

Interim 2001-based national population projections for the United Kingdom and constituent countries

Chris Shaw
Government Actuary's
Department

INTRODUCTION

The Government Actuary's Department (GAD) produces the official national population projections for the United Kingdom and its constituent countries, usually every second year, 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. The latest 'full' set of projections, based on the estimated population of the UK in mid-2000, was published by GAD in November 2001.¹

However, following consultation with the Registrars General of England & Wales, Scotland and Northern Ireland, it was agreed that the Government Actuary should carry out an additional 'interim' 2001-based set of national population projections for the UK and its constituent countries. This followed the publication in September 2002 of the first results of the 2001 Census.² The interim 2001-based national population projections were published on 1 November 2002. These projections replace the previous 2000-based national projections.

These interim 2001-based projections take preliminary account of the results of the 2001 Census which show that the base population used in the previous projections was overestimated. The interim projections also incorporate a revised assumption of net international migration to the United Kingdom, informed by the first results of the 2001 Census and taking account of more recent migration information. Assumed long-term fertility and mortality rates are unchanged from the 2000-based projections.

The next full set of national population projections, based on the population at the middle of 2002, are scheduled for release in October 2003. These will

This article describes new 2001-based national population projections which were carried out following the publication in September 2002 of the first results of the 2001 Census. These "interim" projections, carried out by the Government Actuary in consultation with the Registrars General, take preliminary account of the results of the Census which showed that the base population used in previous projections was overestimated. The interim projections also incorporate a reduced assumption of net international migration to the United Kingdom, informed by the first results of the 2001 Census and taking account of more recent migration information. The population of the United Kingdom is now projected to increase from an estimated 58.8 million in 2001 to reach 63.2 million by 2026. The projected population at 2026 is about 1.8 million (2.8 per cent) lower than in the previous (2000-based) projections.

be based on a full reassessment of trends in fertility, mortality and migration and will take into account the further Census-related data which will become available during 2003.

The above information is summarised in Box One.

Box one

SUMMARY OF RECENT, CURRENT AND NEXT NATIONAL PROJECTIONS

Projection	Published in	Key points
1998-based	November 1999	Full review of all assumptions
2000-based	November 2001	Full review of all assumptions
2001-based (interim)	November 2002	Base population based on 2001 Census; Interim review of migration; No change to fertility and mortality
2002-based	October 2003 (prov.)	Full review of all assumptions

This article presents the main results from the interim 2001-based national population projections. The main focus of these projections is on the next twenty-five years, i.e. up to 2026. However, the results of longer-term projections are included in the graphs in this article and discussed where appropriate. The main areas where the Census results and the related revision to migration assumptions have altered the likely prospects for future population size and structure are highlighted. The article also gives results of variant population projections based on alternative assumptions of future fertility, mortality and net migration.

For availability of subnational population projections, see Box two.

Box two

SUBNATIONAL PROJECTIONS

Subnational projections for England are the responsibility of the Office for National Statistics, while those for the other countries are produced by the General Register Office for Scotland, the National Assembly for Wales and the Northern Ireland Statistics and Research Agency respectively.

The availability of subnational projections for the four countries was summarised in the corresponding article on the 2000-based national projections.⁸ There are no interim 2001-based subnational projections as much of the required information from the 2001 Census is not yet available. However, each country is looking to produce 2002-based subnational projections during 2004. These projections will take full account of the findings of the 2001 Census.

IMPACT OF THE CENSUS ON NATIONAL POPULATION PROJECTIONS

The estimated population of the United Kingdom at mid-2001, based on 2001 Census results, was 58,837,000.³ This estimate is 919,000 lower than the estimated population at mid-2000 on which the previous national projections were based, and 1,150,000 lower than the 2000-based projection of the population at mid-2001.

The two main consequences of the 2001 Census results for the national population projections are that:

- the mid-2000 population estimates, on which the latest 'full' GAD projections were based, overestimated the population of the United Kingdom by about 1.1 million; and
- the assumption in GAD's 2000-based principal projection of future long-term net inward migration to the UK of 135,000 persons a year was based on estimates of recent net inward international migration which are now known to have been significantly overestimated.

The overestimation of the population was concentrated amongst males aged 20 to 39. This implies a significant gender differential in recent migration trends.⁴ The Census results therefore also have important implications for the assumed age/sex distribution of future international migrants.

However, to take *full* account of 2001 Census data, considerably more information is required than the official mid-2001 population estimates based on the 2001 Census, which were published in September 2002 (for Scotland and Northern Ireland) and October 2002 (for England and Wales). In particular, the following are needed:

- revised population estimates for earlier years consistent with 2001 Census data (estimates for England, Wales and Scotland are being revised back to 1982, those for Northern Ireland back to 1992);
- revised estimates of total international migration for past years; and
- revised estimates of international migration by age and sex for past years.

Very little of this information was available when the 2001-based projections were prepared (and most of what was available was on a provisional basis). More data has been published subsequently^{5,6} and the remaining required data will become available later in 2003. All of this information will be taken into account in preparing the 2002-based projections. GAD expects to publish these projections in October 2003.

It was, therefore, not possible to take full account of the implications of the 2001 Census for the *interim* 2001-based projections, but these interim projections:

- are based on the estimated population at mid-2001 derived from the 2001 Census and therefore 'correct' for the overestimation of the base population in the 2000-based projections; and
- incorporate revised assumptions of net international migration to the United Kingdom agreed with the Registrars General. This is necessarily a very provisional revision. A full reassessment of trends in international migration will be made for the 2002-based projections, when the full range of Census-related data has become available.

For the interim 2001-based projections, the long-term fertility and mortality assumptions are unchanged from the 2000-based projections. Again, GAD will make a full assessment of the effect of 2001 Census results on fertility and mortality trends for the 2002-based projections taking account of the revised population denominators for the period 1982 to 2000.

BASE POPULATION

The 2001-based projections are based on the mid-2001 population estimates produced by the Office for National Statistics, the General Register Office for Scotland and the Northern Ireland Statistics and Research Agency.⁷ The estimated population of the United Kingdom at mid-2001 was 58.8 million. As Table 1 shows, this was 1.15 million (1.9 per cent) lower than the 2000-based projection of the population at mid-2001. This was a consequence of the base population in the previous projections having been an overestimate. The mid-2001 estimates were lower than had been expected for each country of the UK, ranging from 2.1 per cent lower in England to 0.9 per cent lower in both Scotland and Northern Ireland.

Table 1 Population at mid-2001: mid-2001 estimates (based on 2001 Census) and 2000-based projections

	thousands			
	Population at mid-2001			
	mid-2001 estimates	2000-based projections	Difference	
000s			percentage	
United Kingdom	58,837	59,987	-1,151	-1.9
England	49,181	50,225	-1,044	-2.1
Wales	2,903	2,949	-46	-1.6
Scotland	5,064	5,109	-44	-0.9
Northern Ireland	1,689	1,705	-15	-0.9

The difference between the mid-2001 estimates and the 2000-based projection of the UK population at mid-2001 by age and sex is shown in Figure 1a. (Similar charts for the individual countries of the UK can be found on the GAD website.) The male population was about 1 million lower than had been expected and this was concentrated on the 20–39 age group. However, the female population was only about 160 thousand lower than expected and at some ages, notably the peak childbearing ages of the late 20s, the census showed there were actually slightly more women than had been thought.

UNDERLYING ASSUMPTIONS

The assumptions used in the interim 2001-based national population projections are summarised in Table 2.

Fertility and mortality

As noted above, long-term fertility and mortality assumptions are unchanged from those used in the 2000-based projections. These were summarised in the corresponding article on the 2000-based national projections.⁸ However, assumptions for the first year of the interim projections (i.e. 2001–02) were adjusted to agree with provisional estimates of births and deaths during that period.

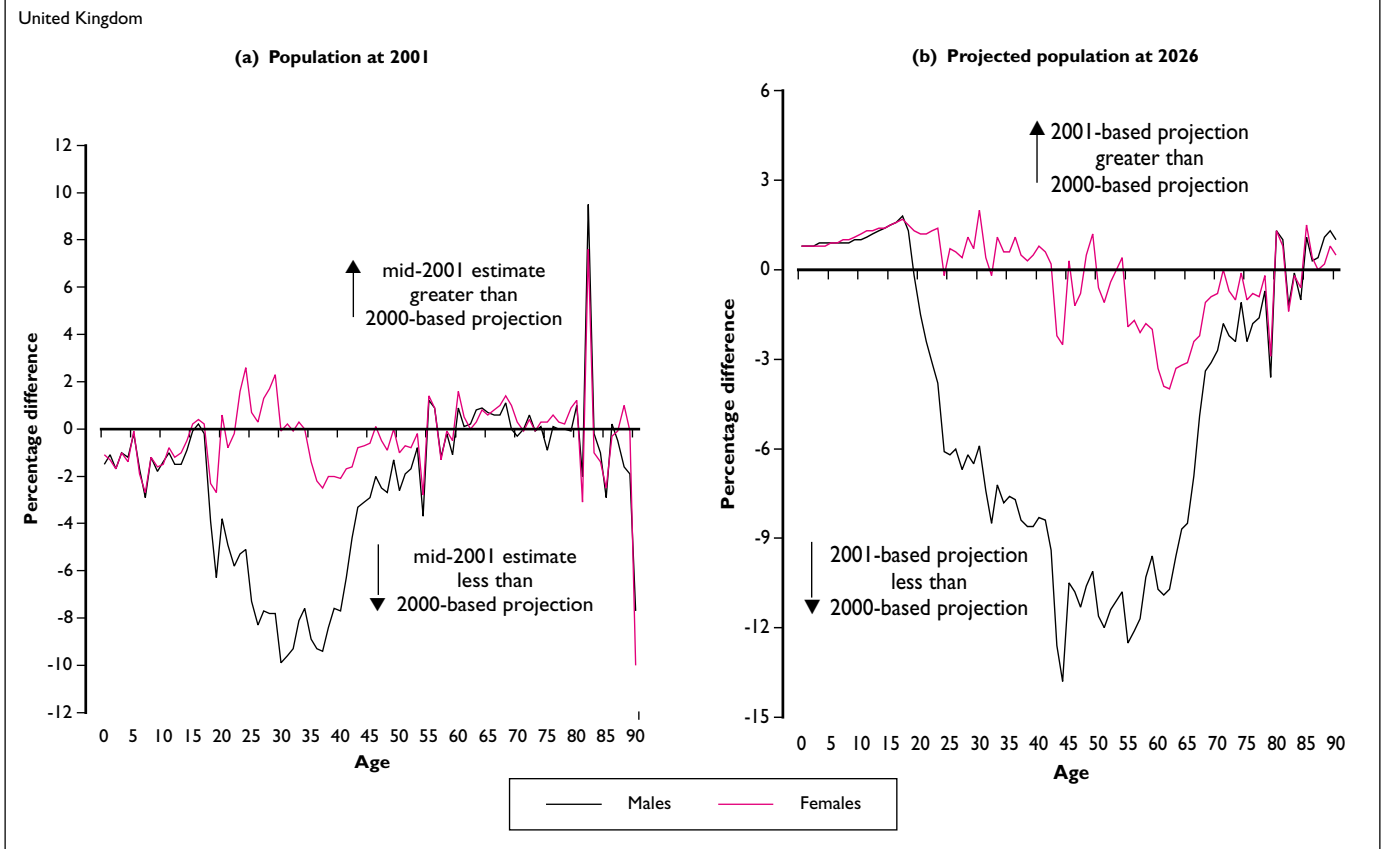
Trends in fertility and mortality for the period since 1982 will be reassessed for the 2002-based projections. However, given that the estimated number of women of childbearing age at mid-2001 was close to what was expected, it is unlikely that the Census will have any significant effect on the estimation of past fertility trends. However, because the Census showed that there were significantly fewer men aged 20–39 in the population than had been thought, it follows that male mortality rates at these ages have been *underestimated* in recent years. It is likely, therefore, that assumed male mortality rates for those aged 20–39 will be revised upwards in the 2002-based projections. Nevertheless, because mortality rates at these ages are very low, this will have only a small effect on the number of men surviving to older ages and on overall mortality measures such as the expectation of life at birth.

Table 2 Assumptions for individual countries, interim 2001-based projections

	Total fertility rate					Net annual migration (000s)		
	2001–02	2005–06	2010–11	from 2014–15	2000-based from 2014–15	from 2002–03	2000-based from 2002–03	
England	1.63	1.71	1.74	1.75	1.75	97.0	128.0	
Wales	1.64	1.74	1.75	1.75	1.75	5.5	7.5	
Scotland	1.47	1.55	1.58	1.60	1.60	-1.0	0.0	
Northern Ireland	1.77	1.78	1.80	1.80	1.80	-1.5	-0.5	
United Kingdom	1.62	1.70	1.73	1.74	1.74	100.0	135.0	

	Expectation of life at birth (years)									
	Males					Females				
	2001–02	2010–11	2020–21	2024–25	2000-based from 2024–25	2001–02	2010–11	2020–21	2024–25	2000-based from 2024–25
England	76.2	77.6	78.8	79.2	79.2	80.7	81.7	83.0	83.4	83.4
Wales	75.7	77.1	78.3	78.6	78.6	80.1	81.2	82.5	82.9	82.9
Scotland	73.8	75.0	76.2	76.5	76.5	79.2	79.9	81.2	81.6	81.6
Northern Ireland	75.8	76.8	78.0	78.3	78.3	80.5	81.3	82.5	82.9	82.9
United Kingdom	75.9	77.3	78.6	78.9	78.9	80.5	81.5	82.8	83.2	83.2

Figure 1 Population at 2001 and 2026 by age and sex: mid-2001 estimates and interim 2001-based projections compared with 2000-based projections



Migration

Assumptions of future international migration have been derived from analyses of recent trends in civilian migration to and from the United Kingdom, as measured by the International Passenger Survey (IPS). Allowance has also been made for sources of international migration not covered by the IPS, namely migration with the Irish Republic, asylum seekers allowed to remain in the UK and “visitor switchers” (people who enter the country as short-term visitors, but who are subsequently granted an extension of stay for a year or longer).

Assumptions of future international migration are therefore based on estimates of these different components. However, the 2001 Census results showed that overall estimates of net international migration to the UK made over the last two decades had been significantly *overestimated*. The average annual overestimation of net migration was about 80,000. [This was calculated from a comparison of estimated population growth from the ‘original’ population estimates, i.e. those based on the 1991 Census, with growth recalculated from interim rebased population estimates taking account of 2001 Census results.] To prevent this overestimation affecting assumptions of future net migration, a downward ‘net migration adjustment’ of 80,000 – i.e. equivalent to the average annual overestimation of net migration since 1991 – was made.⁹

It should be emphasised that this was necessarily an imprecise and provisional way of dealing with this issue. Later in 2003, following an assessment of the accuracy of population estimates made since 1981, the Office for National Statistics will publish final revised estimates of international migration to and from the United Kingdom and its constituent countries (some provisional interim estimates have already

been published⁵). International migration assumptions for future national population projections will be based on this revised series.

The composition of the long-term net migration assumptions for the UK in the interim 2001-based projections, compared with that assumed for the 2000-based projections, is as follows:

Long-term annual net migration assumptions, United Kingdom

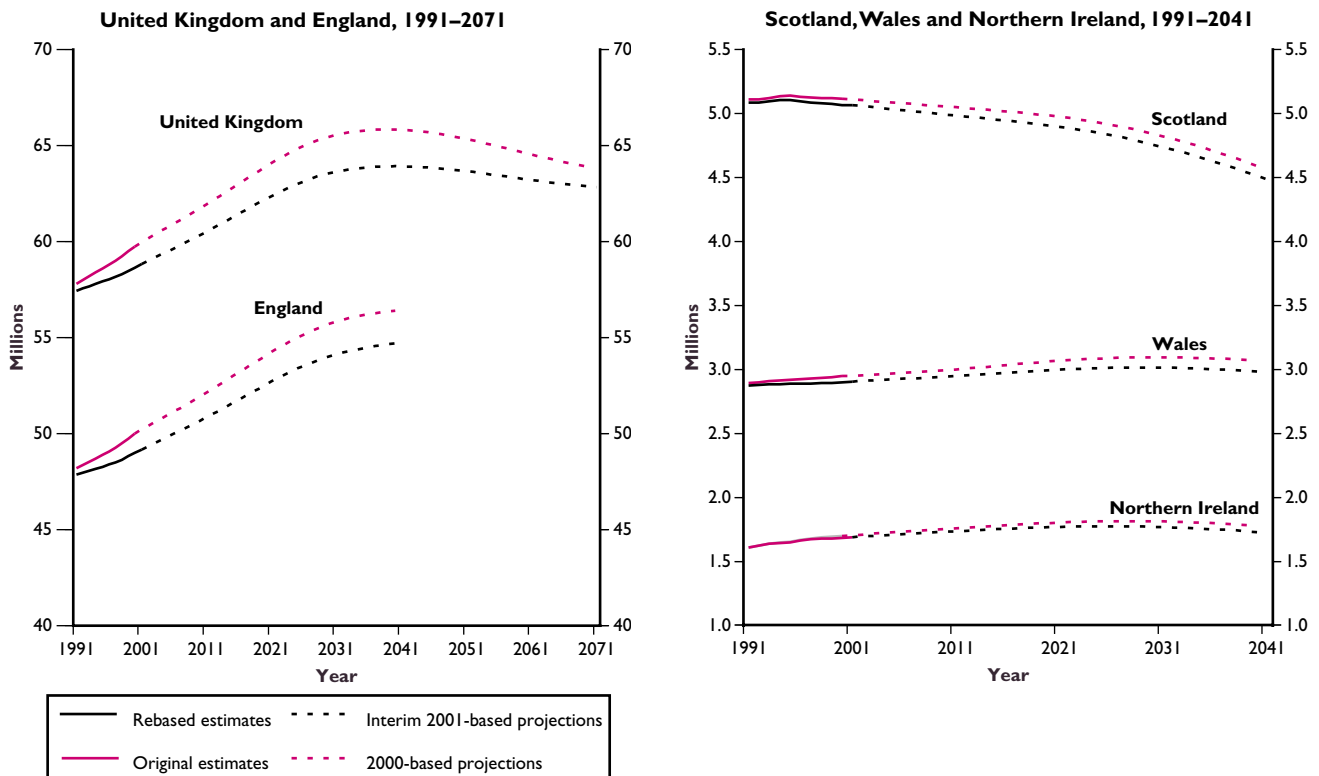
	Interim 2001-based projections	2000-based projections
Total net migration	+100,000	+135,000
As covered by IPS	+140,000	+100,000
Irish Republic	-10,000	-5,000
Asylum seekers	+30,000	+20,000
Visitor switchers	+20,000	+20,000
Net migration adjustment	-80,000	n/a

Despite the downward net migration adjustment of 80,000 reflecting the overestimation of net migration revealed by the census, the long-term assumption of net migration into the United Kingdom has been reduced by only 35,000 persons per year from 135,000 to 100,000. This reflects continuing increases in the levels of net migration recorded by the IPS and an increase in the assumed number of asylum seekers allowed 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 four countries. The cross-border assumptions are unchanged from those used in the 2000-based

Figure 2

Population of the United Kingdom and constituent countries, revised population estimates and interim 2001-based projections compared with original estimates and 2000-based projections



projections but will be reviewed for the next (2002-based) projections. However, because of the reduced assumption of international migration, the assumed net inflows are lower (or net outflows are higher) for each of the four countries.

TOTAL POPULATION SIZE

The results of the new interim projections are summarised for the constituent countries of the United Kingdom in Table 3 and compared with the results of the 2000-based projections in Figure 2. The projections for the individual countries are carried forward for forty years, i.e. until 2041, but to 2071 for the UK as a whole as shown in Figure 2.

The population of the United Kingdom is projected to increase gradually from 58.8 million in 2001 to reach 63.2 million by 2026. This is equivalent to an average annual rate of growth of 0.28 per cent. Around 60 per cent of the projected 4.3 million increase between 2001 and 2026 is attributable to the assumed level of net inward migration. The remainder is due to projected natural increase (more births than deaths). Longer-term projections suggest the population will peak around 2040 at nearly 64 million and then gradually start to fall.

The population of Scotland is projected to continue to decline slowly from 2001, while the populations of Wales and Northern Ireland are projected to peak in around 25 years' time and then start to fall. The population of England is still projected to be increasing at 2041 but at a very low rate of growth.

Comparison with 2000-based projections

Future population sizes are lower than previously projected. The projected total population of each country is compared with the 2000-

based projections in Table 4 and the difference between 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 2000-based projections) are shown as positive numbers in the table as they contribute to an increase in the size of the population.

For the UK as a whole, the projected total population in 2026 is about 1.8 million (2.8 per cent) lower than previously projected. The reduction at 2026 is 3.0 per cent for England, 2.5 per cent for Wales, 2.2 per cent for Northern Ireland and 1.7 per cent for Scotland. This is because of the overestimation of the base population in the previous projections coupled with the effect of the reduced assumption of net inward migration, itself a consequence of the Census results.

Wales and Northern Ireland are now projected to reach their peak population sizes in 2029 and 2026 respectively, about the same time as in the 2000-based projections. As in the previous projections, the population of England is still growing in forty years' time, whereas the population of Scotland is still projected to decline continuously.

The effects of the reduced base population and the lower migration assumption are marginally offset by there being (for the UK as a whole) slightly more projected births and slightly fewer projected deaths. A reduction in the number of deaths is to be expected given the lower overall population size. The slight increase in births arises despite the reduction in the base population and the reduction in the net migration assumption. This is because both of these reductions are concentrated amongst males. Indeed, the new net migration assumption for females is very slightly higher than in the 2000-based projections.

Table 3 Components of change: five year summary, 2001–2026

	<i>annual averages (thousands)</i>				
	2001–2006	2006–2011	2011–2016	2016–2021	2021–2026
United Kingdom					
Population at start	58,837	59,657	60,524	61,459	62,386
Births	675	683	698	709	705
Deaths	613	609	611	624	651
Natural change	62	73	87	85	54
Net migration	102	100	100	100	100
Total change	164	173	187	185	154
Population at end	59,657	60,524	61,459	62,386	63,156
England					
Population at start	49,181	49,994	50,859	51,790	52,725
Births	571	579	594	606	605
Deaths	506	503	504	516	539
Natural change	65	76	89	90	66
Net migration	97	97	97	97	97
Total change	163	173	186	187	163
Population at end	49,994	50,859	51,790	52,725	53,541
Wales					
Population at start	2,903	2,926	2,947	2,972	2,997
Births	31	32	33	33	32
Deaths	33	33	33	34	35
Natural change	-2	-1	-0	-1	-2
Net migration	7	6	6	6	6
Total change	5	4	5	5	3
Population at end	2,926	2,947	2,972	2,997	3,012
Scotland					
Population at start	5,064	5,023	4,983	4,943	4,895
Births	52	51	50	50	48
Deaths	59	58	57	58	60
Natural change	-7	-7	-7	-9	-12
Net migration	-1	-1	-1	-1	-1
Total change	-8	-8	-8	-10	-13
Population at end	5,023	4,983	4,943	4,895	4,828
Northern Ireland					
Population at start	1,689	1,714	1,735	1,754	1,769
Births	21	21	21	21	20
Deaths	15	15	16	16	17
Natural change	6	6	5	4	3
Net migration	-1	-2	-2	-2	-2
Total change	5	4	4	3	1
Population at end	1,714	1,735	1,754	1,769	1,775

Table 4 Change in projected population compared with the 2000-based projections

thousands

Country	Interim 2001-based projections	2000-based projections	Total change	Change due to			
				base population*	projected births	projected deaths**	projected migrants
Population at 2011							
England	50,859	52,151	-1,292	-1,044	17	60	-325
Wales	2,947	3,000	-53	-46	2	4	-14
Scotland	4,983	5,047	-64	-44	-1	-9	-10
Northern Ireland	1,735	1,759	-24	-15	0	1	-10
United Kingdom	60,524	61,956	-1,432	-1,151	18	57	-357
Population at 2021							
England	52,725	54,262	-1,537	-1,044	46	97	-635
Wales	2,997	3,067	-70	-46	3	6	-34
Scotland	4,895	4,973	-78	-44	1	-14	-20
Northern Ireland	1,769	1,803	-34	-15	0	0	-20
United Kingdom	62,386	64,105	-1,719	-1,151	50	89	-707
Population at 2026							
England	53,541	55,178	-1,637	-1,044	63	133	-790
Wales	3,012	3,088	-76	-46	5	8	-44
Scotland	4,828	4,911	-83	-44	2	-15	-25
Northern Ireland	1,775	1,814	-39	-15	0	0	-25
United Kingdom	63,156	64,992	-1,836	-1,151	70	127	-882

* Difference between the estimated population at mid-2001 and the 2000-based projection of the population at mid-2001.

** 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 5 Projected population by age, 2001–2026

thousands

United Kingdom						
Age group	2001	2006	2011	2016	2021	2026
All ages	58,837	59,657	60,524	61,459	62,386	63,156
0–14	11,091	10,624	10,329	10,341	10,517	10,630
15–29	11,073	11,428	11,800	11,718	11,258	10,967
30–44	13,291	12,996	12,133	11,644	11,997	12,370
45–59	11,144	11,735	12,223	12,868	12,582	11,760
60–74	7,820	8,280	9,266	9,822	10,407	10,954
75 & over	4,418	4,594	4,774	5,066	5,625	6,475
<i>Mean age (years)</i>	39.1	39.8	40.5	41.2	41.8	42.4
Under 16	11,855	11,422	11,064	11,020	11,210	11,332
Working age*	36,154	36,953	37,492	38,390	38,999	38,651
Pensionable age*	10,828	11,283	11,968	12,049	12,177	13,173
Dependants per 1,000 persons of working age						
Under 16	328	309	295	287	287	293
Pensionable age*	299	305	319	314	312	341
Total*	627	614	614	601	600	634

* 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.

AGE AND SEX DISTRIBUTION

Table 5 summarises the projected age structure of the population. The population will become gradually older with the mean age of the population rising from 39.1 years in 2001 to 42.4 years by 2026. Longer-term projections show continuing ageing with the mean age eventually stabilising at nearly 44 years from 2040.

The number of children aged under 16 is projected to fall by 7.3 per cent from 11.9 million in 2001 to just below 11 million in 2014 and then to rise slowly to 2026. 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 3.7 per cent from 36.2 million in 2001 to 37.5 million in 2011. Allowing for the planned change in women’s state pension age from 60 to 65 between 2010 and 2020,¹⁰ the working age population would rise further to 39.0 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 nearly one million (4 per cent). However, the 45 to 59 age group is projected to increase by 15 per cent over the same period, from 11.1 million in 2001 to 12.9 million in 2016.

The number of people over pensionable age is projected to increase by 10.5 per cent from 10.8 million in 2001 to 12.0 million in 2011. However, with the increase in women’s state pension age, the population of pensionable age will rise only slightly further (to 12.2 million) by 2021. A faster increase will then resume with longer-term projections suggesting the number over pensionable age peaking at over 15 million around 2040. Without the change in women’s state pension age, the population of pensionable age would have risen to 14.2 million by 2021, eventually reaching 17 million.

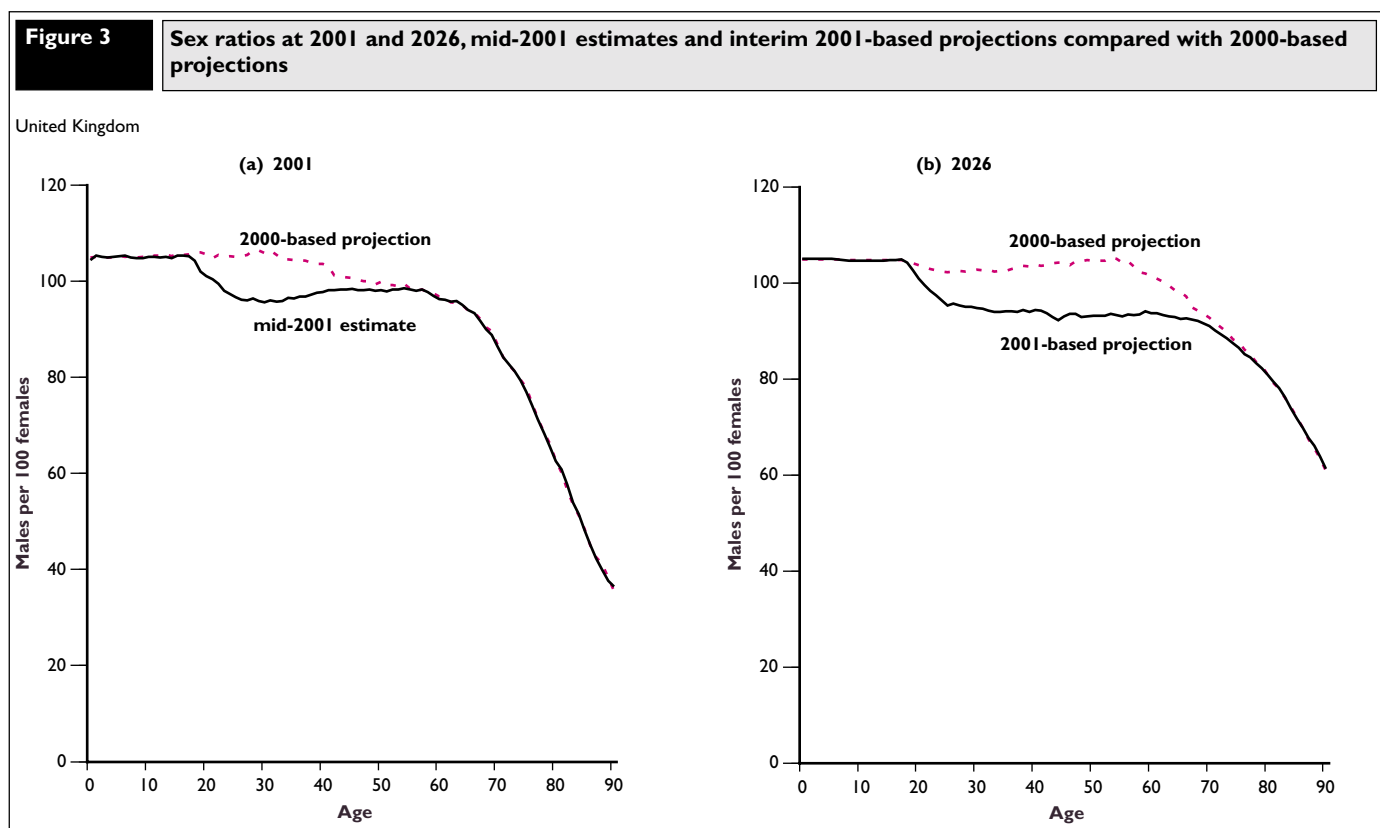
In 2001, there were just over one million more children aged under 16 than people of state pensionable age. However, as a result of these changes, from 2007 the population of state pensionable age is projected to exceed the number of children and by 2026 is projected to exceed it by nearly 2 million.

Comparison with 2000-based projections

The population at 2026 by age and sex from the interim 2001-based projections is compared with that from the 2000-based projections in Figure 1b. (Again, similar charts for the individual countries of the UK can be found on the GAD website.) Many of the key features of this analysis follow from the comparison of the mid-2001 base population with the 2000-based projection of the population at mid-2001 in Figure 1a. A similar comparison of sex ratios in 2001 and 2026 from the 2000-based and interim 2001-based projections is given in Figure 3.

The results for 2026 clearly depend on the assumptions made about the age distribution of future migrants, which is a particularly uncertain aspect of the projection process at the present time. Normally, migrant age distributions for projection purposes are derived directly from the same data sources used to derive estimates of total migration flows. However, as noted above, these data sources have overestimated net migration in total. Also this past overestimation of net migration has not been uniform across the population, but has been concentrated amongst males aged 20 to 39.

Therefore, for the purposes of these interim projections, GAD calculated an age and sex distribution for the total ‘net migration adjustment’ mentioned above. This was calculated so that, when combined with the age distributions obtained from the other migration data sources, projected sex ratios at young ages (roughly up to the late 20s) in future years would be broadly similar to those observed in the 2001 Census. Implicitly, the assumption being made is that the migration trends which have brought about the present age and sex structure of the population at younger ages will continue unchanged.



A further consequence of the assumed age and sex distributions is that, simply because of population ageing, the lower sex ratios will spread progressively to older ages. So, the Census results showed that current sex ratios are significantly lower than previously thought between ages 20 to 40, but Figure 3 shows lower ratios than previously projected up to age 65 by the year 2026.

Revised estimates of migration by age for previous years will become available later in 2003. These will provide a stronger basis for the migrant age distributions to be applied in future projections. In general, important areas for future research will be to investigate whether the gender differentials in migration revealed by the Census are likely to continue and to what extent males (in particular) who leave the country at young ages may be likely to return at older ages.

However, despite these uncertainties about the future age and sex distribution of migrants and their impact on future sex ratios, projected long-term trends in broad age groups are not significantly different from previous projections, as illustrated by Figure 4. This shows that the broad outlook of children and young adults accounting for an increasing lower share of the total population, and the pensionable age population for a correspondingly higher share, has not altered.

DEPENDENCY RATIOS

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.

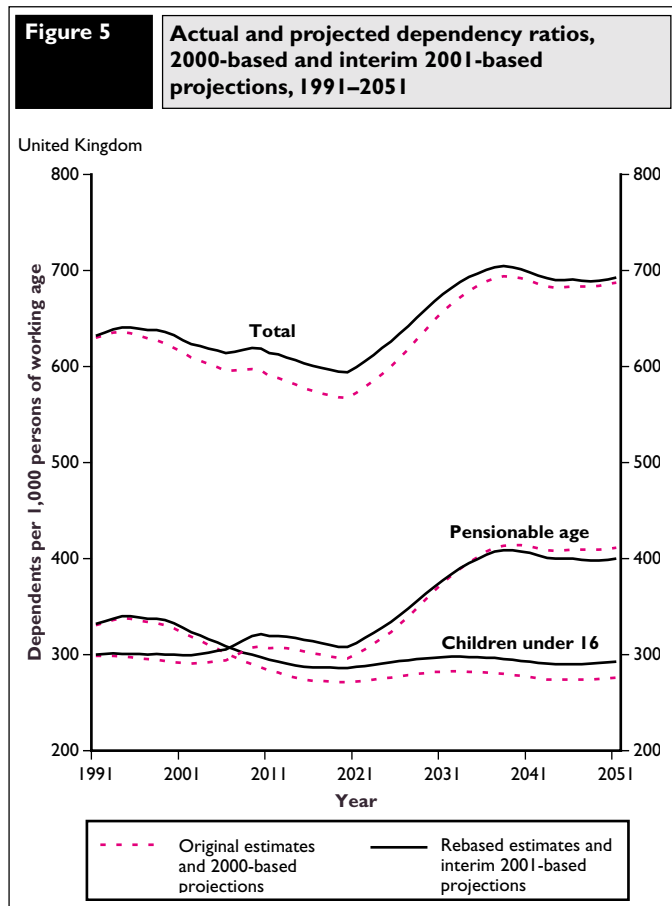
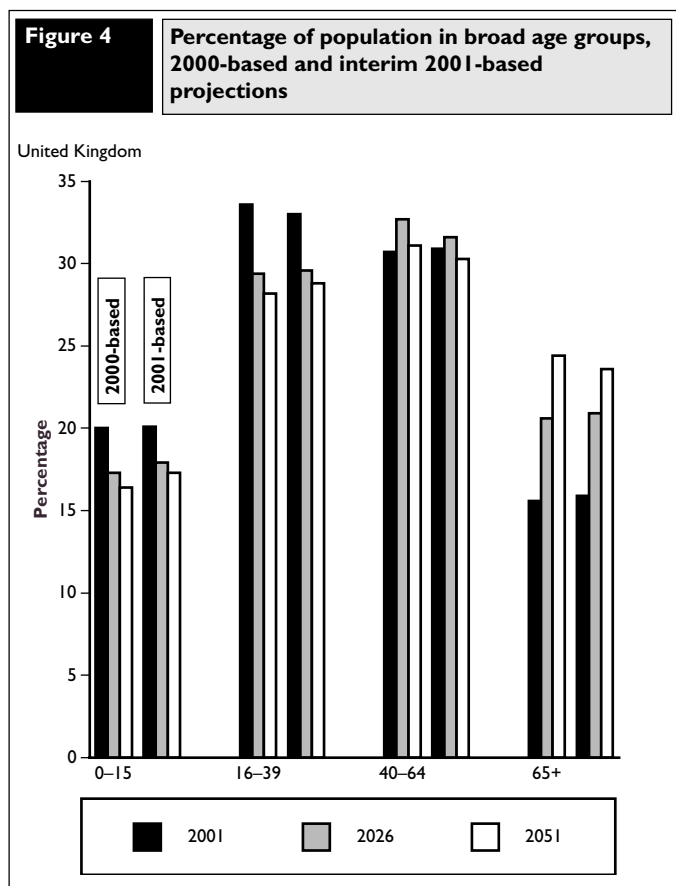
The total dependency ratio will fall gradually from 627 dependants per 1,000 persons of working age in 2001 to just under 600 per 1,000 in 2020 when the increase in women’s state pension age is complete. It will then increase rapidly, with longer-term projections suggesting a levelling off at around 700 per 1,000 from the mid 2030s. However, this would still be slightly lower than the ratio in the early 1970s, although then it was children who comprised the majority of dependants. Of course, without the planned change in women’s state pension age, the proportion of dependants would rise earlier and further.

Figure 5 also shows how these dependency ratios differ from those previously estimated and projected. As the reduction in the base population is concentrated amongst those of working age, the effect is that the current total dependency ratio and that projected for the short and medium-term has been slightly increased. In the longer-term, the differential gradually reduces.

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 the national population projections made during the 1970s and 1980s was published in *Population Trends* 77.¹¹

Another way of illustrating uncertainty is by preparing variant projections based on alternative assumptions of future fertility, mortality and migration. For the 2000-based projections, GAD



produced the most extensive set of official variant projections ever published in the United Kingdom.¹² For the first time, this included variant projections at individual country level in addition to UK level variants. It is likely that a similar range of variants will be published for the 2002-based projections. However, for the interim 2001-based projections, only 'standard' high and low variants for each of the three components of population change at UK level are available. Full details of these variants are available on the GAD website.

Compared with the principal projection assumptions, the fertility variants assume long term family sizes of ± 0.2 children per woman. Projected life expectancy at birth at 2026 differs by about ± 1.5 years from the principal projection for males and by about ± 1 year for females. These fertility and mortality assumptions are unchanged from those used for the 2000-based variants. (Although, of course, the projected population numbers in the resulting variants differ from the corresponding 2000-based versions because of the reduced base population and the revised principal net migration assumption.)

The high and low migration assumptions have been reduced in line with the reduction in the principal assumption. The assumed high and low long-term annual net inflows are now +160,000 and +40,000 respectively. As with the fertility and mortality variants, these assumptions are intended as plausible alternative scenarios and *not* as upper or lower limits for what might occur in the future.

Figure 6 shows the projected total population under these alternative assumptions. It is clear 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 2026 differs from the principal projection by around ± 2 million (± 3 per cent). The uncertainty widens with time and by 2071, the total

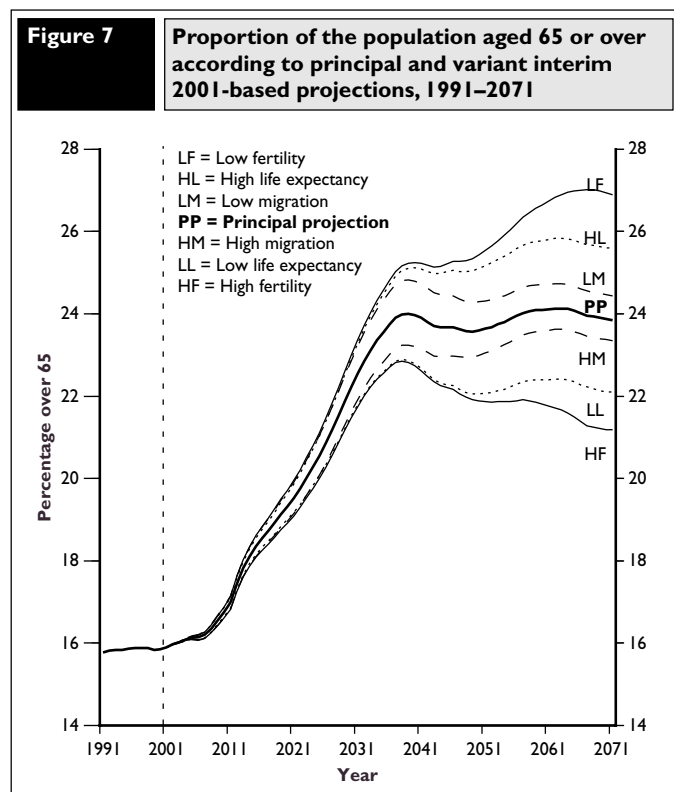
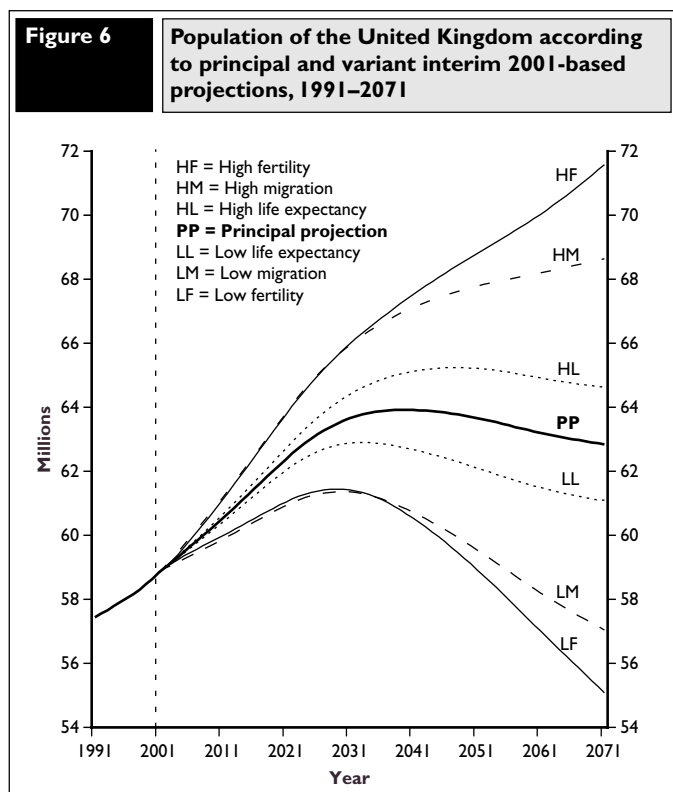
population under the high and low fertility assumptions differs by about ± 8 million (13 per cent) from the principal projection. Figure 6 also shows that future population decline is not inevitable. Indeed, previous work has shown that a long-term family size of 2.0 children per woman coupled with net migration of 100,000 per year, for example, would lead to continuing population growth throughout the 21st century.¹³

However, while population decline is not inevitable, Figure 7 demonstrates that population ageing will occur under any plausible set of future assumptions. In 2001, some 16 per cent of the population were aged 65 and over. But, although higher fertility levels would reduce population ageing, even the high fertility variant in the interim 2001-based projections produces an increase in the proportion aged 65 and over to over 20 per cent by 2026 and to nearly 22 per cent by 2051. And in the low fertility or high life expectancy variants, the proportion aged 65 and over would be above one in four by 2051.

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 interim 2001-based national population projections for the United Kingdom and constituent countries are available on the GAD website www.gad.gov.uk.



Key findings

- The United Kingdom population is projected to increase gradually from an estimated 58.8 million in 2001 to over 63 million by 2026, equivalent to an average annual rate of growth of 0.28 per cent. Longer-term projections suggest the population will peak around 2040 at nearly 64 million and then gradually start to fall.
- The projected total population of the United Kingdom in 2026 is about 1.8 million (2.8 per cent) lower than in the previous (2000-based) projections. This is a consequence of the base population in the previous projections having been an overestimate, together with the effect of a reduced assumption of future net inward migration.
- The population of Scotland is projected to continue to decline slowly from 2001, while the populations of Wales and Northern Ireland are projected to peak in around twenty-five years' time and then start to fall. The population of England is still projected to be increasing in forty years' time but at a low rate of growth.
- Almost 60 per cent of the projected 4.3 million increase in the UK population between 2001 and 2026 is attributable to the assumed level of net inward migration. The remainder is due to projected natural increase (more births than deaths).
- The population will gradually become older with the mean age projected to rise from 39.1 years in 2001 to 42.4 years in 2026.
- 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 over 10.5 per cent from 10.8 million in 2001 to 12.0 million in 2011. Allowing for the change in women's state pension age, the population of pensionable age will rise only slightly further (to 12.2 million) by 2021. However, a faster increase will then resume with longer-term projections suggesting the number over pensionable age will peak at over 15 million around 2040.

REFERENCES

1. Office for National Statistics/Government Actuary's Department (2002). *National population projections: 2000-based*. ONS Series PP2 no.23. TSO: London.
2. *The Big Number*. National Statistics News Release (30 September 2002).
3. Steady growth: 1.4 million increase in decade to 2001 www.statistics.gov.uk/cci/nugget.asp?id=6 (February 2003).
4. Implications of the 2001 Census results: Why the Census shows fewer men. Available from www.statistics.gov.uk/census2001/implications.asp
5. *International migration 2001 – interim estimates*. National Statistics News Release (28 November 2002).
6. Revised mid-1982 to mid-2000 population estimates are available from the National Statistics website at www.statistics.gov.uk/statbase/Product.asp?vlnk=601
7. Available from the National Statistics website at www.statistics.gov.uk/statbase/Product.asp?vlnk=601
8. Shaw C (2002) 2000-based national population projections for the United Kingdom and its constituent countries. *Population Trends* **107**, pp. 5–13.
9. For further details of how this adjustment was calculated see www.gad.gov.uk/Population/2001/migradj.htm.
10. Pensions Act 1995. Chapter 26 Part II, Section 126 and Schedule 4.
11. Shaw C (1994) Accuracy and uncertainty of national population projections for the United Kingdom. *Population Trends* **77**, pp. 24–32.
12. Shaw C (2002) Variant population projections for the United Kingdom and its constituent countries. *Population Trends* **109**, pp. 15–26.
13. Shaw C (2001) United Kingdom population trends in the 21st century. *Population Trends* **103**, pp. 37–46.