

# BCS70

## Data Note: Pre-2000 geographically linked data

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CLS Data Note / User guide to the data  
(Second Edition)

November 2017



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First published in 2017 by the  
Centre for Longitudinal Studies  
Institute of Education, University of London  
20 Bedford Way  
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[www.cls.ioe.ac.uk](http://www.cls.ioe.ac.uk)  
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ISBN XXXX

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## Introduction

This Data Note explains the pre-2000 geographical units which have been linked to sweeps 3 and 4 of the British Cohort Study (BCS70).

There has been an increasing awareness of the value of geographically linked data in social scientific research, especially since the 'GIS revolution' of the early 1990s (Longley and Batty, 1996). Spatial data can be approached from a number of directions. For example, "longitudinal studies are particularly valuable to geographers because they chart change, collect information across various domains and are spatially referenced" (Ekinsmyth, 1996: 364). On the other hand, economists, particularly those of a more heterodox bent, are beginning to appreciate the value of spatially referenced data, especially in research into the economics of education (e.g. Gibbons et al, 2013 who use the National Pupil Database to estimate the effects of neighbourhood composition on teenagers' behavioural and educational outcomes in England). Epidemiology and its associated disciplines are perhaps most consistently associated with investigating the spatial effects of the type of data collected across the different longitudinal cohort studies. For example, Christakis and Fowler (2007) used data from the Framingham Heart Study in the US to examine the spread of obesity in a large social network over 32 years while Tunstall et al (2010) used data from the Millennium Cohort Study to analyse the health outcomes of pregnant women who moved house. Two particularly fruitful fields are, firstly, the investigation of so-called 'neighbourhood effects' across a number of socio-economic domains (e.g. Lupton and Kneale (2012) used data from the 1970 British Cohort Study to investigate neighbourhood influences on teenage parenthood) and, secondly, network-based analyses of particular issues such as obesogenic environments (e.g Burgoine et al, 2014), accessibility to health-promoting community resources (e.g. Wolch et al, 2011) and the impact of built environment (morphological) characteristics on health and well-being (e.g. Sarkar et al, 2014).

However, balancing the obvious advantages of incorporating the spatial dimension within longitudinal social scientific research, there are a number of important limitations to be borne in mind when dealing with this type of data. The principal consideration is protecting the identity of cohort members, particularly in the current era of 'open data' and increasing linkage of previously disparate administrative datasets. It is recognised that there is a cultural dimension to the issue of data confidentiality, with, for example, Scandinavian countries taking a more laissez-faire approach, adopting the perspective that data gathered using public funds should be available for public consumption. More socially conservative states like the US and UK, on the other hand, have tended to take a much more protectionist approach to personal data (Exeter et al, 2014). At present, the UK Data Archive takes the approach that access to geo-referenced data below Government Office Region (GOR) level should be subject to increasing access restrictions the more likely the data is to reveal the identity of cohort members. Other limitations include non-

uniformity of geo-identifiers used across different sweeps of the various cohort studies and varying levels of accuracy in terms of the geo-identifiers collected (a particular problem of early sweeps before the standardisation of unit postcodes).

## Data and methodology

In order to enable the process of spatial analysis of longitudinal cohort study data, unit postcodes are gathered from the addresses collected during interview, which are then validated by the CLS Cohort Maintenance Team using a range of specialist software products from AFD<sup>1</sup>. Unit postcode at interview is the variable used to link to a range of higher level areal units. The UK has had full coverage of postcodes since 1974 (Raper et al, 1992). This means that accurate geographically linked data is available for BCS70 from sweep 3 onwards.

The primary data source for spatialising longitudinal cohort study data within this software is the ONS Postcode Directory, available from the UK Data Service Census Support website<sup>2</sup>. This dataset has been released quarterly since 2004 (every February, May, August and November) and stretches back on an annual basis to 1980. The Postcode Directory contains Ordnance Survey eastings and northings for each unit postcode centroid. These eastings and northings are spatialised in GIS in the form of 'x', 'y' points, usually to an accuracy of 1 metre of the mean postcode centroid<sup>3</sup>. Eastings and Northings are Postcodes held by CLS have been cleaned (i.e. reformatted to the standard 6, 7, or 8 character 'pcd', 'pcd2', or 'pcds' format as present in the Postcode Directory). This postcode data can then be linked to the data in the Directory, and the eastings and northings are then used to generate point data within a GIS. There are a number of licensed and open source GIS packages available (e.g. ArcGIS<sup>4</sup>, MapInfo<sup>5</sup> and QGIS<sup>6</sup>). Areal (polygon) representations of unit postcodes are produced in the OS 'Code-Point with Polygons' product, available from Edina Digimap<sup>7</sup>. The projected coordinate system used to display geo-referenced data across Great Britain (i.e. England, Wales and Scotland) is the British National Grid<sup>8</sup>.

The point-based longitudinal cohort study data is associated with pre-2001 geographies by means of a 'spatial join' (i.e. based on location) within a GIS. A

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<sup>1</sup> [www.afd.co.uk/](http://www.afd.co.uk/)

<sup>2</sup> <http://census.edina.ac.uk/pcluts.html>

<sup>3</sup> There are, however, a range of 'grid reference positional quality indicators', ranging from 1 ('within the building of the matched address closest to the postcode mean' to 9 ('no grid reference available'). Some 85% of all postcodes have a positional quality indicator of 1.

<sup>4</sup> Licensed software, available from <http://www.esriuk.com/>

<sup>5</sup> Licensed software, available from <http://www.mapinfo.com/>

<sup>6</sup> Open-source software, available from <http://www2.qgis.org/en/site/>

<sup>7</sup> <http://digimap.edina.ac.uk/digimap/home>

<sup>8</sup> WKID 27700, Authority EPSG

range of 1971, 1981 and 1991 Census geography boundaries are available to download from the UK Data Service<sup>9</sup>. One drawback of the use of mean unit postcode centroids in geo-referenced data is their variation in size (typically unit postcodes in rural areas will cover a much larger extent than their urban counterparts). This means that greater accuracy will be achieved in geo-referencing the address at interview based on the unit postcodes of cohort members who live in more urbanised areas.

### **Availability of datasets**

Because of the potentially disclosive nature of these datasets, geographic identifiers below Standard Statistical Region (STREG) are being released under Secure Access.

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<sup>9</sup> <https://census.ukdataservice.ac.uk/get-data/boundary-data>

Dataset	Description	Boundary Data Source (UK Data Service unless stated)
Interview Wards	<p>1981 Electoral Ward Boundaries BCS70 Sweep 3</p> <p>1991 Electoral Ward Boundaries BCS70 Sweep 4</p> <p>1998 Electoral Ward Boundaries BCS70 Sweep 5</p>	<p>English Electoral Wards, 1981 Welsh Electoral Wards, 1981 Scottish Electoral Wards, 1981</p> <p>English Electoral Wards, 1991 Welsh Electoral Wards, 1991 Scottish Electoral Wards, 1991</p> <p>English Electoral Wards, 1998 Welsh Electoral Wards, 1998 Scottish Electoral Wards, 1998</p>
Interview Region	<p>Pre-1998 Standard Statistical Region Boundaries BCS70 Sweeps 3 and 4</p> <p>1996 Government Office Region BCS70 Sweep 5</p>	<p>English Standard Statistical Regions, pre-1998 Boundaries</p> <p>Government Office Region, 1996 Boundaries (plus pseudo-codes for Wales and Scotland)</p>

Dataset	Description	Boundary Data Source (UK Data Service unless stated)
Interview Enumeration District (ED)	1981 Enumeration District Boundaries BCS70 Sweep 3	English Enumeration Districts, 1981 Welsh Enumeration Districts, 1981 Scottish Enumeration Districts, 1981
	1991 Enumeration District Boundaries BCS70 Sweep 4	English Enumeration Districts, 1991 Welsh Enumeration Districts, 1991 Scottish Enumeration Districts, 1991
Interview Census Output Area (OA)	2001 Census Output Area BCS70 Sweep 5	English OAs, 2001 Welsh OAs, 2001 Scottish OAs, 2001
Interview District	1981 District Boundaries BCS70 Sweep 3	English Districts, 1981 Welsh Districts, 1981 Scottish Districts, 1981
	1991 District Boundaries BCS70 Sweep 4	English Districts, 1991 Welsh Districts, 1991 Scottish Districts, 1991
	2002 District Boundaries BCS70 Sweep 5	English Districts, 2002 Welsh Districts, 2002 Scottish Districts, 2002

<b>Dataset</b>	<b>Description</b>	<b>Boundary Data Source (UK Data Service unless stated)</b>
Interview Census LSOA	2001 Lower Layer Super Output Area BCS70 Sweep 5	English LSOAs, 2001 Welsh LSOAs, 2001 Scottish LSOAs, 2001
Interview Census MSA	2001 Middle Layer Super Output Area BCS70 Sweep 5	English MSAs, 2001 Welsh MSAs, 2001 Scottish MSAs, 2001
Interview Westminster Parliamentary Constituency	1983 Westminster Parliamentary Constituency Boundaries BCS70 Sweep 3  1987 Westminster Parliamentary Constituency Boundaries BCS70 Sweep 4  1997 Westminster Parliamentary Constituency Boundaries BCS70 Sweep 5	English Westminster Parliamentary Constituencies, 1983 Welsh Westminster Parliamentary Constituencies, 1983 Scottish Westminster Parliamentary Constituencies, 1983  English Westminster Parliamentary Constituencies, 1987 Welsh Westminster Parliamentary Constituencies, 1987 Scottish Westminster Parliamentary Constituencies, 1987  English Westminster Parliamentary Constituencies, 1997 Welsh Westminster Parliamentary Constituencies, 1997 Scottish Westminster Parliamentary Constituencies, 1997

Dataset	Description	Boundary Data Source (UK Data Service unless stated)
Interview County	1981 County Boundaries BCS70 Sweep 3	English Counties, 1981 Welsh Counties, 1981 Scottish Counties, 1981
	1991 County Boundaries BCS70 Sweep 4	English Counties, 1991 Welsh Counties, 1991 Scottish Districts, 1991

## Variables

BCS70 Sweep 3 linked to geographical variables (based on 1981 Census boundaries):

SERIAL	BCS70 research id
B3COUNTRY	Sweep 3 country of residence
B3STREG	Standard Statistical Region (pre-1998 boundaries)
B3CTY81	Counties (1981 boundaries)
B3DT81	Districts (1981 boundaries)
B3PCON83	Parliamentary constituencies (1983 boundaries)
B3WARD81	Wards (1981 boundaries)
B3ED81	Census Enumeration Districts (1981 boundaries)

BCS70 Sweep 4 linked to geographical variables (based on 1991 Census boundaries):

SERIAL	BCS70 research id
B4COUNTRY	Sweep 4 country of residence
B4STREG	Standard Statistical Region (pre-1998 boundaries)
B4CTY91	Counties (1991 boundaries)
B4DT91	Districts (1991 boundaries)
B4PCON87	Parliamentary constituencies (1987 boundaries)
B4WARD91	Wards (1991 boundaries)
B4ED91	Census Enumeration Districts (1991 boundaries)

BCS70 Sweep 5 linked to geographical variables (based on 2001 Census boundaries):

SERIAL	BCS70 research id
B5CTRY	Sweep 5 country of residence
B5GOR	1996 Region
B5WARD98	1998 Ward Code
B5OACODE	2001 Census Output Code
B5LSOA	2001 Census Lower Layer Output Code
B5MSOA	2001 Census Middle Layer Output Code
B5OSLAUA	2002 Local Authority District/Unitary Authority Code
B5PCON97	Parliamentary Constituency (1997 boundaries)

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