REGISTRAR GENERAL FOR SCOTLAND

Projected Population of Scotland (2004-based)

A National Statistics publication

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Main Points

The key points in this report are:

- the population of Scotland is projected to rise, peaking at just over 5.1 million in 2019 and then slowly declining, falling below 5 million in 2036 and reaching 4.86 million by 2044;

- the number of children aged under 16 is projected to decrease by 15 per cent from 0.94 million in 2004 to 0.79 million by 2031;

- the number of people of working age[1] is projected to fall by 7 per cent from 3.18 million in 2004 to 2.96 million in 2031;

- the number of people of pensionable age[1] is projected to rise by 35 per cent from 0.97 million in 2004 to 1.31 million in 2031;

- the number of people aged 75 and over is projected to rise by 75 per cent from 0.37 million in 2004 to 0.65 million by 2031;

- while Scotland's population is projected to fall from 2019, the populations of the other three countries in the UK are projected to rise to 2031, and continue rising except for Northern Ireland where the population is projected to peak in 2033 and then slowly decline;

- Italy, Germany and seven of the new accession states in eastern Europe are amongst the countries with a projected population decline which exceeds Scotland's over the next 40 years.

[1] Note that between 2010 and 2020 the pensionable age for women rises from 60 to 65, and the figures take account of this.

1. Background

1.1 The Government Actuary's Department (GAD) on behalf of the Registrars General, prepares the population projections for the United Kingdom and its constituent countries. This paper presents the main results of the latest, 2004-based, projection for Scotland, and outlines the fertility, mortality and migration assumptions used in its preparation.

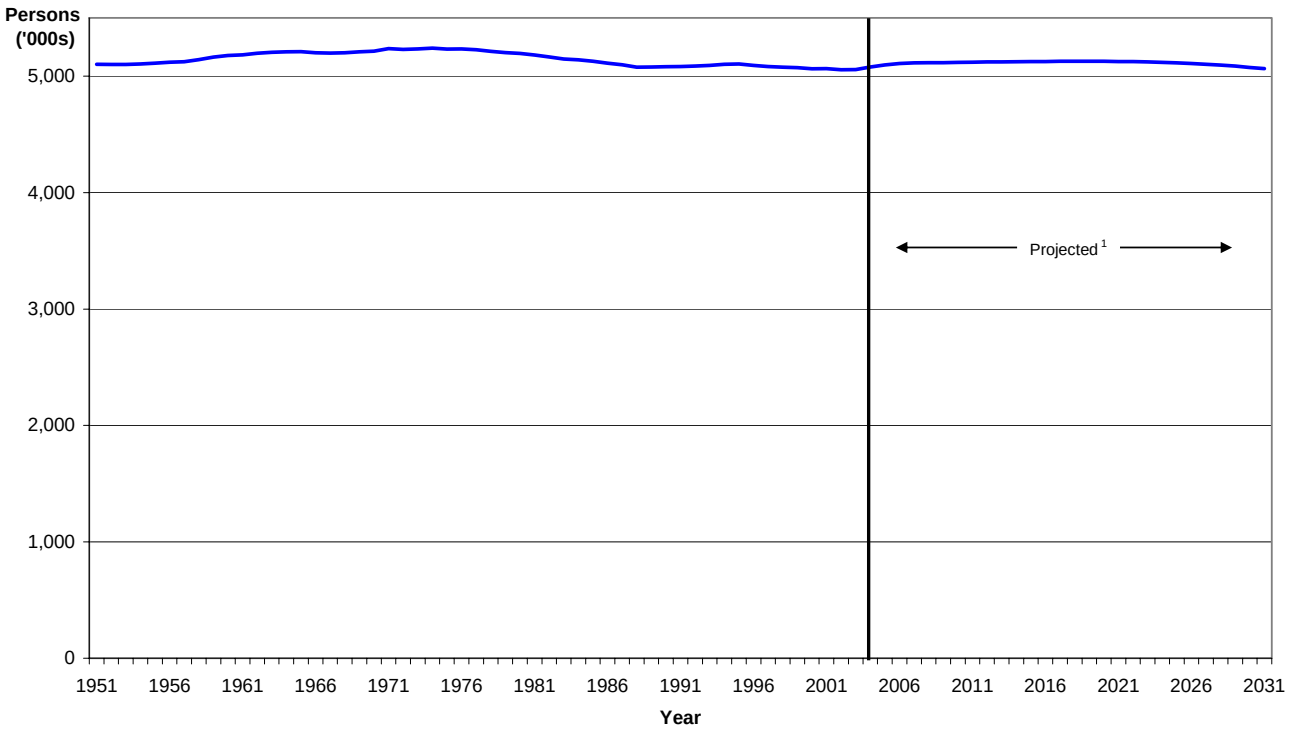
1.2 The results in this paper concentrate on the period up to 2031, although for the first time GAD are making available projections up to 2074. However, projections this far ahead become increasingly more uncertain the further ahead they go because assumptions are being made, in some cases, about the behaviour of people who have not yet been born.

1.3 As well as producing the main "principal" projection GAD also usually produce "variant" projections using alternative plausible assumptions. At the time this paper was written (20 October 2005) GAD had published seven variant projections on their website. Additional variants will follow in November 2005. More information on the variant projections is given in section 7.

2. Summary of results

2.1 The results of this new set of projections, summarised in **Table 1** and illustrated in **Figure 1**, show the total population of Scotland rising from 5.08 million in 2004 to 5.13 million in 2019 before falling to 5.07 million by 2031. Longer term projections for up to 40 years ahead show a continuing decline after 2031 to 4.86 million in 2044. The point at which Scotland's population is projected to fall below 5 million is now 2036 rather than 2017. It should be stressed that the precise point at which the population reaches a particular level can be very sensitive to relatively small changes in the underlying assumptions, and should therefore be treated with caution. A key point is that despite the projected rise in the size of the population over the next 15 years Scotland's population is still projected to age markedly.

Figure 1 Estimated population of Scotland, actual and projected, 1951-2031



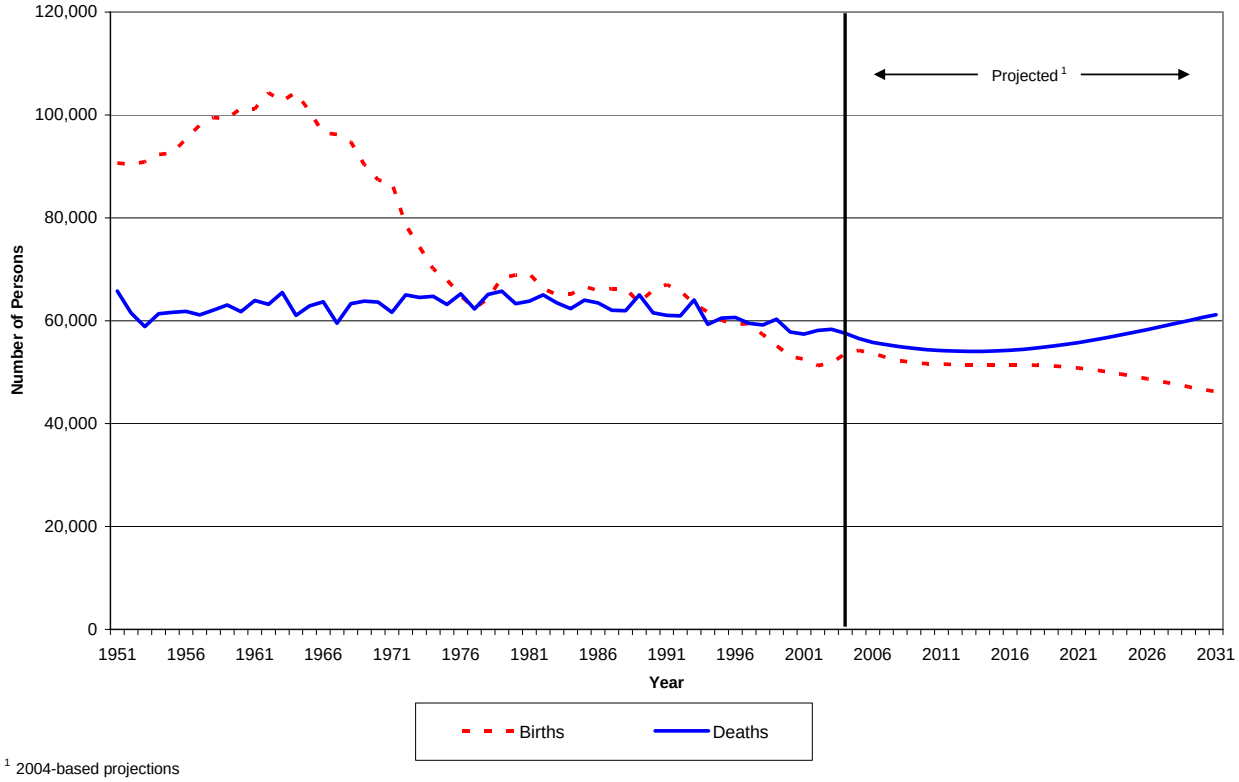
[1] 2004-based projection.

2.2 **Table 2** provides information on the projected components of change between 2004 and 2031. It is clear from this table that the most significant factor affecting future projected ***levels*** of the population to around 2021 is migration. This is because the natural decrease (where the number of deaths exceeds the number of births) is assumed to be offset by more migrants moving to Scotland. However, after 2021 the most significant factor affecting the ***level*** of the population is the natural decrease.

2.3 In the first years of the projection, **Figure 2** shows that the number of births is projected to rise very slightly before declining, levelling off in 2010 for about 6 years before continuing to decline. Despite small increases in recent years, the number of births has been falling since the early 1980s. Continued low birth rates lead to a lower number of women passing through child bearing ages in the next generation. This further contributes to lower numbers of births in the future.

2.4 **Figure 2** also shows that the number of deaths is projected to decrease slightly, levelling off in 2008 before increasing back to the levels experienced in the early 1990s by 2031. The reason for the rise is because there will be more old people in 2031 rather than an increase in mortality rates.

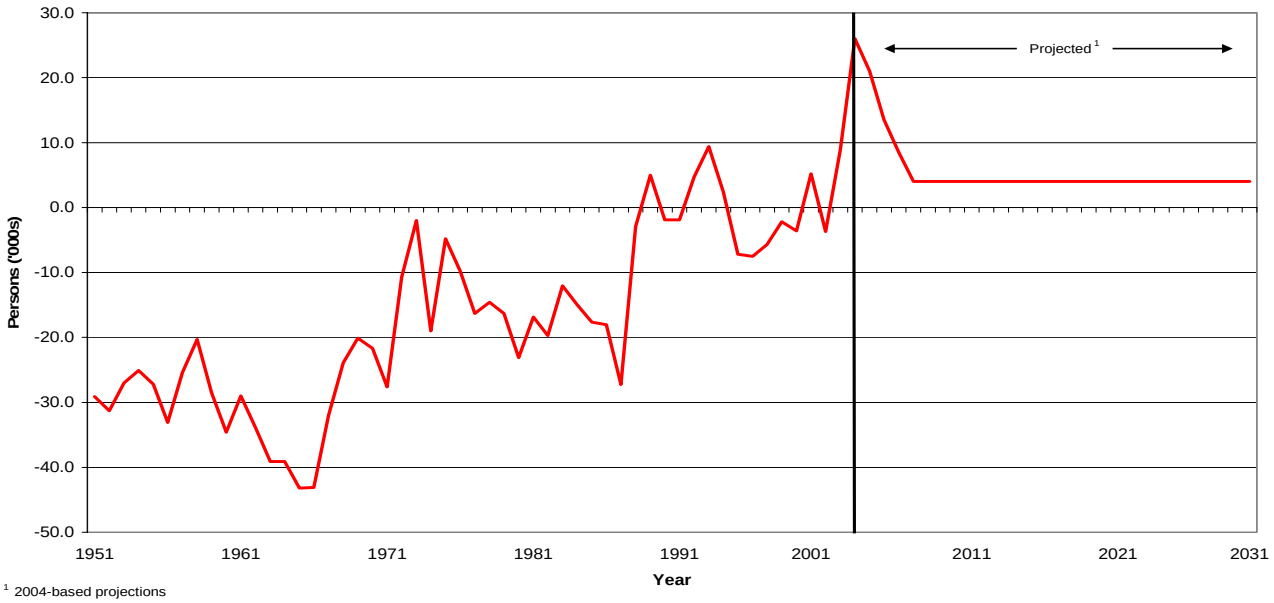
Figure 2 Births and deaths, actual and projected, Scotland, 1951-2031



[1] 2004-based projections

2.5 **Figure 3** illustrates that in the short-term it is assumed that there will be a net inflow of 21,000 migrants to Scotland in 2004-2005, 13,500 in 2005-2006 and 8,500 in 2006-2007 before the level drops to an assumed net inflow of 4,000 for the rest of the projection period. This reflects recent increases in the number of people migrating to Scotland, after many years when net out-migration was the norm. More detailed information on the fertility, mortality and migration assumptions leading to these results is given in section 3 and **Annexes A, B and C**.

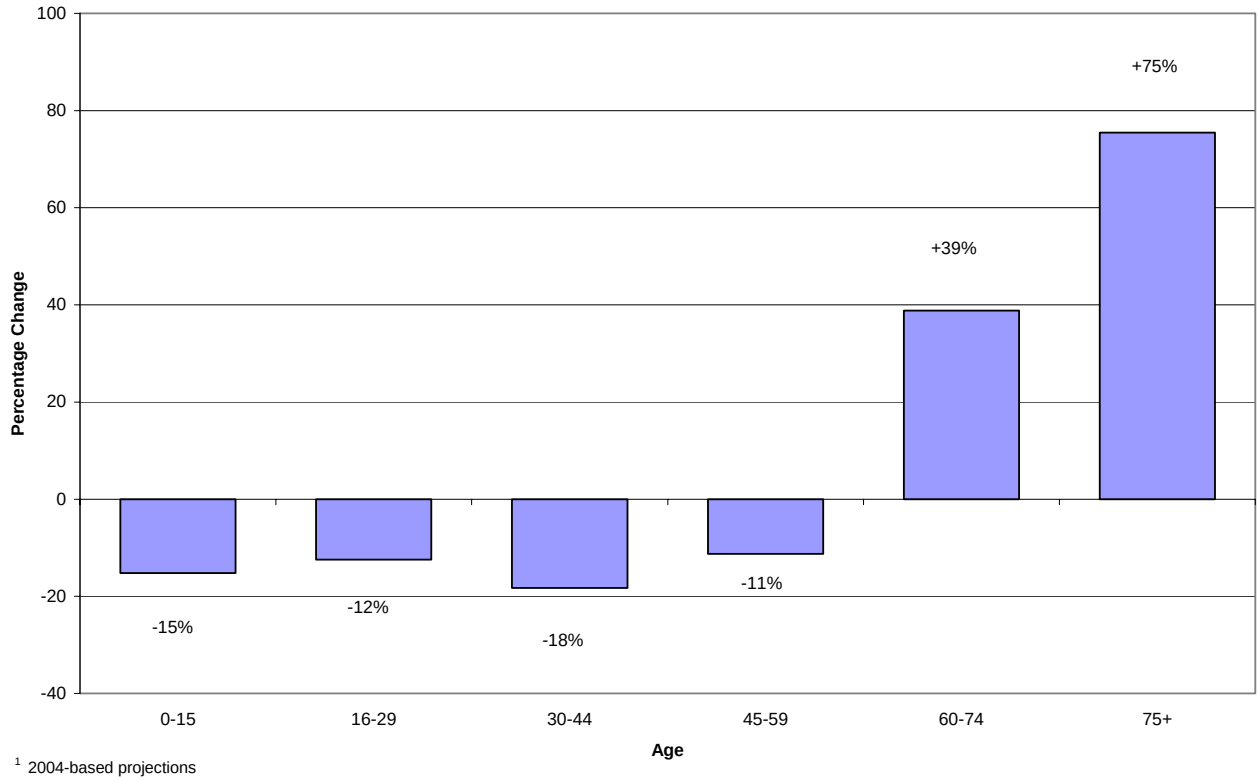
Figure 3 Estimated and projected net migration, Scotland, 1951-2031



[1] 2004-based projections

2.6 A summary of projected populations by broad age groups is given in **Table 3**; projected populations by sex and five year age groups are given in **Table 6**. These tables and **Figure 4** show that the age structure of the population is projected to change markedly between 2004 and 2031.

Figure 4 The projected percentage change in age structure of Scotland's population, 2004-2031[1]



[1] 2004-based projections

2.7 The main changes in the age structure of Scotland's population are:

- the number of children aged under 16 is projected to decrease by 15 per cent from 0.94 million in 2004 to 0.79 million by 2031;
- the number of people of working age is projected to fall by 7 per cent from 3.18 million in 2004 to 2.96 million in 2031;
- the number of people of pensionable age is projected to rise by 35 per cent from 0.97 million in 2004 to 1.31 million in 2031;
- the number of people aged 75 and over is projected to rise by 75 per cent from 0.37 million in 2004 to 0.65 million by 2031 (this is in part due to the baby boomers after the Second World War entering their early eighties by 2031 and the effect of improved mortality rates.) ;
- the population of males aged 65 and over is projected to increase by just over 70 per cent by 2031, whilst for females the corresponding increase is just under 50 per cent;
- the average age of the population is projected to rise from around 40 at the present time to just over 45 by 2031.

2.8 A useful summary measure of the age structure of a population is the dependency ratio - the ratio of persons aged under 16 or over pensionable age to those of working age. **Table 4** shows that the dependency ratio is projected to remain around 60 per 100 from 2004 to 2021. It is only after 2021, and the completion of the change to the state pension age, that the dependency ratio rises, to 71 per 100 working age population in 2031, and eventually to 75 in 2044.

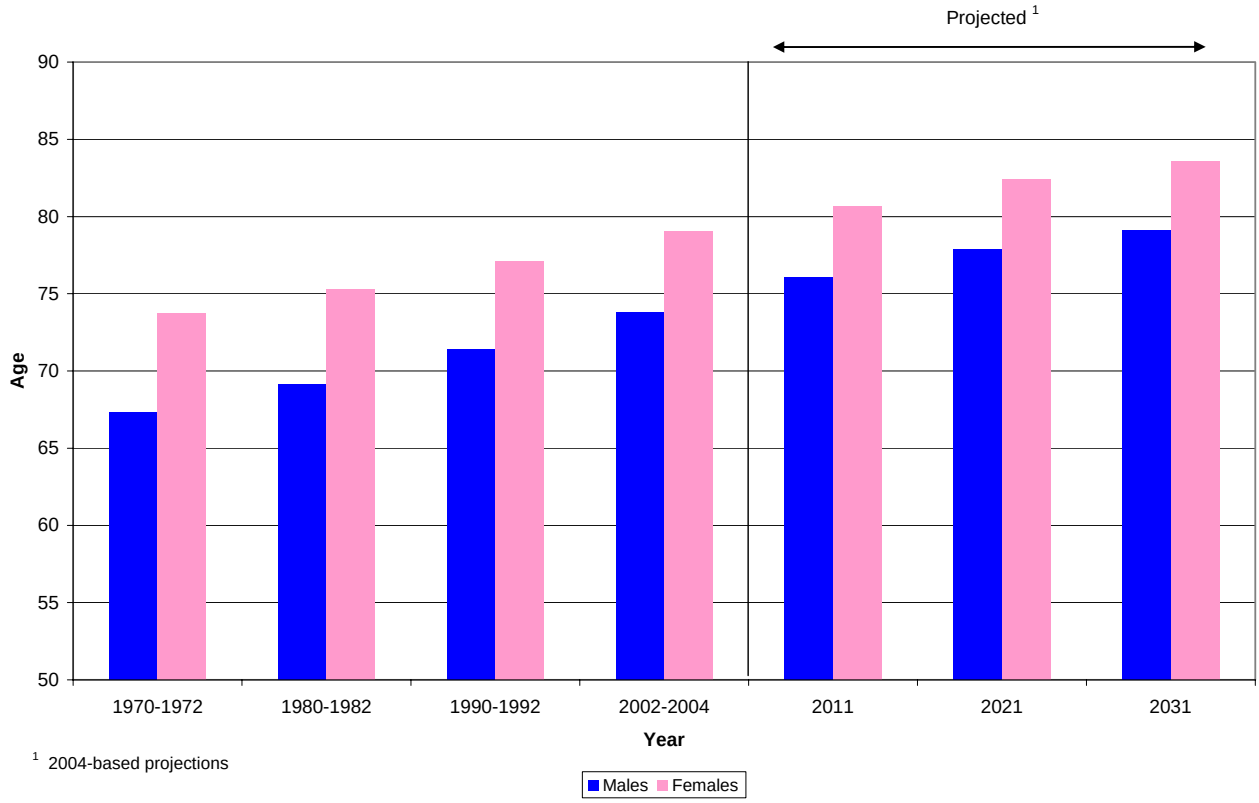
3. The base population and assumptions used in the projection

3.1 **The base population:** The projection is based on the Registrar General's population estimates for mid-2004. The population covered includes all persons usually resident in Scotland whatever their nationality. Members of HM and non-UK armed forces stationed in Scotland are included; HM forces stationed outside Scotland are excluded. Students are treated as being resident at their term-time address.

3.2 **Fertility:** The fertility rates used in the projection are based on assumptions about the average completed family size of successive cohorts of women. It has been assumed that the average completed family size will continue to decline from around 1.90 children per woman for those born in the late 1950s and now reaching the end of their childbearing lives, before levelling off at 1.60 for those born in the 1990s and later. A downward trend in the number of births is expected, to a projected level of about 46,000 by 2031. More details on the fertility assumptions are available in **Annex A**.

3.3 **Mortality:** Future improvements in mortality rates are based on the trend observed in the period 1961 to 2003. It is assumed that annual rates of reduction in mortality rates will tend towards a common reduction at each age of 1 percent a year by 2029. Thereafter the mortality improvement is assumed to continue at this rate (in contrast to the previous projections where it was assumed to half every subsequent twenty-five years). In line with the long-term trends, it has been assumed that the mortality rates for Scotland will continue to be higher at most ages than those for England & Wales. Based on these rates, expectations of life at birth are projected to increase from 73.8 in 2002-04 to 79.1 in 2030-31 for males; and from 79.1 in 2002-04 to 83.6 in 2030-31 for females as shown in **Figure 5**. More details on the mortality assumptions are available in **Annex B**.

Figure 5 Expectation of life at birth, Scotland, 1971-2031



[1] 2004-based projections

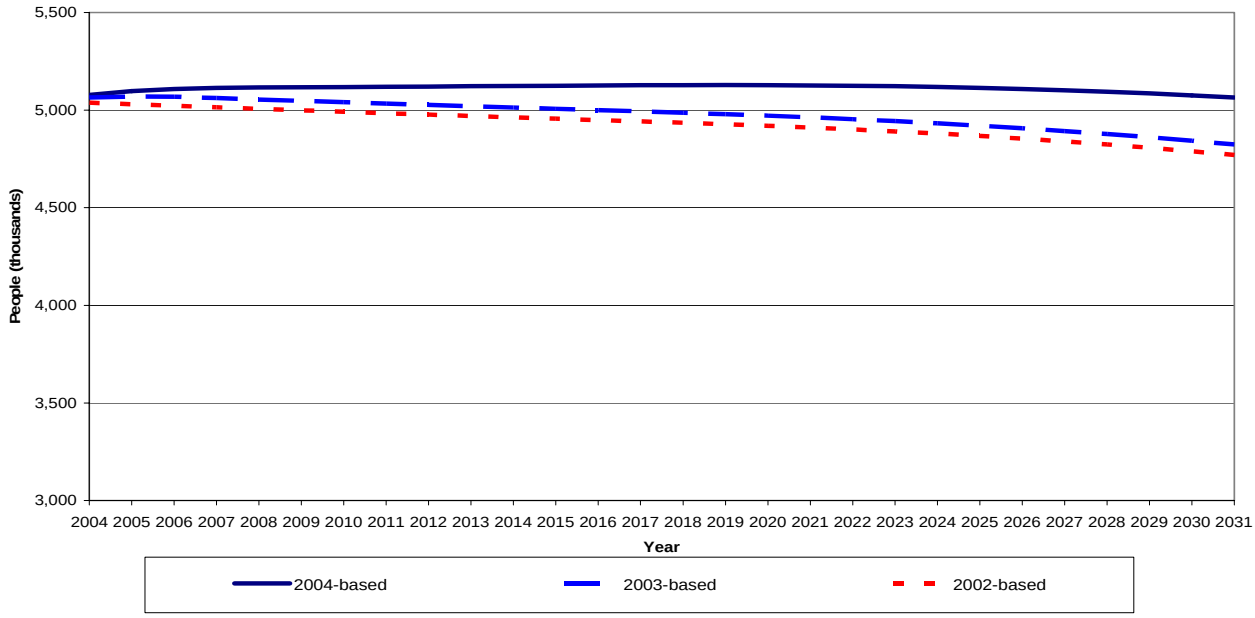
3.4 **Migration:** It is assumed that from 2008 onwards there will be a net inflow of 4,000 people per year to the end of the projection period, i.e. the total migration inflow is assumed to be greater than the total outflow. This assumption has been derived from analyses of trends in civilian migration to and from the United Kingdom as well as cross-border migration between the four constituent countries. In the first three years of the projection higher net inflows are assumed, reflecting recent trends as described in section 2.5. See **Annex C** for more details on the migration assumptions.

4. Comparison with previous projections

4.1 The last full set of projections were based on the mid-year population estimate for 2002 and the more recent interim set the 2003 mid-year estimate. The key changes from previously published projections in terms of births, deaths and total population are shown in **Table 5a, 5b and 5c** respectively**.** Section 4.4 looks at the differences in the migration assumptions between the projections. Note that national projections are usually produced every two years – the next set will be 2006-based and are due to be published in 2007.

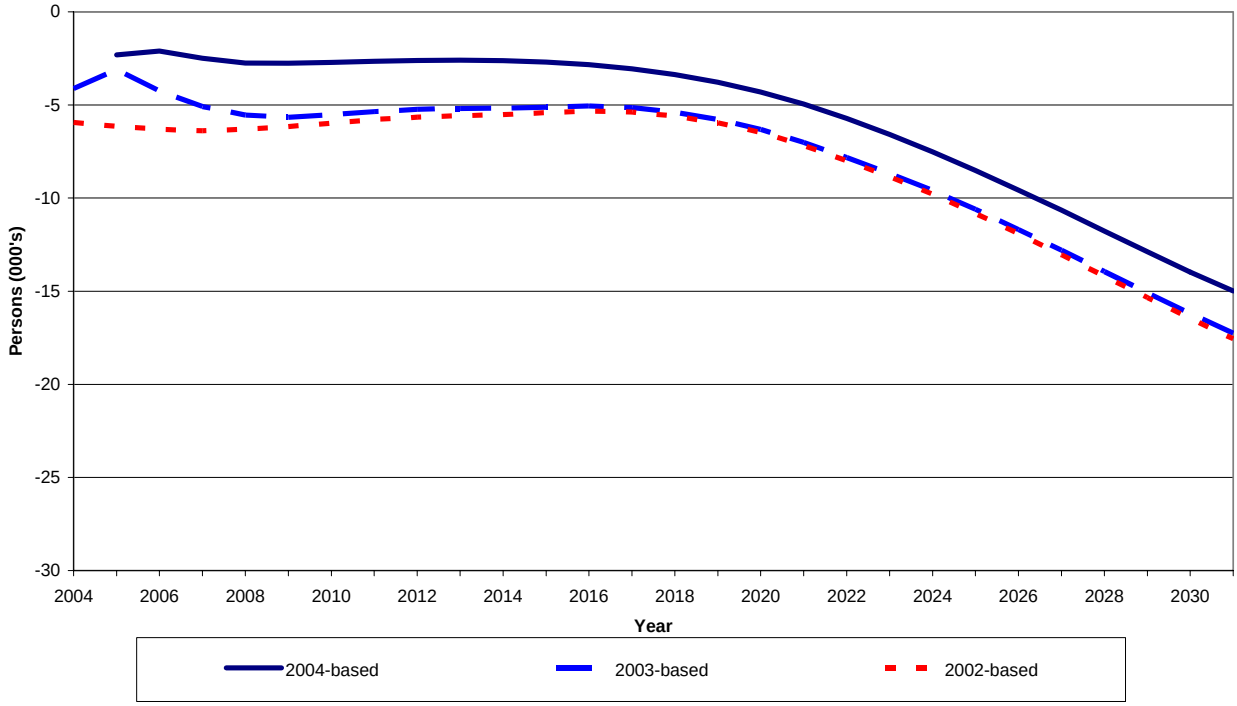
4.2 **Figure 6** compares the 2004-based projection with previous projections and shows that the level of the population under the latest projection is higher and that the decline has been deferred to the 2020s.

Figure 6 Projected total population compared with previous projections



4.3 The difference between the projections is due to the different assumptions made about fertility, mortality and migration. The natural change (the difference between the number of births and deaths) for the 2004-based projection compared with previous projections is shown in **Figure 7**. The number of births is projected to be slightly higher and the number of deaths is projected to be broadly similar to the 2002 and 2003-based projections resulting in a reduced natural decrease. More information on the reasons for the differences is given in section 3 and **Annexes A, B and C**.

Figure 7 Natural Change (Births minus Deaths) compared with previous projections, 2004-2031



4.4 The overall long-term migration assumption has been changed from the assumption used in the last full (2002 based projections) and interim 2003 national projections from –1,500 per annum, to +4,000 per annum:-

	2002/2003 based	2004-based
International migration	-1,500	+2,500
Internal migration	0	+1,500
Net migration	-1,500	+4,000

4.5 This increase in the assumption for the 2004-based projections compared with the 2 previous sets arises because the projections are trend based and more people migrated to Scotland from the rest of the UK and overseas in the last couple of years. This is described in the latest Registrar General's Annual Report available through the following link:

http://www.gro-scotland.gov.uk/statistics/library/annrep/index.html.

4.6 The tables below summarise the differences between the current 2004 and the interim 2003-based projections. The difference in results for the projected age structure of Scotland is small, but show slightly less people to be of pensionable age with an increase in the working age population in 2031. The projected number of dependents (both children and pensioners) per 100 of working age show a small decrease in 2031.

Projected age structure of Scotland's population

Age Group[1]	2003-based			2004-based	
	2004	2031		2004	2031
Children	18.4%	15.7%		18.4%	15.7%
Working age	62.5%	57.9%		62.5%	58.5%
Pension age	19.1%	26.5%		19.1%	25.8%

Projected number of dependents per 100 population of working age, Scotland

Age Group[1] (per 100 people of working age)	2003-based			2004-based	
	2004	2031		2004	2031
Children	29.5	27.0		29.5	26.8
Pensioners	30.5	45.8		30.5	44.2
All dependants	60.0	72.8		60.0	70.9

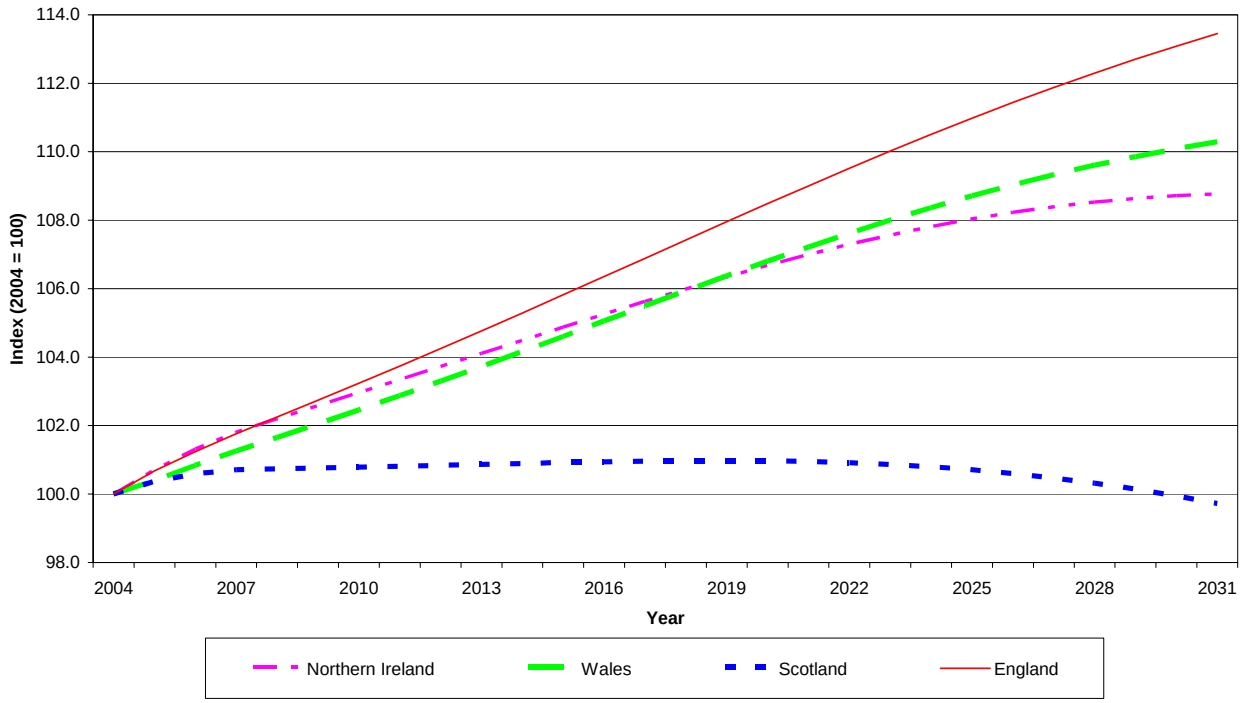
1. Children defined as under 16. Working age and pensionable age populations based on state pension age for given year. Between 2010 and 2020, state pension age will change from 65 years for men and 60 years for women, to 65 years for both sexes.

5. Scotland's position within the United Kingdom

5.1 The United Kingdom population is projected to increase gradually from an estimated 59.8 million in 2004, passing 60 million in 2005, to reach 67.0 million by 2031.

5.2 Due to differences in demographic patterns, projected trends differ for the four countries of the United Kingdom. While the population of Scotland is projected to rise, peaking in 2019 and then slowly decline, the populations of the other three countries in the UK are projected to rise to 2031, and continue rising except for Northern Ireland where the population is projected to peak in 2033 and then slowly decline. **Figure 8** illustrates the projected percentage change in the populations of the four countries from 2004 to 2031.

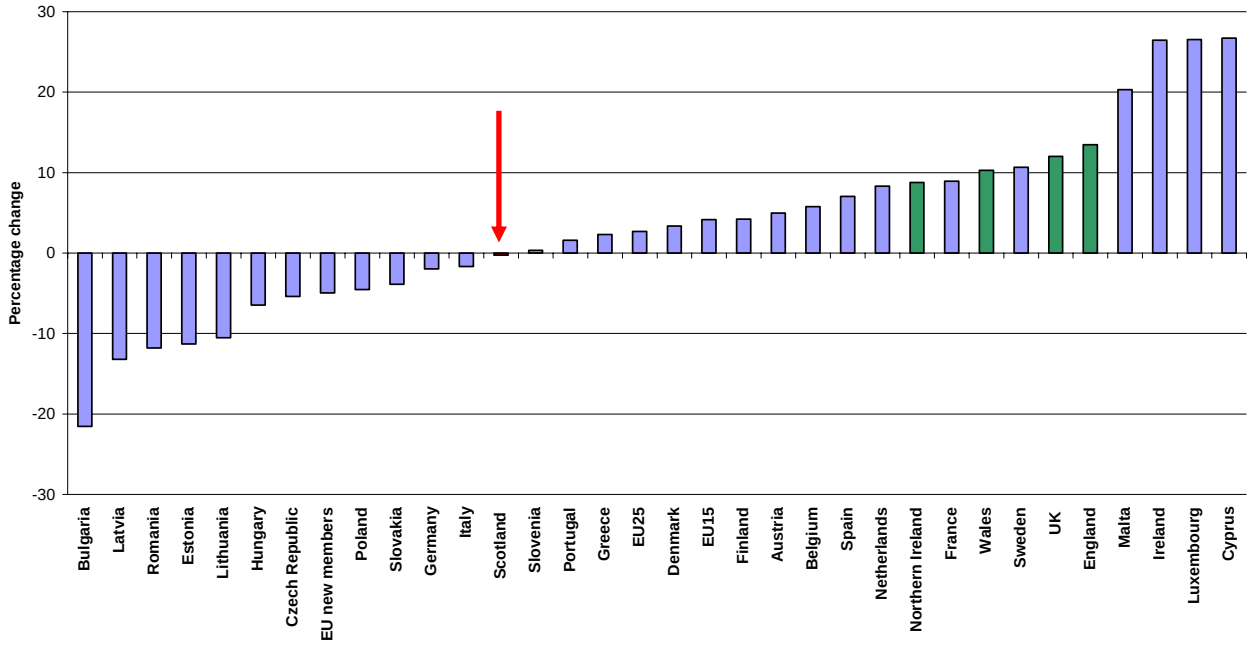
Figure 8 UK Nations index of population, 2004-2031



6. Scotland's position within Europe

6.1 Scotland is not alone in having a natural decrease in population (i.e. deaths exceeding births). But, for most of Europe, this is compensated by higher in-migration than in Scotland. The population of Europe (EU-25) is projected to increase (by 2.7 per cent between 2004 and 2031). Italy, Germany and seven of the new accession states in eastern Europe are amongst the countries with a projected population decline which exceeds Scotland's over the next 30 years, as **Figure 9** shows.

Figure 9 Projected Percentage Population Change in Selected European Countries, 2004-2031



Source: GAD (UK and constituent countries) and Eurostat. Note: Eurostat also produce an alternative UK projection not shown here.

6.2 Nor is the ageing of the population unique to Scotland. The pattern of change over the last twenty years is consistent with other countries in the UK and Europe, although the rate of change varies.

6.3 The Economic and Social Research Council (ESRC) recently announced a new two-year research initiative into aspects of Scotland's demographic trends. Funded in partnership with the Scottish Executive, this £300,000 research programme will investigate migration, as well as fertility and the impact of an ageing population. More information about the projects can be found on the ESRC website [http://www.esrc.ac.uk/ESRCInfoCentre/index.asp].

7. Long-term and variant projections

7.1 To address the increasing interest in longer term issues such as pensions and health care GAD has, for the first time, made available longer-term projections for Scotland to 2074. However, projections this far ahead become increasingly unreliable because assumptions are being made, in some cases, about the behaviour of people who have not yet been born. Hence, GAD as well as producing a "principal" population projection, also produce a number of "variant" projections, based on alternative assumptions of future fertility, mortality and migration.

7.2 The variants are produced because of the inherent uncertainty of demographic behaviour, to give users an indication of this uncertainty, especially for the long-term projections to 2074. The purpose is to illustrate plausible alternative scenarios and not to represent upper or lower limits for future demographic behaviour. These projections are simply 'scenarios' (the certain outcome of a given set of assumptions), rather than forecasts of the most likely course of future events. At the date this report was written GAD had made available only the six high/low variants and the variant on "zero migration". Additional variants will be published on GAD's website in November 2005. **Annex D** gives more information about these variants and the assumptions used.

7.3 Under these alternative, but still plausible, fertility, mortality and migration assumptions, the population at 2031 differs from the principal projection by around up to ± 0.3 million. The uncertainity widens with time - by 2044 it has increased to ± 0.4 million, with further increases to ± 0.8 million by 2074 highlighting the unreliability of projections this far ahead.

7.4 However, **Figures 10 and 11** illustrate clearly that, despite increasing uncertainty the further one goes into the future about the size of the population, the average ***age*** of Scotland's population increases under any plausible assumptions. In addition, **Figure 12**, shows that the dependency ratio for the number of dependents to 100 people of working age will rise significantly under the principal and also all the variant projections after the change in womens state pension age is complete in 2020.

Figure 10 Actual and projected total population Scotland, under the 2004-based principal and selected variant projections,1981-2074

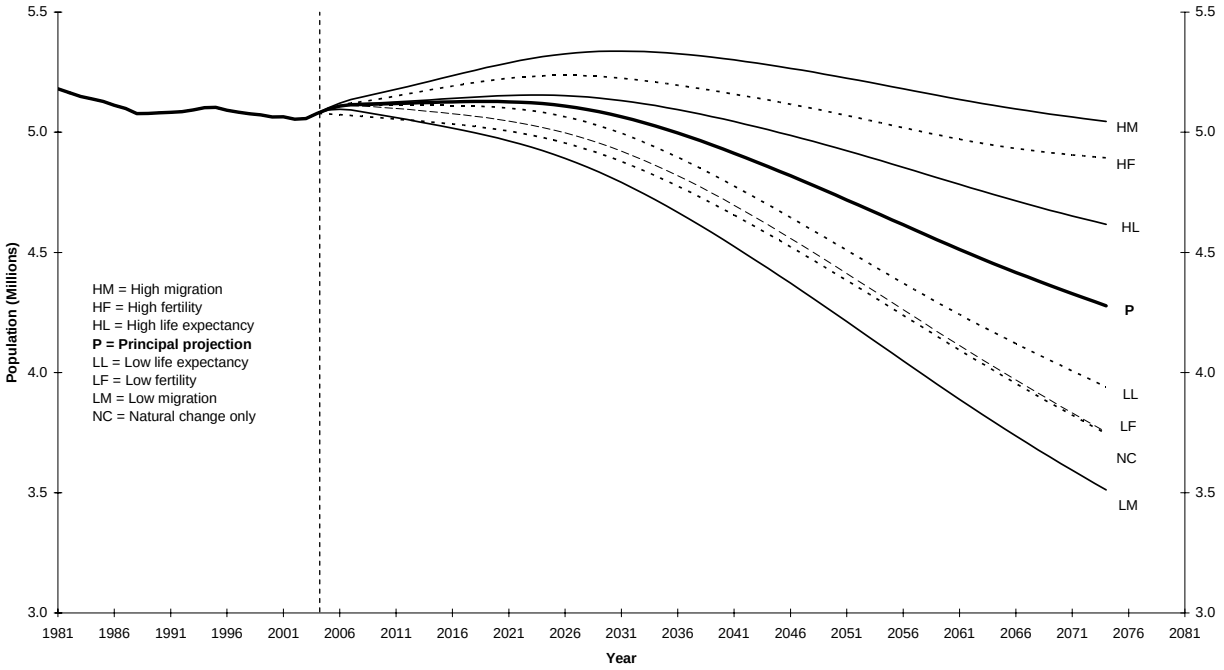


Figure 11 Average age of Scotland's population under the 2004-based prinicpal and selected variant projections, 2004-2031

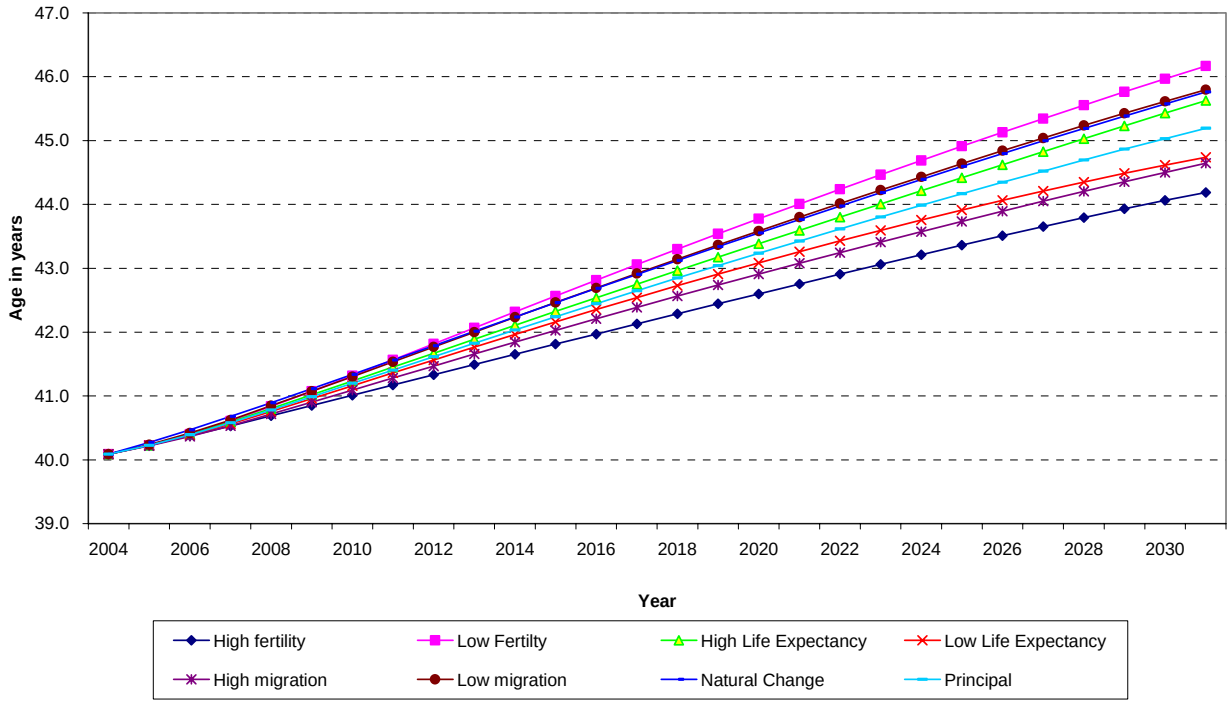
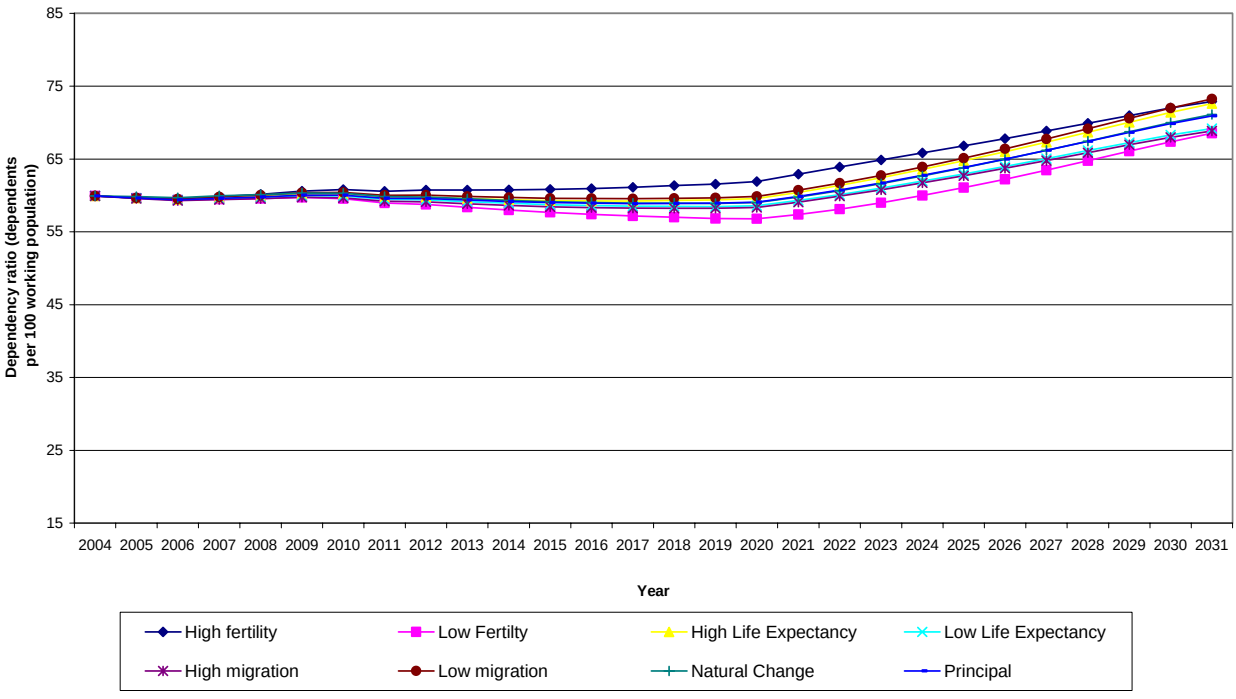


Figure 12 Dependency Ratios (dependents per 100 working population) under the 2004-based principal and selected variant projections, 2004-2031



8. Further information

Corresponding data for the United Kingdom and its constituent countries along with detailed information on the assumptions which are made is available from the Government Actuary's Department website (www.gad.gov.uk) or by contacting GAD at:

Government Actuary's Department
Finlaison House
15-17 Furnival Street
London EC4A 1AB

Tel: 020 7211 2622
Fax: 020 7211 2660
E-mail: projections@gad.gov.uk

More detailed age and sex breakdowns of the Scottish results are available from GROS customer services or from the GAD web site (www.gad.gov.uk). The next set of sub-national projections for Scotland will be released on 20 December 2005. These will be consistent with the latest 2004-based projection for Scotland. Further details can be obtained from:

Customer Services
General Register Office for Scotland
Census Analysis and Dissemination Branch
Ladywell House
Ladywell Road
EDINBURGH EH12 7TF

Telephone 0131 314 4243
Facsimile 0131 314 4696
E-mail: customer@gro-scotland.gsi.gov.uk

Summary tables: detailed results are available on GAD's website: www.gad.gov.uk

Table 1 **Projected population of Scotland (2004-based): 2004-2044** **('000s)**

								Longer term projections	
	2004 (base)	**2006**	**2011**	**2016**	**2021**	**2026**	**2031**	**2036**	**2044**
All Ages	5,078	5,108	5,120	5,126	5,127	5,109	5,065	4,997	4,857

Table 2 **Projected components of population change, Scotland: 2004-2031, (annual averages)** **('000s)**

	2004 -2006	**2006 -2011**	**2011 -2016**	**2016 -2021**	**2021 -2026**	**2026 -2031**
Population at start	**5,078**	**5,108**	**5,120**	**5,126**	**5,127**	**5,109**
Births	54	52	51	51	50	47
Deaths	56	55	54	55	57	60
Natural change	-2	-3	-3	-4	-8	-13
Migration	17	5	4	4	4	4
Population at end	**5,108**	**5,120**	**5,126**	**5,127**	**5,109**	**5,065**
Total change	15	2	1	0	-4	-9

Note: Not all figures will sum due to rounding.

Table 3 **Projected population of Scotland (2004-based), by age group: 2004-2031** **('000s)**

Age group	**2004 (base)**	**2006**	**2011**	**2016**	**2021**	**2026**	**2031**
All ages	**5,078**	**5,108**	**5,120**	**5,126**	**5,127**	**5,109**	**5,065**
Children under 16	**935**	**919**	**865**	**838**	**828**	**814**	**793**
Working ages							
16-64/59[1]	**3,175**	**3,205**	**3,208**	**3,225**	**3,207**	**3,096**	**2,963**
16-29	881	907	926	896	837	793	772
30-44	1,140	1,107	1,003	940	956	966	932
45-64/59[1]	1,154	1,192	1,279	1,389	1,414	1,337	1,260
Pensionable ages							
65/60[1]& over	**968**	**985**	**1,047**	**1,063**	**1,092**	**1,198**	**1,308**
65/60[1] - 74	596	602	631	606	581	603	657
75 & over	371	383	415	458	511	595	652

[1] Pensionable age is 65 for men, 60 for women until 2010; between 2010 and 2020 pensionable age for women increases to 65.

Note: Not all figures will sum due to rounding.

Table 4	Projected number of dependants per 100 population of working age Scotland: 2004-2031						
Age group	2004 (base)	2006	2011	2016	2021	2026	2031
All dependants	**60**	**59**	**60**	**59**	**60**	**65**	**71**
Children under 16	29	29	27	26	26	26	27
Pensionable ages 65/60[1] & over	30	31	33	33	34	39	44
65/60[1] - 74	18	19	20	19	18	20	22
75 & over	12	12	13	14	16	19	22

[1] Pensionable age is 65 for men, 60 for women until 2010; between 2010 and 2020 pensionable age for women increases to 65.

Note: Not all figures will sum due to rounding.

Table 5a	Projected number of births (2004-based), Scotland: 2004-2031						
	2004-05	2005-06	2010-11	2015-16	2020-21	2025-26	2030-31
2004 based	54,224	53,671	51,540	51,434	50,819	48,712	46,208
2003 based	53,074	51,446	48,818	49,260	48,751	46,449	43,553
2002 based	49,961	49,271	48,209	48,769	48,341	45,906	42,888

Table 5b	Projected number of deaths (2004 based), Scotland: 2004-2031						
	2004-05	2005-06	2010-11	2015-16	2020-21	2025-26	2030-31
2004 based	56,540	55,783	54,199	54,277	55,766	58,286	61,196
2003 based	56,182	55,697	54,174	53,090	55,772	58,140	60,811
2002 based	56,115	55,577	53,997	54,094	55,517	57,817	60,440

Table 5c	Projected population (2004 based), Scotland: 2004-2031						('000s)
	2004	2006	2011	2016	2021	2026	2031
2004 based	5,078	5,108	5,120	5,126	5,127	5,109	5,065
2003 based	5,065	5,068	5,034	5,000	4,963	4,907	4,825
2002 based	5,038	5,022	4,984	4,949	4,911	4,854	4,770

Table 6			Projected population of Scotland (2004-based), by sex and age group 2004-2031						('000s)
Age	Sex	Estimated population	Projected population at 30 June						
		30 June 2004	2006	2011	2016	2021	2026	2031
All ages	**Persons**	**5,078**	**5,108**	**5,120**	**5,126**	**5,127**	**5,109**	**5,065**
	Males	**2,446**	**2,463**	**2,470**	**2,473**	**2,471**	**2,457**	**2,429**
	Females	**2,632**	**2,646**	**2,649**	**2,653**	**2,656**	**2,652**	**2,635**
0-4	**P**	263	266	259	257	255	248	235
	M	135	136	132	131	130	126	120
	F	129	130	127	126	125	121	115
5-9	**P**	290	279	267	261	258	256	249
	M	149	143	136	132	131	130	126
	F	141	137	131	128	127	126	122
10-14	**P**	319	308	280	268	261	258	257
	M	163	157	143	136	133	131	131
	F	156	151	137	132	129	127	127
15-19	**P**	328	329	312	284	272	265	263
	M	168	169	160	145	138	135	134
	F	160	160	153	139	134	130	129
20-24	**P**	325	335	345	328	300	288	281
	M	164	169	176	167	153	145	142
	F	161	166	169	161	147	142	139
25-29	**P**	291	308	327	337	319	292	279
	M	144	155	163	170	161	147	140
	F	147	153	164	166	158	145	139
30-34	**P**	344	317	305	323	332	315	288
	M	166	153	151	159	166	157	143
	F	178	164	154	164	167	159	145
35-39	**P**	397	385	316	304	322	331	315
	M	191	185	151	149	157	164	155
	F	206	200	165	155	165	168	160
40-44	**P**	399	405	382	313	301	320	329
	M	193	195	183	149	147	155	162
	F	206	210	199	165	155	165	167
45-49	**P**	362	377	400	378	310	298	316
	M	177	183	192	180	146	144	152
	F	185	194	208	198	164	154	164
50-54	**P**	330	335	371	393	372	305	294
	M	163	165	179	187	176	143	141
	F	167	171	192	206	196	162	153
55-59	**P**	333	344	327	362	384	363	299
	M	164	169	159	173	181	171	139
	F	169	175	168	189	203	193	160
60-64	**P**	270	279	329	314	348	370	351
	M	129	135	159	151	164	172	163
	F	141	145	170	163	184	197	188
65-69	**P**	245	244	261	310	297	329	351
	M	114	114	124	148	141	153	162
	F	131	130	137	162	156	176	190
70-74	**P**	211	213	221	238	284	274	305
	M	93	95	101	111	133	127	140
	F	118	118	120	128	151	146	166
75-79	**P**	166	169	179	191	208	250	243
	M	68	70	77	84	94	113	110
	F	98	99	102	107	114	136	133
80-84	**P**	121	119	127	140	153	169	205
	M	43	44	49	57	65	73	89
	F	77	75	77	83	89	96	115
85-89	**P**	54	63	73	82	95	108	121
	M	16	20	25	30	37	43	50
	F	38	43	48	52	58	65	72
90 & over	**P**	31	32	36	45	55	68	83
	M	7	8	10	14	19	25	31
	F	24	25	26	31	36	44	52

Note: Not all figures will sum due to rounding.

Annex A Fertility assumptions

Fertility assumptions are agreed in two stages. The long term assumption is decided as part of the consultation process between the UK countries and the Government Actuary's Department. Then there is a detailed assumption setting to produce the age-specific fertility rates for each year of the projection period that are consistent with this long-term assumption.

Fertility assumptions of long term average completed family size for the 2004-based projections are the same as those used in the previous 2002-based and 2003-based projections. The assumptions for Scotland and other constituent countries of the UK are given in **Table A1**.

Table A1 Assumptions of long-term average completed family size 2002, 2003 and 2004-based projections

	2004-based	2002 and 2003-based
England	1.75	1.75
Wales	1.75	1.75
Scotland	1.6	1.6
Northern Ireland	1.8	1.8
United Kingdom	1.74	1.74

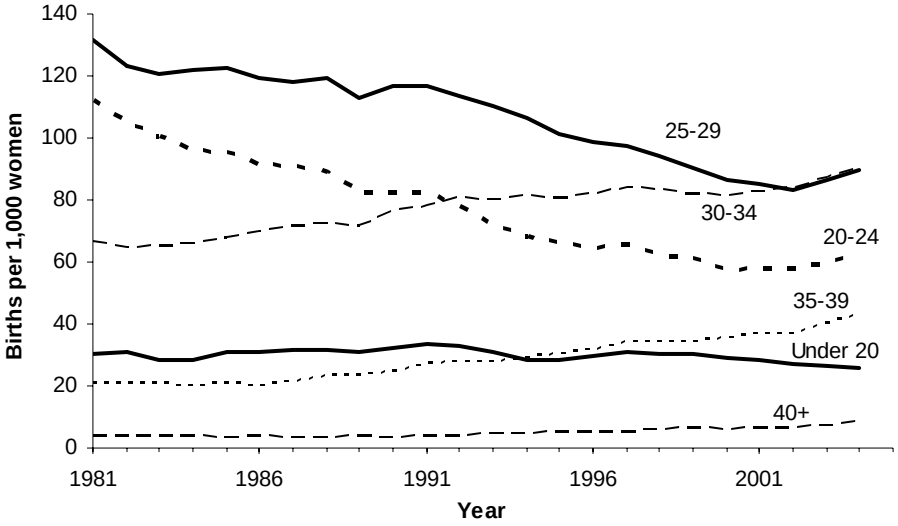
Recent data have shown rises in fertility, that at ages under 30 are not in line with previous downwards trends, and at older ages are stronger than recent trends. It is too early to know whether these changes are a temporary phenomenon or indicative of a sustained higher level. In holding the assumptions for this projections round at the previously assumed level it is recognised that if these changes in trends continue for the next two years then there is likely to be a case for raising the fertility assumption in the next projection round. However, in view of the changes that we have seen in recent years, although the long-term assumption has been held constant the path to the assumption has been substantially changed.

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). This is because it is affected only by change in the total number of children women have and not by the timing of births within their lives. Period rates may rise or fall if births are brought forward or delayed for any reason.

The assumptions about completed family size are based on family building patterns to date and other relevant data. For the UK as a whole, completed family size has been falling steadily from 2.45 children per women born in the mid 1930s. It is assumed that this will continue to decline until the 1985 cohort and then level off at 1.74.

The trends in age specific fertility for Scotland are shown in **Figure A1**. Up until 2002, there is a general pattern of falling fertility at younger ages coupled with rises in fertility at older ages. From 2002, with the exception of the under 20 group there have been increases in fertility.

Figure A1 Scotland Age Specific Fertility 1981-2004



Around 1980 the fertility levels in Scotland were similar to the UK, but they have shown a more rapid decline in age specific fertility at ages between 20 and 29. The fertility rates in the under 30s are currently 90 per cent of those in the UK as a whole.

At times when women are delaying the age at which they have children the total fertility rate will underestimate the real fertility levels. The current evidence of increasing fertility at later ages, and past declines in fertility among women in their twenties, may be indicative of postponement. As such, the increases in fertility of more recent years may reflect a catching up of postponed births and the recent trend may not continue. **Figure A2** illustrates the impact of increasing fertility at ages over 30, on the completed family size assuming age specific fertility rates a) remain constant at 2004 levels or b) increase in line with trends in the most recent 10years (shown as dotted lines). These are compared with actual data and the assumptions for the previous projections made in 2003 (bold line). Note that cohorts up to 1959 are complete, family size for women born after that year contain an increasing element of projection.

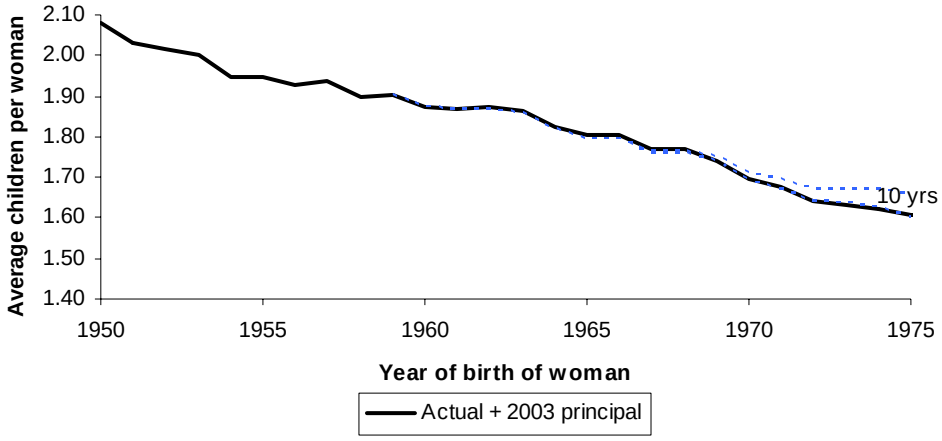
This demonstrates that for women in the second half of their childbearing careers the previous assumptions appear to have been at risk of underestimating those women's completed family size. Although not as steep, the trend is still downwards and there is insufficient evidence for raising the long-term assumption.

As part of the ESRC/Scottish Executive demography research programme some research is ongoing to investigate factors in the low fertility in Scotland. See section 6.3 for more details.

More details on the background of how the fertility assumptions are derived can be found in ***"Population Trends 114"*** on the Office for National Statistic's website through the following link:

http://www.statistics.gov.uk/downloads/theme_population/PT114.pdf.

Figure A2 Completed family size by cohort, Scotland, 1950-1975 cohorts



Annex B Mortality assumptions

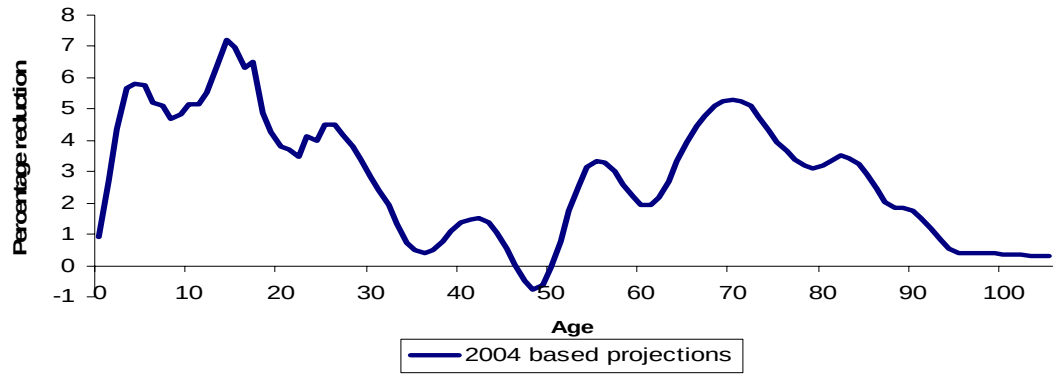
The mortality rates for the first year of the projection, mid-2004 to mid-2005, are based on the best estimates that could be made in the autumn of 2005 of the numbers of deaths at each age in 2004-05.

Assumed improvements in mortality rates after 2004-05 are based on trends in mortality rates before 2004. Improvements in mortality rates by age and gender in the base year of the projection are estimated from the trends in years from 1961 to 2003. It is assumed that these annual rates of reduction in mortality rates for the base year will tend towards a common reduction at each age of 1 per cent a year by 2029. Thereafter the mortality improvement is assumed to continue at this rate, in contrast to the previous projections where it was assumed to half every subsequent twenty-five years.

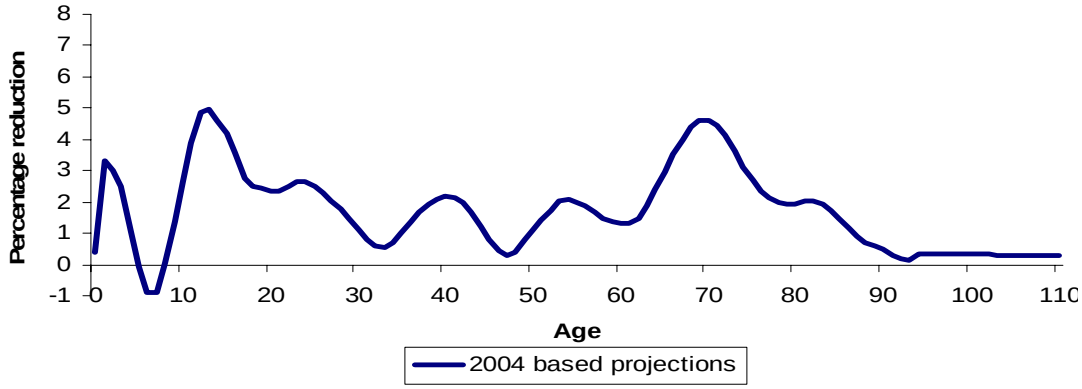
The rates of mortality improvement which are assumed for the UK for the base year of the projections (2003-04) are shown below.

Figure B1 Projected smoothed reductions in death rates by age, UK, 2003-2004

Males

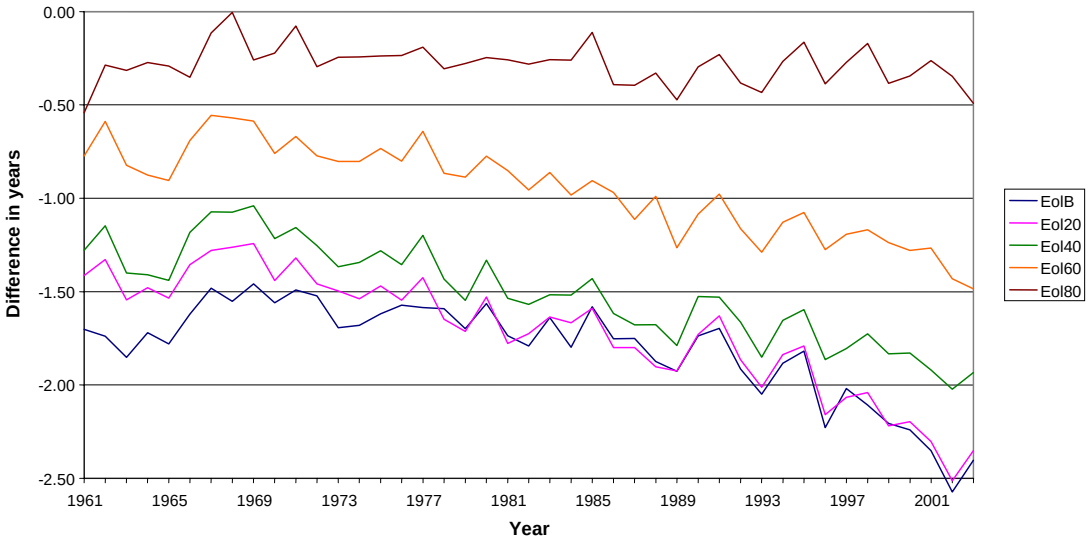


Females



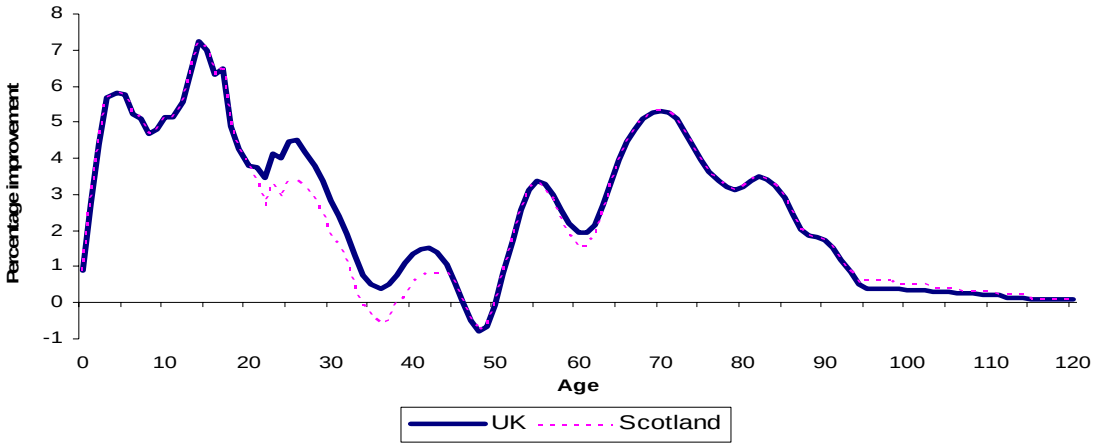
A comparison of period expectations of life (eols) for Scotland with the UK as a whole (**Figure B2**) suggests there has been a gradual widening in the difference in expectations of life for males under the age of 80, since the mid-1970s. There are no obvious patterns of divergence (or convergence) in the comparison of Scottish and UK life expectancies for females.

Figure B2 Period eols for Scotland less respective eols for UK - for males at birth and ages 20, 40, 60 and 80



Given this finding for males, further analysis indicated lower rates of improvement should be adopted in Scotland for males in their 20s, 30s and early 40s, and also in their late 50s and early 60s, than for the UK as a whole. The extent of these differences are shown in **Figure B3**.

Figure B3 : Comparison of proposed UK and Scotland mortality improvements for base year of projections – males

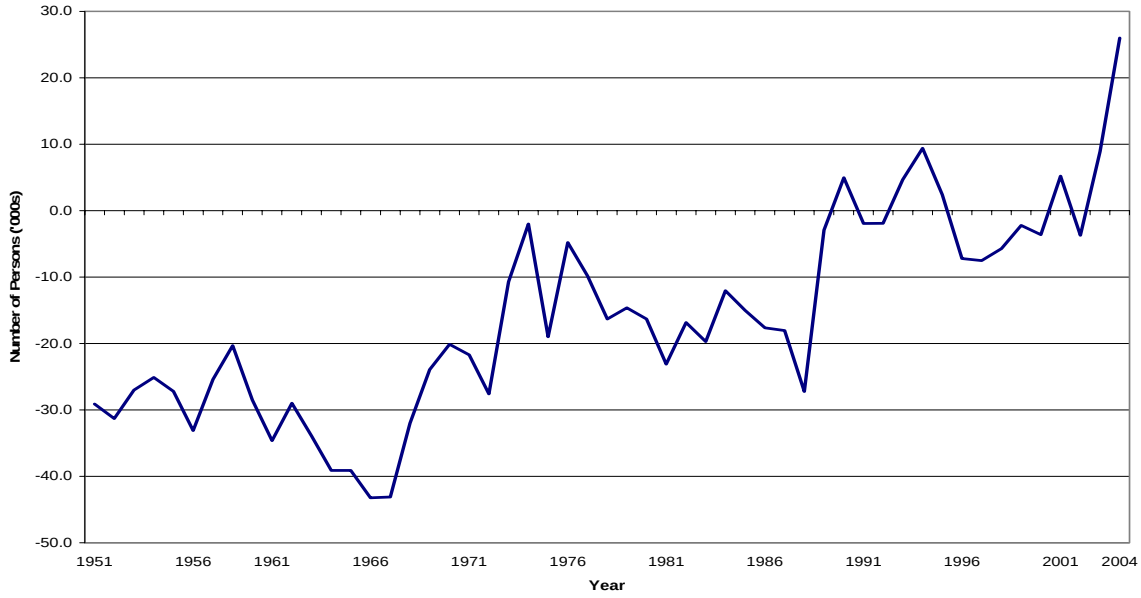


The impact of these new assumptions can be summarised using the period expectation of life at birth, based on the mortality rates for the given year. This life expectancy is assumed to rise from 74.3 years in 2004 to 79.1 years in 2031 for males, and from 79.4 years in 2004 to 83.6 years in 2031 for females (For the UK as a whole, the equivalent figures are a rise from 76.7 years in 2004 to 81.4 years in 2031 for males, and from 81.1 years in 2004 to 85.0 years in 2031 for females). Compared to the assumptions used in the 2002-based projections for Scotland, these lead to an increase in the expectations of life at birth for males of around 0.3 years in 27 years, and for females of 0.1 years.

Annex C Migration Assumptions

The long term assumption for net migration to Scotland is +4,000 each year compared with -1,500 in the previous projections. This increase follows two years where migration has increased sharply compared with previous years. **Figure 1** illustrates the trends since 1951.

Figure 1 Estimated net migration, Scotland, 1951-2004



Migration assumptions for the initial years are designed to reflect recent rates of migration, and gradually converge to the long-term assumptions.

The long term assumptions are comprised of:

- Cross-border +1,500
- International migration +2,500

The cross-border assumptions are derived from the average of moves recorded through the National Health Service Central Register (NHSCR) system over the last 10 years. The international migration assumption is based largely on International Passenger Survey data (IPS), with adjustments for visitors who stay for a longer period, and also for the unmeasured migration which was identified following analysis of the 2001 Census.

The short term assumptions for total net migration are:

- 2004-05 +21,000
- 2005-06 +13,500
- 2006-07 + 8,500

These reflect recent migration data and also include an additional allowance for migrants from the A8 Accession countries. A separate allowance was necessary as EU enlargement took place in May 2004 and the effects are therefore not yet adequately reflected in the usual migration data series on which assumptions are based.

Annex D Variant projections and their assumptions

Every two years the Government Actuary's Department (GAD) in consultation with the Registrars General, produces a "principal" population projection and a number of "variant" projections, based on alternative assumptions of future fertility, mortality and migration, for the UK and its constituent countries. The variants are produced because of the inherent uncertainty of demographic behaviour, to give users an indication of this uncertainty. There are two distinct types of variant produced: "standard" variants and "special case scenarios".

As well as the "principal" assumptions, high and low assumptions are prepared for each of the components of population change (fertility, life expectancy and net migration). These are used to generate what are referred to as the "standard variants". There are 27 possible combinations of these sets of assumptions although aside from the principal projection only 12 are published by GAD. These are the six possible "single component" variants (i.e. varying only one component at a time from the principal assumptions, the purpose being to illustrate plausible alternative scenarios rather than to represent upper or lower limits for future demographic behaviour) and also six selected "combination" variants: those which produce the largest / smallest total population size, the oldest / youngest age structure and the largest / smallest dependency ratios. Dependency ratios show the relationship between the working age population and the two main dependant groups – children under 16 and people of pensionable age.

As well as producing the "standard variants" GAD produce "special case scenarios", or "what if" projections to illustrate the consequences of a particular, but not necessarily realistic set of assumptions. In total five sets of special case scenarios will be prepared:

- Replacement fertility
- Constant fertility
- Constant mortality improvement
- No mortality improvement
- Zero migration (or natural change)

In addition (and finally!), two special case projections, based on combinations of these assumptions, will be prepared:

- No change projections
- Stationary projections.

More details on the variants referred to in this paper and their assumptions are contained in **Tables A and B** on the next page.

On the date of the publication of this paper (20 October 2005) only the six standard variants and the zero migration variant were published. The remaining variants will be published on GAD's website in November 2005. The General Register Office for Scotland plans to produce a paper in early 2006 comparing all the 2004-based variant projections with the principal projection.

More details about all the variants mentioned in this paper can be obtained from GAD's website: www.gad.gov.uk.

Table A Assumptions for the 2004-based principal and seven variant projections for Scotland

	Assumptions	Long-term Fertility (Total Fertility Rate - TFR)	Life Expectancy Males	Life Expectancy Females	Long-term Migration
Standard variants	**High variant**	**1.80**	**81.4**	**85.1**	**+12,500**
	Principal	**1.60**	**79.1**	**83.6**	**+4,000**
	Low variant	**1.40**	**76.8**	**82.1**	**-4,500**
Special case scenario	**Zero migration**	**1.60**	**79.1**	**83.6**	**0**

From these assumptions, the following projection variants have been created.

Table B Variants and Scenario

		Fertility	Life expectancy	Migration
1	Principal projection	Principal	Principal	Principal
Standard 'single component' variants				
2	High fertility	High	Principal	Principal
3	Low fertility	Low	Principal	Principal
4	High life expectancy	Principal	High	Principal
5	Low life expectancy	Principal	Low	Principal
6	High migration	Principal	Principal	High
7	Low migration	Principal	Principal	Low
Special case scenario				
8	Zero migration	Principal	Principal	Zero

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GROS is the department of the devolved Scottish Administration responsible for the registration of births, marriages, deaths, divorces, and adoptions in Scotland. We are responsible for the Census of Population in Scotland which we use, with other sources of information, to produce population statistics. We make available important information for family history. Our website is www.gro-scotland.gov.uk

ENQUIRIES ABOUT THIS PUBLICATION

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OTHER GROS STATISTICS

Further detailed statistics produced by GROS are available from the Statistics Library on the GROS website (http://www.gro-scotland.gov.uk/statistics/library/index.html). Statistics from the 2001 Census are on the website, Scotland's Census Results On-Line (www.scrol.gov.uk). See also the Census section of the main website (http://www.gro-scotland.gov.uk/statistics/census/index.html).

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The OFFICE FOR NATIONAL STATISTICS (ONS) is responsible for producing a wide range of economic and social statistics. It also, for England and Wales, registers life events and holds the Census of Population.	Customer Contact Centre, Room 1.015, Office for National Statistics, Cardiff Road, Newport, NP10 8XG Telephone: 0845 601 3034 Minicom: 01633 812399 Fax: 01633 652747 E-mail: info@statistics.gsi.gov.uk Website: www.statistics.gov.uk
The GOVERNMENT ACTUARY'S DEPARTMENT (GAD), among other things, provides the social security projections, demographic analyses, and actuarial advice necessary to underpin ministerial decision-making in social security and pensions policy. GAD produces projections of the population of Scotland.	Government Actuary's Department, Finlaison House, 15-17 Furnival Street, London, EC4A 1AB Telephone: 0207 211 2622 Fax: 0207 211 2640 E-mail: projections@gad.gov.uk Website: www.gad.gov.uk
The NORTHERN IRELAND STATISTICS AND RESEARCH AGENCY (NISRA) is Northern Ireland's official statistics organisation. The Agency also has responsibility, in Northern Ireland, for the registration of births, marriages, adoptions and deaths and the Census of Population.	Northern Ireland Statistics and Research Agency, McAuley House, 2-14 Castle Street, Belfast, BT1 1SA Telephone 028 9034 8100 Fax 028 9034 8106 Website: www.nisra.gov.uk