

## Household Projections – Headship Rates

This note examines the possibility that errors in the 2001 and 2011 Census population estimates might have contributed to an underestimate in the rate of household formation in Highland. In particular, the estimated 2001 Census response has often been regarded as being too high which has the potential to bias assumptions about the long term change in headship rates for private households.

The 2011 Census estimated that the population of Highland was 9,630 higher (4.3%) than the figure given by the “rolled forward” mid year estimates based on the 2001 Census. There are three potential sources for this error: an underestimate by the 2001 Census; an underestimate arising from the balance between births, deaths and migration used in the mid year estimates; and an over estimate by the 2011 Census. The error will be due to a combination of all three but there is a possibility that an underestimate in the 2001 Census may have played a part, and that this might have arisen from problems with the coverage survey<sup>1</sup>.

The coverage survey is an additional survey carried immediately after the main Census survey, conforming to internationally recognised best practice, which aims to identify and quantify individuals and families missed by the main survey<sup>2</sup>. Records for missing people are then “imputed” (synthesised) and added those recorded by the main survey. The 2011 coverage survey for Highland estimated that 94% of the population submitted a return leaving 6% of the population to be imputed: these figure are similar to those for comparator Councils such as Perth & Kinross giving some confidence in the figure. The equivalent 2001 coverage survey<sup>3</sup> suggested that around 98% of people in Highland submitted a return, higher than the 2011 figure but also similar to comparator Councils. Comparing with rolled forward mid year estimates, the error was in the region of +0.2% (ie the Census was around 400 higher than the mid year estimate).

If the 2001 coverage survey suggested too high a return rate (ie too low an imputation rate) then this could have a significant impact on the analysis of the rate of household formation. The NRS 2012 household projection methodology<sup>4</sup> relies on private household headship rates estimated (para 6.4.2) from the 1991, 2001 and 2011 Censuses using a modified two-point exponential model weighted 75% towards rates calculated using 2001 and 2011 data, and 25% towards the 1991 and 2001 data. Therefore, if the 2001 Census population and occupancy rates are too high, the bias in the calculation will be towards the 2001 to 2011 data which will have an erroneously low rate of household growth, and the result of the calculation will be household growth rates that are too low.

Although the suspicion remains that the estimated 2001 Census response rate might be on the low side, the evidence above – and in particular the match between the 2001 Census and the mid year estimates rolled forward from 1991 – suggests that that the error is likely to be relatively small.

### Confidence Intervals

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<sup>1</sup> See <http://www.scotlandscensus.gov.uk/census-methodology>

<sup>2</sup> NRS “To account for people and households who may not have been counted by the census, or who may have been counted more than once or counted in the wrong place, a Coverage Assessment and Adjustment (CAA) methodology was used to identify the number of people and households affected and to adjust the 2011 Census estimates accordingly.

An important element of this methodology - the Census Coverage Survey (CCS) - took place six weeks after Census Day. This independent voluntary doorstep survey of 40,000 households (80,000 individuals) from across Scotland collected information about people and households that was then matched to census records and used to estimate the size of the census under- or overcount. The Coverage Assessment and Adjustment (CAA) methodology resulted in estimates of households and people missed by the census which were then imputed into the census database.”

<sup>3</sup> See <http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/2001-populations/appendix-1-2001-census-method>

<sup>4</sup> <http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/households/household-projections>

**Table A4 Census Day population estimates:  
95% confidence intervals widths, by age and sex,  
Scotland**

<b>Council area</b>	<b>Relative confidence interval width <sup>1</sup> (percentage)</b>
<b>Scotland</b>	<b>0.44</b>
Aberdeen City	2.61
Aberdeenshire	1.19
Angus	1.31
Argyll and Bute	1.36
Clackmannanshire	0.99
Dumfries and Galloway	0.79
Dundee City	2.15
East Ayrshire	0.93
East Dunbartonshire	1.44
East Lothian	1.09
East Renfrewshire	1.58
Edinburgh, City of	1.76
Eilean Siar	1.45
Falkirk	1.03
Fife	1.06
Glasgow City	1.83
Highland	1.49
Inverclyde	1.73
Midlothian	1.56
Moray	1.51
North Ayrshire	0.97
North Lanarkshire	1.36
Orkney Islands	2.34
Perth and Kinross	1.22
Renfrewshire	1.53
Scottish Borders	1.01
Shetland Islands	1.26
South Ayrshire	0.80
South Lanarkshire	1.16
Stirling	1.26
West Dunbartonshire	1.60
West Lothian	1.35

<http://www.scotlandscensus.gov.uk/documents/censusresults/release1a/rel1asbtablea4.xls>

**Confidence intervals of  
population estimates, by age  
group and gender**

Age group	Relative confidence interval width (percentage) for Highland	
	Males	Females
0	4.77%	
1 to 4	4.02%	4.09%

5 to 9	3.81%	3.74%
10 to 14	2.78%	2.76%
15 to 19	2.33%	2.37%
20 to 24	4.36%	4.50%
25 to 29	5.63%	5.63%
30 to 34	5.50%	3.32%
35 to 39	6.16%	3.19%
40 to 44	2.16%	3.40%
45 to 49	2.16%	1.82%
50 to 54	2.53%	2.04%
55 to 59	2.66%	2.04%
60 to 64	2.78%	2.31%
65 to 69	1.78%	2.30%
70 to 74	1.77%	1.63%
75 to 79	1.76%	1.60%
80 and over	1.69%	1.42%

<http://www.scotlandscensus.gov.uk/documents/censusresults/release1b/rel1bconfidenceintervals.xls>

c.j.t. 23/12/14