

Interim 2003-based national population projections for the United Kingdom and constituent countries

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The 2003-based national population projections, carried out by the Government Actuary in consultation with the Registrars General, and using essentially the same underlying assumptions as for the previous 2002-based projections, show the population of the United Kingdom rising from 59.6 million in 2003, passing 60 million during 2005, to reach 65.7 million by 2031. Longer-term projections suggest the population will peak around 2050 at nearly 67 million and then very gradually start to fall. The population will become older with the median age expected to rise from 38.4 years in 2003 to 43.3 years by 2031. In 2003, there were around 700 thousand (six per cent) more children aged under 16, than people of state pensionable age. However, from 2007, the population of pensionable age is projected to exceed the number of children.

INTRODUCTION

The Government Actuary's Department (GAD) produces national population projections for the United Kingdom and its constituent countries at the request of the Registrars General of England & Wales, Scotland and Northern Ireland. The assumptions are agreed in consultation with the statistical offices of the four countries. Normally, a new set of projections is made every second year, based on a full-scale review of the underlying assumptions about fertility, mortality and migration. The last 'full' set of projections, published on the GAD website in December 2003, was 2002-based.¹ The next full set, scheduled for issue in October 2005, will be based on the estimated population at mid-2004.

However, following consultation with the Registrars General of England & Wales, Scotland and Northern Ireland, it was agreed that the Government Actuary should produce an additional 'interim' set of 2003-based projections. This followed the announcement in July 2004 by the Office for National Statistics (ONS) that they would be revising their estimate of the mid-2001 population of England & Wales upwards by about 60,000.² Accordingly, revised estimates for mid-2001 and mid-2002, together with estimates for mid-2003, were published on 9 September 2004.³

The interim 2003-based projections take account of these revisions. The allowance for unattributable population change in England and Wales (see below) made in the 2002-based projections has also been removed. They are designated as 'interim' projections as, aside from the allowance for unattributable population change, there has been no change to the long-term assumptions (for fertility, mortality and net migration) underlying the 2002-based projections. The principal interim

2003-based national projections were published on the GAD website on 30 September 2004 and high and low variant projections, at United Kingdom level, were published on 21 October 2004.

Population estimates for Scotland and Northern Ireland were unaffected by the above changes. However, in the interests of producing up to date results at UK level, interim 2003-based projections were produced for all countries. And some short-term changes have been made to the assumptions about fertility and migration between the countries of the UK which affect all four countries.

The main focus of these projections is on the period to 2031. However, the results of longer-term projections are included in the graphs in this article and discussed where appropriate.

Box one

SUBNATIONAL PROJECTIONS

Subnational population projections are the responsibility of the statistical offices of the individual countries. ONS published 2003-based subnational projections for England, consistent with the national projections described in this article on 25 November 2004⁴. The Welsh Assembly Government Statistical Directorate aim to publish 2003-based subnational projections in early 2005. Both the General Register Office for Scotland⁵ and the Northern Ireland Statistics and Research Agency⁶ published 2002-based subnational projections earlier in 2004.

BASE POPULATION

The projections are based on the Registrars General's estimate (published on 9 September 2004) of the resident population of the United Kingdom at mid-2003 of some 59.6 million.³ This estimate therefore also takes account of the revisions to the mid-2001 and mid-2002 populations of England and Wales also published on 9 September 2004.

Table 1

Population change 2002–2003: actual change compared with 2002-based projected change

United Kingdom

	Actual change from mid-year estimates	Projected change from 2002-based projections	Difference	
			000s	per cent
Population at mid-2001	59,322	59,229	93	0.2
Components of change (2002–2003)				
Births	682	681	0	-0.0
Deaths	605	606	-1	-0.2
Natural change	77	75	2	-
Net migration	149	150	-1	-
Other changes	7*	-27**	34	-
Total change	232	198	34	-
Population at mid-2003	59,554	59,427	126	0.2
England	49,856	49,755	101	0.2
Wales	2,938	2,925	13	0.4
Scotland	5,057	5,045	12	0.2
Northern Ireland	1,703	1,703	0	0.0

* Net movements of Armed Forces and other smaller changes

** Adjustment for unattributable population change (see main text)

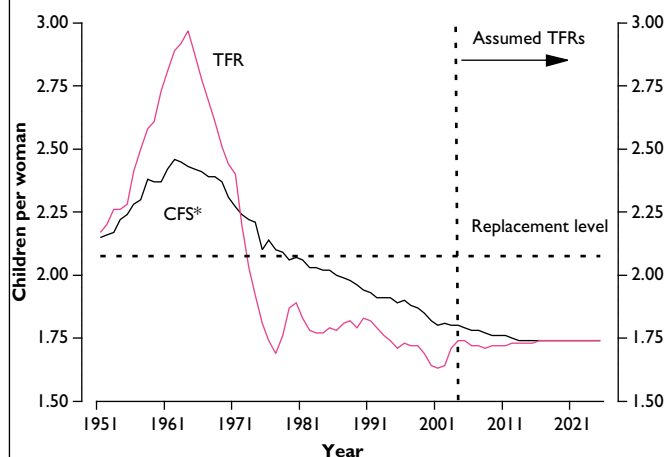
As Table 1 shows, the estimated population at mid-2003 was 126 thousand (0.2 per cent) higher than envisaged in the 2002-based projections. This was almost entirely due to subsequent upward revisions

Figure 1

Assumptions for the interim 2003-based national population projections

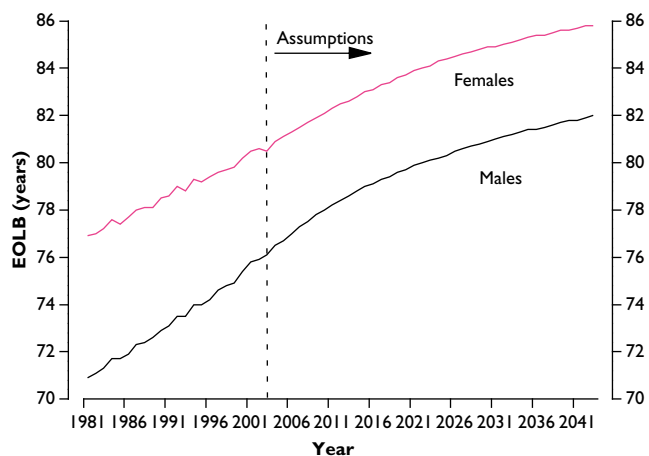
United Kingdom

(a) Total fertility rate (TFR) and average completed family size (CFS), 1951–2025

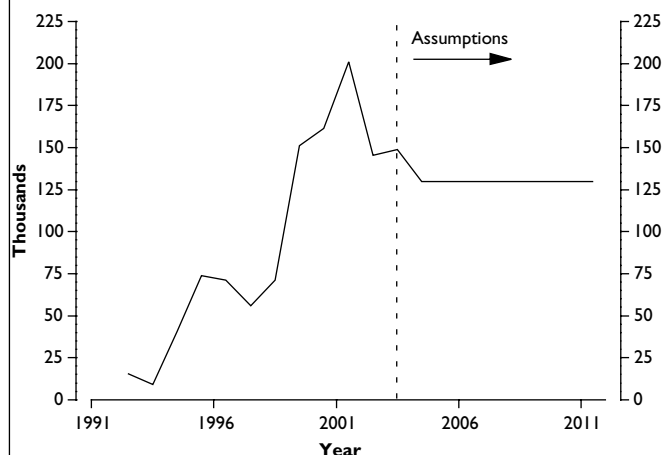


* CFS relates to cohort born 28 years earlier – 28 years being roughly the mean age at childbearing. Projected CFS is given for cohorts who have not yet completed childbearing.

(b) Expectation of life at birth, 1981–2043



(c) Total net migration, 1981–92 to 2010–11



to the original estimate of the population which had been the base for the 2002-based projections and the associated removal of the allowance for unattributable population change (see below) made in the 2002-based projections.

UNDERLYING ASSUMPTIONS

The assumptions used in the 2003-based national population projections are shown, for the United Kingdom as a whole, in Figure 1, while those for the individual countries are summarised in Table 2.

Fertility

Fertility assumptions are formulated in terms of the average number of children that women born in particular years will have. This *cohort* measure of fertility is more stable than the analogous calendar year or *period* measure (the total fertility rate), as it is affected only by changes in the total number of children women have and not by the timing of births within their lives. Period rates, in contrast, may rise or fall if births are brought forward or delayed for any reason. The assumed average completed family sizes and resultant total fertility rates (TFRs) are both shown in Figure 1a, while the TFRs for individual countries are summarised in Table 2.

The assumptions about completed family size are based on family building patterns to date and other relevant evidence. For the United Kingdom as a whole, completed family size has been falling steadily from an average of around 2.45 children for women born in the mid 1930s. The family sizes to be achieved by younger cohorts are highly conjectural, but for this projection it has been assumed that average completed family size, for the United Kingdom as a whole, will continue to decline until around the 1985 cohort and eventually level off at 1.74 children per woman.

For England, and for Wales, long-term average completed family size is assumed to be 1.75 children per woman. A higher level of 1.80 is assumed for Northern Ireland where fertility remains higher than elsewhere in the UK. In Scotland, where current fertility levels are

particularly low and differentials with the rest of the UK are now long established, a lower level of 1.60 has been assumed. These long-term assumptions are unchanged from the previous (2002-based) projections.⁷ However, some revisions have been made to the assumptions for the immediate short-term in the light of a recent increase in birth rates.⁸ As a result the total fertility rates assumed for each country from 2003–04 to 2007–08 are a little higher than in the 2002-based projections.

Mortality

Long-term mortality assumptions are also unchanged from the previous 2002-based projections⁹. It is assumed that annual rates of reduction in mortality rates, which currently vary considerably from age to age, will tend towards a common reduction at each age of 1.0 per cent a year by 2027. Thereafter, reductions are assumed to halve every twenty-five years.

For the UK as a whole, life expectancy at birth, based on the mortality rates for the given year, is assumed to rise from 76.4 years in 2003–04 to 81.0 years in 2031–32 for males, and from 80.7 years to 85.0 years for females. Assumed expectations of life to 2031–32 for the individual countries are shown in Table 2. Current mortality levels differ between the individual countries. However, the same future improvements have been assumed for all countries of the United Kingdom except that slightly smaller improvements in the period to 2027 have been assumed at some ages for males in Scotland. Therefore, the relative differences in life expectancy between the four countries are approximately maintained throughout the projection period.

The expectations of life shown in Table 2 are based on the mortality rates applying to a single year and are examples of *period* expectations of life. However, expectations of life can also be calculated on a *cohort* basis, allowing for known or projected changes in mortality rates in later years. Box two gives further information on the differences between period and cohort expectations of life.

Table 2 Summary of assumptions for individual countries

	Total fertility rate				Net annual migration (thousands)			
	2003–04	2006–07	2011–12	from 2018–19	2003–04	2004–05	2005–06	from 2006–07
England	1.76	1.73	1.74	1.75	99.5	108.0	116.0	124.0
Wales	1.72	1.73	1.74	1.75	18.5	15.0	11.5	8.0
Scotland	1.58	1.53	1.55	1.60	12.0	7.5	3.0	-1.5
N. Ireland	1.85	1.80	1.80	1.80	0.0	-0.5	-0.5	-0.5
United Kingdom	1.74	1.72	1.73	1.74	130.0	130.0	130.0	130.0

	Expectation of life at birth (years)							
	Males				Females			
	2003–04	2011–12	2021–22	2031–32	2003–04	2011–12	2021–22	2031–32
England	76.7	78.6	80.2	81.3	80.9	82.5	84.1	85.2
Wales	75.9	78.0	79.6	80.7	80.5	82.1	83.7	84.7
Scotland	74.0	76.1	77.8	78.9	79.1	80.9	82.6	83.6
N. Ireland	76.1	77.8	79.4	80.5	80.5	82.0	83.6	84.6
United Kingdom	76.4	78.3	79.9	81.0	80.7	82.4	83.9	85.0

Box two

PERIOD AND COHORT EXPECTATIONS OF LIFE

Expectations of life can be calculated in two ways: either period life expectancy or cohort life expectancy.

Period life expectancies are worked out using the age-specific mortality rates for a given period (either a single year, or a run of years), with no allowance for any later actual or projected changes in mortality.

Cohort life expectancies are worked out using age-specific mortality rates which allow for known or projected changes in mortality in later years.

For example, period life expectancy at birth in 2003 would be worked out using the mortality rate for age 0 in 2003, for age 1 in 2003, for age 2 in 2003, and so on. Cohort life expectancy at birth in 2003 would be worked out using the mortality rate for age 0 in 2003, for age 1 in 2004, for age 2 in 2005, and so on.

In most official statistics, period life expectancies are given. For past years, they provide a useful measure of mortality *actually* experienced over a given period and provide an objective means of comparing trends over time, between areas of a country and with other countries. However, they are often mistakenly interpreted by users as allowing for subsequent mortality changes. If mortality rates are projected to decrease in later years, then cohort life expectancy will be greater than period life expectancy. For many years, the national projections reference volume^{5,10} have contained analyses of cohort life expectancy and the Pensions Commission has recently recommended the use of the cohort approach in describing current and future trends in longevity¹¹.

Period and cohort life expectancies at birth and five-yearly age intervals for 2003 to 2053 for the United Kingdom and its constituent countries derived from the interim 2003-based national population projections are available from the GAD website.¹² Expectations at birth and at age 65 for the United Kingdom for the years 2003 and 2053 are shown in the summary table below.

Table A Period and cohort expectation of life

	2003		2053	
	Period	Cohort	Period	Cohort
Life expectancy at birth				
Males	76.2	83.0	82.6	84.0
Females	80.6	86.9	86.4	87.6
Life Expectancy at 65				
Males	16.3	18.7	21.3	21.8
Females	19.1	21.7	23.9	24.4

The table shows that male life expectancy at birth in 2003 was 76.2 years based on the mortality rates actually experienced in that year. However, allowing for the future improvements in mortality assumed in the 2003-based projections, a boy born in 2003 can actually expect to live for 83.0 years. For females the

corresponding period and cohort life expectancies at birth in 2003 are 80.6 years and 86.9 years respectively. For a person aged 65 in 2003, cohort life expectancy (that is, taking account of assumed future improvements in mortality above age 65) is about 2.5 years higher than period life expectancy for both sexes.

The differences between period and cohort life expectancies in fifty years' time are much smaller. This is because mortality is assumed to be improving at a slower rate in the second half of the century than it is today.

Migration

The interim 2003-based projections assume a constant annual net inflow of 130,000 persons a year into the United Kingdom. The net migration assumptions for the constituent countries of the United Kingdom are shown in Table 2. These combine assumptions regarding the distribution of international migration with assumptions about cross-border migration between the countries of the United Kingdom.

As with fertility and mortality, the long-term migration assumptions are unchanged from the 2002-based projections⁹. However, some revisions have been made to the cross-border migration assumptions for the immediate short-term. The assumptions applied for the first year of the projection (2003–04) also take account of some provisional migration data for the second half of 2003. As a result, the long-term assumption for Northern Ireland takes effect from 2004–05, while the assumptions for England, Wales and Scotland now take effect from 2006–07. Between 2003–04 and 2005–06, it is assumed that both Wales and Scotland will experience higher net inflows from England than those assumed for the long-term.

As in the previous set of projections, the migration assumptions for Scotland and Northern Ireland include an allowance for migration unmeasured in the historical migration statistics.

Other changes

The 2002-based projections for England & Wales included an annual downward adjustment of 27,000 for unattributable population change.¹³ This adjustment was included in the projections after ONS had made a similar adjustment for the original mid-2002 population estimates for England & Wales in respect of the unexplained intercensal discrepancy which had accumulated in population estimates between the 1991 and 2001 Censuses.

Following the results of local authority population studies published in July 2004,² the size of the unexplained intercensal discrepancy has reduced. ONS reviewed the need for the adjustment for unattributable population change in the light of this reduction, ONS's plans to improve the quality of population estimates and in response to comments made about the adjustment made for the mid-2002 estimates. ONS concluded from this further research that it is now not possible to demonstrate that such an adjustment will produce more reliable population estimates, either nationally or subnationally.¹⁴ Consequently, the mid-2003 and revised mid-2002 estimates published by ONS on 9 September 2004³ did not include any allowance for unattributable population change.

In the light of this decision, GAD have decided *not* to include any allowance for unattributable population change in the interim 2003-based national population projections.

Table 3 Components of change: five year summary, 2003–2031

	annual averages (thousands)					
	2003–2006	2006–2011	2011–2016	2016–2021	2021–2026	2026–2031
United Kingdom						
Population at start	59,554	60,254	61,401	62,618	63,835	64,902
Births	701	682	692	705	702	687
Deaths	597	582	579	591	619	658
Natural change	103	99	113	113	83	30
Net migration	130	130	130	130	130	130
Total change	233	229	243	243	213	160
Population at end	60,254	61,401	62,618	63,835	64,902	65,700
England						
Population at start	49,856	50,483	51,595	52,770	53,954	55,025
Births	594	579	589	601	602	592
Deaths	493	481	478	489	512	545
Natural change	101	98	111	113	90	47
Net migration	108	124	124	124	124	124
Total change	209	222	235	237	214	171
Population at end	50,483	51,595	52,770	53,954	55,025	55,881
Wales						
Population at start	2,938	2,980	3,020	3,064	3,106	3,138
Births	32	32	33	33	32	31
Deaths	33	32	32	32	34	36
Natural change	-1	-0	1	1	-2	-5
Net migration	15	8	8	8	8	8
Total change	14	8	9	9	6	3
Population at end	2,980	3,020	3,064	3,106	3,138	3,153
Scotland						
Population at start	5,057	5,068	5,034	5,000	4,963	4,907
Births	53	49	49	49	47	45
Deaths	57	55	54	55	57	60
Natural change	-4	-5	-5	-6	-10	-15
Net migration	8	-2	-2	-2	-2	-2
Total change	4	-7	-7	-7	-11	-17
Population at end	5,068	5,034	5,000	4,963	4,907	4,825
Northern Ireland						
Population at start	1,703	1,723	1,753	1,783	1,811	1,832
Births	22	21	21	22	21	20
Deaths	15	15	15	15	16	18
Natural change	7	6	7	6	5	2
Net migration	0	-1	-1	-1	-1	-1
Total change	7	6	6	6	4	2
Population at end	1,723	1,753	1,783	1,811	1,832	1,840

RESULTS OF THE INTERIM 2003-BASED NATIONAL POPULATION PROJECTIONS

Total population

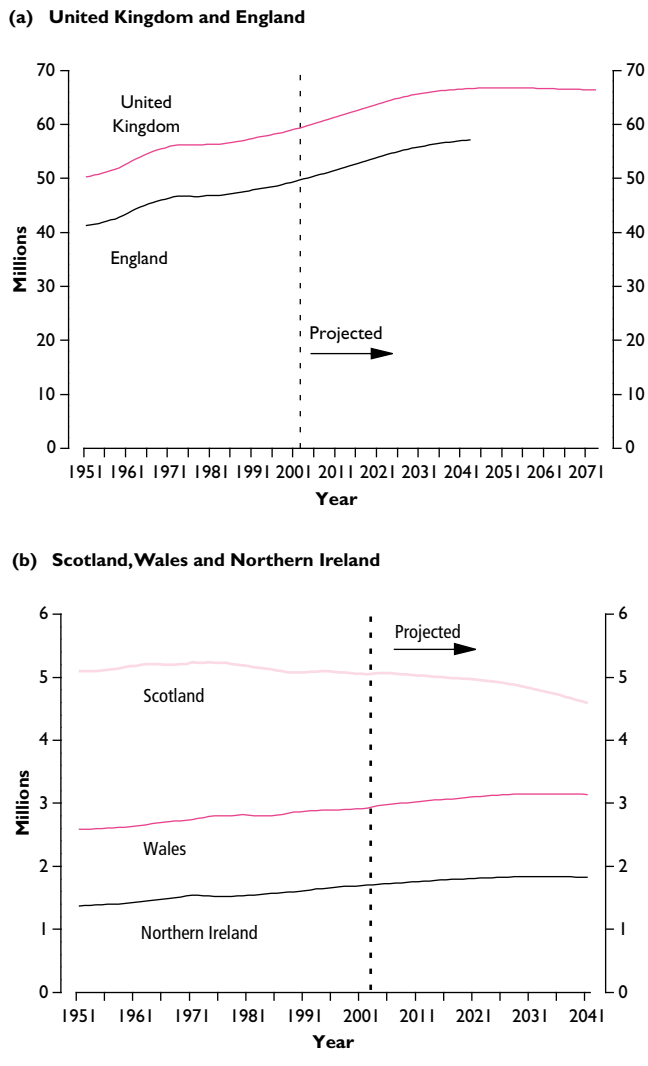
The results of the new projections are summarised for the constituent countries of the United Kingdom in Table 3 and Figure 2. The projections for the individual countries are carried forward for forty years, that is until 2043, but projections to 2073 for the UK as a whole are shown in Figure 2 and in the remaining graphs in this article.

The population of the United Kingdom is projected to increase gradually from 59.6 million in 2003 to reach 65.7 million by 2031. This is

equivalent to an average annual rate of growth of 0.35 per cent during this period. Longer-term projections suggest the population will peak around 2050 at nearly 67 million and then very gradually start to fall. The population of Scotland is projected to decline from 2005, while the populations of Wales and Northern Ireland are projected to peak in the early 2030s and then start to fall. The population of England is still projected to be rising in forty years' time, but at a reducing rate of growth.

The population is projected to reach 60 million during 2005. Annual mid-year population estimates for the United Kingdom go back to 1951. Prior to that only Census year estimates are available. The estimated

Figure 2 Actual and projected population of the United Kingdom and constituent countries, 1951–2073



Clearly if annual net inward migration to the UK was to average 130 thousand a year (the long-term assumption in the principal projection) this would lead to a total net inflow of 3.6 million migrants in the period between 2003 (the base year of the projections) and 2031. The assumed fertility and mortality rates are the same in the principal projection and the natural change variant projection. However, because migration is concentrated at young adult ages, there is a significant second generation effect with the number of migrants changing the number of women of childbearing age and hence the future number of births. Because migrants are predominantly young, the effect on the number of deaths over the period to 2031 is considerably smaller.

Table A below shows the projected components of population change in the period to 2031 in the principal projection and the natural change variant projection.

Table A Projected population change, United Kingdom 2003–31

	<i>thousands</i>	
	Principal projection	Natural change variant
Population at mid-2003	59,554	59,554
Population change (2003–31)		
Births	19,442	17,836
Deaths	16,937	16,870
Natural change	2,506	965
Net migration	3,640	0
Total change	6,146	965
Population at mid-2031	65,700	60,519

Table B shows how the projected population growth in the principal projection is broken down between the assumed level of net migration and projected natural change.

Table B Projected population growth by component, United Kingdom, 2003–31

	<i>thousands</i>
Total population increase between 2003 and 2031	6,146
Resulting from:	
Assumed net migration	3,640
Natural change assuming no migration	965
Additional natural change from assumed level of net migration	1,541

In the principal projection, the population of the UK is projected to grow by 6.1 million between 2003 and 2031. Some 3.6 million of this increase is directly due to the assumed number of net migrants. Natural change accounts for a further 2.5 million (the difference between 19.4 million births and 16.9 million deaths). Some 1.0 million of this natural increase would occur in the absence of migration. The remaining 1.5 million is the net effect of the assumed annual level of net migration on natural change (increasing births by about 1.6 million, slightly offset by a small increase in deaths).

Some 59 per cent of population growth in the principal projection is therefore directly attributable to the assumed number of net migrants. The remaining 41 per cent is attributable to projected natural increase (of which 16 per cent would occur in the absence of net migration and 25 per cent arises from the effect of net migration on natural change).

Box three

MIGRATION AND POPULATION GROWTH

The population of the United Kingdom is projected to rise both because of positive natural change (that is, more births than deaths) and because of positive net migration. However, the components of population change are not independent of each other. In particular, the projected numbers of future births and deaths are themselves partly dependent on the assumed level of net migration.

An understanding of the overall effect of migration on population growth can be obtained by comparing the results of the principal projection with those of the 'natural change' variant projection. The natural change variant assumes that net migration will be zero at all ages in future, but makes the same assumptions about fertility and mortality as the principal projection. In the analysis below, the effect of net migration on population growth in the period to 2031 is considered.

population of the UK at 1951 was 50.3 million. It is probable that the population reached 50 million in the late 1940s.

Of the projected 6.1 million increase between 2003 and 2031, some 2.5 million (41 per cent) is projected natural increase (more births than deaths) while the remaining 3.6 million (59 per cent) is the assumed total number of net migrants. However, the projected numbers of future births and deaths are themselves partly dependent on the assumed level of net migration. The overall effect of net migration on future population growth is considered in Box three.

Births and deaths

Projected numbers of births and deaths are shown in Figure 3. With the single exception of 1976, the United Kingdom gained population through natural increase (births less deaths) throughout the 20th century. However, it is projected that deaths will begin to outnumber births in about 30 years' time. By the middle of the century, this natural deficit

is projected to exceed the assumed gain to the population through net migration and so the population then begins to decline. Of course, projections so far ahead are subject to considerable uncertainty. In particular, the projected trend in births depends on the assumed future level of fertility (including that for women not yet born) and has much greater uncertainty attached to it than the projected trend in deaths which is largely determined by the age structure of the population alive today.

Age distribution

Table 4 and Figure 4 summarise the projected age structure of the population. The age structure will become gradually older with the median age of the population rising from 38.4 years in 2003 to 43.3 years by 2031. Longer-term projections show continued ageing with the median age reaching 45 years around the middle of the century but not rising much further thereafter.

The number of children aged under 16 is projected to fall by 5.9 per cent from 11.7 million in 2003 to 11.0 million in 2015 and then to rise slowly until the late 2020s. The number of people of working age (currently

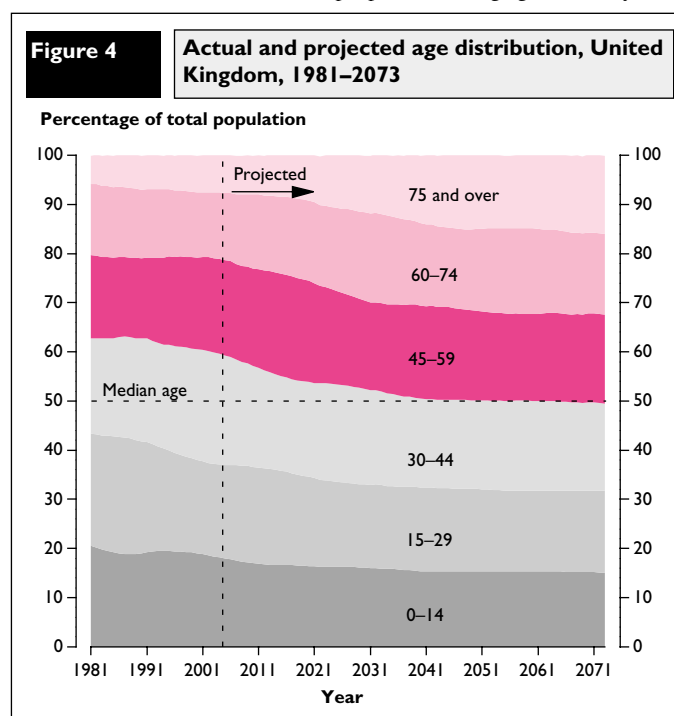
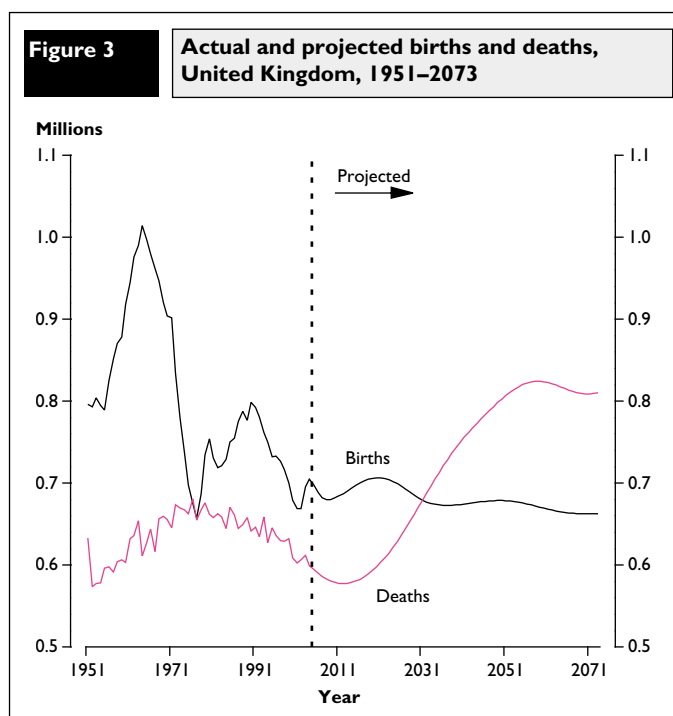


Table 4 Projected population by age, 2003-2031

United Kingdom							
Age group	2003	2006	2011	2016	2021	2026	2031
All ages	59,554	60,254	61,401	62,618	63,835	64,902	64,700
0-14	10,924	10,697	10,385	10,364	10,447	10,553	10,533
15-29	11,234	11,583	11,988	11,873	11,455	11,148	11,130
30-44	13,519	13,253	12,446	12,010	12,405	12,812	12,703
45-59	11,424	11,764	12,325	13,113	12,952	12,186	11,789
60-74	7,948	8,307	9,327	9,900	10,502	11,115	11,871
75 & over	4,505	4,651	4,930	5,357	6,075	7,088	7,675
Median age (years)	38.4	39.2	40.5	41.4	41.8	42.4	43.3
Under 16 (A)	11,712	11,496	11,118	11,039	11,149	11,248	11,242
Working age* (B)	36,828	37,392	38,100	39,162	39,983	39,786	39,186
Pensionable age* (C)	11,014	11,366	12,182	12,417	12,703	13,868	15,271
Support ratios							
Young (B/A)	3.14	3.25	3.43	3.55	3.59	3.54	3.49
Old (B/C)	3.34	3.29	3.13	3.15	3.15	2.87	2.57
Total (B/(A+C))	1.62	1.64	1.64	1.67	1.68	1.58	1.48

* Working age and pensionable age populations based on the state pension age for given year. Between 2010 and 2020, state pension age will change from 65 for men and 60 years for women, to 65 years for both sexes.

defined as 16 to 64 for men and 16 to 59 for women) is projected to rise by 2.8 per cent from 36.8 million in 2003 to 37.8 million in 2010. Allowing for the planned change in women's state pension age from 60 to 65 between 2010 and 2020,¹⁵ the working age population will increase further to 39.9 million by 2020. It is projected to peak at 40.0 million in 2022.

The working age population will become much older as the baby boom generations of the mid 1960s age. In 2003, there were 2.3 million (13 per cent) more working age adults aged below 40 than above 40. However, by 2010, there will be just 0.5 million (3 per cent) more and, boosted by the change in women's state pension age, by 2020 there will be 1.4 million (7 per cent) more working age people above 40 than below 40.

The number of people of state pensionable age is projected to increase by 10.4 per cent from 11.0 million in 2003 to 12.2 million in 2010. However, allowing for the change in women's state pension age, the population of pensionable age will then rise more slowly, reaching 12.5 million by 2020. A faster increase will then resume with the number over pensionable age reaching 15 million by 2031 and eventually reaching nearly 18 million in about sixty years' time. Without the change in women's state pension age, the population of pensionable age would have risen to 14.4 million by 2020, eventually reaching nearly 20 million.

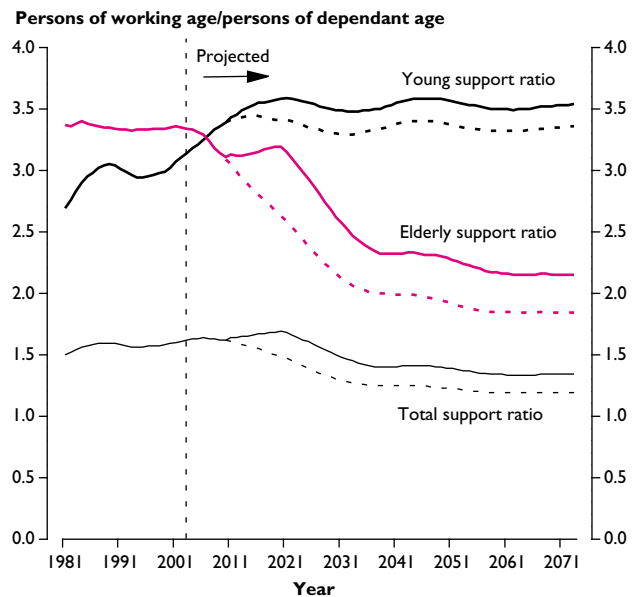
In 2003, there were around 700 thousand (6 per cent) more children aged under 16, than people of state pensionable age. However, as a result of the projected changes, the population of state pensionable age starts to exceed the number of children from 2007 and by 2031 is projected to exceed it by about 4 million (36 per cent).

Support ratios

These changes in age structure will, in time, have a marked effect on the future proportion of dependants in the population. Figure 5 shows projected demographic support ratios. The young support ratio is the ratio of persons of working age to those aged under 16, and the elderly support ratio is the ratio of persons of working age to those of pensionable age.

Figure 5

Actual and projected demographic support ratios, United Kingdom, 1981–2073



Note: The 'working age' population is that between 16 and state pension age, and the 'dependant age' population is that aged under 16 or over state pension age. Between 2010 and 2020, state pension age will change from 65 years for men and 60 years for women, to 65 years for both sexes. The dotted lines in the graph show what the support ratios would have been, had the present state pension age applied throughout.

The total support ratio is the ratio of persons of working age to all those of dependant ages (young or old). It should be emphasised, however, that demographically defined support ratios such as these, whatever age boundaries are used, take no account of workforce participation rates and therefore do not represent real levels of economic dependence. In reality, full-time education ends, and retirement starts, at a range of ages.

Table 5

Change in projected population compared with the 2002-based projections

Country	Interim 2003-based projections	2002-based projections	Total change	Change due to				
				base population*	projected births	projected deaths**	projected migrants	removal of unattributable population change
Population at 2011								
England	51,595	51,315	280	101	28	-4	-46	200
Wales	3,020	2,971	48	13	3	-2	18	16
Scotland	5,034	4,984	50	12	12	-2	27	0
Northern Ireland	1,753	1,751	2	0	1	0	1	0
United Kingdom	61,401	61,022	379	126	45	-8	0	216
Population at 2021								
England	53,954	53,478	475	101	-27	-3	-46	450
Wales	3,106	3,038	68	13	7	-6	18	36
Scotland	4,963	4,911	52	12	17	-4	27	0
Northern Ireland	1,811	1,811	0	0	0	0	1	0
United Kingdom	63,835	63,239	596	126	-3	-13	0	486
Population at 2031								
England	55,881	55,158	723	101	-33	1	-46	700
Wales	3,153	3,066	87	13	10	-11	18	56
Scotland	4,825	4,770	55	12	23	-7	27	0
Northern Ireland	1,840	1,840	1	0	1	-1	1	0
United Kingdom	65,700	64,835	865	126	0	-18	0	756

* Difference between the estimated population at mid-2003 and the 2002-based projection of the population at mid-2003 (see Table 1).

** Increases in the projected number of deaths (compared with the previous projections) are shown as negative numbers as they contribute to decreases in the size of the population.

In 2003, there were 3.34 persons of working age for every person of pensionable age. By 2010, this elderly support ratio is projected to fall to 3.11. Allowing for the change in women's state pension age, it will then rise slightly to 2020 before declining quickly. After briefly stabilising around 2.30 in the 2040s, longer-term projections suggest a further slight decline to around 2.15 in the 2060s. However, the young support ratio is projected to rise until 2020 and then remain fairly constant after the increase in women's state pension age is complete.

The dotted lines in Figure 5 show what the projected demographic support ratios would have been had there been no change to the present state pension age. For example, without the change in women's state pension age from 60 to 65, the elderly support ratio would fall earlier and much further. However, to have the same elderly support ratio in fifty years' time as we do today, state pension age would need to rise to 71 for both sexes.

COMPARISON WITH 2002-BASED NATIONAL PROJECTIONS

The projected total population of each country is compared with the 2002-based projections in Table 5 and the difference between the two projections is broken down into changes in the base population and changes in the projected numbers of births, deaths, migrants and the removal of the adjustment for unattributable population change. Increases in the projected numbers of deaths (as compared with the previous projections) are shown as negative numbers in the table as they contribute to decreases in the size of the population.

The projected population of the United Kingdom at 2031 is 865 thousand (1.3 per cent) higher than in the 2002-based projections. This is mainly because of the removal of the downward adjustment for unattributable population change for England & Wales made in the 2002-based projections (see above), but also reflects the upward revisions to the starting population. The population of Wales at 2031 is almost three per cent higher than previously projected while the populations of England and Scotland are just over one per cent higher. In addition to the effects of the higher base population and the removal of the adjustment for unattributable population change in England & Wales, the individual country changes also reflect somewhat higher assumed migration flows from England to both Wales and Scotland in the first few years of the projection. The projected population of Northern Ireland, however, is almost unchanged from the previous projections.

The change in the projected size of the population of the United Kingdom in particular age groups is shown in Table 6. The upward revisions to the base population and the removal of the adjustment for unattributable population change principally relate to persons under 45 but the effect spreads to older age groups in later years as the population ages. By 2031, the UK population is higher than previously projected for all age groups below 75. However, the 75 & over age group is slightly reduced.

This is because the unattributable population change adjustment made in the 2002-based projections was actually positive (that is, adding to the population) at most ages over 55.

SENSITIVITY ANALYSIS

The one certainty of making population projections is that, due to the inherent unpredictability of demographic behaviour, they will turn out to be wrong as a forecast of future demographic events or population structure. One way of giving users an indication of uncertainty is by considering the performance of past projections. An analysis of the accuracy of national population projections made since 1971 was published in *Population Trends* 77.¹⁶ This analysis was carried out following the rebasing of population estimates after the 1991 Census. An updated analysis following the 2001 Census rebasing is planned, but has been delayed because of the need to take account of the revisions made to population estimates in 2003 and 2004.

Another way of illustrating uncertainty is by preparing variant projections based on alternative assumptions of future fertility, mortality and migration. For a normal full set of projections, GAD now produces an extensive set of variant projections at both UK and individual country level. Full details of the latest such set, from the 2002-based projections, are available on the GAD website.¹⁷ However, for the interim 2003-based projections, only selected UK level variants – the 'standard' high and low variants for each of the three components of population change and the natural change variant – have been produced. Again, full details are available on the GAD website.¹⁸

Compared with the principal projection assumptions, the high and low fertility variants assume long term family sizes of ± 0.2 children per woman. In the high and low mortality variants, projected life expectancy at birth at 2031 differs by about ± 2.4 years for males and ± 1.6 years for females from the principal projection. Finally, in the high and low migration variants, the long-term annual net migration inflows are assumed to be 60,000 persons above and below the principal projection. These variant assumptions are intended as plausible alternative scenarios and *not* as upper or lower limits for what might occur in the future. Figures 6 and 7 show the total population of the UK and the percentage of the population aged over 65 under these alternative assumptions.

It is clear from Figure 6 that there is considerable uncertainty regarding the future size of the population. Under these alternative, but still plausible, fertility and migration assumptions, the population at 2031 differs from the principal projection by around ± 2 million. The uncertainty widens with time and by 2073 the population would be nearly 75 million under the high fertility assumptions but only about 59 million with the low fertility assumptions. Figure 6 clearly shows that future population decline is not inevitable in the United Kingdom. In each of the three high variant projections, the population would continue growing throughout the projection period.

Table 6

Change in projected population by age compared with the 2002-based projections

United Kingdom

thousands/percentages

Age group	2003		2011		2021		2031	
	thousands	per cent	thousands	per cent	thousands	per cent	thousands	per cent
Under 16	36	0.3	138	1.3	59	0.5	83	0.7
16–29	35	0.3	86	0.8	215	2.0	228	2.2
30–44	37	0.3	68	0.6	123	1.0	202	1.6
45–59	12	0.1	106	0.9	214	1.7	236	2.0
60–74	–2	–0.0	–19	–0.2	14	0.1	143	1.2
75 & over	7	0.2	0	0.0	–28	–0.5	–27	–0.3
All ages	126	0.2	379	0.6	596	0.9	865	1.3

Figure 6

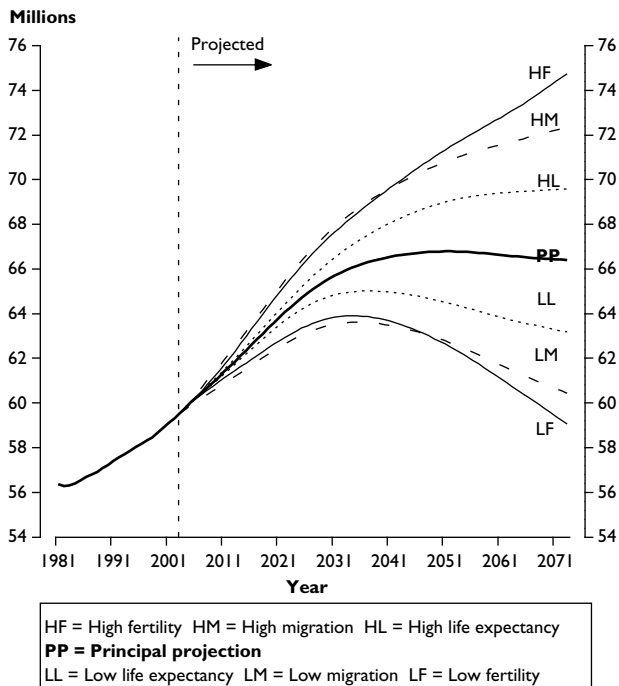
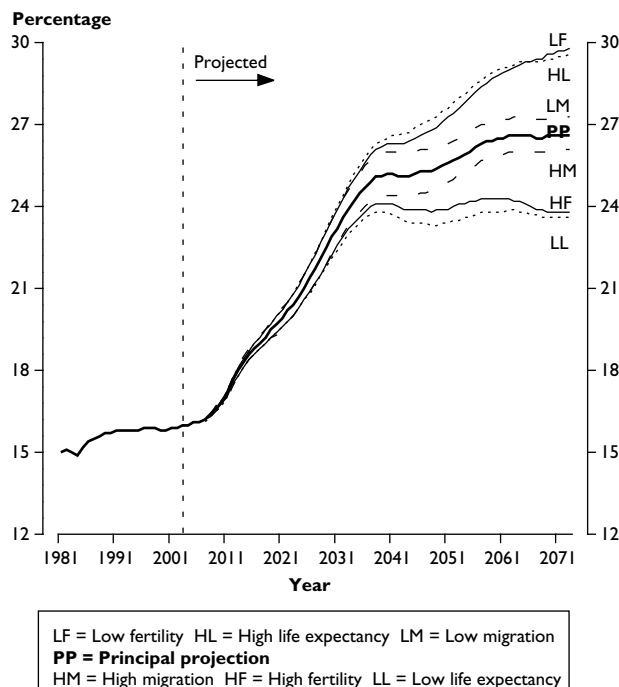
Population of the United Kingdom according to principal and variant 2003-based projections, 1981–2073


Figure 7

Proportion of the population aged 65 or over according to principal and variant 2003-based projections, 1981–2073


However, while population decline is not inevitable, Figure 7 demonstrates that population ageing will occur under any plausible set of future assumptions. In 2003, some 16 per cent of the population were aged 65 and over. But, although higher fertility or lower life expectancy levels would significantly reduce population ageing, even these variants

produce increases to around 24 per cent by the 2030s. And in either the low fertility or high life expectancy variants, the proportion would continue increasing, reaching nearly 30 per cent in seventy years' time.

The inevitability of population ageing is a consequence of the current age structure of the population. This, in turn, is a result of changes in the past numbers of births. Thus, during the first half of this century, the number of elderly people will rise as the relatively large cohorts born after the Second World War and during the 1960s baby boom replace at older ages the much smaller cohorts born before 1945. Conversely at younger ages, the relatively small cohorts born since the mid-1970s will replace the baby boomers.

NATIONAL POPULATION PROJECTIONS ON THE INTERNET

Full details of the results of the 2003-based national population projections for the United Kingdom and constituent countries are available on the GAD website, <http://www.gad.gov.uk/Population/index.asp>. Tables and charts for the individual countries, corresponding to most of the UK level analyses given in this article, are also available on the website.

Key findings

Based on the assumptions underlying these projections:

- The United Kingdom population is projected to increase gradually from an estimated 59.6 million in 2003, passing 60 million in 2005, to reach 65.7 million by 2031, equivalent to an average annual rate of growth of 0.35 per cent. Longer-term projections suggest the population will peak around 2050 at nearly 67 million and then very gradually start to fall.
- The projected population of the United Kingdom at 2031 is 865 thousand (1.3 per cent) higher than in the previous (2002-based) projections. This is primarily due to the effect of upward revisions to the mid-2002 population estimates for England and Wales and the associated removal of the downward adjustment for unattributable population change made in the previous projections.
- The population of Scotland is projected to decline from 2005, while the populations of Wales and Northern Ireland are projected to peak in the early 2030s and then start to fall. The population of England is still projected to be rising in forty years' time but at a reducing rate of growth.
- Of the projected 6.1 million increase in the UK population between 2003 and 2031, some 2.5 million (41 per cent) is projected natural increase (more births than deaths) while the remaining 3.6 million (59 per cent) is the assumed total number of net migrants.
- The population will gradually become older with the median age projected to rise from 38.4 years in 2003 to 43.3 years by 2031.
- By 2007, the population of pensionable age is projected to exceed the number of children.

- The number of people of state pensionable age is projected to increase by 10.4 per cent from 11.0 million in 2003 to 12.2 million in 2010. Allowing for the change in women's state pension age, the population of pensionable age will then rise more slowly, reaching 12.5 million by 2020. A faster increase will then resume with the number over pensionable age reaching 15 million by 2031 and eventually peaking at nearly 18 million in about sixty years' time.
- In 2003 there were 3.34 persons of working age for every person of pensionable age. By 2010, this demographic support ratio will decline to 3.11. Allowing for the change in women's state pension age, it will then rise slightly to 2020 before declining quickly. After briefly stabilising around 2.30 in the 2040s, longer-term projections suggest a further slight decline to around 2.15 in the 2060s.

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