6,29.7)
	49.1	52.2	45.3	41.1	31.4
	(44.1,54.7)	(47.2,57.7)	(40.8,50.5)	(36.5,46.2)	(30.0,32.9)
	27.1	32.1	33.2	32.5	18.7
	(25.6,28.6)	(30.6,33.7)	(31.6,34.9)	(30.7,34.3)	(18.3,19.1)
	5.0	3.0	2.6	1.8	3.7
	(4.0,6.3)	(2.5,3.6)	(2.1,3.1)	(1.4,2.2)	(3.4,4.0)

Source: Reproduced from Table 6. Age-specific mortality rates by five year age group and NS-SEC classification, men aged 25-64, England and Wales, 2001-03. England and Wales, 2001-03. Social inequalities in alcohol-related adult mortality by National Statistics Socio-economic Classification, England and Wales, 2001-03. Siegler V, Al-Hamad A, Johnson B, Wells C. (Office for National Statistics) and Nick Sheron (Southampton University). Health Statistics Quarterly 50 Summer 2011. 2011, p. 18. ([http://www.ons.gov.uk/ons/dcp19975\\_225351.xml](http://www.ons.gov.uk/ons/dcp19975_225351.xml))

© Crown Copyright 2009. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Table D.6.** Age-specific mortality rates<sup>1,2,3</sup> from alcohol related causes of death by five year age group and NS-SEC classification, women aged 25-59, England & Wales, 2001-03 (rate per 100,000)

NS-SEC Analytic Classes		Age (years)		
		25-29	30-34	35-39
1	Higher managerial & professional	0.7 (0.3,1.7)	0.7 (0.4,1.5)	2.0 (1.3,3.0)
1.1	Large employers & higher managerial	(:)	1.0 (0.4,2.3)	1.8 (1.0,3.3)
1.2	Higher professional	0.7 (0.2,2.2)	(:)	2.2 (1.2,3.8)
2	Lower managerial & professional	0.2 (0.1,0.7)	1.2 (0.8,1.9)	2.8 (2.2,3.7)
3	Intermediate	0.7 (0.3,1.5)	2.2 (1.4,3.4)	5.5 (4.2,7.3)
4	Small employers & own account workers	(:)	1.1 (0.4,3.0)	4.1 (2.6,6.5)
5	Lower supervisory & technical	2.0 (0.9,4.4)	2.7 (1.5,4.9)	7.1 (5.0,10.0)
6	Semi-routine	2.7 (1.7,4.2)	5.2 (3.9,7.1)	7.5 (5.9,9.7)
7	Routine	1.0 (0.4,2.8)	6.2 (4.3,9.1)	13.6 (10.5,17.6)
	All classes	1.0 (0.7,1.3)	2.3 (2.0,2.8)	4.9 (4.3,5.4)
	Ratio 7:1	1.5 (0.4,5.7)	8.7 (3.9,19.4)	6.8 (4.2,11.1)

1. 95 per cent confidence intervals shown in parenthesis.

2. Rates were not calculated where there were fewer than 3 deaths in a cell, denoted by (:)

3. Rates calculated from fewer than 20 deaths are shown in italics.



40-44	45-49	50-54	55-59	25-59
3.2	6.5	7.1	8.1	3.7
(2.2,4.4)	(5.0,8.4)	(5.5,9.2)	(6.2,10.6)	(3.3,4.3)
3.2	7.3	7.4	7.4	3.9
(2.0,5.1)	(5.2,10.2)	(5.2,10.5)	(4.9,11.1)	(3.2,4.6)
3.1	5.6	6.9	8.7	3.6
(1.9,5.1)	(3.8,8.4)	(4.8,10.0)	(6.1,12.5)	(3.0,4.3)
7.0	9.7	12.8	12.3	6.3
(5.8,8.4)	(8.2,11.3)	(11.2,14.8)	(10.6,14.4)	(5.8,6.8)
9.5	13.3	14.5	12.2	7.8
(7.6,12.0)	(10.8,16.4)	(12.0,17.6)	(9.9,15.1)	(7.1,8.6)
8.6	13.6	14.2	17.1	9.8
(6.4,11.8)	(10.6,17.5)	(11.3,17.8)	(13.9,21.1)	(8.7,11.0)
11.3	18.5	22.5	24.2	13.0
(8.6,15.0)	(14.7,23.3)	(18.4,27.4)	(20.0,29.3)	(11.8,14.4)
15.8	21.7	22.1	20.1	13.2
(13.2,19.0)	(18.3,25.7)	(18.9,26.0)	(17.1,23.6)	(12.2,14.3)
27.4	42.0	38.2	29.5	21.7
(22.6,33.4)	(35.4,49.7)	(32.3,45.2)	(24.6,35.3)	(20.0,23.6)
9.6	14.3	16.1	16.0	8.9
(8.8,10.5)	(13.2,15.4)	(15.1,17.3)	(14.9,17.2)	(8.6,9.3)
8.7	6.5	5.4	3.6	5.8
(5.9,12.9)	(4.8,8.8)	(3.9,7.3)	(2.6,5.0)	(5.0,6.7)

Source: Reproduced from Table 6. Age-specific mortality rates by five year age group and NS-SEC classification, men aged 25-64, England and Wales, 2001-03. England and Wales, 2001-03. Social inequalities in alcohol-related adult mortality by National Statistics Socio-economic Classification, England and Wales, 2001-03. Siegler V, Al-Hamad A, Johnson B, Wells C. (Office for National Statistics) and Nick Sheron (Southampton University). Health Statistics Quarterly 50 Summer 2011. 2011, p. 18. ([http://www.ons.gov.uk/ons/dcp19975\\_225351.xml](http://www.ons.gov.uk/ons/dcp19975_225351.xml))

© Crown Copyright 2009. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Table D.7.** Average weekly alcohol consumption (units), by gender and socio-economic class based on the current or last job of the household reference person. Great Britain, Persons aged 16 & over (2009<sup>1</sup>)

Socio-economic classification of household reference person <sup>2</sup>	Men		Women		Total	
<i>Managerial &amp; professional</i>						
Large employers & higher managerial	19.9	} 17.5	11.7	} 9.7	15.7	} 13.5
Higher professional	17.3		9.8			
Lower managerial & professional	17.0		9.2			
<i>Intermediate</i>						
Intermediate	15.0	} 15.8	6.8	} 7.8	9.8	} 11.4
Small employers & own account	16.3		9.1			
<i>Routine &amp; manual</i>						
Lower supervisory & technical	15.4	} 15.4	7.1	} 6.6	11.4	} 10.7
Semi-routine	14.9		6.7			
Routine	15.9		6.1			
<b>Total<sup>2</sup></b>	<b>16.3</b>		<b>8.0</b>		<b>11.9</b>	
<i>Weighted bases (000s) = 100%</i>						
Large employers & higher managerial	1,276		1,332		2,608	
Higher professional	2,084		1,787		3,871	
Lower managerial & professional	4,927		5,664		10,591	
Intermediate	1,289		2,177		3,466	
Small employers & own account	1,890		1,849		3,740	
Lower supervisory & technical	2,462		2,296		4,758	
Semi-routine	2,235		3,211		5,447	
Routine	2,130		2,382		4,512	
<b>Total<sup>2</sup></b>	<b>19,505</b>		<b>22,242</b>		<b>41,747</b>	
<i>Unweighted sample</i>						
Large employers & higher managerial	420		440		860	
Higher professional	630		590		1,220	
Lower managerial & professional	1,560		1,870		3,440	
Intermediate	400		710		1,100	
Small employers & own account	600		600		1,210	
Lower supervisory & technical	790		750		1,550	
Semi-routine	690		1,040		1,720	
Routine	690		790		1,480	
<b>Total<sup>2</sup></b>	<b>6,130</b>		<b>7,280</b>		<b>13,410</b>	

1 Results for 2009 include longitudinal data

2 Full-time students, members of the Armed Forces, the long-term unemployed and those who have never worked are not shown as separate categories but are included in the totals

Source: Reproduced from Table 2.6. Average weekly alcohol consumption (units), by sex and socio-economic class based on the current or last job of the household reference person. Smoking and drinking among adults, 2009. A report on the 2009 General lifestyle Survey. Robinson S, and Harris H. Dunstan S. (ed.). Office for National Statistics. 2011, p.65. (<http://www.ons.gov.uk/ons/rel/ghs/general-lifestyle-survey/2009-report/smoking-and-drinking-among-adults--2009.pdf>)

© Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

For table D.8.

1 Results for 2009 include longitudinal data

2 Full-time students, members of the Armed Forces, the long-term unemployed and those who have never worked are not shown as separate categories but are included in the totals

Source: Reproduced from Table 2.13. Drinking last week, by sex, and socio-economic classification based on the current or last job of the household reference person. Smoking and drinking among adults, 2009. A report on the 2009 General lifestyle Survey. Robinson S, and Harris H. Dunstan S. (ed.). Office for National Statistics. 2011, p.71.

URL: <http://www.ons.gov.uk/ons/rel/ghs/general-lifestyle-survey/2009-report/smoking-and-drinking-among-adults--2009.pdf>

© Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

**Table D.8.** Drinking last week, by gender, and socio-economic classification based on the current or last job of the household reference person. Great Britain, Persons aged 16 & over (2009<sup>1</sup>)

Socio-economic classification of household reference person <sup>2</sup>	Men		Women		Total		
<i>Percentage who drank last week</i>							
<i>Managerial &amp; professional</i>							
Large employers & higher managerial	87	}		73	}	80	
Higher professional	77		77	69		65	74
Lower managerial & professional	75			62			68
<i>Intermediate</i>							
Intermediate	69	}	67	52	}	58	
Small employers & own account	66			57			62
<i>Routine &amp; manual</i>							
Lower supervisory & technical	62	}		49	}	56	
Semi-routine	56		59	45		44	50
Routine	60			37			48
<b>Total<sup>2</sup></b>	<b>68</b>			<b>54</b>		<b>61</b>	
<i>Percentage who drank on 5 or more days last week</i>							
<i>Managerial &amp; professional</i>							
Large employers & higher managerial	29	}		15	}	22	
Higher professional	24		23	16		14	20
Lower managerial & professional	20			13			16
<i>Intermediate</i>							
Intermediate	17	}	19	9	}	12	
Small employers & own account	21			12			16
<i>Routine &amp; manual</i>							
Lower supervisory & technical	17	}		8	}	13	
Semi-routine	11		14	6		7	8
Routine	13			7			10
<b>Total<sup>2</sup></b>	<b>18</b>			<b>10</b>		<b>14</b>	
<i>Weighted bases (000s) = 100%</i>							
Large employers & higher managerial	1,280			1,332		2,612	
Higher professional	2,087			1,787		3,874	
Lower managerial & professional	4,981			5,678		10,659	
Intermediate	1,289			2,181		3,471	
Small employers & own account	1,898			1,854		3,752	
Lower supervisory & technical	2,467			2,301		4,768	
Semi-routine	2,243			3,209		5,452	
Routine	2,137			2,381		4,518	
<b>Total<sup>2</sup></b>	<b>18,953</b>			<b>21,431</b>		<b>40,384</b>	
<i>Unweighted sample</i>							
Large employers & higher managerial	420			440		860	
Higher professional	630			590		1,220	
Lower managerial & professional	1,580			1,880		3,450	
Intermediate	400			710		1,100	
Small employers & own account	600			610		1,210	
Lower supervisory & technical	790			750		1,550	
Semi-routine	690			1,040		1,730	
Routine	690			790		1,480	
<b>Total<sup>2</sup></b>	<b>5,970</b>			<b>7,040</b>		<b>13,010</b>	

**Table D.9.** Maximum number of units drunk on any one day last week, by gender and socio-economic classification based on the current or last job of the household reference person. Great Britain, Persons aged 16 & over (2009<sup>1</sup>)

1 Results for 2009 include longitudinal data

2 Full-time students, members of the Armed Forces, the long-term unemployed and those who have never worked are not shown as separate categories but are included in the totals

3 The first of each pair of figures shown relates to men, and the second, to women.

Source: Reproduced from Table 2.14. Maximum number of units drunk on any one day last week, by sex and socio-economic classification based on the current or last job of the household reference person. *Smoking and drinking among adults, 2009. A report on the 2009 General Lifestyle Survey.* Robinson S, and Harris H. Dunstan S. (ed.). Office for National Statistics. 2011, p.72. (<http://www.ons.gov.uk/ons/rel/ghs/general-lifestyle-survey/2009-report/smoking-and-drinking-among-adults--2009.pdf>)

© Crown Copyright 2011. This information is licensed under the terms of the Open Government License v1.0 (<http://www.nationalarchives.gov.uk/doc/open-government-licence/open-government-licence.htm>)

Socio-economic classification of household reference person <sup>2</sup>							
	Men		Women		Total		
<i>Percentage who drank more than 4/3 units on at least one day last week<sup>3</sup></i>							
<i>Managerial &amp; professional</i>							
Large employers & higher managerial	49	}		44	}	46	
Higher professional	40		41	39		35	39
Lower managerial & professional	39			32			35
<i>Intermediate</i>							
Intermediate	35	}	36	24	}	28	
Small employers & own account	37			32			35
<i>Routine &amp; manual</i>							
Lower supervisory & technical	35	}		28	}	32	
Semi-routine	32		34	22		23	26
Routine	35			20			27
<b>Total<sup>2</sup></b>	<b>37</b>			<b>29</b>		<b>33</b>	
<i>Percentage who drank more than 8/6 units on at least one day last week<sup>3</sup></i>							
<i>Managerial &amp; professional</i>							
Large employers & higher managerial	25	}		18	}	21	
Higher professional	23		23	18		15	21
Lower managerial & professional	22			14			18
<i>Intermediate</i>							
Intermediate	21	}	20	12	}	15	
Small employers & own account	19			12			16
<i>Routine &amp; manual</i>							
Lower supervisory & technical	18	}		13	}	16	
Semi-routine	19		19	11		11	14
Routine	19			9			14
<b>Total<sup>2</sup></b>	<b>20</b>			<b>13</b>		<b>16</b>	
<i>Weighted bases (000s) = 100%</i>							
Large employers & higher managerial	1,280			1,332		2,612	
Higher professional	2,085			1,787		3,872	
Lower managerial & professional	4,985			5,675		10,660	
Intermediate	1,289			2,177		3,466	
Small employers & own account	1,903			1,857		3,760	
Lower supervisory & technical	2,469			2,301		4,770	
Semi-routine	2,241			3,203		5,444	
Routine	2,132			2,385		4,517	
<b>Total<sup>2</sup></b>	<b>18,956</b>			<b>21,423</b>		<b>40,379</b>	
<i>Unweighted sample</i>							
Large employers & higher managerial	420			440		860	
Higher professional	630			590		1,220	
Lower managerial & professional	1,580			1,880		3,450	
Intermediate	400			710		1,100	
Small employers & own account	610			610		1,210	
Lower supervisory & technical	800			750		1,550	
Semi-routine	690			1,040		1,720	
Routine	690			790		1,480	
<b>Total<sup>2</sup></b>	<b>5,970</b>			<b>7,040</b>		<b>13,010</b>	

## Bibliography

1. Armstrong, G.L., Conn, L.A. and Pinner, R.W. (1999). Trends in Infectious Diseases Mortality in the United States during the 20th Century. *J. Amer. Med. Assoc.*; 281(1):61-66 (<http://jama.ama-assn.org/content/281/1/61.long>)
2. Swinburn B.A., Sacks G., Hall K.D., McPherson K., Finegood D.T., Moodie M.L., Gortmaker S.L. (2011). The global obesity pandemic: Shapes by global drivers and local environments. *Lancet* 2011;378:804–14. Summary: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(11\)60813-1/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(11)60813-1/fulltext)
3. Boyle S. (2011). United Kingdom (England): Health system review. *Systems in Transition*; 13(1)1: p.226. Published by the World Health Organization on behalf of the European Observatory on Health Systems and Policies. ([http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0004/135148/e94836.pdf](http://www.euro.who.int/__data/assets/pdf_file/0004/135148/e94836.pdf))
4. Bridgwood A., Lilly R., Thomas M., Bacon J., Sykes W., Morris S. *Living in Britain. 2000. Results from the 1998 General Household Survey.* Office for National Statistics Social Survey Division.
5. Butland B., Jebb S., Kopelman P., McPherson K., Thomas S., et al. (2007). Tackling obesity: future choices - Project report: ([http://www.foresight.gov.uk/Obesity/Obesity\\_final/Index.html](http://www.foresight.gov.uk/Obesity/Obesity_final/Index.html))
6. Butland B., Jebb S., Kopelman P., McPherson K., Thomas S., Mardell J., Parry V. (2007) Tackling obesity: future choices - Project report. 2nd edition. (<http://www.bis.gov.uk/assets/bispartners/foresight/docs/obesity/17.pdf>)
7. Chiatti, C., Di Rosa, M., Barbadoro, P., Lamura, G., Di Stanislao, F. and Prospero, E. (2010) Socioeconomic determinants of influenza vaccination among adults in Italy. *Preventive Medicine*; 51(3-4):332-333. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed?term=chiatti%20di%20rosa%20>
8. Continuous Mortality Investigation (2009). CMI Working Paper 38. A prototype mortality projections model: Part one – an outline of the proposed approach. Institute of Actuaries and Faculty of Actuaries. (<http://www.actuaries.org.uk/sites/all/files/documents/pdf/mpmwp-workingpaper38final.pdf>)
9. Continuous Mortality Investigation (2009). CMI Working Paper 39. A prototype mortality projections model: Part two –Detailed analysis. Institute of Actuaries and Faculty of Actuaries. (<http://www.actuaries.org.uk/sites/all/files/documents/pdf/mpmwp-workingpaper39-final.pdf>)
10. Cuthbertson S.A., Goyder E.C., and Poole J. Inequalities in breast cancer stage at diagnosis in the Trent region, and implications for the NHS Breast Cancer Screening Programme. *Journal of Public Health*;31(3):398-405. (<http://pubhealth.oxfordjournals.org/content/31/3/398.full.pdf+html>)
11. Damiani, G., Frederico, B., Visca, M., Agostini, F. and Ricciardi, W. (2007). The impact of socioeconomic level on influenza vaccination among Italian adults and elderly: a cross-sectional study. *Preventive medicine*; 45(5): 373-379. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed?term=damiani%20frederico%20visca>
12. Davey Smith G, Hart C, Hole D, MacKinnon P, Gillis C, Watt G, Blane D, Hawthorne V. (1998). Education and occupational social class: Which is the more important indicator of mortality risk? *J Epidemiol Community Health*; 52:153-60. (<http://jech.bmj.com/content/52/3/153.full.pdf>)
13. Department of Health (2010). Healthy lives, healthy people: Our strategy for public health in England. Department of Health. ([http://www.dh.gov.uk/prod\\_consum\\_dh/groups/dh\\_digitalassets/documents/digitalasset/dh\\_127424.pdf](http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_127424.pdf))
14. Doll R, Peto R, Boreham J, Sutherland I. (2004). Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ*, doi:10.1136/bmj.38142.554479. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC437139/pdf/bmj32801519.pdf>)
15. Downing A, Prakash K, Gilthorpe MS, Mikeljevic JS, Forman D. (2007). Socioeconomic background in relation to stage at diagnosis, treatment and survival in women with breast cancer. *B J Cancer*; 96:836-40. (<http://www.nature.com/bjc/journal/v96/n5/pdf/6603622a.pdf>)
16. Harrison, D.E., Strong R., Sharp Z.D., Nelson J.F., C.M. Astle et al. (2009). Rapamycin fed late in life extends lifespan in genetically heterogeneous mice. *Nature*, 460, 392-395. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2786175/pdf/nihms127666.pdf>)
17. House of Commons Health Committee (2009). Third report of Session 2008-09. Health inequalities. House of Commons. HC 286 (Cm 7621). (<http://www.publications.parliament.uk/pa/cm200809/cmselect/cmhealth/286/28602.htm>)
18. Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). ([www.mortality.org](http://www.mortality.org) or [www.humanmortality.de](http://www.humanmortality.de))

19. Janssen F, Kunst A, Mackenbach J. (2007). Variations in the pace of old-age mortality decline in seven European countries, 1950-1999: The role of smoking and other factors earlier in life. *Eur J Population* 23(2):171-88. Abstract: <http://www.springerlink.com/content/j787pm6313h36444/>
20. Johnson B. (2011). Deriving trends in life expectancy by the National Statistics Socio-economic Classification using the ONS Longitudinal Study. HSQ 49. Spring 2011:9-52. (<http://www.statistics.gov.uk/hsq/downloads/hsq49.pdf>)
21. Jepson RG, Harris FM, Platt S, Tannahill C. The effectiveness of interventions to change six health behaviours: A review of reviews. 2010. *BMC Public Health*; 10:538. (<http://www.biomedcentral.com/content/pdf/1471-2458-10-538.pdf>)
22. Langford A. and Johnson B. (2010). Trends in social inequalities in male mortality, 2001-08. Intercensal estimates for England and Wales. HSQ 47. Autumn 2010:5-32. (<http://www.statistics.gov.uk/hsq/downloads/hsq47.pdf>)
23. Logan, J.L. (2009). Disparities in influenza immunisation among US adults. *J Natl Med Assoc.*; 101(2): 161-166. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed/19378634>
24. Mamelund S.E. (2006). A socially neutral disease? Individual social class, household wealth and mortality from Spanish influenza in two socially contrasting parishes in Kristiania 1918-1919. *Social Science and Medicine*, 60(4): 923-940. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed?term=mamelund%20social%20class%20household%20wealth%20>
25. Marmot M., and Wilkinson R.G. (eds) (2006). *Social determinants of health*. 2nd Edition. Oxford University Press.
26. McBride D., Hardoon S., Walters K., Gilmour S., and Raine R. (2010). Explaining variation in referral from primary to secondary care: Cohort study. *BMJ* 2010; 341:c6267 doi: 10.1136/bmj.c6267. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2995017/pdf/bmj.c6267.pdf>)
27. McCay C.M., Crowell M.F., Maynard L.A. (1935). The effect of retarded growth upon the length of life span and upon the ultimate body size. *The J. Nutr.*;63-79. (<http://jn.nutrition.org/content/10/1/63.full.pdf>)
28. McPherson K, Marsh T, Brown M (2007). *Tackling obesity: future choices—modelling future trends in obesity and their impact on health*. 2nd Edition. Foresight programme of the Government Office of the Chief Scientist (<http://www.bis.gov.uk/assets/bispartners/foresight/docs/obesity/14.pdf>)
29. Meara ER, Richards S, and Cutler DM. (2008). The gap gets bigger: Changes in mortality and life expectancy, by education, 1981-2000. *Health Affairs*; 27(2):350-60. (<http://content.healthaffairs.org/content/27/2/350.full.pdf>)
30. Morris S, Sutton M, Gravelle H. (2003). *Inequity and inequality in the use of health care in England: An empirical investigation*. CHE Technical Paper Series 27. Centre for Health Economics. The University of York. (<http://www.york.ac.uk/che/pdf/tp27.pdf>)
31. National Audit Office (2001). *Tackling obesity in England*. Report by the Comptroller and Auditor General. HC 220 Session 2000-2001: 15 February 2001. National Audit Office. ([http://www.nao.org.uk/publications/0001/tackling\\_obesity\\_in\\_england.aspx](http://www.nao.org.uk/publications/0001/tackling_obesity_in_england.aspx))
32. National Equality Panel (2010). *An anatomy of economic inequality in the UK: Report of the National Equality Panel*. (<http://sticerd.lse.ac.uk/dps/case/cr/CASereport60.pdf>)
33. National Equality Panel (2010). *Report of the National Equality Panel: Executive summary*. ([http://sticerd.lse.ac.uk/dps/case/cr/CASereport60\\_executive\\_summary.pdf](http://sticerd.lse.ac.uk/dps/case/cr/CASereport60_executive_summary.pdf))
34. National Equality Panel (2010). *An anatomy of economic inequality in the UK – Summary*. Report of the National Equality Panel. ([http://sticerd.lse.ac.uk/dps/case/cr/CASereport60\\_summary.pdf](http://sticerd.lse.ac.uk/dps/case/cr/CASereport60_summary.pdf))
35. NHS Choices. *Learning linked to slower ageing*. (<http://www.nhs.uk/news/2011/05may/pages/education-slows-ageing-telomeres.aspx>). Accessed 24 August 2011.
36. Office for National Statistics (2010). *Standard Occupational Classification 2010. Volume 3. The National Statistics Socio-economic Classification: (Rebased on the SOC2010) User Manual*. (<http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc2010/soc2010-volume-3-ns-sec--rebased-on-soc2010--user-manual/index.html#12>)
37. Office for National Statistics (2011). *Statistical Bulletin. Trends in life expectancy by the National Statistics Socio-economic Classification 1982-2006*. (<http://www.ons.gov.uk/ons/rel/hsq/health-statistics-quarterly/trends-in-life-expectancy-by-the-national-statistics-socio-economic-classification-1982-2006/index.html>)
38. Pasdika S. and Wolff J. (2005). *Coping with longevity: The new German Annuity Valuation Table DAV 2004R*. Presented to The Living to 100 and Beyond Symposium. Sponsored by the Society of Actuaries. January 12-14, 2005. Orlando, Florida. Society of Actuaries. (<http://www.soa.org/library/monographs/retirement-systems/living-to-100-and-beyond/2005/january/m-li05-1-xvi.pdf>)
39. Partridge, L. (2010). The new biology of ageing. *Proc. Trans. R. Soc. B*, 365, 147-154. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2842712/pdf/rstb20090222.pdf>)



40. Power E., Miles A., von Wagner C., Robb K., and Wardle J. (2009). Uptake of colorectal cancer screening: system, provider and individual factors and strategies to improve participation. *Future Oncology*; 5(9):17371-88. Summary: [http://www.futuremedicine.com/doi/abs/10.2217/fon.09.134?url\\_ver=Z39.88-2003&rft\\_id=ori:rid:crossref.org&rft\\_dat=cr\\_pub%3dpubmed](http://www.futuremedicine.com/doi/abs/10.2217/fon.09.134?url_ver=Z39.88-2003&rft_id=ori:rid:crossref.org&rft_dat=cr_pub%3dpubmed)
41. Prospective Studies Collaboration, Whitlock G., Lewington S., Sherliker P., Calrke R., Emberson J., Halsey J., Qizibash N., Collins R., Peto R. (2009). Body-mass index and cause-specific mortality in 900000 adults: Collaborative analyses of 57 prospective studies. *The Lancet*; 373(9669):1083-96. Summary: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(09\)60318-4/fulltext#article\\_upsell](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)60318-4/fulltext#article_upsell)
42. Raine R., Wong W., Ambler G., Hardoon S., Petersen I., Morris R., Bartley M. and Blane D. (2009). Sociodemographic variations in the contribution of secondary drug prevention to stroke survival at middle and older ages: Cohort study. *BMJ* 2009;338:b1279. doi:10.1136/bmj.b1279. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2669853/pdf/bmj.b1279.pdf>)
43. Raine R., Wong W., Scholes S., Ashton C., Obichere A., Ambler G. (2010). Social variations in access to hospital care for patients with colorectal, breast, and lung cancer between 1999 and 2006: Retrospective analysis of hospital episode statistics. *BMJ* 340:b5479. (<http://www.bmj.com/content/340/bmj.b5479.long>)
44. Richards SJ, and Currie ID. (2009). Longevity risk and annuity pricing with the Lee-Carter model. Presented to the Faculty of Actuaries, 16 February 2009. (<http://www.actuaries.org.uk/research-and-resources/documents/longevity-risk-and-annuity-pricing-lee-carter-model>)
45. Robinson S, Harris H. (2011). Smoking and drinking among adults, 2009. A report on the 2009 General Lifestyle Survey. Office for National Statistics. ([http://www.statistics.gov.uk/downloads/theme\\_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf](http://www.statistics.gov.uk/downloads/theme_compendia/GLF09/GLFSmoking-DrinkingAmongAdults2009.pdf))
46. Rostron B.L., Wilmoth J.R. (2011). Estimating the effect of smoking on slowdowns in mortality declines in developed countries. *Demography* 48:461-79. URL (Abstract): (<http://www.springerlink.com/content/9w340766w57g5k73/>)
47. Siegler V., Al-Hamad A., Johnson B., Wells B. (2011). Social inequalities in alcohol-related adult mortality by National Statistics Socio-economic Classification, England & Wales 2001-03. *Health Statistics Quarterly* 50, Summer 2011, pp. 4-39. Office for National Statistics. (<http://www.statistics.gov.uk/hsq/downloads/hsq24.pdf>)
48. Steele R.J., Kostourou I., McClements P., Watling C., Libby G., Weller D., Brewster D.H., Black R., Carey F.A., Fraser C. (2010). Effect of gender, age and deprivation on key performance indicators in a FOBT-based colorectal screening programme. *J Med Screen*; 17(2):68-74. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed/20660434>
49. Steptoe A., Hamer M., Butcher L., Lin J., Brydon L., Kivimaki M., Marmot M., Blackburn E., Erusalimsky J.D. (2011). Educational attainment but not measures of current socioeconomic circumstances are associated with leukocyte telomere length in healthy older man and women. *Brain Behav Immun*. (<http://www.ncbi.nlm.nih.gov/pubmed/21536122>)
50. Strand B.H., Kunst A., Huisman M., Menvielle G., Glickman M., Bopp M., Borell C., Borgan J.K., Costa G., Deboosere P., Regidor E., Valkonen T., Mackenbach J.P., EU Working Group on Socioeconomic Inequalities in Health (2007). The reversed social gradient: Higher breast cancer mortality in the higher educated compared to lower educated. A comparison of 11 European populations during the 1990s. *Eur J Cancer*; 43(7):1200-7. (<http://www.ncbi.nlm.nih.gov/pubmed/17331712>)
51. The Marmot Review (2010). Strategic Review of Health Inequalities in England post-2010. Fair Society, Healthy Lives: Full Report. (<http://www.marmotreview.org/AssetLibrary/pdfs/Reports/FairSocietyHealthyLives.pdf>)
52. The Marmot Review (2010). Strategic Review of Health Inequalities in England post-2010. Fair Society, Healthy Lives: Executive Summary. (<http://www.marmotreview.org/AssetLibrary/pdfs/Reports/FairSocietyHealthyLivesExecSummary.pdf>)
53. The Marmot Review (2011). Strategic Review of Health Inequalities in England post-2010. Fair Society, Healthy Lives. Press Release. Feb. 2011. Health inequalities – A challenge for local authorities. (<http://www.marmotreview.org/AssetLibrary/press%20releases/Marmot%20Review%201%20Year%20On%20Press%20Release%20FINAL%20COPY%20090211.doc>)
54. The Marmot Review. Fair Society, Healthy Lives. Key Messages. (<http://www.marmotreview.org/english-review-of-hi/key-messages.aspx>). Accessed 20 October 2011.
55. The NHS Information Centre, Lifestyles Statistics (2011). Statistics on alcohol: England, 2011. The Health and Social Care Information Centre. ([http://www.ic.nhs.uk/webfiles/publications/003\\_Health\\_Lifestyles/Alcohol\\_2011/NHSIC\\_Statistics\\_on\\_Alcohol\\_England\\_2011.pdf](http://www.ic.nhs.uk/webfiles/publications/003_Health_Lifestyles/Alcohol_2011/NHSIC_Statistics_on_Alcohol_England_2011.pdf))

56. The NHS Information Centre, Lifestyles Statistics (2010). Statistics on obesity, physical activity and diet: England, 2010. The Health and Social Care Information Centre. ([http://www.ic.nhs.uk/webfiles/publications/opad10/Statistics\\_on\\_Obesity\\_Physical\\_Activity\\_and\\_Diet\\_England\\_2010.pdf](http://www.ic.nhs.uk/webfiles/publications/opad10/Statistics_on_Obesity_Physical_Activity_and_Diet_England_2010.pdf))
57. The UK CRC Screening Pilot Evaluation Team (2003). Evaluation of the UK colorectal cancer screening pilot. Final report (February 2003, revised May 2003). (<http://www.cancerscreening.nhs.uk/bowel/finalreport.pdf>)
58. United Nations General Assembly (2011). Prevention and control of non-communicable diseases. Report of the Secretary-General. Sixty-sixth session. Item 119 of the preliminary list. Follow-up to the outcome of the Millennium Summit. ([http://www.un.org/ga/search/view\\_doc.asp?symbol=A/66/83&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=A/66/83&Lang=E))
59. Von Wagner C., Baio G., Raine R., Snowball J., Morris S., Atkin W., Obichere A., Handley G., Logan R.F., Rainbow S., Smith S., Halloran S., Wardle J. (2011). Inequalities in participation in an organized national colorectal cancer screening programme: Results for the first 2.6 million invitations in England. *Int J Epidemiol*. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed/21330344>
60. Wang Y.C., McPherson K., Marsh T., Gortmaker S.L., Brown M. (2011). Health and economic burden of the projected obesity trends in the USA and the UK. *Lancet*;378:815–25. Abstract: <http://www.ncbi.nlm.nih.gov/pubmed?term=wang%20mcpherson%20marsh%20gortmaker>
61. Wanless D. (2004). Securing good health for the whole population. Final Report. HM Treasury. ([http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/consult\\_wanless04\\_final.htm](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/consult_wanless04_final.htm))
62. Wardle J., Rapoport A., Miles T., Afuape T., and Duman M. (2001). Mass education for obesity prevention: The penetration of the BBC's 'Fighting Fat, Fighting Fit' campaign. *Health Education Research*; 16(3):343. (<http://www.ncbi.nlm.nih.gov/pubmed?term=wang%20mcpherson%20marsh%20gortmaker>)
63. Weller D., Coleman D., Robertson R., Butler P., Melia J., Campbell C., Parker R., Patnick J., Moss S. (2007). The UK colorectal cancer screening pilot: Results of the second round of screening in England. 2007. *British Journal of Cancer*; 97:1601-1605. (<http://www.nature.com/bjc/journal/v97/n12/pdf/6604089a.pdf>)
64. Weller D., Moss D., Butler P., Campbell C., Coleman D., Melia J., Robertson R. (2006). English pilot of bowel cancer screening: An evaluation of the second round. Final Report to the Department of Health. February 2006 (Revised August 2006). (<http://www.cancerscreening.nhs.uk/bowel/pilot-2nd-round-evaluation.pdf>)
65. Willems S., De Maesschalck S., Deveugele M., Derese A., and De Maeseneer J. (2005). Socio-economic status of the patient and doctor-patient communication: Does it make a difference? *Patient Education and Counselling*; 56:139-146. Abstract: [http://www.pec-journal.com/article/S0738-3991\(04\)00099-0/abstract](http://www.pec-journal.com/article/S0738-3991(04)00099-0/abstract)
66. Wilkinson R., and Marmot M. (eds) (2003). *The solid facts* (2nd edn). World Health Organization, Copenhagen. ([http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0005/98438/e81384.pdf](http://www.euro.who.int/__data/assets/pdf_file/0005/98438/e81384.pdf))
67. World Health Organization Regional Office for Europe. Data from European Health for All Databases (HFA-DB). Updated July 2011. (<http://www.euro.who.int/hfadb>)
- 

**This publication was prepared by:**

Sir Derek Wanless, *Chair*

Sir John Pattison

Klim McPherson

Steven Haberman

Colin Blakemore

**Other Contributors:**

Wun Wong

Joseph Lu

## Longevity Science Advisory Panel Membership

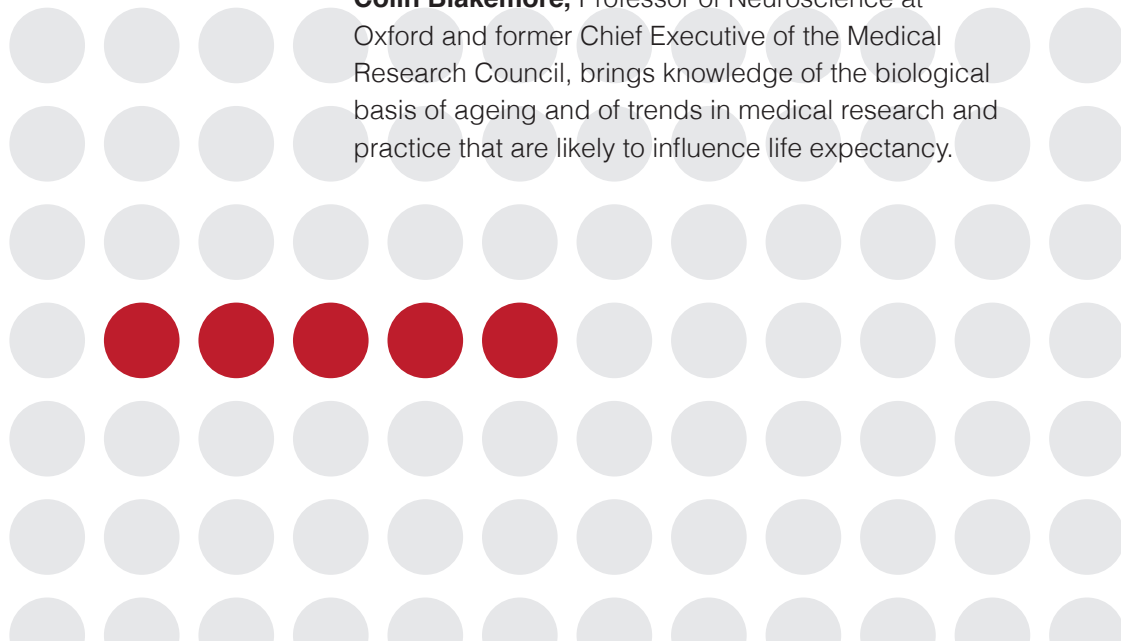
**Sir Derek Wanless**, chair of the Longevity Science Advisory Panel has advised governments and companies on a wide range of issues, but more recently has led various reviews on the long-term trends affecting the health and social care services in the UK.

**Sir John Pattison**, formerly Director of Research and Development at the Department of Health in England, who is well placed to assess the health services' ability to deliver the changes emerging from health research findings.

**Klim McPherson**, a public health academic at Oxford who is recognised for his work on obesity and the wide ranging detrimental effect this has on the health of the population and particular sub-groups.

**Steven Haberman**, an academic actuary, based at Cass Business School experienced in statistical modeling and mortality research with the expertise to consider how to convert the findings of scientific research into a format for actuarial analysis.

**Colin Blakemore**, Professor of Neuroscience at Oxford and former Chief Executive of the Medical Research Council, brings knowledge of the biological basis of ageing and of trends in medical research and practice that are likely to influence life expectancy.



## **Disclaimer**

The opinions expressed in this publication are those of the authors. The material is for general information only and does not constitute investment, tax, legal or any other form of advice. You should not rely on this information to make (or refrain from making) any decisions. You should always obtain independent, professional advice for your own particular situation. The authors offer no guarantee for the completeness or veracity of the contents of this publication. The statements in this publication may provide expectations of past, current and future events based upon certain assumptions. These statements involve known and unknown risks, uncertainties and other factors which are not exhaustive. The authors of this publication undertake no obligation to publicly revise or update any statements, whether as a result of new information, future events or otherwise. To the fullest extent permitted by law, neither the authors nor their affiliates shall be liable for any direct or consequential loss occasioned to any person acting, omitting to act or refraining from acting in reliance upon the information detailed in this publication. Consequential loss means any loss of anticipated profits, damage, expenses payable to any third party or any other indirect losses.

Visit <http://www.longevitypanel.co.uk/index.html> to download additional copies of this publication.

© 2011 Longevity Science Advisory Panel.  
All rights reserved.

