

## Carstairs scores from the 2011 Census

### Comparison of postcode sectors over time: a technical note

To compare postcode sectors (PCS) over time those areas that have remained roughly the same between 1991 and 2011 were selected (1981 had to be excluded as the boundary files were not available). To do this postcode sector boundaries were created in GIS for all three time points using the output area boundary files and the look-up files provided by the census. The boundaries of all postcode sectors at each time point were then compared and their union, i.e. the overlapping area, determined. Lastly, the size of the union relative to postcode sector area at the three time points was calculated, that is, the percentage of the overlapping area from the 1991, 2001 and 2011 postcode sectors.

If the overlapping area covered over 90% of the postcode sector at each of the three time points the postcode sector was included in analysis. If the overlapping area was 90% or less for any one of the time points it was excluded. Figure 1 provides an example of these cases, with data on the size of the areas provided in Table 1. The left plot shows the postcode sector G11 7, which has remained roughly the same between 1991 and 2011. Table 1 shows that in this case the overlapping area is over 98% at each of the three time points. The postcode sector G12 9 has, however, changed more significantly and the overlapping area is less than 90% of the sector in 2001 and 2011.

Table 1: Postcode sector areas across time, 1991-2011

PCS	Size of the area ( $m^2$ )			Overlapping area	Overlapping area as % of:		
	1991	2001	2011		1991	2001	2011
G11 7	1,042,943	1,037,295	1,037,065	1,023,871	98.2	98.7	98.7
G12 9	762,519	845,334	941,882	753,889	98.9	89.2	80.0



Figure 1: Postcode sector (G11 7) that has remained roughly similar and postcode sector (G12 9) that has changed across time

Using this method 431 postcode sectors (roughly 42%) can be considered as similar across time. If the criteria was increased to 95% the number of postcodes that could be considered similar is reduced to 316 (or 31%). Figure 2 shows the Glasgow postcode sectors included in the analysis.



Figure 2: Glasgow postcode sectors

Some issues should be addressed before analysis. First, areas that experience little change in deprivation over time may be overselected. Areas experiencing housing development or regeneration are likely to experience rapid changes in population. This may also increase the probability of change in the postcode sector's boundaries. Thus, areas with a lot of changes in housing stock, and also potentially in deprivation levels, are less likely to be selected as being similar across the three points. One way to explore this is to compare the distribution of the Carstairs score at the three time points for all postcode sectors and for those included in selection (Figure 3). In general the distribution of scores for all postcode sectors are very similar to that of those areas selected. However, it is noticeable that at all three time points the postcodes selected for analysis have fewer (very) deprived areas – the interquartile range is smaller and there are fewer extreme values among those selected.

The second question relates to the distribution of postcode sectors across regions. Table 2 shows the percentage distribution of postcode sectors by NHS boards in 2011 and also the percentage distribution of the postcode sectors suitable for comparison. The table also provides the absolute and percentage differences between the two. In both cases the negative values indicate underselection and positive values overselection. All NHS boards are represented in the selection and in most cases with roughly similar proportions. In a few NHS boards (e.g. Grampian and Lanarkshire) the postcode sectors have seen more changes to

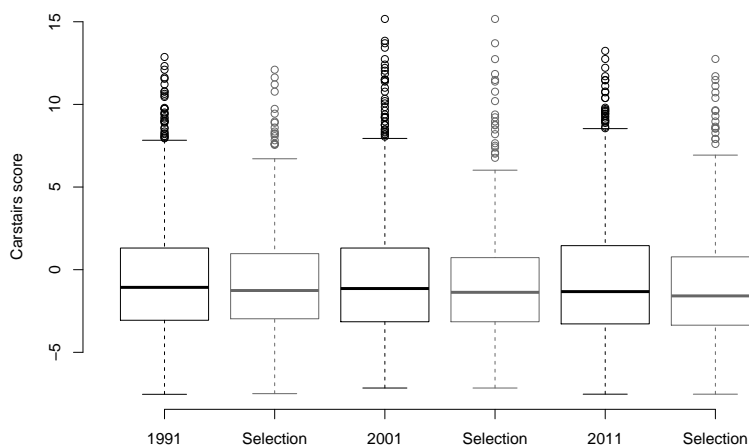


Figure 3: Distribution of scores for all postcode sectors and those areas selected, 1991-2011

their boundaries and for this reason these areas are underrepresented in the selection. The reverse is true for Dumfries & Galloway and the Highland NHS boards – postcode sectors from these areas are overrepresented in the selection.

Table 2: Distribution of postcode sectors and selected areas by 2014 Health Boards, 2011

NHS Board	All PCS	Selection	Absolute Difference	Percentage Difference
Ayrshire & Arran	7.4	7.9	0.5	6.8
Borders	3.1	5.3	2.2	71.0
Dumfries & Galloway	3.5	6.3	2.8	80.0
Fife	5.0	3.7	-1.3	-26.0
Forth Valley	5.2	3.2	-2.0	-38.5
Grampian	11.1	5.8	-5.3	-47.7
Greater Glasgow & Clyde	19.3	16.5	-2.8	-14.5
Highland	14.2	21.3	7.1	50.0
Lanarkshire	8.1	4.4	-3.7	-45.7
Lothian	13.0	13.0	0.0	0.0
Orkney	0.3	0.7	0.4	133.3
Shetland	0.3	0.5	0.2	66.7
Tayside	8.5	10.0	1.5	17.6
Western Isles	1.0	1.4	0.4	40.0