



Technical Guide

Assigning Deprivation Categories

Assigning areas to deprivation categories (quantiles)

Rather than producing outputs for large numbers of individual areas, we often want to group these small areas into categories for analytical purposes, such as into **deprivation quintiles or deciles**. This document defines a standard approach for assigning small areas to deprivation categories to ensure that a consistent method is available to all public health analysis services.

Calculating deprivation score

Deprivation categories are most commonly assigned using the Index of Multiple Deprivation (IMD) scores. These are published by the Department for Levelling Up, Housing and Communities (DLUHC) at Lower Super Output Area (LSOA) level. Each LSOA is also assigned a rank based on its IMD score. In addition, DLUHC publish LSOA scores for the different domains which make up IMD (such as health, income and education).

DLUHC produce several different measures to summarise IMD scores from LSOA to higher geographies, such as local authorities. For indicators published on the Fingertips platform, the population-weighted average IMD score is used to assign deprivation categories to higher geographies unless otherwise stated. DLUHC publish LSOA population denominators for their indices of deprivation, allowing population-weighted average IMD scores to be calculated for any geography aggregated from LSOAs.

Defining the categorisation geographies

It is important to understand that there are always two levels of geography to consider when assigning areas to deprivation categories:

- the small area '**base**' geography for which deprivation scores are available – these are the areas that will be grouped up into deprivation categories
- the '**higher**' geographical area or areas within which separate deprivation categories are required.

National deprivation categories are produced when all the base geography areas across England are grouped into a single deprivation classification. In this case the higher geography is England. A national deprivation category assigned to any small area indicates how deprived that area is **relative to England** as a whole. At a national level, there will be an equal number of base geography areas in each deprivation category, but the distribution of deprivation categories within any sub-national geography is likely to be skewed.

Local deprivation categories are produced when all the base geography areas across England are grouped into separate deprivation classifications for each sub-national area, eg local authorities. In this case the higher geography is the sub-national geographical level. These are often referred to as 'within-area' deprivation categories. A local deprivation category assigned to any small area indicates how deprived that area is **relative to other small areas within the same local area**. At the local level there will be an equal number of base geography areas in each deprivation category, but the deprivation score thresholds that divide the deprivation categories will differ between local areas. As a result, **comparisons of the deprivation categories are only viable within local areas and not between different local areas**. For example, 20% of small areas within any local authority will fall into the most deprived within-LA deprivation quintile irrespective of whether that local authority is more or less deprived than the England average (see Figure 1).

Demonstrating the difference between national and local categories

Figure 1 shows how the assignment of national and local deprivation categories to LSOAs can produce very similar, or very different, results for a specific area. This example uses IMD 2015. In Bury, LSOAs are spread evenly across all five national deprivation quintiles. As a result, the assignment of its LSOAs to national and local deprivation quintiles is almost identical.

In contrast, over 50% of LSOAs in Hackney fall into the most deprived national deprivation quintile and there are no LSOAs in the two least deprived quintiles. However, Hackney still has an even spread of LSOAs across local deprivation quintiles as these ignore the rest of England and simply show the spread of deprivation within this local authority.

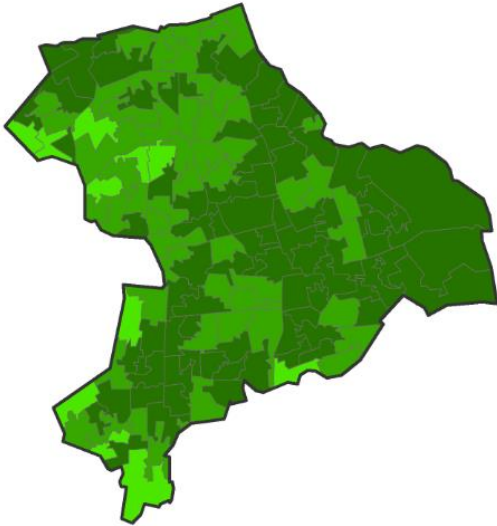
Appropriate use of national and local deprivation categories

There are advantages and disadvantages in the use of both national and local deprivation categories. Local categories can provide a robust means of measuring inequalities within areas, but they limit how comparisons can be made between local areas because the most deprived quintile within a local authority in the south of England is unlikely to have a similar level of deprivation to the most deprived quintile within a local authority in the north.

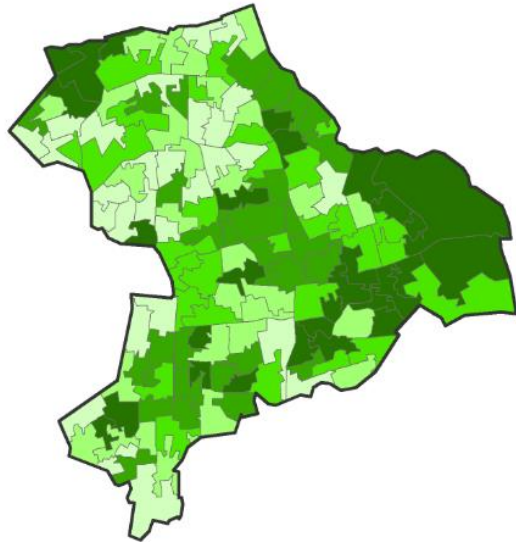
If national deprivation categories are assigned then categories in different areas will have similar levels of deprivation, facilitating comparisons between areas. This method does however often result in unequal distributions of populations between the deprivation categories within areas. Many local authorities, for example, have none of their population living in either the least or the most deprived national quintile of LSOAs, and in some areas, the majority of the population is found in just one quintile.

Figure 1 - Example of two LSOAs with national and local IMD2015 Quintiles

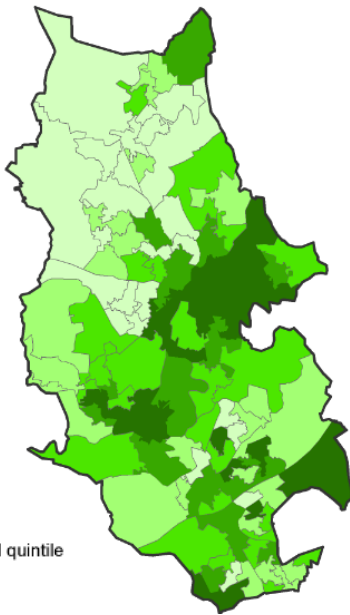
Hackney LSOAs by National IMD2015 Quintile



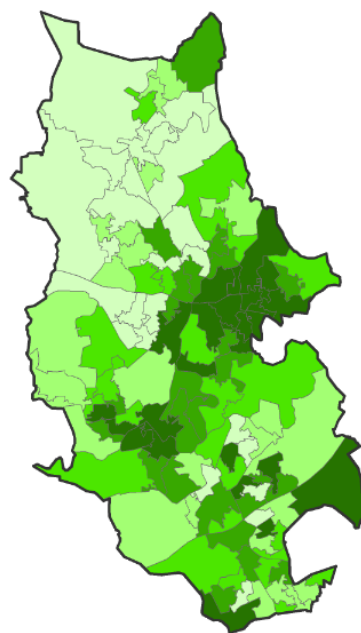
Hackney LSOAs by Local IMD2015 Quintile



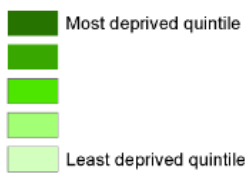
Bury LSOAs by National IMD2015 Quintile



Bury LSOAs by Local IMD2015 Quintile



Legend



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Procedure for assigning small areas to deprivation categories

The method below, used for most indicators in **Fingertips**, is based on dividing small areas into categories so that there are equal numbers of small areas in each deprivation decile/quintile.

Step 1 – Arrange data so that each small area is assigned both a deprivation score/rank and a higher geography for which deprivation categories are needed (for example, local authority, Integrated Care Board, county). If assigning national deprivation categories, then the higher geography will be the same (England) for all small areas.

Step 2 – Sort small areas by higher geography and then by deprivation from most to least deprived within each higher geography. Take care in selecting the most appropriate field to use when sorting data by deprivation – for example LSOA IMD scores are sometimes only available in rounded form but a rank is often provided that is based on the unrounded score and provides greater accuracy for sorting.

Step 3 – Divide small areas into deprivation categories within each higher geography area with **category 1 representing the most deprived areas**. Use the following method to calculate how many small areas should be assigned to each deprivation category.

For each higher geography:

- Divide the number of small areas within the higher geography by the number of deprivation categories required (up to a maximum of 10), giving an integer and fractional part.
- The integer-part of this number represents the minimum number of small areas that will be assigned to each deprivation category within each higher geography.
- Note that quantiles should not be assigned for any higher geography if the integer part of this number is less than 1, as this indicates that there are fewer small areas than the number of quantiles being used. For example, when the higher geography is lower tier local authority (LTLA) and the small areas are LSOAs, within-LTLA quintiles cannot be calculated for Isles of Scilly which is made up of a single LSOA. Combining higher geographies with neighbouring areas (eg Isles of Scilly and Cornwall) can avoid having to display missing quantile data in these circumstances.
- Table 1 then shows which deprivation categories should be assigned additional small areas based on the fractional part of this number.
- The algorithm is such that allocation of additional small areas is weighted slightly in favour of more deprived categories.

Worked example:

If assigning 163 small areas to deprivation deciles within a local authority, then divide 163 by 10 to give the result 16.3. In this case 7 of the deciles will each contain 16 small areas and 3 of the deciles (the 1st, 4th and 7th deciles) will contain 17 small areas.

Table 1 – deprivation categories receiving additional small areas

Deciles		Quintiles		Quartiles	
Number after decimal point	Deciles receiving an extra area	Number after decimal point	Quintiles receiving an extra area	Number after decimal point	Quartiles receiving an extra area
.0	None	.0	None	.0	None
.1	1	.2	1	.25	1
.2	1,6	.4	1,3	.5	1,3
.3	1,4,7	.6	1,2,4	.75	1,2,3
.4	1,3,6,8	.8	1,2,3,4		
.5	1,3,5,7,9				
.6	1,2,4,6,7,9				
.7	1,2,3,5,6,8,9				
.8	1,2,3,4,6,7,8,9				

The method used for determining the allocation of small areas to deprivation categories and a tool for applying this method are illustrated in an accompanying Excel workbook which is available on the [Fingertips Technical Guidance site](#). A function for applying this method is also available in the [PHEindicatormethods R package](#), available on CRAN.

Equal population deprivation categories

Assigning LSOAs or MSOAs to deprivation categories using the 'equal number' method described above produces deprivation categories with similar sized populations, since LSOAs and MSOAs were designed to have similar populations.

However, assigning geographies with varied populations, such as local authorities, to deprivation categories using the 'equal number' method can produce categories with very varied populations. In these cases it may appear more appropriate to assign geographies to deciles using an 'equal population' method – this method is not used routinely for indicators in Fingertips and is not described here due to some of the complexities that the method introduces, not least that the same geographical area may be assigned to different deprivation categories depending on the indicator, since different indicators use different denominator populations.

OHID Technical Guides

This document forms part of a suite of OHID technical guides that are available on the [Fingertips Technical Guidance site](#). Of relevance to this document is the guidance on 'Indices of Multiple Deprivation', a guide to measuring deprivation over time including advice on which versions of the IMD to use for different time periods in a series.