

2002-based national population projections for the United Kingdom and constituent countries

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The 2002-based national population projections, carried out by the Government Actuary in consultation with the Registrars General, show the population of the United Kingdom rising from 59.2 million in 2002 to nearly 65 million by 2031. Longer-term projections suggest the population will peak around 2050 at over 65 million and then gradually start to fall. The population will become gradually older with the median age expected to rise from 38.2 years in 2002 to 43.3 years by 2031. In 2002, there were around 850 thousand (8 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 in 2001, was 2000-based.¹ However, following the publication in September 2002 of the first results of the 2001 Census, an additional 'interim' 2001-based set of projections² was published later in 2002 taking preliminary account of the results of the Census. This article presents the main results from the new 2002-based national population projections which replace these interim 2001-based national projections. The availability of subnational projections is discussed in Box one.

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.

BASE POPULATION

The projections are based on the Registrars General's estimate (published on 4 November 2003) of the resident population of the United Kingdom at mid-2002 of some 59.2 million.³ This estimate takes account of the provisional update to the mid-2002 (and mid-2001) population of England announced by ONS on 4 November 2003.⁴ It does *not* take

Box one

SUBNATIONAL PROJECTIONS

Subnational population projections are the responsibility of the statistical offices of the individual countries. New subnational population projections for Scotland, consistent with the national projections described in this article, were recently published by the General Register Office for Scotland.⁵ The Northern Ireland Statistics and Research Agency will be publishing 2002-based subnational projections for Northern Ireland in Spring 2004, while ONS will publish new subnational projections for England later in 2004. The Welsh Assembly Government Statistical Directorate is considering producing new subnational projections for Wales later in 2004.

account of the further small correction to the mid-2002 estimates for England made by ONS on 27 January 2004.⁶

As Table 1 shows, the estimated population at mid-2002 was 223 thousand (0.4 per cent) higher than envisaged in the interim 2001-based projections. This was almost entirely due to subsequent upward revisions to the original estimate of the population at mid-2001 which had been the base for the interim 2001-based projections. ONS made upward revisions to the mid-2001 estimates for England & Wales in September 2003.⁷ Together with a further provisional update for Manchester (and hence England) in November 2003,⁴ these totalled 213 thousand.

Table 1 Population change 2001–2002: actual change compared with 2001-based projected change

	Mid-year estimates*	Interim 2001-based projections	Difference	
			000s	per cent
Population at mid-2001	59,051	58,837	214	0.4
Components of change (2001–2002)				
Births	663	664	-1	-0.1
Deaths	601	602	-1	-0.1
Natural change	62	62	0	-
Net migration and other changes	116	108	8	-
Total change	178	170	8	-
Population at mid-2002	59,229	59,006	223	0.4
England	49,559	49,342	217	0.4
Wales	2,919	2,912	7	0.2
Scotland	5,055	5,057	-2	-0.0
Northern Ireland	1,697	1,696	1	0.1

* The mid-2002 figures are those on which the 2002-based projections were based. The mid-2002 estimate for England (and hence the UK) has subsequently been revised upward by 3 thousand.

UNDERLYING ASSUMPTIONS

The assumptions used in the 2002-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

Figure 1 Assumptions for the 2002-based national population projections

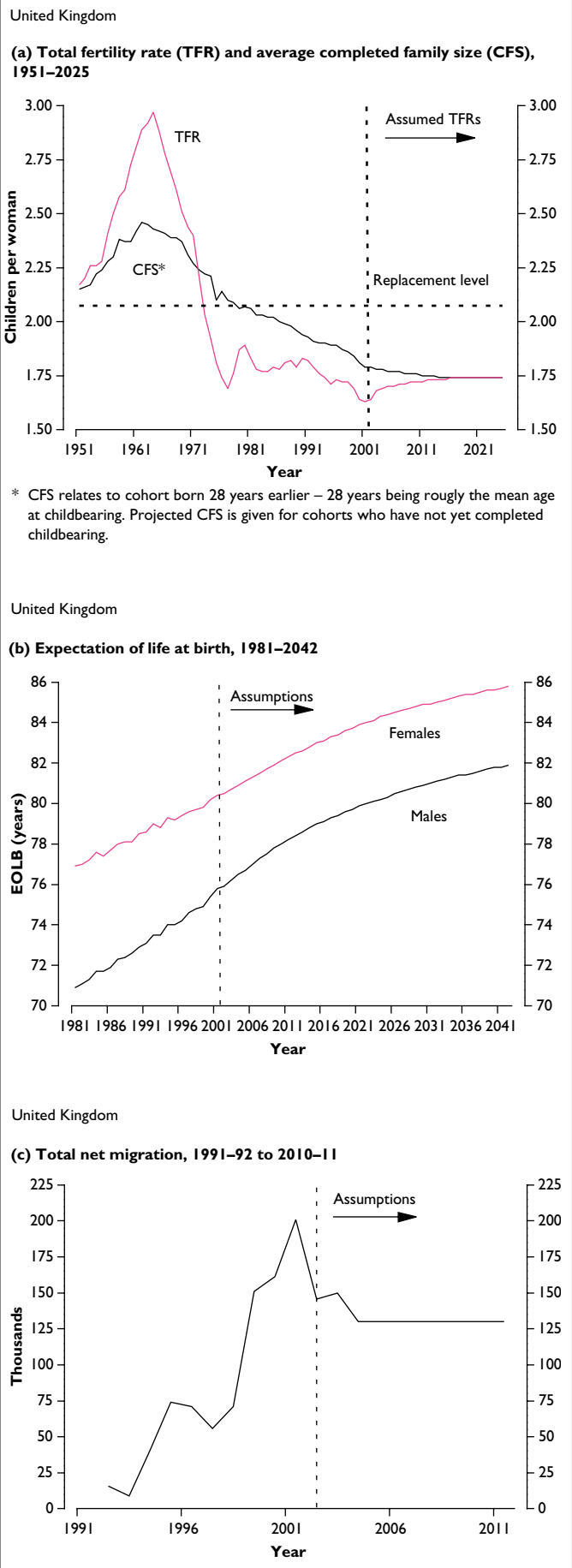


Table 2 Summary of assumptions for individual countries

	Total fertility rate				
	2002–03	2006–07	2011–12	from 2018–19	2001-based from 2014–15
England	1.69	1.72	1.74	1.75	1.75
Wales	1.67	1.73	1.74	1.75	1.75
Scotland	1.51	1.51	1.55	1.60	1.60
N. Ireland	1.78	1.78	1.80	1.80	1.80
United Kingdom	1.67	1.70	1.73	1.74	1.74

	Expectation of life at birth (years)									
	Males					Females				
	2002–03	2011–12	2021–22	2031–32	2001-based for 2031–32	2002–03	2011–12	2021–22	2031–32	2001-based for 2031–32
England	76.4	78.6	80.2	81.3	79.6	80.8	82.5	84.1	85.2	83.8
Wales	75.6	78.0	79.6	80.7	79.1	80.1	82.1	83.7	84.7	83.3
Scotland	73.5	76.1	77.8	78.9	77.0	79.0	80.9	82.6	83.6	82.0
N. Ireland	75.7	77.8	79.4	80.5	78.8	80.6	82.0	83.6	84.6	83.3
United Kingdom	76.1	78.3	79.9	81.0	79.4	80.6	82.4	83.9	85.0	83.6

	Net annual migration (thousands)					Net annual migration plus other changes* (thousands)			
	2002–03	2003–04	2004–05	from 2005–06	2001-based from 2005–06	2002–03	2003–04	2004–05	from 2005–06
England	143.0	122.0	123.0	124.0	97.0	118.0	97.0	98.0	99.0
Wales	11.0	10.0	9.0	8.0	5.5	9.0	8.0	7.0	6.0
Scotland	-3.0	-1.5	-1.5	-1.5	-1.0	-3.0	-1.5	-1.5	-1.5
N. Ireland	-1.0	-0.5	-0.5	-0.5	-1.5	-1.0	-0.5	-0.5	-0.5
United Kingdom	150.0	130.0	130.0	130.0	100.0	123.0	103.0	103.0	103.0

* Includes adjustment for unattributable population change in England & Wales (see main text).

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 (the TFR has been around 1.5 since 1999), and differentials with the rest of the UK are long established, a lower level of 1.60 has been assumed. These assumptions are unchanged from the previous projections. Further details of the fertility assumptions were published in the previous issue of *Population Trends*.⁸

Mortality

Future improvements in mortality rates are based on the trend in the years up to 2001. It has been 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. In the 2000-based (and interim 2001-based) projections, annual rates of mortality improvement were assumed to converge to a common reduction of 0.75 per cent in 2025 (the 25th year of the 2000-based projections), halving every ten years thereafter.

So the 2002-based projections assume lower future mortality rates (particularly at older ages), and therefore higher life expectancy, than previous projections. Official projections, both in the UK and elsewhere in industrialised countries, have tended to assume that the high rates of mortality improvement seen over the 20th century as a result of medical and environmental change were unlikely to be repeated in the future to the same extent. It is still believed that these arguments are valid. Nevertheless, expectations of life at birth have continued to rise at relatively constant rates over the last twenty years for both males and females, suggesting that previous long-term assumptions were too pessimistic.⁹

For the UK as a whole, life expectancy at birth, based on the mortality rates for the given year, is assumed to rise from 76.1 years in 2002–03 to 81.0 years in 2031–32 for males, and from 80.6 years to 85.0 years for females. These expectations of life at birth at 2031–32 are around 1.5 years higher (slightly more for males, slightly less for females) than assumed in the previous projections.

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.

Box two

COMPARISON OF MIGRATION ASSUMPTIONS WITH PREVIOUS PROJECTIONS

The 2000-based projections published in November 2001 (the last to be produced before the results of the 2001 Census became available) assumed a long-term net inflow to the United Kingdom of 135,000 persons a year.

However, the first results of the 2001 Census (published in September 2002) showed that the base population used in the 2000-based projections had been significantly overestimated. Therefore, GAD produced a special 'interim' set of 2001-based projections in November 2002. At the time it was assumed that, after allowing for revisions to the 1991 Census base, all of the remaining difference between Census estimates and previous population estimates was due to overestimation of net migration. A special downward 'net migration adjustment' was made to the 2001-based projections to allow for this. This was partly offset by taking into account the new data on international migration which had emerged since the 2000-based projections were published. The overall result was that the annual long term migration assumption for the interim 2001-based projections was revised down from a net inflow of +135,000 to +100,000.

The 2001-based assumption of +100,000 was the best that could be made at the time. However, it rested on the assumption that all of the difference between 2001 Census estimates and previous population estimates was attributable to overestimation of net migration. In fact, the final revised estimates of international migration for 1992 to 2001 (published by ONS in June 2003) did not fully account for the residual intercensal discrepancy. Furthermore, the revisions to mid-2001 population estimates for England & Wales (published by ONS in September 2003 and further updated in November 2003) effectively reduced the size of that discrepancy.

This new information means that the downward net migration adjustment made for the interim 2001-based projections was too great. Partly offsetting this, the asylum seeker component of the migration assumption has been reduced for the 2002-based projections in line with the recent substantial decreases in asylum applications. The overall result is that the annual long term net migration assumption for the 2002-based projections has been revised back up from an inflow of +100,000 to +130,000.

Migration

Figure 1c shows the recent trend in total net migration to the United Kingdom. The underlying trend for most of the 1990s was clearly upward although, since 1998, net flows have fluctuated around 150,000 a year.

Taking account of actual data for the second half of 2002, a net inward flow of 150,000 has been assumed for 2002–03, reducing to 130,000 per year from 2003–04 onwards. The long-term assumption is therefore a little lower than the figures of recent years. This reflects the recent substantial decrease in asylum seeker applications. The 2002-based projections assume a long-term annual inflow of 15,000 migrant asylum seekers (including dependants) granted leave to remain in the UK.

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.

Comparison of these assumptions with those used for previous projections is complicated by the implications of the results of the 2001 Census. In the 2000-based projections published in November 2001,

the last set before 2001 Census results became available, assumptions were based on the then current estimates of international migration in the years up to 1999. In the interim 2001-based projections published in November 2002, assumptions were based on the same series of estimates (however including data for 2000 and 2001) but were adjusted by making assumptions about the implications of Census results. In these 2002-based projections, assumptions are based on the revised estimates of international migration in the years to 2001 published in June 2003. This is considered further in Box two.

The table below summarises these various assumptions. It also shows the effect of the additional allowance for unattributable population change in England & Wales (see Box three) made in the 2002-based projections.

Assumed annual long-term net migration and other changes, United Kingdom, 2002-based, interim 2001-based and 2000-based projections

	2002-based	Interim 2001-based	2000-based
Net migration	+130,000	+100,000	+135,000
Unattributable population change	-27,000	-	-
Net migration plus other changes	+103,000	-	-

Box three

UNATTRIBUTABLE POPULATION CHANGE

The first results of the 2001 Census, published in September 2002, showed that previous mid-year population estimates rolled forward from the 1991 Census had overestimated the population of the United Kingdom. For the UK as a whole, the Census results indicated an overestimation of about 1.2 million at mid-2001.

About 375,000 of this difference has been attributed to overestimation of the mid-1991 population used as the base for mid-year population estimates made after 1991. Revisions to international migration estimates (published by ONS in June 2003) have accounted for a further 350,000 of the intercensal discrepancy. Finally, upward revisions to the estimated population of England & Wales at mid-2001 (published by ONS in September 2003 and further updated in November 2003) have effectively reduced the intercensal discrepancy by a further 213,000.

This leaves around 270,000 of the intercensal difference to be explained. ONS research suggests this may be attributable, amongst other factors, to remaining difficulties in estimating international migration accurately, or to those who spend part of their time in the UK and part abroad and so may not be covered in the population measurement process. A recent National Statistics Quality Review¹⁰ has made a number of recommendations to improve the quality of international migration statistics.

To ensure that mid-year estimates are robust and do not continue to overestimate the population, a downward adjustment of 27,000 (i.e. one tenth of the unexplained intercensal difference) for unattributable population change was introduced into the mid-2002 population estimates for England & Wales. This action assumes that future statistical 'bias' will be the same as that which occurred during the 1990s. A similar annual adjustment has therefore also been introduced for the 2002-based projections for England & Wales. In Scotland and Northern Ireland, it has been assumed that overestimation of the population during the 1990s was wholly comprised of unmeasured migration. Therefore, an annual allowance for migration unmeasured in the historical migration statistics, but evident from the Census comparisons, has been included in the migration assumptions for both countries and no additional allowance is required for unattributable population change. The need for the adjustment for unattributable population change in England & Wales will be reassessed by ONS annually.

Unattributable population change

In addition to the assumptions regarding fertility, mortality and net migration, an additional downward adjustment of 27,000 persons per year (25,000 for England and 2,000 for Wales) has been made for unattributable population change. This is discussed in Box three and follows similar action taken by ONS in preparing the mid-2002 estimates for England & Wales. Further information on the revisions to population estimates following the 2001 Census and on the adjustment for unattributable population change are available from the National Statistics website.¹¹

RESULTS OF THE 2002-BASED NATIONAL POPULATION PROJECTIONS

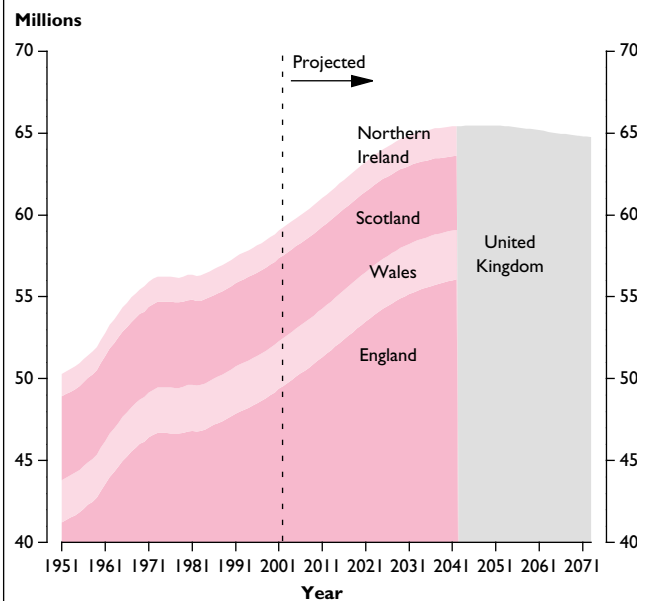
Total population

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, i.e. until 2042, but projections to 2072 for the UK as a whole are shown in Figure 2 and in the remaining figures in this article.

Table 3 Components of change: five year summary, 2002–2031

	2002–2006	2006–2011	2011–2016	2016–2021	2021–2026	2026–2031
United Kingdom						
Population at start	59,229	59,995	61,022	62,134	63,239	64,178
Births	682	684	697	709	703	686
Deaths	599	581	578	591	619	657
Natural change	83	102	119	118	85	28
Net migration & other changes	108	103	103	103	103	103
Total change	191	205	222	221	188	131
Population at end	59,995	61,022	62,134	63,239	64,178	64,835
England						
Population at start	49,559	50,310	51,315	52,396	53,478	54,432
Births	579	583	595	606	604	592
Deaths	494	480	478	489	512	545
Natural change	85	102	117	117	92	46
Net migration & other changes	103	99	99	99	99	99
Total change	188	201	216	216	191	145
Population at end	50,310	51,315	52,396	53,478	54,432	55,158
Wales						
Population at start	2,919	2,942	2,971	3,006	3,038	3,060
Births	31	32	32	32	32	30
Deaths	33	32	31	32	33	35
Natural change	-2	-0	1	1	-2	-5
Net migration & other changes	8	6	6	6	6	6
Total change	6	6	7	7	4	1
Population at end	2,942	2,971	3,006	3,038	3,060	3,066
Scotland						
Population at start	5,055	5,022	4,984	4,949	4,911	4,854
Births	50	48	48	49	47	44
Deaths	57	54	54	55	57	59
Natural change	-6	-6	-5	-6	-10	-15
Net migration	-2	-2	-2	-2	-2	-2
Total change	-8	-8	-7	-8	-11	-17
Population at end	5,022	4,984	4,949	4,911	4,854	4,770
Northern Ireland						
Population at start	1,697	1,720	1,751	1,782	1,811	1,831
Births	21	21	22	22	21	20
Deaths	15	15	15	15	16	17
Natural change	7	7	7	6	5	2
Net migration	-1	-1	-1	-1	-1	-1
Total change	6	6	6	6	4	2
Population at end	1,720	1,751	1,782	1,811	1,831	1,840

Figure 2 Actual and projected population of the United Kingdom and constituent countries, 1951–2072



The population of the United Kingdom is projected to increase gradually from 59.2 million in 2002 to reach 64.8 million by 2031. This is equivalent to an average annual rate of growth of 0.31 per cent during this period. Of the projected 5.6 million increase between 2002 and 2031, just under half (2.6 million) is due to projected natural increase (more births than deaths) and just over half (3.0 million) to the assumed level of net inward migration and other changes. Longer-term projections suggest the population will peak around 2050 at over 65 million and then gradually start to fall.

The population of Scotland is projected to continue to decline slowly from 2002, while the populations of Wales and Northern Ireland are projected to peak around 2030 and then start to fall. The population of England is still projected to be rising in forty years' time, but at a reduced rate of growth.

Births and deaths

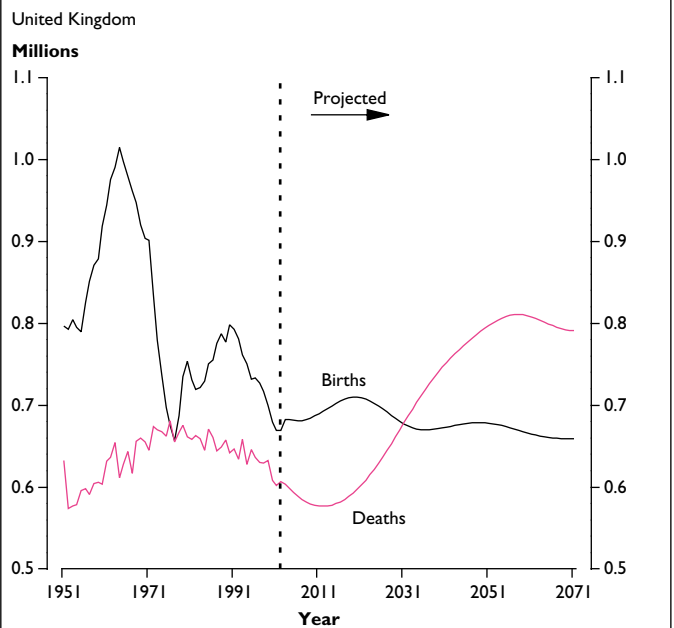
Projected numbers of births and deaths are shown in Figure 3. With the single exception of 1976, the United Kingdom gained population through natural increase (births less deaths) throughout the 20th century. However, it is projected that deaths will begin to outnumber births in about 30 years' time. By 2050, 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 38.2 years in 2002 to 43.3 years by 2031. Longer-term projections show further ageing with the median age eventually stabilising around 45 years from the 2040s.

The number of children aged under 16 is projected to fall by 7.4 per cent from 11.8 million in 2002 to just below 11 million in 2014 and then

Figure 3 Actual and projected births and deaths, 1951–2072



to rise slowly until the late 2020s. The number of people of working age (currently defined as 16 to 64 for men and 16 to 59 for women) is projected to rise by 3.5 per cent from 36.6 million in 2002 to 37.8 million in 2011. Allowing for the planned change in women's state pension age from 60 to 65 between 2010 and 2020,¹² the working age population will increase further to 39.4 million by 2021 and then gradually start to fall.

Even ignoring the change in women's state pension age, the working age population will become much older as the baby boom generations of the mid 1960s age. So, during the period to 2016, the number of adults aged under 45 is projected to fall by 3.6 per cent. However, the 45 to 59 age group is projected to increase by nearly 15 per cent over the same period, from 11.3 million in 2002 to 12.9 million in 2016.

Figure 4 Actual and projected age distribution, 1981–2072

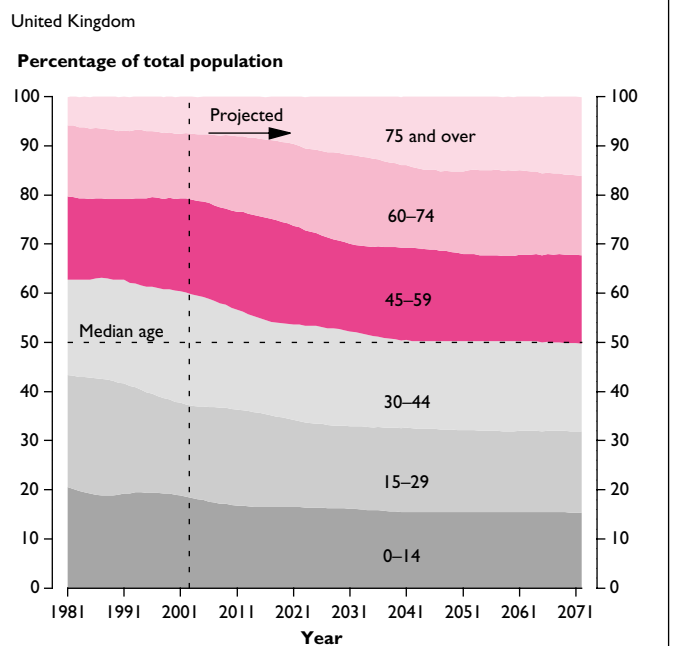


Table 4 Projected population by age, 2002–2031

United Kingdom

Age Group	2002	2006	2011	2016	2021	2026	2031
All ages	59,229	59,995	61,022	62,134	63,239	64,178	64,835
0–14	10,993	10,582	10,257	10,253	10,411	10,512	10,457
15–29	11,140	11,520	11,892	11,730	11,216	10,896	10,895
30–44	13,476	13,192	12,377	11,927	12,282	12,657	12,501
45–59	11,301	11,736	12,219	12,943	12,738	11,965	11,553
60–74	7,853	8,321	9,346	9,909	10,488	11,030	11,728
75 & over	4,465	4,644	4,930	5,371	6,103	7,119	7,701
Median age (years)	38.2	39.3	40.6	41.5	41.9	42.5	43.3
Under 16	11,759	11,377	10,981	10,916	11,090	11,199	11,160
Working age*	36,565	37,245	37,836	38,767	39,412	39,087	38,449
Pensionable age*	10,905	11,372	12,205	12,450	12,737	13,892	15,227
Dependants per 1,000 persons of working age							
Under 16	322	305	290	282	281	287	290
Pension age*	298	305	323	321	323	355	396
Total*	620	611	613	603	605	642	686

* 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.

The number of people of state pensionable age is projected to increase by 11.9 per cent from 10.9 million in 2002 to 12.2 million in 2011. However, allowing for the change in women’s state pension age, the population of pensionable age will then rise somewhat slower, reaching 12.7 million by 2021. A faster increase will then resume with the number over pensionable age reaching 15 million by 2031, eventually peaking at over 17 million in about sixty years’ time. Without the change in women’s state pension age, the population of pensionable age would have risen to 14.7 million by 2021, eventually peaking at over 19 million around 2060.

In 2002, there were around 850 thousand (8 per cent) more children aged under 16, than people of state pensionable age. However, as a result of these changes, the population of state pensionable age is projected to exceed the number of children from 2007 and by 2031 is projected to exceed it by about 4 million (36 per cent).

Dependency ratios

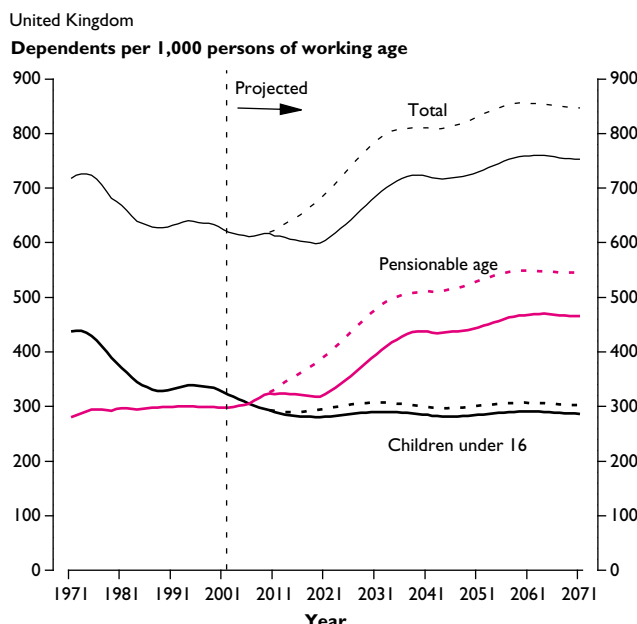
These changes in age structure will, in time, have a marked effect on the future proportion of dependants in the population. Figure 5 shows projected dependency ratios, i.e. the number of children under 16 or the population of pensionable age (or the sum of the two) expressed as a proportion of the working age population. These are, of course, somewhat arbitrary boundaries as, in reality, full-time education ends, and retirement starts, at a range of ages.

Figure 5 shows that the total dependency ratio will fall slightly from 620 dependants per 1,000 persons of working age in 2002 to about 600 per 1,000 in 2020 when the increase in women’s state pension age is complete. It will then increase rapidly, reaching 700 per 1,000 in the 2030s. This is comparable to the ratio in the early 1970s, although then it was children who comprised the majority of dependants. Longer-term projections suggest the ratio will level off at over 750 per 1,000 in the second half of the century. Of course, without the change in women’s state pension age, the proportion of dependants would rise earlier and further as indicated by the dotted lines in Figure 5.

COMPARISON WITH INTERIM 2001-BASED NATIONAL PROJECTIONS

The projected total population of each country is compared with the interim 2001-based projections in Table 5 and the difference between

Figure 5 Actual and projected dependency ratios, 1971–2072



Note: The ‘working age’ population is that aged between 16 and state pension age, and the population of ‘pensionable age’ is that 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 graphs show what the dependency ratios would have been, had the present state pension age applied throughout.

the two projections is broken down into changes in the base population and changes in the projected number of births, deaths and migrants. Reductions in the projected numbers of deaths (as compared with the previous projections) are shown as positive numbers in the table as they contribute to an increase in the size of the population.

The projected population of the United Kingdom at 2031 is about 1.2 million (1.9 per cent) higher than in the interim 2001-based projections. This is mainly a result of the higher life expectancy assumptions which lead to around 850 thousand (4.7 per cent) fewer deaths in the period to 2031 compared with the previous projections. The revisions to the base population used for the interim 2001-based projections (see Table 1 and

Table 5

Change in projected population compared with the interim 2001-based projections

thousands

Country	2002-based projections	interim 2001-based projections	Total change	Change due to			
				base population*	projected births	projected deaths**	projected migrants & other changes
Population at 2011							
England	51,315	50,859	456	217	38	168	34
Wales	2,971	2,947	25	7	-3	10	11
Scotland	4,984	4,983	1	-2	-16	25	-6
Northern Ireland	1,751	1,735	16	1	1	5	9
United Kingdom	61,022	60,524	498	223	20	208	47
Population at 2021							
England	53,478	52,725	753	217	47	435	54
Wales	3,038	2,997	41	7	-8	27	16
Scotland	4,911	4,895	16	-2	-31	60	-11
Northern Ireland	1,811	1,769	42	1	8	15	19
United Kingdom	63,239	62,386	853	223	16	537	77
Population at 2031							
England	55,158	54,140	1,018	217	29	699	74
Wales	3,066	3,012	54	7	-15	42	21
Scotland	4,770	4,735	35	-2	-39	92	-16
Northern Ireland	1,840	1,768	72	1	17	25	29
United Kingdom	64,835	63,656	1,179	223	-7	856	107

* Difference between the estimated population at mid-2002 and the 2001-based projection of the population at mid-2002 (see Table 1).

** Reductions in the projected number of deaths (compared with the previous projections) are shown as positive numbers as they contribute to an increase in the size of the population.

Table 6

Change in projected population by age compared with the interim 2001-based projections

United Kingdom

thousands/percentages

Age group	2002		2011		2021		2031	
	thousands	per cent	thousands	per cent	thousands	per cent	thousands	per cent
Under 16	-7	-0.1	-83	-0.8	-119	-1.1	-149	-1.3
16-29	86	0.8	103	0.9	-28	-0.3	-70	-0.7
30-44	127	1.0	245	2.0	285	2.4	209	1.7
45-59	5	0.0	-3	-0.0	156	1.2	245	2.2
60-74	8	0.1	81	0.9	82	0.8	165	1.4
75 & over	3	0.1	156	3.3	477	8.5	778	11.2
All ages	223	0.4	498	0.8	853	1.4	1,179	1.9

accompanying text) and the small increase in the assumed level of net migration and other changes also contribute.

In England and in Wales, the projected populations at 2031 are also about 2 per cent higher than previously projected. The change is greater in Northern Ireland (4 per cent) because of the higher net migration assumption. In Scotland, which is the only country where the net migration assumption has been reduced, the projected population at 2031 is only 1 per cent higher than previously projected.

The change in the projected size of the population of the United Kingdom in particular age groups is shown in Table 6. The projected number of people aged 75 and over at the year 2031 is 778 thousand (11.2 per cent) higher than in the interim 2001-based projections, almost entirely a result of the higher life expectancy assumptions. The revisions to the base population used for the 2001-based projections were mainly at ages 25 to 34 which leads to higher numbers of 55 to 64 year olds by the year 2031.

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* 77.¹³ This analysis was carried out following the rebasing of population estimates after the 1991 Census. It is hoped that an updated analysis, taking account of the implications of the 2001 Census, will be published during the next year.

Another way of illustrating uncertainty is by preparing variant projections based on alternative assumptions of future fertility, mortality and migration. An extensive set of variant 2002-based projections has been carried out; full details of which are available on the GAD website. The current range of variant projections published by GAD was introduced for the 2000-based projections and fully described at that time.¹⁴

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 2072 the population would be 73 million under the high fertility assumptions but only about 57.5 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.

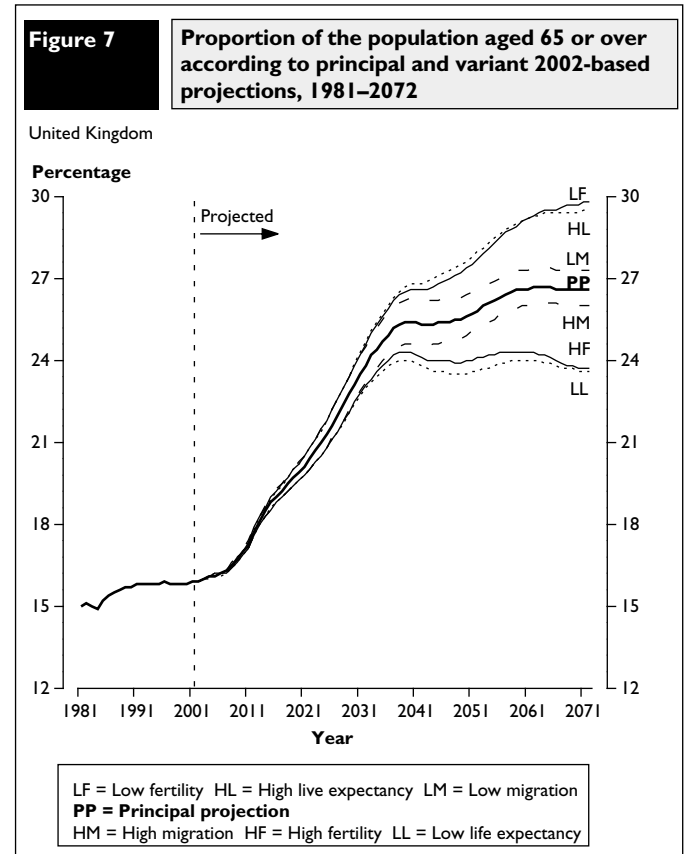
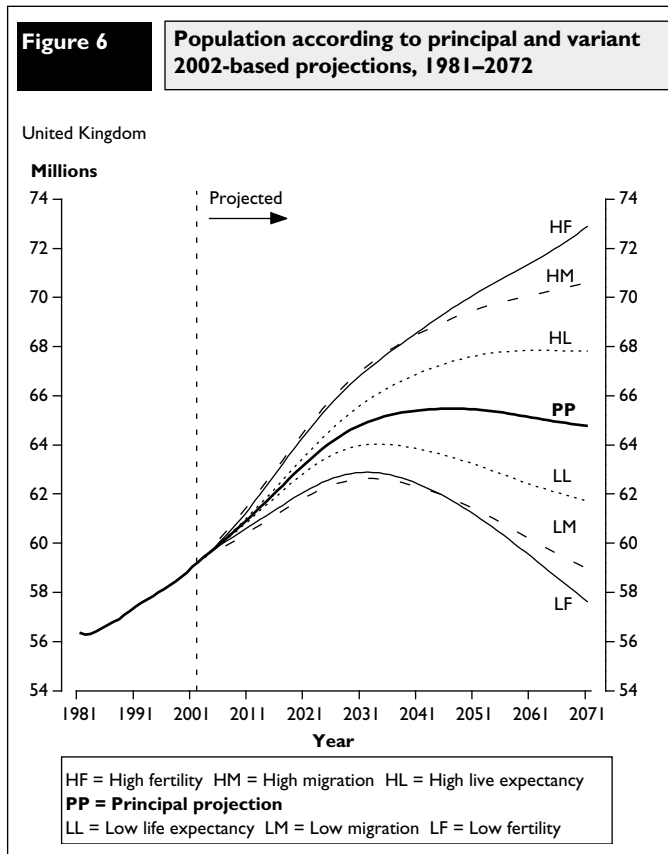
However, while population decline is not inevitable, Figure 7 demonstrates that population ageing will occur under any plausible set of future assumptions. In 2002, some 16 per cent of the population were aged 65 and over. But, although higher fertility or lower life expectancy levels would significantly 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 2002-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

- The United Kingdom population is projected to increase gradually from an estimated 59.2 million in 2002 to reach 64.8 million by 2031, equivalent to an average annual rate of growth of 0.31 per cent. Longer-term projections suggest the population will peak around 2050 at over 65 million and then gradually start to fall.
- The projected total population of the United Kingdom at 2031 is about 1.2 million (1.9 per cent) higher than in the previous (interim 2001-based) projections. This is mainly a result of a higher assumption of future life expectancy.
- The population of Scotland is projected to continue to decline slowly from 2002, while the populations of Wales and Northern Ireland are projected to peak around 2030 and then start to fall. The population of England is still projected to be increasing in forty years' time but at a reduced rate of growth.
- Of the projected 5.6 million increase in the UK population between 2002 and 2031, just under half (2.6 million) is due to projected natural increase (more births than deaths) and just over half (3.0 million) to the assumed level of net inward migration and other changes.
- The population will gradually become older with the median age projected to rise from 38.2 years in 2002 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 11.9 per cent from 10.9 million in 2002 to 12.2 million in 2011. However, allowing for the change in women's state pension age, the population of pensionable age will then rise somewhat slower, reaching 12.7 million by 2021. A faster increase will then resume with the number over pensionable age reaching 15 million by 2031, eventually peaking at over 17 million in about sixty years' time.

REFERENCES

1. Shaw C (2002) 2000-based national population projections for the United Kingdom and its constituent countries. *Population Trends* 107, pp 5–13.
2. Shaw C (2003) Interim 2001-based national population projections for the United Kingdom and its constituent countries. *Population Trends* 111, pp 7–17.
3. Mid-2002 estimates for each constituent country of the UK are available from the National Statistics website at <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=601>
4. Office for National Statistics (2003) *New estimate for Manchester's population*. ONS Press Release (4 November 2003). <http://www.statistics.gov.uk/pdfdir/man1103.pdf>
5. General Register Office for Scotland (2004) *2002-based population projections for Scottish areas*. GROS: Edinburgh. <http://www.gros-scotland.gov.uk/grosweb/grosweb.nsf/pages/02population-projections-scottishareas>
6. Office for National Statistics (2004) *Population Estimates Armed Forces correction*. ONS Explanatory Note (27 January 2004). http://www.statistics.gov.uk/notices/PopEst_27Jan04.asp
7. Office for National Statistics (2003) *Publication of 2002 population estimates and revisions to 2001 mid-year population estimates*. ONS Press Release (26 September 2003). <http://www.statistics.gov.uk/pdfdir/popest0903.pdf>
8. Smallwood S (2003). Fertility assumptions for the 2002-based national population projections. *Population Trends* 114, pp 8–18.
9. See <http://www.gad.gov.uk/Population/2002/methodology/mortass.htm> for further details.
10. Office for National Statistics (2003) *Review of international migration statistics*. NSQR Series Report No.23. http://www.statistics.gov.uk/methods_quality/quality-review/population.asp
11. See http://www.statistics.gov.uk/about/methodology_by_theme/revisions_to_population_estimates/default.asp
12. *Pensions Act 1995 Chapter 26 Part II*, Section 126 and Schedule 4.
13. Shaw C (1994) Accuracy and uncertainty of national population projections for the United Kingdom. *Population Trends* 77, pp 24–32.
14. Shaw C (2002) Variant population projections for the United Kingdom and its constituent countries. *Population Trends* 109, pp 15–26.