

COMPARISONS OF CENSUS OUTPUTS FROM THE 2001 AND 2011 CENSUSES FOR GEOGRAPHIC AREAS WITHIN NORTHERN IRELAND

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Guidance Note

1. Introduction

Comparison of statistics from the 2001 and 2011 Censuses will be one of the main uses made of the new 2011 Census figures. In broad terms, such comparison will be dependent on sufficient consistency of the statistics in terms of population coverage, questionnaire content and geographic units. Regarding coverage, both the 2001 and 2011 Censuses were statistically adjusted to allow for Census under-enumeration and the outputs from both Censuses represent the complete Northern Ireland population on the two Census Days. Regarding the questionnaire content, NISRA has published a paper that compares the 2001 and 2001 Northern Ireland Census questionnaires¹ in detail. The purpose of this paper is to discuss issues around the similarity or otherwise of the geographic units used to report the 2001 and 2011 Censuses.

2. The Main Spatial Units – Local Government Boundaries

Census of Population statistics are mostly based on administrative geographic units across Northern Ireland. The main administrative units used in Census reporting are electoral wards and Local Government Districts (LGDs), collectively known as local government boundaries. Local government boundaries are reviewed on an occasional basis to ensure that, among other things, electoral wards within any single LGD have broadly similar populations, to take account of different rates of population growth and decline in different areas. The reporting of individual Censuses is based on the local government boundaries in use at the time of the relevant Census. In recent decades, Northern Ireland has had local government boundary reviews in the 1970s, 1980s and 1990s. Accordingly, each of the 1971, 1981, 1991 and 2001

¹ 'Comparability of the Census questionnaire in Northern Ireland between 2001 & 2011' is available from: <https://www.nisra.gov.uk/publications/comparability-census-northern-ireland-between-2001-and-2011>

Censuses were reported on different sets of local government boundaries, and attempts to track change over time through Census outputs must take account of the changing administrative geography. Since the major review in the early 1970s, LGD boundaries have been relatively stable, but ward boundaries have changed – often quite radically – even when a ward name is unchanged.

A local government boundary review was initiated in the mid 2000s, as part of the Review of Public Administration, and was originally scheduled to have been implemented prior to the 2011 Census. However, delays to the wider RPA have delayed the latest review of local government boundaries², which has only recently been accepted by government. The new local government boundaries for wards and LGDs will not be used for administrative purposes until 2015 and, consequently, the local government boundaries from the 1992 review – used in the reporting of the 2001 Census – remain in place and are the current basis for local government administration in Northern Ireland.

Accordingly, the ‘1992’ ward and LGD boundaries are the main administrative units used for the reporting of the 2011 Census. Consequently, for the first time in recent decades, the administrative geographic units – used to report Census statistics – will remain constant for two successive Censuses. This will enable relatively easy comparisons of Census outputs for administrative geographic areas between the 2001 and 2011 Censuses. This paper notes some issues about which users should be aware when making such comparisons, and smaller spatial units.

3. Further Administrative Geographies

There are a number of other administrative boundaries for which Census results are routinely published. They are based on local government boundaries and, as such, are comparable across the 2001 and 2011 Census, but there are some considerations discussed below regarding the statistical uncertainty around any Census output, specifically for small areas.

At the time of the 2001 Census, and hence for the reporting of 2001 Census outputs, Health Boards, Education and Library Boards and NUTS3 (areas used for statistical reporting and the targeting of funding by the EU) areas were all exact aggregates of LGDS, while Assembly Areas were exact

² ‘Local Government (Boundaries) Order (Northern Ireland) 2012’ is available from: <http://www.legislation.gov.uk/nisr/2012/421/made>

aggregates of wards. Further background information about these spatial units can be found on the geography section of the NISRA website³.

The positions regarding these spatial units in 2011 are summarised below:

- The NUTS3 units are unchanged, and directly comparable
- The administration of the education sector is under review, but the Education and Library Board areas still exist, and their boundaries are unchanged since 2001
- The spatial structure of the administration of health and social services has changed since 2001, with the four old Health and Social Services Boards replaced by five Health and Social Care Trusts
- Assembly Areas and Parliamentary Constituencies share common boundaries in Northern Ireland. A revised set of Assembly Areas / Parliamentary Constituencies were introduced through The Parliamentary Constituencies (Northern Ireland) Order 2008⁴

Users should be aware that while this review of Parliamentary Constituencies introduced revised boundaries, the number and names of the areas were unchanged by the review.

Further information on the range of geographic units, specifically the statistical units, used by NISRA by can found on the geography page of the NISRA website as previously referenced above.

4. Statistical Geographies – 2001 Census

The basic units of administrative geography used in the reporting of the 2001 and 2011 Censuses are, as described above, the 582 electoral wards and 26 Local Government Districts resulting from the 1992 review of local government boundaries.

The populations of Northern Ireland's 26 Local Government Districts vary greatly, and historically the requirement to have similar sized (in population

³ More information on Northern Ireland geography is available from:
<https://www.nisra.gov.uk/support/geography>

⁴ 'The Parliamentary Constituencies (Northern Ireland) Order 2008' is available from:
<http://www.legislation.gov.uk/ukdsi/2008/9780110813172/contents>

terms) electoral wards was a requirement only within a given LGD. Accordingly, many electoral wards in Moyle have populations of around 1,000 whereas there are many electoral wards in the Greater Belfast area with populations approaching 10,000. It is good statistical practice to compare spatial statistics across units that have a similar population size, and accordingly NISRA developed a statistical geography based on 890 Super Output Areas (SOAs)⁵. These SOAs are constrained to ward boundaries but the SOAs all have broadly similar sized populations of about 1,800 people across Northern Ireland. Most SOAs are themselves wards, but in Greater Belfast most wards were split into a number of SOAs while in Moyle (uniquely) the SOAs were created by aggregating wards.

While being constrained to ward boundaries, the SOAs were created through the aggregation of Census Output Areas (COAs). A COA is the smallest spatial unit for which Census outputs were disseminated in 2001. There were 5,022 COAs, each containing about 125 households. Each SOA is the aggregate of a number of COAs. The COA geography is described further on the NISRA website⁶.

In summary, during and after the 2001 Census, NISRA developed a statistical geography composed of 5,022 COAs and 890 SOAs that fit exactly, within a hierarchical structure, to the '1992' ward boundaries.

5. Statistical Geography – 2011 Census

Although the 582 wards from the '1992' review of local government boundaries remain in place and are unchanged since 2001, NISRA has reviewed the OA and SOA geography from 2001. This section describes the outcome of that review.

For 2011, the 890 SOAs remain largely unchanged apart from a small number of minor changes around HM Forces bases and a change to accommodate the recent (2008) review of Parliamentary Constituencies – the parliamentary boundary review divided an electoral ward (Derriaghy) between two Parliamentary Constituencies, and NISRA has altered the SOAs within

⁵ More information on Northern Ireland Super Output Areas used in the 2001 Census is available from: <https://www.nisra.gov.uk/support/geography/northern-ireland-super-output-areas>

⁶ More information on Northern Ireland Output Areas is available from: <https://www.nisra.gov.uk/support/geography/northern-ireland-output-areas>

Derriaghly ward such that SOA boundaries within the ward now align to the new Parliamentary Constituency Boundary. All other Northern Ireland Parliamentary Constituencies (following the 2008 review) are composed of aggregates of wards, and consequently Parliamentary Constituency statistics can be generated through aggregations of wards and / or SOAs. The changes to SOAs between 2001 and 2011 are summarised on the NISRA website⁷.

NISRA has also reviewed the 2001 COA boundaries in the light of the 2011 Census. The COA is the smallest geographic unit for which standard Census outputs are produced, and all COAs must contain sufficient households to minimise sufficiently the risk of inadvertent disclosure. There is a risk, for example, that in an urban redevelopment area a COA that contained sufficient households in 2001 no longer does so.

A new set of Census Small Areas has been developed for the production of small area statistics from the 2011 Census. There are 4,537 2011 Small Areas that are based on the 5,022 2001 Census Output Areas. Each 2011 Small Area is either a simply a 2001 Census Output Area, or an aggregation of 2001 Census Output Areas. Thus, comparisons between 2001 and 2001 can be made directly using the appropriate aggregations of the 2001 Census Output Areas and the 2011 Census Small Areas.

Further details of the mapping between 2001 Census Output Areas and 2011 Census Small Areas, and the geographic extent of each 2011 Census Small Area can be found in 'Small Areas for Northern Ireland – A new Statistical Geography for the 2011 Census Data' paper on the NISRA website⁸.

6. Cautions about Census Statistics for Small Areas

One of the strengths of the Census is its ability to provide robust statistics for small areas because of its full population coverage. However, it must be acknowledged that for a number of reasons Census statistics are estimates, not exact counts. For example, Census returns were received from 94 per cent of households in both 2001 and 2011. Statistical methods were used to adjust outputs such that they represent the complete population, but this modelling

⁷ More information on changes to Northern Ireland Super Output Areas between 2001 and 2011 Censuses is available from: <https://www.nisra.gov.uk/publications/soa-background-paper>

⁸ 'Small Areas for Northern Ireland – A new Statistical Geography for the 2011 Census Data' is available from: <https://www.nisra.gov.uk/publications/small-area-look-tables-and-guidance-documents>

does introduce an element of uncertainty into the Census figures. Inevitably, this uncertainty will be proportionately larger for smaller areas – for example, the response rate will vary by small area and may be relatively large in certain small areas. Further, statistical modelling will produce estimates that are robust when averaged over a wide area but will inevitably be subject to greater uncertainty for smaller areas. The quality of Census estimates is discussed more generally in ‘Population and Household Estimates for Northern Ireland – Methodology Overview’ paper on the NISRA website⁹.

There are also issues about the geo-referencing of households. The Census database contains information about individual households, where each household is placed at a given location, identified by a grid-reference. Statistics for a small area are produced by aggregating the information for all households (and, where appropriate, communal establishments) with a grid-reference within the small area. In 2011 these grid-references came from the POINTER system, and in 2001 it came from the predecessor COMPASS system. The quality of the grid-references is known to be high, but it can never be perfect. As with statistical modelling, any errors that are introduced through erroneous grid-references have the potential to be proportionately more important for small areas.

One known issue with geo-referencing relates to the grid-references for properties built shortly before Census Day. The following describes the broad processes that were used by Census Office for the 2001 Census (a similar process was in place for the 2011 census). For Census processing purposes, Census Office ‘froze’ the postcode geography in late 2000 / early 2001, and the set of ‘frozen’ postcodes fully covered Northern Ireland. If a property in the 2001 Census had a postcode that was not in the set of ‘frozen’ postcodes, Census Office staff manually allocated the property to neighbouring postcode that was in the ‘frozen’ set. Clearly, this situation will occur most frequently with new housing development. The grid-reference of the ‘frozen’ postcode (the centroid) was also attributed – along with the postcode – to the relevant property, and informed 2001 Census outputs at that time.

In summary, the 2001 Census was reported on the basis of the addresses, postcodes and grid-references that were available to Census Office at that

⁹ ‘Population and Household Estimates for Northern Ireland – Methodology Overview’ is available from: <https://www.nisra.gov.uk/publications/2011-census-methodology-overview>

time. NISRA is content that the 2001 small area statistics were fit for purpose, but emphasise that caution should be used in interpreting statistics for very small areas.

Ten years on, the true grid-references for such properties can be compared with those used for the 2001 Census. Grid-references have a resolution of 1 metre, and as such the temporary grid-references inevitably differ from the final grid-references. The final grid-reference may be just a matter of a few metres away from the temporary grid-reference, but this may be enough to place the property in different Census Output Area or potentially Super Output Area.

NISRA has taken the opportunity in developing the new small areas for 2011 to examine further the effects of temporary grid-references that were in place at the time of the analysis of the 2001 Census. An example is given below of properties where the final grid-references for a late 1990s development have placed properties in different geographic units than the temporary locations used for 2001 outputs. It is stressed that the example given is one of the most extreme cases in terms of the numbers of properties involved – however, even this extreme example does not affect SOA statistical output from 2001.

The example relates to postcode BT47 3BF, which lies in Altnagelvin ward (in Altnagelvin3 SOA) in Derry LGD. The vast majority of properties in this postcode were built in the late 1990s, and the postcode was not in the ‘frozen’ postcode set used for the 2001 Census.

Map 1 Postcode: BT47 3BF



The properties currently in BT47 3BF are shown as purple dots on the map. At the time of the 2001 Census, postcode BT47 3BF was not included in the set of ‘frozen’ postcodes, and accordingly the relevant properties were allocated grid-references within the 2001 Census Output Area 95MM010013, delineated by then blue boundary on the map. The black line on the map, running roughly vertically, is the boundary between Census Output Areas 95MM010002 and 95MM010003. It is clear that use of the correct locations of properties in BT47 3BF would have placed some of the properties in 95MM010002 and some in 95MM010003. The locations indicated by the purple dots are the true locations of the properties, and have been used for 2011 Census outputs.

In general terms, the information available to Census Office in 2001 has led to some properties being “counted” in one COA in 2001 and potentially been “counted” in a different COA in 2011, had the 2001 set of COAs been brought forward unchanged for reporting of the 2011 Census. Some (indeed most) of these effects would have been quite minor, but some involving developments with numerous properties may have had the effect of concealing or exaggerating ‘real’ population growth or decline between 2001 and 2011. NISRA has decided that the best way to address this has been to combine the relevant 2001 COAs into 2011 Small Areas. Thus, taking the example above in Altnagelvin, a 2011 Small Area has been created through the aggregation of

the 2001 COAs 95MM010002, 95MM010003 and 95MM010013. While NISRA remain content that the statistical profiles reported in 2001 for Output Areas 95MM010002, 95MM010003 and 95MM010013 remain valid, change in numbers between 2001 and 2011 is better measured at the level of the new Small Area (N00002404) that combines the three COAs.

A look-up table that shows which 2001 COAs have been combined into 2011 SAs, and which COAs are mapped 1-1 onto SAs is available to download from the NISRA website¹⁰.

As a general principle, users are advised to be more cautious with statistics for smaller areas because there is the potential for proportionately greater uncertainty to be associated with such small area statistics.

7. Grid Square Outputs

It is inevitable that the administrative and statistical geographies discussed in this note, and used for Census outputs, will change over time because of their basis in administrative geography that is reviewed periodically. A secondary set of Census outputs, based on grid squares, has been produced since 1971; by definition these are on a consistent spatial geography that enables trends analyses, but the spatial units are unrelated to administrative units, which most users wish to use. More detail on the grid-square outputs can be found on the NISRA website¹¹.

8. Summary

In summary, the administrative geography from the '1992' review of local government boundaries has been in place since in the 1990s, remains in place now, and is the basis for the primary reporting of both the 2001 and 2011 Censuses. Accordingly, 2001 and 2011 comparisons can readily be made for electoral wards and LGDs. While the wards and LGDs are unchanged since 2001, some government functions (for example, Assembly Areas) have changed the geographic units used for administrative purposes since 2001 – this is described in section 3 'Further Administrative Geographies' of this note.

¹⁰ More information on Northern Ireland Small Areas is available from:

<https://www.nisra.gov.uk/support/geography/northern-ireland-small-areas>

¹¹ More information on 1km Grid Square Product is available from:

<https://www.nisra.gov.uk/publications/2011-census-combined-grid-square-product-northern-ireland>

NISRA developed a statistical geography, called Super Output Area (SOA) after the 2001 Census where each SOA across NI has a similar population size. These SOAs remain virtually unchanged since 2001, apart from a small number of SOAs as detailed in section 5 'Statistical Geography – 2011 Census', facilitating direct comparisons between 2001 and 2011.

NISRA also developed Census Output Areas (COAs) as part of the 2001 Census. These represent the smallest areas for which standard statistical output from the 2001 Census was produced. A set of 2011 Census Small Areas has been produced, that represent the smallest areas for which standard statistical output from the 2011 Census will be produced. There were 5,022 COAs in 2001, and there are 4,537 Census Small Areas in 2011. Each 2011 Census Small Area is either a 2011 COA (indeed most 2001 COAs are also 2011 SAs) or an aggregation of a number of 2001 COAs. The reasoning behind the aggregation of 2001 COAs to create 2011 Census Small Areas is outlined in section 6 'Cautions about Census Statistics for Small Areas'.

As a general principle, users are advised to be more cautious with statistics for smaller areas because there is the potential for proportionately greater uncertainty to be associated with such small area statistics.