

Correction to age distribution of the mid-year population estimates, 2002-2010

Introduction

1. National Records of Scotland (NRS) have recently identified an error in the Scottish mid-year population estimates for 2002 to 2010 due to an issue with the method of rebasing the population estimates using the 2011 Census results. This affects the age distribution of older age groups which made the 90+ population too small and the population of those aged 81 to 89 too large. There is no impact on the total population estimates for Scotland other than a very small change in 2006 due to rounding adjustments. This issue does not affect recent population estimates from 2011 to 2017. This short note provides further information on the statistical outputs affected, as well as more details on the issue and the overall impact.

Outputs affected

2. NRS will publish corrected data on 25 September 2018 to coincide with the publication of population estimates of the very old (those aged 90+) including centenarians. The following statistical outputs will be updated on the NRS website to include the corrected age distributions:
 - Population estimates for Scottish Centenarians, including estimates for those aged 90 and over.
 - Mid-year Population Estimates (MYE): all published time series.
 - Revised versions of affected tables in the Vital Events Reference tables and Deaths by Specific Causes.
 - 2011 Census Reconciliation Report – Population
3. Small area population estimates (SAPE) will be corrected as part of a separate programme of work to produce a consistent SAPE back series from 2001 to 2010 using the new 2011 data zone boundaries. NRS will confirm to users when these data tables have been published on the NRS website.
4. NRS have liaised with ONS on this issue and corrections will be made to the following UK-level outputs on 25 September 2018:
 - UK Estimates of the Very Old (EVO): ONS will publish the 2002 to 2017 EVOs for the UK which will incorporate the corrected estimates for Scotland.
 - Mid-year Population Estimates (MYE): ONS will update the most recent set of MYE bulk tables which includes time series for 2001 to 2017, and will also update the data on NOMIS, Customise your data and other supplementary products that use these figures.
5. Work is ongoing to investigate the impact on the national life tables, which provide life expectancy statistics for the UK and each constituent country.
6. NRS apologise for the error and any inconvenience caused. If you have any questions please email statisticscustomerservices@nrscotland.gov.uk.

Background to rebasing of the population estimates

7. In 2013, the mid-year population estimates from 2002 to 2010 were rebased based on the 2011 Census. This is a key part of the methodology for producing population estimates to ensure the mid-year population estimates align with the results of the Census.
8. First, the Census-based mid-year estimates for 2011 were rolled back, using these 2011 estimates to calculate the estimated population in 2010, then using these 2010 estimates to calculate 2009 figures, and so on until 2002. To ensure continuity of the time series, this initial 2002 mid-year estimate was then rolled back to give an estimate of the 2001 population. The difference was then calculated between this rolled-back 2001 estimate and the published population estimate based on the 2001 Census. The rolled-back figures for 2002 to 2010 were then adjusted to compensate for this 'unattributable' difference.

Issue identified

9. The intended methodology was, for each council and single year of age, to multiply the 2001 adjustment by 90% for the rolled-back 2002 estimate, multiply by 80% for 2003, and so on until 10% of the adjustment was used for 2010. This adjustment also accounted for the population ageing, so that for example the 20-year-old population in 2010 was adjusted based on the difference in the 11-year-old population in 2001. This was done correctly for ages up to 80, but the adjustments for older people were aged on incorrectly. An error meant that the same age structure was used for those aged over 80 in 2001 and those over 90 in 2011. This is the same cohort (those born before or on 1921) but the age structure did not stay the same over the ten years, due to people being much more likely to die as they get older.
10. The table below shows an example of how the ages of this cohort changed between 2001 and 2011. An 83-year-old in 2001 will be 85 in 2003 and 93 in 2011. When considering what proportion of the cohort are 85 in 2003, we can either base it on the proportion aged 83 in 2001 or the proportion aged 93 in 2011. We do not have access to the proportion in 2003 as these figures are themselves based on the mid-year estimates.

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	2001	'02	'03	'04	'05	'06	'07	'08	'09	'10	2011
	Year										

11. As another example, the calculations assumed that those aged 90+ in 2001 were the same proportion of this cohort than those aged 100+ in 2011. The table below, which shows this cohort ten years apart, shows that this is not the case – 15% of this cohort were 90 or over in 2001, but only 2% were 100 or over in 2011.

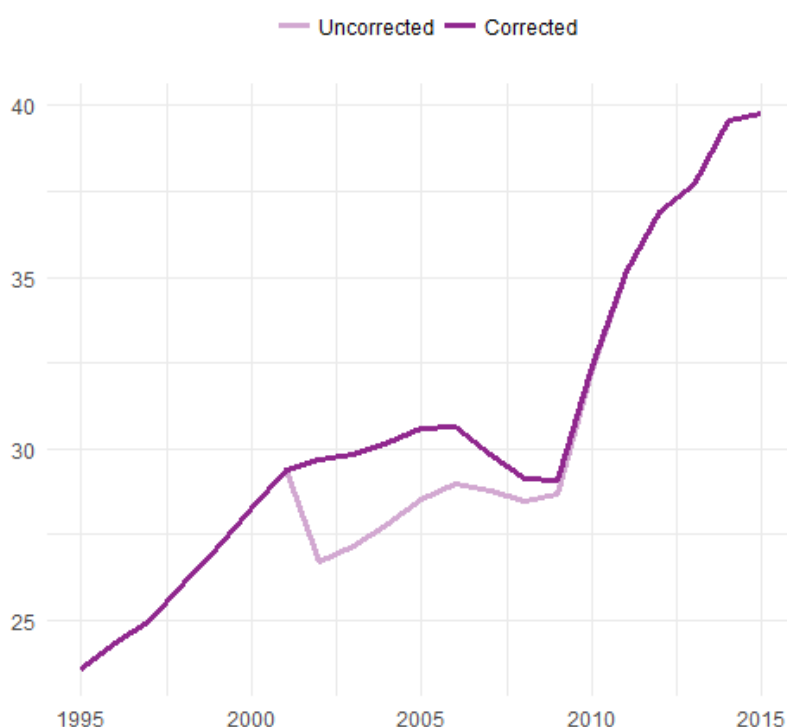
2001		2011	
Age	Population	Age	Population
80	28,920	90	9,280
81	28,190	91	7,990
82	18,310	92	4,380
83	15,590	93	3,410
84	15,130	94	2,770
85	14,600	95	2,260
86	13,920	96	1,740
87	12,340	97	1,210
88	10,190	98	830
89	8,360	99	510
90	7,070	100	340
91	5,820	101	170
92	4,700	102	120
93	3,660	103	70
94	2,610	104	50
95+	5,530	105+	40
Total	194,940	Total	35,170
% 90+	15%	% 100+	2%

Impact

12. As outlined, the issue identified affects the age distribution of older age groups, particularly those aged over 80 between 2002 and 2010. The errors in the rebasing process generally resulted in too much adjustment being made to the 81-89 year old population and not enough adjustment being made for the 90+ population. This resulted in the 90+ population being too small and the population of those aged 81 to 89 being too large. This can be seen in the chart below, where we see a dip in the uncorrected 90+ population starting in 2002. The corrected figures show a steady increase until a dip starting in 2006, caused by a lower birth rate during the First World War.

90+ population before and after correction

Persons (thousands), mid-year estimates, Scotland, 1995-2015



13. The change that the corrections will cause in the overall population by age for each year is shown in the table below (rounded to the nearest 10):

	80	81	82	83	84	85	86	87	88	89	90+
2002	0	-1,090	-660	-180	-480	-490	-170	50	-20	80	2,960
2003	0	0	-960	-590	-160	-420	-430	-140	50	-20	2,710
2004	0	0	0	-840	-520	-140	-370	-370	-130	40	2,360
2005	0	0	0	0	-730	-450	-120	-320	-320	-110	2,080
2006	0	0	0	0	0	-620	-380	-100	-270	-280	1,650
2007	0	0	0	0	0	0	-480	-300	-80	-210	1,080
2008	0	0	0	0	0	0	0	-370	-220	-60	660
2009	0	0	0	0	0	0	0	0	-250	-150	400
2010	0	0	0	0	0	0	0	0	0	-120	130

For example, after correction the 2002 estimate for 81 year olds in Scotland will be 1,090 less than the previously published estimates. A comparison of the 90+ population before and after corrections is shown below:

	90+ Population			
	Uncorrected	Corrected	Change	% Change
2001	29,390	29,390	0	0.0%
2002	26,710	29,670	2,960	11.1%
2003	27,150	29,860	2,710	10.0%
2004	27,810	30,170	2,360	8.5%
2005	28,530	30,610	2,080	7.3%
2006	29,000	30,650	1,650	5.7%
2007	28,770	29,850	1,080	3.8%
2008	28,480	29,140	660	2.3%
2009	28,670	29,070	400	1.4%
2010	32,300	32,430	130	0.4%
2011	35,170	35,170	0	0.0%

The correction is largest in 2002. The numbers affected decrease broadly linearly in subsequent years to 2010 when just over 100 people are affected.

14. A table showing the impact at council level in each year is provided in the Annex.

15. There is no impact on the total population estimates for Scotland other than a very small change in 2006 due to rounding adjustments. Some population estimates for ages below 80 may have small negligible differences, again caused entirely by rounding adjustments. This issue does not affect recent population estimates from 2011 to 2017.

NRS: Population and Migration Statistics

7 August 2018

Annex

Change in 90+ population due to correction, by council, 2002-2010

(rounded to the nearest 10)

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Scotland	2,960	2,710	2,360	2,080	1,650	1,080	660	400	130
Aberdeen City	150	140	110	70	60	30	10	0	0
Aberdeenshire	210	170	150	130	100	70	40	20	10
Angus	140	120	80	70	60	40	30	20	10
Argyll and Bute	120	100	80	60	50	30	10	10	0
City of Edinburgh	380	330	300	250	180	120	60	40	10
Clackmannanshire	0	10	10	0	0	0	0	0	0
Dumfries and Galloway	120	90	80	70	60	50	40	20	10
Dundee City	110	90	70	90	70	50	20	10	0
East Ayrshire	40	50	50	40	30	20	10	10	0
East Dunbartonshire	40	30	30	20	20	10	10	10	0
East Lothian	60	40	60	60	40	30	20	0	0
East Renfrewshire	30	30	20	20	10	-10	0	0	0
Falkirk	60	70	50	30	20	20	10	10	0
Fife	190	260	250	240	180	120	70	50	10
Glasgow City	270	270	220	220	180	110	60	40	10
Highland	180	140	120	100	100	60	40	30	0
Inverclyde	30	20	30	40	20	20	10	10	0
Midlothian	20	20	20	30	30	10	10	0	0
Moray	30	20	10	10	10	10	10	10	0
Na h-Eileanan Siar	30	30	20	30	10	10	0	0	0
North Ayrshire	100	80	60	50	40	20	20	10	0
North Lanarkshire	80	110	80	80	60	40	30	20	10
Orkney Islands	10	20	10	10	10	10	0	0	0
Perth and Kinross	110	90	100	100	80	50	40	20	10
Renfrewshire	-20	-10	30	40	50	40	20	10	10
Scottish Borders	40	20	20	20	0	-10	-10	-10	0
Shetland Islands	10	10	10	10	10	10	10	0	0
South Ayrshire	100	70	50	40	50	60	40	20	10
South Lanarkshire	200	180	120	90	50	30	20	20	10
Stirling	70	70	70	60	40	30	20	10	0
West Dunbartonshire	20	20	20	20	10	0	0	10	0
West Lothian	40	30	30	30	30	20	10	10	0