Communities and Local Government

The English Indices of Deprivation 2010

www.communities.gov.uk
community, opportunity, prosperity

Communities and Local Government

The English Indices of Deprivation 2010

David McLennan, Helen Barnes, Michael Noble,
Joanna Davies, Elisabeth Garratt
Social Disadvantage Research Centre,
Oxford Institute of Social Policy, University of Oxford

Chris Dibben
University of St Andrews

March 2011
Department for Communities and Local Government

This document/publication is also available on our website at www.communities.gov.uk

If you require this publication in an alternative format please email:
alternativeformats@communities.gsi.gov.uk

Any enquiries regarding this document/publication should be sent to us at:

Department for Communities and Local Government
Eland House
Bressenden Place
London
SW1E 5DU
Telephone: 030 3444 0000

March 2011

ISBN: 978-1-4098-2922-5

Contents

Preface

Indices of Deprivation are an important tool for identifying the most disadvantaged areas in England so that local policy makers and communities can target their activities at the areas with greatest need for services.

The English Indices of Deprivation 2010 is the third release in a series of statistics produced to measure multiple forms of deprivation at the small spatial scale. Following fundamental changes in the measurement of deprivation in the 2004 Indices, we have listened to requests from key stakeholders and users of the Index to provide a consistent measure to allow change over time to be measured.

The Indices of Deprivation 2010 (ID2010) therefore updates the Indices of Deprivation 2007 and 2004, retaining broadly the same methodology, domains and indicators.

This report outlines the conceptualisation underpinning the model of multiple deprivation used and describes the indicators and domains that make up the ID2010. The datasets underpinning the ID2010 can be accessed at:

www.communities.gov.uk/corporate/researchandstatistics/statistics/subject/indicesdeprivation

We would like to thank all those who assisted in the production of the ID2010, in particular all those who responded to the consultation and provided a number of helpful contributions.

Acknowledgements

The English Indices of Deprivation 2010 were constructed by the Social Disadvantage Research Centre at the Department of Social Policy and Social Work[1] at the University of Oxford. The team comprised: Michael Noble, David McLennan, Helen Barnes, Elisabeth Garratt and Joanna Davies. In addition, the Health Deprivation and Disability Domain was constructed by Chris Dibben from the University of St Andrews; the air quality indicator by Jon Fairburn at Staffordshire University; the housing affordability indicator by Glen Bramley at Heriot-Watt University; and geographic information system work was undertaken by David Avenell. The research team would like to thank Kate Wilkinson and Adam Whitworth for their work on the Education, Skills and Training Deprivation Domain and the Living Environment Deprivation Domain respectively whilst working at the Social Disadvantage Research Centre.

The research team would also like to thank the Geographic and Statistical Evidence unit within the Department for Communities and Local Government, all the suppliers of data, and the many respondents to the consultation for their helpful contributions.

[1] Now Oxford Institute of Social Policy at the Department of Social Policy and Intervention.

Introduction

The Department for Communities and Local Government commissioned the Social Disadvantage Research Centre at the Department of Social Policy and Social Work at the University of Oxford to update the English Indices of Deprivation 2007 (ID2007). The remit was to update the previous Indices using, where possible, similar but updated indicators and the same methodology. Following public consultation (see **Annex A**), and a significant programme of work by the research team the Indices of Deprivation 2010 (ID2010) have been produced using the same approach, structure and methodology used to create the ID2007. The ID2010 update the ID2007 using more up-to-date data.

The new Index of Multiple Deprivation 2010 (IMD 2010) is a Lower layer Super Output Area (LSOA) level measure of multiple deprivation, and is made up of seven LSOA level domain indices. These relate to income deprivation, employment deprivation, health deprivation and disability, education skills and training deprivation, barriers to housing and services, living environment deprivation, and crime which reflect the broad range of deprivation that people can experience.

There are also two supplementary indices: the Income Deprivation Affecting Children Index (IDACI) and the Income Deprivation Affecting Older People Index (IDAOPI). Summary measures of the IMD 2010 are presented at local authority district level. The LSOA level domain indices, IMD 2010, IDACI and IDAOPI, together with the local authority district summaries, are collectively referred to as the Indices of Deprivation 2010.

This report presents the conceptual framework of the new ID2010; the component indicators and domains; the methodology for creating the domains and the overall Index of Multiple Deprivation; and a summary of the main LSOA level results. All project outputs are available to download from the Department for Communities and Local Government's website.

Chapter 1

Measuring multiple deprivation at the small area level: The conceptual framework

The Index of Multiple Deprivation 2010 (IMD 2010) is a measure of multiple deprivation at the small area level. The model of multiple deprivation which underpins the IMD 2010 is the same as that which underpinned its predecessors – the IMD 2007, IMD 2004 and IMD 2000 (Noble et al., 2008; Noble et al., 2004; Noble et al., 2000) – and is based on the idea of distinct dimensions of deprivation which can be recognised and measured separately. These are experienced by individuals living in an area. People may be counted as deprived in one or more of the dimensions, depending on the number of types of deprivation that they experience. The overall Index of Multiple Deprivation is conceptualised as a weighted area level aggregation of these specific dimensions of deprivation. This chapter elaborates on the model of multiple deprivation that has been used, and addresses issues relating to it.

Background

In his 1979 account of *Poverty in the United Kingdom* Townsend sets out the case for defining poverty in relative terms. Thus his definition of poverty is: 'Individuals, families and groups can be said to be in poverty if they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved in the societies to which they belong' (Townsend, 1979, p.31). Though 'poverty' and 'deprivation' have often been used interchangeably, many have argued that a clear distinction should be made between them (see for example the discussion in Nolan and Whelan, 1996). In his article 'Deprivation' Townsend argues that 'people can be said to be *deprived* if they lack the types of diet, clothing, housing, household facilities and fuel and environmental, educational, working and social conditions, activities and facilities which are customary …' (Townsend, 1987, p.125-126, our italics). It could be argued, therefore, that people are in poverty if they lack the financial resources to meet their needs and escape deprivation, whereas people can be deprived due to a lack of resources of all kinds, not just financial. Following Townsend, deprivation should be defined in a broad way to encompass a wide range of aspects of an individual's living conditions.

In his 1987 article Townsend also lays down the foundation for articulating multiple deprivation as an accumulation of several types of deprivation. This formulation of multiple deprivation is the starting point for the model of small area deprivation which is

presented here. Seven main types of deprivation are considered in the IMD 2010 – income, employment, health, education, housing and services, living environment and crime – and these are combined to form a measure of multiple deprivation.

Area based measures

Although Townsend's work mainly (though not entirely) referred to individuals experiencing deprivation – single or multiple – the arguments can, in modified form, extend to area based measures. However, limitations of data availability inevitably cause some of the sophistication of his original concept to be lost in practice. At an area level it is very difficult to measure the percentage of the population experiencing deprivation in one, two or more dimensions. This would require different datasets to be linked together in order for individual level deprivation to be determined. Not all datasets one would wish to use to measure deprivation are available at an individual level, and in any case there is no single individual identifier common to all the datasets and data linkage is therefore not a straightforward task. There are also legal issues with regard to data sharing between government departments.

It is possible, however, to look at single forms of deprivation at an area level and describe at an area level the combination of single deprivations as area level multiple deprivation. The approach used here conceptualises multiple deprivation as a composite of different dimensions, or domains, of deprivation. It, however, says little about the *individual* experience of *multiple* deprivation.

The area itself can be characterised as deprived *relative to other areas*, in a particular dimension of deprivation, on the basis of the proportion of people in the area experiencing the type of deprivation in question. In other words, the experience of the people in an area gives the area its deprivation characteristics. The area itself is *not* deprived, but the presence of a concentration of people experiencing deprivation in an area may give rise to a compounding deprivation effect – this is still *measured* by reference to those individuals. Having attributed the aggregate of individual experience of deprivation to the area, it is possible to say that an area is deprived in that particular dimension. Once the specific dimensions of deprivation have been measured, these can be understood as elements of multiple deprivation.

Dimensions of deprivation

The approach allows the separate measurement of different dimensions of deprivation. There is a question as to whether low income or the lack of socially perceived necessities (Gordon et al., 2000) (e.g. adequate diet, consumer durables, ability to afford social activities etc) should be one of the dimensions. To follow Townsend, within a multiple deprivation measure only the types of deprivation resulting from a low income would be

included so low income itself would not be a component, but lack of socially perceived necessities would. However, there are no readily available small area data on the lack of socially perceived necessities and therefore low income is an important indicator for these aspects of material deprivation. Moreover, it could be argued that measures of consumption are themselves problematic as lack of certain items may be by choice rather than inability to pay for them. Therefore, it is appropriate to measure low income itself rather than the possession of certain items (i.e. material deprivation).

Despite recognising income deprivation in its own right, it should not be the only measure of area deprivation. Other dimensions of deprivation contribute crucial further information about an area. However, low income remains a central component of the definition of multiple deprivation for the ID2010. As Townsend writes 'while people experiencing some forms of deprivation may not all have low income, people experiencing multiple or single but very severe forms of deprivation are in almost every instance likely to have very little income and little or no other resources' (Townsend, 1987, p.131).

Measuring different aspects of deprivation and combining these into an overall multiple deprivation measure raises a number of questions. Perhaps the most important one is the extent to which area deprivation in one dimension can be cancelled out by lack of deprivation in another dimension. Thus if an area is found to have high levels of income deprivation but relatively low levels of education deprivation, should the latter cancel out the former and if so to what extent? The IMD 2010 is essentially based on a weighted cumulative model and the argument for limited cancellation effects is presented.

Another question concerns the extent to which the same people or households are represented in more than one of the dimensions of deprivation. Prior to the year 2000, small area indices of deprivation did not conform to the current conceptual framework and were based primarily on Census data (e.g. The Index of Local Conditions, 1991; The Index of Local Deprivation, 1998). These pre-2000 indices contained no explicit information on the issue of double-counting within a dimension of deprivation. For instance, the 'households with no access to a car' may well have been the same households who 'live in overcrowded accommodation'. The combination of indicators in the pre-2000 indices takes no account of possible double-counting and nor do the published accounts address the potential problem. The position taken in the ID2000 and which is still taken in the ID2010 is that if an individual, family or area experiences more than one form of deprivation this is 'worse' than experiencing only one form of deprivation. The aim is not to eliminate double-counting *between* domains – indeed it is desirable and appropriate to measure situations where deprivation occurs on more than one dimension.

To summarise, the model which emerges from this theoretical framework is of a series of one dimensional domains of deprivation which may be combined, with appropriate weighting, into a single measure of multiple deprivation (**Annex B**).

The concept of multiple deprivation

The IMD 2010 is therefore underpinned by a coherent conceptual model of multiple deprivation at the small area level. To reiterate, the model of multiple deprivation is based on the idea of separate dimensions of deprivation which can be recognised and measured separately. These are experienced by individuals living in an area. The area itself can be characterised as deprived, relative to other areas, in a particular dimension of deprivation on the basis of the proportion of people in the area experiencing the type of deprivation in question. In other words, the experience of the people in an area gives the area its deprivation characteristics. The area itself is not deprived, though the presence of a concentration of people experiencing deprivation in an area may give rise to a compounding deprivation effect, but this is still measured by reference to those individuals. Having attributed the aggregate of individual experience of deprivation to the area, it is possible to say that an area is deprived in that particular dimension. Having measured specific dimensions of deprivation, these can be understood as elements of multiple deprivation.

Uses of the Indices

Since their original publication, the Indices of Deprivation have been used very widely for a range of purposes. The Indices of Deprivation can be used for identifying areas with high levels of deprivation or areas with specific issues, such as health, that may not be considered deprived on the overall index. Local authorities or other larger geographies can also be compared by, for instance, looking at the proportion of the 10% most deprived LSOAs contained with each of the areas. Cut offs other than the 10% most deprived may also be appropriate depending on the use being made of the summary.

The Indices are central to the evidence base for regeneration policy in England and help target limited resources appropriately. As a composite index, the Index of Multiple Deprivation fits well with moves from Government to take a holistic approach to developing local services. The fact that the Indices cover a range of domains means that they will also be useful to local communities as they drive forward policies in their own way to address their own local priorities. The Indices also allows communities to compare their areas with similar, or nearby, areas on a range of nationally consistent measures. This helps residents to gauge their relative levels of deprivation, assess whether progress is being made and hold relevant authorities accountable.

Some examples of how previous versions of the Indices have been used by central Government include as a criteria for allocating resources efficiently for programmes such as regeneration, neighbourhood renewal, identify disadvantaged pupils for additional support or allocate grants to community groups. Key users of the Indices are local authorities where the Indices are used to identify the local areas with the greatest level of need for support or intervention. Examples include analysing community safety data to

evaluate neighbourhood policing and partnerships, using the Indices as local measures of community cohesion, investigating patterns of 'risk of youth offending', identifying the greatest health inequalities between the most and least deprived populations or for context in community safety strategic assessments.

Chapter 2

Methods

Overview of the methodology used to construct the Index of Multiple Deprivation 2010

The construction of the Index of Multiple Deprivation 2010 (IMD 2010) can be broadly summarised as consisting of six stages:

1. Dimensions (referred to as domains) of deprivation are clearly identified.
2. Indicators are chosen which provide the best possible measure of each dimension of deprivation.
3. 'Shrinkage estimation' is used to address issues of large standard errors.
4. Indicators are combined to form the domains, generating separate domain scores.
5. Domain scores are ranked and the domain ranks are transformed to a specified exponential distribution.
6. The exponentially transformed domains are combined using appropriate domain weights to form an overall Index of Multiple Deprivation.

Each of these stages in the construction of the IMD 2010 is discussed in detail in the following sections.

Stage 1: Domains of deprivation are clearly identified

The central idea of the Index of Multiple Deprivation is that deprivation is multi-dimensional and can be experienced in relation to a number of distinct domains. Although areas may be deprived on more than one domain, and cumulative effects may be seen, each domain is nonetheless a separate dimension of deprivation. Multiple deprivation is the combination of these domains. It is therefore important that each dimension of deprivation is clearly identified and reflects a particular aspect of deprivation.

The same seven domains identified for inclusion in the IMD 2007 have been retained for the IMD 2010:

- Income Deprivation
- Employment Deprivation

- Health Deprivation and Disability
- Education, Skills and Training Deprivation
- Barriers to Housing and Services
- Crime
- Living Environment Deprivation.

Stage 2: Indicators are chosen which provide the best possible measure of each dimension of deprivation

Indicator criteria

Each domain contains a number of indicators. The criteria for inclusion of these indicators have always been that they should be:

- 'domain specific' and appropriate for the purpose (as direct as possible measures of that form of deprivation)
- measuring major features of that deprivation (not conditions just experienced by a very small number of people or areas)
- up-to-date
- capable of being updated on a regular basis
- statistically robust at the small area level; and
- available for the whole of England at a small area level in a consistent form.

The aim for each domain was to include a parsimonious selection of indicators that comprehensively captured the deprivation for each domain, within the constraints of data availability and the criteria listed above.

There are 38 indicators in total in the IMD 2010. These are broadly the same as in the IMD 2007, updated using more recent data. Where this is not the case, details are given in the appropriate place in **Chapter 3**.

Data time point

As mentioned above, the indicators need to be as up-to-date as possible. In most cases, the indicators in the IMD 2010 relate to 2008. A later time point would have been desirable but 2009 data for many indicators were not available during the period of index construction and small area denominators (see below) for any date later than 2008 were also not available at that time. The most recent time point that could be used was therefore 2008.

For indicators where it was not possible to obtain 2008 data – for example, those based on Census data – this is indicated in the text. As with previous Indices, the IMD 2010 only used Census data when alternative data from administrative sources were not available. Three

such indicators were derived from the 2001 Census – adult skill levels in the Education, Skills and Training Deprivation Domain, household overcrowding in the Barriers to Housing and Services Domain and houses without central heating in the Living Environment Deprivation Domain.

Spatial scale

As has been indicated, the IMD 2010 and component domains have been developed at Lower layer Super Output Area (LSOA)[2] level. Deprivation has been measured at the LSOA level since the ID2004. LSOAs are homogenous small areas of relatively even size containing approximately 1,500 people. The objective has always been to develop the Index of Multiple Deprivation and supplementary indices at as small a spatial level as is possible to ensure that pockets of deprivation are not overlooked.

LSOAs are an improvement on the ward based geography used in the ID2000 (Noble et al., 2000) which has certain recognised weaknesses. The two principal requirements for a geography of deprivation are that areas must be of relatively equal population size, and their boundaries must be consistent over time. The main function of electoral wards is for the election of local councillors, and for this reason their boundaries are regularly adjusted following population change to ensure that each local authority has similar ratios of elector to councillor (Norman et al., 2007). Over time substantial revision is therefore made to the ward geography which undermines the geographical consistency of wards and increases the likelihood that changes seen in an area do not identify 'real' change but simply reflect amendments to the boundary system (Norman, 2010).

Denominators

Population estimates at LSOA level for mid 2008 were provided by the Office for National Statistics' Small Area Population Estimation Unit. The majority of the indicators in the IMD 2010 use denominators derived from these population estimates. Certain indicators use numerators and denominators derived from the same data source, including the three indicators derived from the 2001 Census. A detailed explanation of the denominators can be found in **Annex D**.

The domains and indicators are discussed in detail in **Chapter 3** and a full list given in **Annex C**.

[2] This report will use the term LSOA as the name for Lower layer Super Output Areas. For more information on LSOAs see: http://neighbourhood.statistics.gov.uk/dissemination/Info.do?page=nessgeography/superoutputareasexplained/output-areas-explained.htm

Stage 3: 'Shrinkage estimation' is used to address issues of large standard errors

Problems may arise in some indicators where small numbers result in large standard errors. The shrinkage estimation methodology is used, where necessary, to improve the reliability of such an indicator. The effect of shrinkage is to move such a score towards the local authority district average for that indicator. The extent of movement depends on both the reliability of the indicator and the heterogeneity of the district. If scores are not unreliable, the movement is negligible as the amount of shrinkage is related to the standard error. A further advantage of the shrinkage technique is that movement is less in heterogeneous districts. The shrinkage technique does not mean that the score necessarily gets smaller, i.e. less deprived. Where LSOAs do move this may be in the direction of more deprivation if the 'unreliable' score shows less deprivation than the district mean. Further details about the shrinkage technique, including examples of the impact of shrinkage, are given in **Annex E**.

The shrinkage technique has been used in each of the English Indices of Deprivation released using this methodology (i.e. the ID2000, the ID2004, the ID2007 and the ID2010). In the ID2010 the shrinkage technique was applied to the majority of indicators. Those which were not subjected to shrinkage include the modelled indicators, the road distance indicators and the indicators supplied at local authority district level. Specific information about the indicators to which shrinkage was applied is given in the indicator descriptions in **Chapter 3**.

Stage 4: Indicators are combined to form the domains, generating separate domain scores

For each domain of deprivation the aim is to obtain a single summary measure which is straightforward to interpret in that it is, if possible, expressed in meaningful units (e.g. proportion of people or of households experiencing that form of deprivation). This has been achieved in the Income and Employment Domains, but was not possible in the other five domains.

In the Income and Employment Domains, the underlying metric is the same and the indicators are constructed to be non-overlapping counts of deprived individuals. This means that to create the domain the indicators can be simply summed and divided by the population 'at-risk' to create an area rate.

In the other domains the indicators are on different metrics and therefore it is not possible to calculate a simple rate. The indicators are therefore standardised by ranking and transforming to a normal distribution, before combining with selected weights to form the domain score. In the Health Deprivation and Disability Domain, the Children and Young

People sub-domain in the Education, Skills and Training Deprivation Domain, and the Crime Domain Maximum Likelihood factor analysis was used to find appropriate weights for combining indicators into a single score based on the inter-correlations between all the indicators. For further details about the factor analysis technique, please see **Annex F**. In the remaining domains equal weights or weights based on a theoretical premise have been applied. This approach to weighting replicates that taken in the ID2004 and ID2007.

In domains where there are sub-domains, the indicators are first combined into a sub-domain score and then the sub-domains are combined into a domain score. Details are given in the appropriate place in **Chapter 3**.

Stage 5: Domain scores are ranked and the domain ranks transformed to a specified exponential distribution

Having obtained a set of domain indices these needed to be combined into an overall Index of Multiple Deprivation. In order to combine domain indices which are each based on very different units of measurement there needs to be some way to first standardise the scores. This is undertaken by ranking. The ranked scores are then transformed to an exponential distribution in order that when the domains are combined, appropriate control over cancellation and facilitation of the identification of the most deprived LSOAs can be achieved. The exponential transformation of the ranks was used in the ID2010, as in the previous Indices.

A more extensive account of the exponential transformation procedure is given in **Annex G**.

Stage 6: The exponentially transformed domains are combined using appropriate domain weights to form an overall Index of Multiple Deprivation

To create the overall Index of Multiple Deprivation, the seven domains must be combined. If they are simply added together this would imply that they had equal importance in the measurement of multiple deprivation. Certain domains are, however, considered to make a greater contribution to the experience of multiple deprivation and for this reason the domains are each weighted according to their perceived importance.

In the ID2004 and ID2007 the overall Index of Multiple Deprivation was constructed by combining the individual domain indices using explicit weights, driven by theoretical considerations and responses to the consultation processes. In the theoretical approach account is taken of the available research evidence informing the theoretical model of multiple deprivation and weights are selected which reflect this theory. The Income and

Employment Deprivation Domains were regarded as the most important contributors to the concept of multiple deprivation and the indicators comprising these domains were very robust. Hence it was decided that they should carry more weight than the other domains. The domain weights were consulted upon and there was broad agreement amongst respondents about the proposed weights. Research into the issue of weighting was carried out by the University of St Andrews (Dibben et al., 2007) and showed broad support for the selected weights.

In the light of this, and in the context that future Indices were to be constructed in such a way as to *replicate* (with updated indicators) the previous Indices, the weights adopted for the ID2007 were the same as those used in the ID2004. Following further consultation, these weights were retained for the ID2010, and are shown in **Table 2.1**.

Table 2.1: Weights used in the Index of Multiple Deprivation 2010

	Domain Weight
Income Deprivation	22.5%
Employment Deprivation	22.5%
Health Deprivation and Disability	13.5%
Education, Skills and Training Deprivation	13.5%
Barriers to Housing and Services	9.3%
Crime	9.3%
Living Environment Deprivation	9.3%

Chapter 3

The domains and indicators

Income Deprivation Domain

This domain measures the proportion of the population in an area that live in income deprived families. The definition of income deprivation adopted here includes both families that are out-of-work and families that are in work but who have low earnings (and who satisfy the respective means tests).

Following Townsend's model of deprivation, material deprivation (i.e. lack of socially perceived necessities, such as an adequate diet or consumer durables) is an important dimension of multiple deprivation. However, no robust measures of material deprivation are currently available at small area level. As material deprivation flows from a lack of sufficient income to afford the material items, there is a conceptual justification for including a measure of low income as a dimension of multiple deprivation in its own right.

The indicators

A combined count of income deprived individuals per Lower layer Super Output Area (LSOA) is calculated by summing the following five indicators:

- Adults and children in Income Support families[3]
- Adults and children in income-based Jobseeker's Allowance families
- Adults and children in Pension Credit (Guarantee) families
- Adults and children in Child Tax Credit families (who are not claiming Income Support, income-based Jobseeker's Allowance or Pension Credit) whose equivalised income (excluding housing benefits) is below 60% of the median before housing costs
- Asylum seekers in England in receipt of subsistence support, accommodation support, or both.

The combined count of income deprived individuals per LSOA forms the numerator of an income deprivation rate which is expressed as a proportion of the total LSOA population.

[3] The word family is used to designate a 'benefit unit', that is the claimant, any partner and any dependent children (i.e. those for whom Child Benefit is received).

Indicator detail

Data for the five indicators listed above were sourced from three different government departments: the Department for Work and Pensions, HM Revenue and Customs and the Home Office. Through close liaison with the three data supplying government departments it was possible to ensure that no double-counting occurred between the three information sources. A separate numerator count was constructed from the information held by the Department for Work and Pensions, HM Revenue and Customs and the Home Office and these three counts were summed to create the overall Income Deprivation Domain numerator.

Adults and children in families claiming Income Support, income-based Jobseeker's Allowance or Pension Credit (Guarantee)

Numerator

The indicator is the number of adults and children in an LSOA living in families claiming Income Support, income-based Jobseeker's Allowance or Pension Credit (Guarantee), for August 2008. The data come from the Work and Pensions Longitudinal Study database held by the Department for Work and Pensions.

Definitions/terminology

Income Support, Jobseeker's Allowance and Pension Credit are means-tested social security benefits. In order to be eligible for these benefits, claimants must be able to demonstrate that their income and savings are below specified thresholds.

Indicator construction process

The LSOA level count was constructed by selecting relevant claimants from the Work and Pensions Longitudinal Study database, matching in information on dependent partners and dependent children, then aggregating to LSOA level.

Data quality

The Department for Work and Pensions numerator count is constructed from administrative records of benefit claimants, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicators are the same as those used to produce published National Statistics.

Adults and children in Child Tax Credit families (who are not claiming Income Support, income-based Jobseeker's Allowance or Pension Credit) whose equivalised income (excluding housing benefits) is below 60% of the median before housing costs

Numerator

The indicator is the number of adults and children in an LSOA living in Child Tax Credit families (who are not claiming Income Support, income-based Jobseeker's Allowance or Pension Credit) whose equivalised income (excluding housing benefits) is below 60% of the national median before housing costs, for August 2008. The data are sourced from a database held by HM Revenue and Customs.

Definitions/terminology

Child Tax Credit is payable to families with children who are either:

(i) Claiming out-of-work benefits

(ii) In work and claiming Working Tax Credit

(iii) Claiming neither out-of-work benefits nor Working Tax Credit but whose household income does not exceed the Child Tax Credit income threshold.

Income equivalisation is a way of taking into account variations in household size and/or composition when making income comparisons between households. The modified Organisation for Economic Co-operation and Development equivalence scale was used to equivalise household income in this indicator. The Department for Work and Pension's Households Below Average Income calculations switched from using the McClements scale to the modified Organisation for Economic Co-operation and Development scale in 2005, prompted by the Government's 2003 announcement that future child poverty measurements would use the modified Organisation for Economic Co-operation and Development scale (which was mainly to facilitate comparisons with other European countries). The 60% of median threshold (£210 per week) was calculated by the Department for Work and Pension's Households Below Average Income team for the ID2010.[4]

Indicator construction process

The LSOA level count was constructed by selecting claimants and dependent partners from the Child Tax Credit database, merging in information (using a unique person identifier) about dependent children, removing any families who were also claiming Income Support, income-based Jobseeker's Allowance or Pension Credit (Guarantee) to ensure no double-counting with the Department for Work and Pension's means-tested benefit data, and aggregating to LSOA level.

Data quality

The HM Revenue and Customs numerator count is constructed from administrative records of tax credit recipients, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicators are the same as those used to produce published National Statistics.

[4] See http://research.dwp.gov.uk/asd/index.php?page=hbai_arc for further information about the HBAI calculations.

Asylum seekers in England in receipt of subsistence support, accommodation support, or both

Numerator

The indicator is the number of asylum seekers (adults and children) in an LSOA who are in receipt of subsistence support, accommodation support or both, for September 2008. The data were supplied by the Home Office.

Definitions/terminology

Asylum is protection given to someone fleeing persecution in their own country under the 1951 United Nations Convention Relating to the Status of Refugees. In the UK asylum seekers who are homeless or without money to buy food and other essentials ('destitute') can apply for subsistence and accommodation support while their application is being considered.[5]

Indicator construction process

The LSOA level count was provided by the Home Office. Due to the sensitivity of these data, no age or sex disaggregation was supplied.

Data quality

The Home Office numerator count is constructed from administrative records of asylum seekers, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicators are the same as those used to produce published National Statistics.

Combining the indicators

The Department for Work and Pensions, HM Revenue and Customs and Home Office numerator counts were summed to produce a non-overlapping overall count of income deprived individuals at LSOA level. This overall count was then expressed as a proportion of the total population in the LSOA. Shrinkage was applied to construct the overall domain score.

Changes since the ID2007

There have not been any changes since the ID2007.

Income Deprivation Affecting Children Index

As in the ID2007, a supplementary index – Income Deprivation Affecting Children Index – has been produced alongside the Income Deprivation Domain. This covers only children aged 0-15 living in income deprived households, defined as either families receiving Income Support or income-based Jobseeker's Allowance or Pension Credit (Guarantee) or those not in receipt of these benefits but in receipt of Child Tax Credit with an equivalised income (excluding housing benefits) below 60% of the national median before housing costs. The Income Deprivation Affecting Children Index is expressed as the proportion of all

[5] www.ukba.homeoffice.gov.uk/asylum/

children aged 0-15 living in income deprived families. Shrinkage was applied to construct the Income Deprivation Affecting Children Index score.

Income Deprivation Affecting Older People Index

A second supplementary index, also produced in 2007, is the Income Deprivation Affecting Older People Index. This index represents income deprivation affecting older people, expressed as the proportion of adults aged 60 or over living in Income Support or income-based Jobseeker's Allowance or Pension Credit (Guarantee) families. Shrinkage was applied to construct the Income Deprivation Affecting Older People Index score.

Employment Deprivation Domain

Domain definition and rationale

This domain measures employment deprivation conceptualised as involuntary exclusion of the working age population from the world of work. The employment deprived are defined as those who would like to work but are unable to do so through unemployment, sickness or disability.

Worklessness is regarded as a deprivation in its own right, and not simply a driver for low income. Attachment to the labour market confers a number of social and psychological advantages, and it is therefore important to measure the deprivation experienced by individuals who are detached from the labour market.

The indicators

A combined count of employment deprived individuals per LSOA is calculated by summing the following seven indicators:

- Claimants of Jobseeker's Allowance (both contribution-based and income-based), women aged 18-59 and men aged 18-64
- Claimants of Incapacity Benefit aged 18-59/64
- Claimants of Severe Disablement Allowance aged 18-59/64
- Claimants of Employment and Support Allowance aged 18-59/64 (those with a contribution-based element)
- Participants in New Deal for 18-24s who are not claiming Jobseeker's Allowance
- Participants in New Deal for 25+ who are not claiming Jobseeker's Allowance
- Participants in New Deal for Lone Parents aged 18 and over (after initial interview).

The combined count of employment deprived individuals per LSOA forms the numerator of an employment deprivation rate which is expressed as a proportion of the working age population (women aged 18-59 and men aged 18-64) in the LSOA.

Indicator detail

The seven indicators listed above were all sourced from the Department for Work and Pensions. To account for seasonal variations in employment deprivation, four quarterly cuts were taken for each indicator and the average number of claimants/participants across the four quarterly cuts calculated for each of the seven indicators.

Type of indicator, numerator and denominator

The indicator is the proportion of the working age population per LSOA that is employment deprived. The numerator is the number of individuals (women aged 18-59 and men aged 18-64) in an LSOA who are either claiming Jobseeker's Allowance, Incapacity Benefit , Severe Disablement Allowance, Employment and Support Allowance or participating in New Deal for 18-24s, New Deal for 25+ or New Deal for Lone Parents. The denominator is the working age population (women aged 18-59 and men aged 18-64) in the LSOA, provided by the Office for National Statistics.

Definitions/terminology

Jobseeker's Allowance is paid to individuals who are out-of-work, available for work and actively seeking work. It is the main measure of unemployment using administrative data.

Incapacity Benefit and Severe Disablement Allowance are paid to individuals who are unable to work due to limiting illness or disability.

Employment and Support Allowance replaced Incapacity Benefit and Income Support paid because of an illness or disability for new claimants from 27 October 2008.

New Deal for 18-24s and New Deal for 25+ are compulsory training schemes for people who have been unemployed for six and 18 months respectively. New Deal for Lone Parents is a voluntary training scheme for unemployed lone parents.

Indicator construction process

A separate non-overlapping count of claimants/participants in each of the seven indicators listed above was created for the following four time points: February 2008, May 2008, August 2008 and November 2008. The counts are non-overlapping because the benefits system does not permit an individual to claim more than one of the above benefits at the same time. In the case of the New Deal for 18-24s and New Deal for 25+ training schemes, where participants can legitimately claim Jobseeker's Allowance at the same time, it was ensured that no double-counting was permitted. This was achieved by the Department for Work and Pensions through the use of a unique person identifier. As Employment and Support Allowance was only introduced in October 2008 it was only possible to create a single count for this benefit relating to November 2008. A quarterly averaged count of claimants/participants was then calculated for each of the seven indicators.

Data quality

The numerator count is constructed from administrative records of benefit claimants and participants in training schemes, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicators are the same as those used to produce published National Statistics.

Combining the indicators

The seven quarterly averaged indicator counts were summed to form an overall seasonally-adjusted count of employment deprived people per LSOA. This numerator was expressed as a proportion of the working age population (women aged 18-59 and men aged 18-64) in the LSOA. Shrinkage was applied to construct the final domain score.

Changes since the ID2007

The introduction of Employment and Support Allowance in October 2008 required this indicator to be added to the domain in order to retain consistency with the definition adopted for the ID2007.

Health Deprivation and Disability Domain

Domain definition and rationale

This domain measures premature death and the impairment of quality of life by poor health. It considers both physical and mental health. The domain measures morbidity, disability and premature mortality but not aspects of behaviour or environment that may be predictive of future health deprivation.

Health deprivation and disability is included as one of the seven domains because ill health is an important aspect of deprivation that limits an individual's ability to participate fully in society. Because it is generally accepted that the risk of ill health and death becomes greater as a person ages, and that this increase is not seen as socially unjust, this domain aims to capture unexpected deaths or levels of ill health by using age and sex standardised data. This means that the expected levels of health in a small areas, given their age and sex composition, are compared rather than the absolute levels of health.

The indicators

- *Years of Potential Life Lost*: An age and sex standardised measure of premature death.
- *Comparative Illness and Disability Ratio*: An age and sex standardised morbidity/ disability ratio.
- *Acute morbidity*: An age and sex standardised rate of emergency admission to hospital.
- *Mood and anxiety disorders*: The rate of adults suffering from mood and anxiety disorders.

Indicator detail

Years of Potential Life Lost

Type of indicator, numerator and denominator

The indicator is a directly age and sex standardised measure of premature death. The numerator is mortality data in five year age-sex bands from 2004-2008 and the denominator is the total population in five year age-sex bands from 2008 (each band is multiplied by five to match the five years of numerator data). Both are supplied by the Office for National Statistics. Five year age-sex bands were used, rather than single year bands, because of the very low number of deaths and smaller populations that would result, and the associated problem of instability in any derived indicators. Five years of data were used to reduce the problems of small numbers.

Definitions/terminology

Premature death is defined as death before the age of 75 (the commonly used measure of prematurity). Death is defined as all-cause mortality, which includes death due to disease as well as external causes such as accidents, unlawful killing and deaths in combat.

Indicator construction process

The indicator is measured using a combination of five years of data. Age and sex standardising the data serves to compare the actual number of deaths or the level of morbidity in an area to what would be expected given the area's age and gender structure. The level of unexpected mortality is also weighted by the age of the individual who has died. The unexpected death of a younger person therefore has a greater impact on the overall score than someone who is older, even if their death is also unexpected. Shrinkage was applied to the indicator.

Data quality

The data used for this indicator were derived from administrative records – the registration of deaths certified by a doctor or a coroner – which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicator are the same as those used to produce published National Statistics.

Comparative Illness and Disability Ratio

Type of indicator, numerator and denominator

The indicator is a directly age and sex standardised rate of morbidity and disability. The numerator is a non-overlapping count of individuals receiving benefits due to ill health in five year age-sex bands for 2008. The denominator is the total population in five year age-sex bands for 2008. Benefits data were supplied by the Department for Work and Pensions while population data were supplied by the Office for National Statistics.

Definitions/terminology

The benefits paid to people who are unable to work due to ill health are Disability Living Allowance, Severe Disablement Allowance, Incapacity Benefit, Attendance Allowance and the disability premium of Income Support. None of the benefits can be paid at the same time as each other so the numbers of people receiving them can be combined to produce an indicator of work limiting morbidity and disability.

Indicator construction process

The number of people receiving the above benefits in five year age-sex bands was divided by the resident population in five year age-sex bands to provide an age and sex standardised rate of morbidity and disability. Shrinkage was applied to the indicator.

Data quality

The data used for this indicator were derived from administrative records of health related benefit claimants, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicator are the same as those used to produce published National Statistics.

Acute morbidity

Type of indicator, numerator and denominator

The indicator is a directly age and sex standardised rate of emergency admissions to hospital. The numerator is the number of hospital spells starting with admission in an emergency and lasting more than a calendar day in five year age-sex bands for 2006-07 and 2007-08. Two years of data were used to reduce the problems of small numbers.[6] The denominator is the total population in five year age-sex bands for 2008 (each band is multiplied by three to match the three years of numerator data). Hospital admissions data were supplied by the NHS Information Centre from the Hospital Episode Statistics database, while population data were supplied by the Office for National Statistics.

Definitions/terminology

Emergency admissions are defined as cases where 'admission is unpredictable and at short notice because of clinical need'.[7] This includes admission via the Accident and Emergency department, admission directly onto a ward or into theatre and the emergency transfer of patients between hospitals. All emergency admissions greater than one day in length (i.e. discharge not being on the same date as admission) are included as an indication of acute health problems. Only admissions to NHS hospitals are included in the data.

[6] Where events are more frequent or the population is larger, fewer years of data can be used.

[7] NHS data dictionary: www.datadictionary.nhs.uk/data_dictionary/attributes/a/add/admission_method_de.asp?query=emergency%20admission&rank=1&shownav=1

Indicator construction process
The number of emergency admissions to hospital in five year age-sex bands was divided by the resident population in five year age-sex bands to provide an age and sex standardised rate of emergency admissions. Shrinkage was applied to the indicator.

Data quality
The data used for this indicator were derived from administrative records of inpatient admissions, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicator are the same as those used to produce published National Statistics.

Mood and anxiety disorders

Type of indicator, numerator and denominator
The indicator is the rate of mood and anxiety disorders in the population. It is a modelled estimate based on prescribing data for 2005 from NHS Prescription Services, hospital episode data for 2006-07 and 2007-08 from the NHS Information Centre, suicide mortality data for 2004-2008 from the Office for National Statistics and health benefits data for 2008 from the Department for Work and Pensions. None of these datasets is a perfect measure of mood and anxiety disorders and so they are used in combination and together represent a large proportion of all those suffering mental ill health.

Definitions/terminology
The definition used for this indicator includes mood (affective), neurotic, stress-related and somatoform disorders.

Indicator construction process
There are no standard small area measures of mental health in England and so four different data sources were used. Variation in the organisation of local services and different practices within and between organisations affect the type of treatment an individual receives. This may lead to groups of individuals, identical in terms of their mental health, coming in contact with some services in some areas and not in others. For this reason four component indicators from independent administrative data sources were combined to reduce the influence of under- or over-recording so that the bias in the overall indicator should be lower than that in any single indicator.

Prescribing data
The number of patients within a particular GP practice who are suffering from mental health problems was estimated using information on the conditions for which various types of drugs (British National Formulary codes 4.1.2 (anxiolytics) and 4.3 (anti-depressants)) are prescribed and their typical dosages. Unfortunately prescription data is not held at individual level and therefore a two-stage

methodology was adopted to calculate area rates. This method assumes that those with mental ill health take the national Average Daily Quantity (Prescribing Support Unit) of a specific drug on every day of the year. While these assumptions may not fit very well in individual cases, they are more likely to hold across the 'average' for the practice population. The practice rates were then distributed indirectly to LSOAs through knowledge of practice population distribution.

Hospital episode data

Hospital episode data were used to estimate the proportion of the population suffering severe mental health problems relating to depression and anxiety. A count was made of all those who have had at least one inpatient spell in any one year coded within International Classification of Diseases 10 chapter 'F' (the coding for mental ill health): the precise grouping of disorders included can be seen in **Table 3.1**. The indicator is therefore an annual count of those suffering at least one severe mental health episode in a year, an 'annual incidence of hospitalisation'.[8] Two years of data were used to reduce problems of small numbers. Using the LSOA total population as a denominator, a simple rate was then calculated with shrinkage applied.

Table 3.1: International Classification of Diseases 10 mental health coding

ICD-10	Categories of disorder
F30-F39	Mood (affective) disorders
F40-F48	Neurotic, stress-related and somatoform disorders

Suicide mortality data

Although suicide is not a direct measure of mental ill health, it is highly associated with depression where it is implicated in a majority of cases (e.g. Inskip et al., 1998). However, because numbers are small the precision of the measure may be poor. The actual measure used was deaths that occurred between 2004 and 2008 which had International Classification of Diseases 10 codes X60-X84 and Y10-Y34 excluding Y33.9 where the coroner's verdict was pending. Using the LSOA total population as a denominator, a simple rate was calculated with shrinkage applied.

Health benefits data

The rate of long-term sickness and disability in an area can be measured using information on receipt of particular benefits. Incapacity Benefit and Severe Disablement Allowance are benefits paid to individuals of working age who are unable to work because of ill health. Both of these benefit datasets are coded for medical conditions. This coding can be converted to an International Classification of Diseases 10 classification and then a count of individuals with a condition within chapter 'F' made: the precise International Classification of Diseases 10 codes used

[8] Where an individual spent the whole year in hospital they will be counted as one in the 'annual incidence of hospitalisation' measure and they will be attributed to the area they were resident in when first admitted.

were F3 and F4 as for the hospital data. Using the LSOA working age population (women aged 18-59 and men aged 18-64) as a denominator, a rate of mental ill health in each LSOA was calculated with shrinkage applied.

Combining the data to create a composite indicator
The four components were combined using weights generated by factor analysis (see **Table 3.2**). The combined indicators should be a more precise measure of the underlying 'true' rate of mental health than any single indicator on its own. Unlike the other indicators in this domain, this indicator was not age and sex standardised. Although there are ages when a person is at higher risk of suffering from these mental health disorders and females are at greater risk than males, the distribution of mood and anxiety disorders does not follow a clear distribution over the lifespan so age and sex were not controlled for.

Table 3.2: Mood and anxiety disorders indicator factor analysis weights

Indicator	Indicator weight
Prescribing data	0.21
Hospital episode data	0.33
Suicide mortality rate	0.14
Health benefits data	0.32

Data quality
The various datasets used for this indicator are drawn from administrative records (drug prescriptions, inpatient admissions, suicides and health related benefit claimants), which have close to 100% coverage and are not subject to sampling error. Nevertheless, there are some important data quality considerations relating to this indicator:

1. The use of prescribing data is based on a number of assumptions: first, that the individuals are receiving prescriptions throughout the year and in a pattern that is reasonably similar, in terms of dosage, across the country; and second, that the rate of mental ill health within a GP practice is fairly constant across space (the GP catchment area). Both of these assumptions are reasonable but will be stronger in some places than in others.
2. Any individuals treated in the community or a private mental health facility will not be picked up in the Hospital Episodes Statistics data.
3. Sometimes it is difficult for a doctor or coroner to determine intent and this may lead to an actual suicide being categorised under a different classification. However, it is unlikely that there will be any systematic or biasing pattern in this process.

4. The quality of the health benefits based indicator will partly relate to whether a case is categorised as related to mental ill health, rather than as due to another condition from which the person may be suffering.

The raw administrative records used to construct the indicator are the same as those used to produce various published National Statistics.

Combining the indicators

The indicators within the domain were standardised by ranking and transforming to a normal distribution. The factor analysis technique was used to generate the weights to combine the indicators into the final domain score (see **Table 3.3**).

Table 3.3: Health Deprivation and Disability Domain factor analysis weights

Indicator	**Indicator weight**
Years of Potential Life Lost	0.27
Comparative Illness and Disability Ratio	0.30
Acute morbidity	0.19
Mood and anxiety disorders	0.24

Changes since the ID2007

No changes have been made to the indicators or methodology. The only difference with the domain concerns the mood and anxiety disorders indicator, for which it was not possible to obtain updated prescribing data. The prescribing data therefore relate to a time point of 2005. Updated data were obtained for the other three components of this indicator.

Education, Skills and Training Deprivation Domain

Domain definition and rationale

This domain captures the extent of deprivation in education, skills and training in an area. The indicators fall into two sub-domains: one relating to children and young people and one relating to adult skills. These two sub-domains are designed to reflect the 'flow' and 'stock' of educational disadvantage within an area respectively. That is, the 'children and young people' sub-domain measures the attainment of qualifications and associated measures ('flow'), while the 'skills' sub-domain measures the lack of qualifications in the resident working age adult population ('stock').

The indicators

Sub-domain: Children and Young People

- *Key Stage 2 attainment*: The average points score of pupils taking English, maths and science Key Stage 2 exams.

- *Key Stage 3 attainment*: The average points score of pupils taking English, maths and science Key Stage 3 exams.
- *Key Stage 4 attainment*: The average capped points score of pupils taking Key Stage 4 (GCSE or equivalent) exams.
- *Secondary school absence*: The proportion of authorised and unauthorised absences from secondary school.
- *Staying on in education post 16*: The proportion of young people not staying on in school or non-advanced education above age 16.
- *Entry to higher education*: *The* proportion of young people aged under 21 not entering higher education.

Sub-domain: Skills

- *Adult skills*: The proportion of working age adults aged 25-54 with no or low qualifications.

Indicator detail – Children and Young People sub-domain

Key Stage 2 and Key Stage 3 attainment

The Key Stage 2 and Key Stage 3 attainment indicators were constructed in the same way.

Type of indicator, numerator and denominator

The indicator is expressed as an average points score for the particular Key Stage. The numerator is the total score of pupils taking English, maths and science exams in 2006-07 and 2007-08 in an LSOA. The denominator is the total number of subjects (exams) taken by pupils for the same years as the numerator. The data were supplied by the Department for Education from the National Pupil Database. Two years of data were used to reduce the problems of small numbers, and 2007-08 was the latest year of data that could be used in order to maintain consistency with the ID2007 due to a change in pupil assessment in the 2008-09 academic year.

Definitions/terminology

The figures are for pupils in maintained schools (i.e. schools maintained by the local authority) and relate to the LSOA of pupil residence. Each pupil is awarded a level for the three Key Stage exams. Values are assigned to the levels achieved in the three examinations and these values summed for each pupil.[9]

Indicator construction process

The LSOA level numerator and denominator to calculate the average points score of pupils were obtained directly from the Department for Education. Shrinkage was applied to the indicator.

[9] See www.education.gov.uk/performancetables/schools_07/Point-scores-for-tests-and-examinations.doc

Data quality

The data used for this indicator were derived from administrative records of pupils' examination results, which have close to 100% coverage and are not subject to sampling error. The data are classified as National Statistics and comply fully with the National Statistics Code of Practice.

Key Stage 4 attainment

Type of indicator, numerator and denominator

The indicator is expressed as an average capped points score for pupils at Key Stage 4 (GCSE or equivalent). The numerator is the total capped score of pupils taking Key Stage 4 in 2006-07 and 2007-08 in an LSOA. The denominator is the total number of pupils in an LSOA who took Key Stage 4 exams for the same years as the numerator. The data were supplied by the Department for Education from the National Pupil Database. Two years of data were used to reduce the problems of small numbers, and 2007-08 data was the latest year of data used in order to maintain consistency with the Key Stage 2 and 3 indicators.

Definitions/terminology

The figures are for pupils in maintained schools (i.e. schools maintained by the local education authority) and relate to the LSOA of pupil residence. A total capped points score is calculated for each pupil based on their best eight GCSE and equivalent results.[10]

Indicator construction process

The LSOA level numerator and denominator to calculate the average points score of pupils were obtained directly from the Department for Education. Shrinkage was applied to the indicator.

Data quality

The data used for this indicator were derived from administrative records of pupils' examination results, which have close to 100% coverage and are not subject to sampling error. The data are classified as National Statistics and comply fully with the National Statistics Code of Practice.

Secondary school absence

Type of indicator, numerator and denominator

The indicator is the proportion of authorised and unauthorised absences from secondary school. The numerator is the number of half days missed by pupils living in an LSOA due to authorised and unauthorised absences for 2007-08 and 2008-09. The denominator is the total number of possible sessions for 2007-08 and 2008-09.

[10] See www.education.gov.uk/performancetables/schools_07/Point-scores-for-tests-and-examinations.doc

The data were supplied by the Department for Education from the School Census database. Two years of data were used to reduce the problems of small numbers.

Definitions/terminology
The figures are for maintained secondary schools only (Academies, City Technology Colleges, special schools and the independent sector are not included) and relate to the LSOA of pupil residence. Pupils reported to be boarders are not included. A pupil session is a half day.

Indicator construction process
The LSOA level numerator and denominator to calculate the secondary school absence rate were obtained directly from the Department for Education. Shrinkage was applied to the indicator.

Data quality
The data used for this indicator were derived from administrative records of pupil absences (supplied by individual schools), which have close to 100% coverage and are not subject to sampling error. The data are classified as National Statistics and comply fully with the National Statistics Code of Practice.

Staying on in education post 16

Type of indicator, numerator and denominator
The indicator is the proportion of young people not staying on in school or non-advanced education above age 16. Child Benefit counts for the same age cohort from different years were used. The numerator is the number of people in an LSOA aged 17 receiving Child Benefit in 2009 and the denominator is the number of people in an LSOA aged 15 receiving Child Benefit in 2007. The data were supplied by HM Revenue and Customs.

Definitions/terminology
Child Benefit is a tax-free payment that most parents can claim for their child(ren). To qualify a child must be under 16, or between 16 and 19 and in relevant education or training, or registered for work, education or training with an approved body.

Indicator construction process
The indicator was supplied by HM Revenue and Customs. Shrinkage was applied to the indicator. The indicator was calculated in a positive form as the proportion of children staying on in school or non-advanced education. This figure was therefore subtracted from 1 to produce the proportion *not* staying in education.

A recognised limitation of this indicator is the necessary assumption that the group of young people aged 17 in an LSOA in 2009 was identical to the group aged 15 in 2007. Many LSOAs will have seen both in-migration and out-migration of young

people of the relevant age between the two time points. However, no other source of denominator data was considered to be as robust as Child Benefit given the need for a single year of age.

Data quality
The data used for this indicator were derived from administrative records of Child Benefit claimants, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicator are the same as those used to produce published National Statistics.

Entry to higher education

Type of indicator, numerator and denominator
The indicator is the proportion of young people aged under 21 not entering higher education. The numerator is the number of successful entrants under 21 to higher education in an LSOA. An average of four years of data – 2005-06 to 2008-09 – from the Higher Education Statistics Agency was taken for the numerator. Four years of data were used to reduce the problems of small numbers. The denominator is the LSOA population aged 14-17 from the 2001 Census.

Small area population estimates are less reliable for very narrow age definitions such as 14-17 year olds used as the denominator in this indicator. Although five year age-sex bands have been used for indicators in the Health Deprivation and Disability Domain, all the age-sex bands are used together rather than a single band in isolation. Therefore any errors in the population estimation for a particular age-sex band will average out across the full set of age-sex bands used for the health indicators. The margins of error for a three year age band are quite large and therefore population data from the 2001 Census were used for the denominator to give a more reliable population count. A limitation of using the 2001 Census data as the denominator is that any real population change in the 14-17 age group will not be reflected. However, to maintain consistency with the ID2007, when a decision was made not to update the denominator (for the reasons above), the 14-17 population from the Census is retained as the denominator.

Definitions/terminology
The indicator includes those aged under 21 who successfully applied from a domestic postcode in England to a higher education institution anywhere in the UK. For the purpose of the Higher Education Statistics Agency's data collection, higher education refers to courses for which the level of instruction is above that of level 3 of the Qualifications and Curriculum Authority National Qualifications Framework (e.g. courses at the level of Certificate of Higher Education and above). Data are restricted to first degree, first year, full-time students. Age is as at 31 August each year.

Indicator construction process

The total number of successful entrants aged under 21 in an LSOA for the four years combined was divided by the LSOA population aged 14-17 from the 2001 Census. The indicator was calculated in a positive form as the proportion of young people entering higher education. This figure was therefore subtracted from 1 to produce the proportion *not* entering higher education. Shrinkage was applied to the indicator.

Data quality

The data used for this indicator were derived from administrative records of applications to higher education, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicator are the same as those used to produce published National Statistics.

Indicator detail – Skills sub-domain

Adult skills

Type of indicator, numerator and denominator

The indicator is the proportion of adults aged 25-54 with no or low qualifications. The numerator is the LSOA level number of adults aged 25-54 with no qualifications or with qualifications below NVQ Level 2, while the denominator is the number of adults aged 25-54 in the LSOA. Both are taken from the 2001 Census.

Definitions/terminology

In the ID2004, when this indicator was first introduced, a comparison of the Census results nationally and regionally with the results from the equivalent Labour Force Survey was undertaken by the research team as part of the indicator quality assurance. This indicated that the Census appeared to overstate the numbers with no qualifications and that older age groups were more likely to record fewer qualifications in the Census than in the Labour Force Survey. It was therefore decided to include both no and low qualifications from the Census (defined as qualifications at NVQ level 1 or lower). The age band 25-54 years was selected to avoid the student population in areas with higher education institutions and exclude older retired workers.

Indicator construction process

The LSOA level data on proportion of adults with no or low qualifications were obtained from the Office for National Statistics' 2001 Census release. Shrinkage was applied to the indicator.

Data quality

All statistics derived from the 2001 Census are classified as National Statistics and comply fully with the National Statistics Code of Practice.

Combining the indicators

The relevant indicators within the Children and Young People sub-domain were standardised by ranking and transforming to a normal distribution. The factor analysis technique was used to generate the weights to combine the indicators into the sub-domain score (see **Table 3.4**). The sub-domains were then standardised by ranking, transformed to an exponential distribution and combined with equal weights to create the overall domain score.

Table 3.4: Children and Young People sub-domain factor analysis weights

Indicator	Indicator weight
Key Stage 2 attainment	0.17
Key Stage 3 attainment	0.19
Key Stage 4 attainment	0.20
Secondary school absence	0.17
Staying on in education post 16	0.10
Entry to higher education	0.17

Changes since the ID2007

In the ID2007 the average points score at Key Stage 2 and 3 indicators made use of the actual test scores rather than the level achieved (as in the ID2004). For the ID2010 the methodology reverted back to the use of levels. This change is to make the indicator consistent with average score data published by the Department for Education, which are National Statistics.

In the ID2007 the secondary school absence rate indicator was derived from school level data and each pupil assigned their school's two year average absence rate, which was then averaged across an LSOA. A measure of secondary school absence at LSOA level based on individual pupil absences has become available since the ID2007 and data are published by the Department for Education as National Statistics. This is a more accurate measure of absence rates at LSOA level and therefore has been used in the ID2010.

Barriers to Housing and Services Domain

Domain definition and rationale

This domain measures the physical and financial accessibility of housing and key local services. The indicators fall into two sub-domains: 'geographical barriers', which relate to the physical proximity of local services, and 'wider barriers' which includes issues relating to access to housing such as affordability.

Barriers to housing and services is included as one of the seven domains because accessibility of suitable housing and local amenities are significant determinants of quality of life. People who cannot afford to enter owner occupation, live in overcrowded homes or are classed as homeless are deprived of the safety and stability of a home that is appropriate to their household's needs. Individuals who have to travel long distances to key local services are also disadvantaged.

The indicators

Sub-domain: Wider Barriers

- *Household overcrowding*: The proportion of all households in an LSOA which are judged to have insufficient space to meet the household's needs.
- *Homelessness*: The rate of acceptances for housing assistance under the homelessness provisions of housing legislation.
- *Housing affordability*: The difficulty of access to owner-occupation, expressed as a proportion of households aged under 35 whose income means that they are unable to afford to enter owner occupation.

Sub-domain: Geographical Barriers

- *Road distance to a GP surgery*: A measure of the mean distance to the closest GP surgery for people living in the LSOA.
- *Road distance to a food shop*: A measure of the mean distance to the closest supermarket or general store for people living in the LSOA.
- *Road distance to a primary school*: A measure of the mean distance to the closest primary school for people living in the LSOA.
- *Road distance to a Post Office*: A measure of the mean distance to the closest post office or sub post office for people living in the LSOA.

Indicator detail – Wider Barriers sub-domain

Household overcrowding

Type of indicator, numerator and denominator

The indicator is expressed as the proportion of households in an LSOA that are classed as overcrowded according to the definition below. The numerator is the LSOA level number of overcrowded households while the denominator is the number of households in the LSOA. Both were taken from the 2001 Census.

Definitions/terminology

The standard used to measure overcrowding is called the 'occupancy rating' which relates to the actual number of rooms in a dwelling in relation to the number of rooms required by the household, taking account of their ages and relationships.

The room requirement states that every household needs a minimum of two common rooms, excluding bathrooms, with bedroom requirements that reflect the composition of the household. The occupancy rating of a dwelling is expressed as a positive or negative figure, reflecting the number of rooms in a dwelling that exceed the household's requirements, or by which the home falls short of its occupants' needs.[11]

Indicator construction process

The data on proportion of overcrowded households in an LSOA were obtained from the Office for National Statistics' 2001 Census release. Shrinkage was applied to the indicator.

Data quality

All statistics derived from the 2001 Census are classified as National Statistics and comply fully with the National Statistics Code of Practice.

Homelessness

Type of indicator, numerator and denominator

The indicator is expressed as the rate of acceptances for housing assistance under the homelessness provisions of housing legislation (as defined below). The numerator is the number of accepted decisions in a local authority district in 2008-09. The denominator is the local authority district mid-year estimate of households for 2006, which is the latest date for which these data are available. Both the numerator and denominator were supplied by the Department for Communities and Local Government.

Definitions/terminology

Homelessness is defined here as applications made to local housing authorities under the homelessness provisions of housing legislation where a decision has been made and the applicant has been found to be eligible for assistance (acceptances). It therefore excludes any households found to be ineligible.

Indicator construction process

The data on homelessness rates were supplied directly by the Department for Communities and Local Government at local authority district level. The local authority district rates were assigned to the constituent LSOAs, with each LSOA in a district given the same rate.

Data quality

The raw data used to construct the indicator are the same as those used to produce published National Statistics.

[11] www.neighbourhood.statistics.gov.uk/dissemination/LeadMetadataDownloadPDF.do?downloadId=188

Affordability

Type of indicator, numerator and denominator

The indicator is expressed as the proportion of households who cannot afford to own their own home. It is a modelled estimate based on house prices and incomes at local authority district level with a 2008 time point. The main data sources are the Family Resources Survey for household incomes and composition, and the Regulated Mortgage Survey for house prices. Other sources used include a range of Census and other published data at local authority district level including the Annual Population Survey and the Annual Survey of Hours and Earnings.

Definitions/terminology

Income is defined as the income of the 'first benefit unit' in the household, excluding income from means-tested benefits. The first benefit unit is the main householder and any partner. Other adults present in any 'complex' household would be separate benefit units, and their income is not included because these would not be considered reckonable income for the purposes of obtaining a mortgage.

The target group is households aged up to 35, which aims to capture the cohort of households entering the housing market based on the recognition that most first time buyers are in the younger adult age group (Bramley, 2003).

Indicator construction process

This indicator was produced by Heriot-Watt University. It is a modelled estimate of the proportion of households with a head aged under 35 with insufficient income to purchase a dwelling of the appropriate size (based on household composition) at the local threshold price level in 2008. The threshold price is based on the lower quartile of all sales within size groups (1, 2 and 3 bedroom) at local authority district level. The indicator was estimated in stages, firstly for sub-regions and then a modelling procedure was used to translate these sub-regional estimates to local authority district level. The indicator was calculated in a positive form as the percentage of under 35 households who can afford to buy a home in their local authority district. At the final stage the 'able to buy' percentage was subtracted from 100 to express the indicator as the percentage of households who cannot afford to buy a home locally in 2008. The local authority district estimate was assigned to the constituent LSOAs, with each LSOA in a district given the same rate.

Data quality

The data are not National Statistics, however, the main sources utilised were themselves the principal official measures available at the time and are used as the government's main source of information on the topic. The modelling procedure used to estimate local affordability rates from the sub-regional figures was subject to the testing and comparison of a number of procedures, and that chosen was the most satisfactory in terms of a number of criteria.

Indicator detail – Geographical Barriers sub-domain

Road distance indicators

The four road distance indicators were chosen (in the ID2000 and retained in each subsequent update) as they are key services that are important for people's day to day life and to which people need to have good geographical access. All road distance indicators were constructed in the same way.

Type of indicator, numerator and denominator

The indicators are an average road distance measured in kilometres and calculated initially at Output Area[12] level. The locations of GP premises were supplied by NHS Connecting for Health (from a live database, extracted April 2010). The locations of food shops were supplied by MapInfo (for 2008). The locations of schools were supplied by the Department for Education from their Edubase system (a live database, extracted January 2010). The locations of Post Offices were supplied by Post Office Ltd (for 2008). The Output Area level population estimates (total population for all but primary schools where population of children aged 4 to 11 was used) were supplied by the Office for National Statistics and relate to 2007, which is the most recent year for which Output Area level data are available.

Definitions/terminology

The dataset of GPs used to construct the indicator is a list of all GPs and their practice location (approximately 8,600). It does not capture the size of a practice, which will vary from that of a single practitioner to a large surgery with many GPs and additional health care professionals. The definition of 'food shop' includes both larger food shops such as supermarkets as well as smaller convenience stores (approximately 16,000). All state schools classified as 'primary' in the dataset were included (approximately 16,000). This includes separate infant and junior schools as well as primary schools that educate children from 5-11 years of age. All Post Office branches were included (approximately 13,000).

Indicator construction process

Only services open in mid-2008 were included (using open and close date information where necessary). Only GPs and primary schools located in England were retained because healthcare and education is a responsibility for the devolved administrations, so it is not appropriate to consider services outside of England when constructing the English Indices of Deprivation. Food shops and post offices in the mainland UK were included so that account could be taken of services just within the Scottish or Welsh borders. Grid references (accurate to one metre) were assigned to each service location postcode using the Office for National Statistics geotool. A bespoke geographic information system application was then used to calculate

[12] For more information about Output Areas see: www.neighbourhood.statistics.gov.uk/dissemination/Info.do?page=nessgeography/neighbourhoodstatisticsgeographyglossary/neighbourhood-statistics-geography-glossary.htm#O

the road distance to the closest service from the population weighted centroid of each Output Area. To create an average road distance for the LSOA, a population weighted mean of the Output Area road distances was taken (i.e. each Output Area score was weighted according to the proportion of the LSOA's population in the Output Area, and the weighted scores summed).

Data quality

The data used for the road distance indicators are service location points and therefore would not qualify as National Statistics. The sources utilised in the Geographical Barriers sub-domain are still considered to be the most appropriate, and ensure that the indicators remain consistent with the ID2007.

Combining the indicators

The relevant indicators within each of the sub-domains were standardised by ranking and transforming to a normal distribution, and combined using equal weights. The sub-domains were then standardised by ranking, transformed to an exponential distribution and combined with equal weights to create the overall domain score.

Changes since the ID2007

There was a small change to the methodology for producing the difficulty of access to owner occupation indicator. This was essentially a more effective way of modelling down the Family Resources Survey to distribute household incomes to local authority level, one of a number of steps to produce the indicator. The new methodology has been used in a recent study for the National Housing and Planning Advice Unit which was carried out by researchers at the Centre for Housing Policy at the University of York and the School of the Built Environment at Heriot-Watt University (Wilcox and Bramley, 2010). In addition to improving the methodology used in the ID2007, the use of the new methodology in the ID2010 means there is greater consistency with other available estimates of housing affordability.

Crime Domain

Domain definition and rationale

Crime is an important feature of deprivation that has major effects on individuals and communities. The purpose of this domain is to measure the rate of recorded crime for four major crime types – violence, burglary, theft and criminal damage – representing the risk of personal and material victimisation at a small area level.

The indicators

- *Violence*: The rate of violence (19 recorded crime types) per 1000 at-risk population.
- *Burglary*: The rate of burglary (4 recorded crime types) per 1000 at-risk properties.
- *Theft:* The rate of theft (5 recorded crime types) per 1000 at-risk population.
- *Criminal damage*: The rate of criminal damage (11 recorded crime types) per 1000 at-risk population.

Indicator detail

The four indicators listed above were all sourced from the same datasets and created using the same methodology. The only difference is the choice of denominators, as noted below.

Type of indicator, numerator and denominator

The indicators are expressed as a rate representing the risk of personal and material victimisation at LSOA level. The numerator for each indicator is the sum of the constituent notifiable offences at LSOA level. The LSOA level denominator for the violence, theft and criminal damage indicators is the total resident population for mid-2008 plus the non-resident workplace population from the 2001 Census, which is constructed as a measure of the at-risk population. The LSOA level denominator for the burglary indicator is the number of dwellings from the 2001 Census plus the number of business addresses from Ordnance Survey's Address Point, which is constructed as a measure of at-risk properties.

Definitions/terminology

A 'notifiable offence' is any offence where there is a requirement on a police force to notify the Home Office in regular statistical returns. Some more minor offences are excluded and so are those not regarded as notifiable offences. Amendments to the Home Office counting rules which came into effect in April 2008 have introduced some changes to the crime codes and descriptions. These changes amount to a differentiation of crimes within a category and therefore do not imply any substantive change to the overall classification or counting of offences (see **Annex H**). The changes to the counting rules resulted in a slight increase in the number of categories of violence and criminal damage. The wording of racially-aggravated offences within the criminal damage indicator has also been expanded to incorporate both racially and religiously aggravated cases of criminal damage.

Indicator construction process

Each of the 39 regional police forces in England supplied a geocoded point level dataset of recorded crime. Each individual crime was coded as violence, burglary, theft or criminal damage according to its notifiable offence code. The point level data were aggregated to LSOA level using a bespoke geographic information system

application. This geographic information system application imposed a degree of spatial smoothing to the distribution of crimes on and around the boundaries of adjoining LSOAs (to address the common problem of crimes being geocoded to a particular location on one side of a LSOA boundary when in fact the crimes should more appropriately be divided more equally between the adjoining LSOAs). The LSOA level crime counts produced using the geographic information system application were then constrained to aggregate totals for Crime and Disorder Reduction Partnerships[13] provided by the Home Office. This constraining step was performed to account for variations between Crime and Disorder Reduction Partnerships in the proportion of crimes successfully geocoded. The constrained LSOA level crime counts for the four indicators of violence, burglary, theft and criminal damage were then expressed as rates per 1000 at-risk population (for violence, theft and criminal damage) or per 1000 at-risk properties (for burglary). Shrinkage was applied to each of the four composite indicator rates.

Data quality

The data used for this indicator were derived from administrative records of recorded crimes, which have close to 100% coverage and are not subject to sampling error. The raw administrative records used to construct the indicator are the same as those used to produce published National Statistics.

Combining the indicators

The four composite indicators were standardised by ranking and transforming to a normal distribution. The factor analysis technique was used to generate the weights to combine the indicators into the domain score (see **Table 3.5**).

Table 3.5: Crime Domain factor analysis weights

Indicator	Indicator weight
Violence	0.28
Burglary	0.22
Theft	0.26
Criminal damage	0.24

Changes since the ID2007

The amendments to Home Office counting rules in April 2008 resulted in a slight reconfiguration of some of the notifiable offence categories but no substantive changes to the composite indicator definitions.

[13] Crime and Disorder Reduction Partnerships have now been replaced by Community Safety Partnerships.

Living Environment Deprivation Domain

Domain definition and rationale

This domain measures the quality of individuals' immediate surroundings both within and outside the home. The indicators fall into two sub-domains: the 'indoors' living environment, which measures the quality of housing, and the 'outdoors' living environment which contains two measures relating to air quality and road traffic accidents.

The indicators

Sub-domain: The 'indoors' living environment

- *Housing in poor condition*: The proportion of social and private homes that fail to meet the decent homes standard.
- *Houses without central heating*: The proportion of houses that do not have central heating.

Sub-domain: The 'outdoors' living environment

- *Air quality*: A measure of air quality based on emissions rates for four pollutants.
- *Road traffic accidents*: A measure of road traffic accidents involving injury to pedestrians and cyclists among the resident and workplace population.

Indicator detail – Indoors Living Environment sub-domain

Housing in poor condition

Type of indicator, numerator and denominator

The indicator is a modelled proportion of dwellings that fail to meet the decent homes standard, using data from the English House Condition Survey in 2005. It considers both social and private housing. The numerator is the modelled number of non-decent homes in the LSOA, while the denominator is the modelled number of homes in the LSOA in 2005.

Definitions/terminology

The condition of housing is assessed according to the decent homes standard, which is the current minimum standard for housing in the UK. The standard considers four components of home condition: fitness for habitation, disrepair, modern facilities and thermal comfort. Dwellings that do not meet this standard are defined as unfit under the 1985 Housing Act (ODPM, 2004).

Indicator construction process

This indicator was produced by the Building Research Establishment Ltd. It is a modelled estimate of the proportion of social and private housing in poor condition or disrepair. A set of stock profiles at the national level relating to the decent homes standard was provided by data from the English House Condition Survey. Details of local housing stock at small area level were calculated from a range of data sources that replicate the detail of the English House Condition Survey at the local level. Failure likelihood factors were generated by segmentation analysis and logistic regression models. The set of profiles and likelihood values were then applied to the relevant stock numbers per postcode to produce the postcode level model. The postcode level model was aggregated to Output Area level weighted by the number of dwellings per postcode, and then aggregated again to LSOA level.

Data quality

The data are not National Statistics, however the Building Research Establishment data provide the most comprehensive source of information on the topic and therefore the best possible measure of homes in poor condition at a small area level.

Houses without central heating

Type of indicator, numerator and denominator

The indicator is the proportion of houses in each LSOA that do not have central heating. The numerator is the number of houses without central heating in the LSOA while the denominator is the number of households in the LSOA. Both are taken from the 2001 Census.

Definitions/terminology

The Census definition considers a home to have central heating if some or all rooms are centrally heated. A house without central heating is therefore characterised as not having central heating in any room. The definition of central heating used here includes gas, oil or solid fuel central heating, night storage heaters, warm air heating and underfloor heating.

Indicator construction process

The data on proportion of houses in an LSOA that do not have central heating were obtained from the Office for National Statistics' 2001 Census release. Shrinkage was applied to the indicator.

Data quality

All statistics derived from the 2001 Census are classified as National Statistics and comply fully with the National Statistics Code of Practice.

Indicator detail – Outdoors Living Environment sub-domain

Air quality

Type of indicator, numerator and denominator

The indicator is a modelled estimate of the concentration of the four pollutants nitrogen dioxide, benzene, sulphur dioxide and particulates. Air quality data for 2008 on a 1km grid were obtained from the UK National Air Quality Archive (now the UK Air Information Resource[14]).

Definitions/terminology

For each pollutant, the atmospheric concentration is related to a guideline or standard value. The annual mean standards of nitrogen dioxide, benzene and particulates are defined by the UK's National Air Quality Strategy while the safe guideline for sulphur dioxide is set by the World Health Organisation.

Indicator construction process

This indicator was constructed by Staffordshire University. Emissions estimates are available for benzene, sulphur dioxide, nitrogen dioxide and particulates from the National Atmospheric Emissions Inventory (Murrells et al., 2009) and these are modelled to a 1km grid by AEA (Grice et al., 2010). To calculate air quality estimates at LSOA level, a point in polygon analysis was carried out and the values averaged within each LSOA. For LSOAs that did not have grid points falling within them, data from the nearest point of the air quality grid were assigned. The level of each pollutant in an LSOA was then divided by the standard value for the pollutant. An index value of 1 is equivalent to the national standard for that pollutant. The index values for the four pollutants were then summed to create an overall air quality index score for the LSOA. Values for the index range from, in theory, zero to infinity. In practice, values are unlikely to exceed 4, the equivalent of a site where concentrations of all four pollutants were at their respective standards.

Data quality

The source data used for this indicator are provided under contract by AEA to the Department for Environment, Food and Rural Affairs. The data are used by the Department for Environment, Food and Rural Affairs for the purpose of monitoring and reporting air pollution, for example to comply with EU Directives on ambient air quality which requires an annual air quality assessment. Air quality modelling is carried out to supplement the information available from the UK national air quality monitoring sites and contribute to the assessments required by the EU Directives.

[14] http://uk-air.defra.gov.uk/

Road traffic accidents

Type of indicator, numerator and denominator

This indicator measures injury on the roads for pedestrians and cyclists for the years 2007-2009. The numerator for this indicator is the number of reported accidents (weighted for severity) in an LSOA that involve death or personal injury to a pedestrian or cyclist. These data are collected by the Department for Transport and are available from the UK Data Archive. The denominator is the total resident population from the Office for National Statistics' population estimates for 2008, plus the non-resident workplace population from the 2001 Census. Three years of data were used to reduce the problems of small numbers.

Definitions/terminology

The term 'non-motorised road users' includes cyclists, pedestrians and horse riders, although horse riders are excluded from the counts used here. Only accidents that involve at least one mechanically propelled vehicle are included in the dataset. Accidents involving personal injury, including deliberate acts of violence, but excluding confirmed cases of suicide, are counted. Injuries sustained on private roads and in car parks are not included.[15]

Indicator construction process

Three years of data of all reported traffic accidents involving death or personal injury were obtained from the Department for Transport (via the Data Archive) from police data relating to these accidents. Where many casualties were associated with one accident, all pedestrian and cyclist casualties were counted. Each incident was plotted according to its grid reference which gives its location accurate to 10 metres. Where an incident occurred within 10 metres of an LSOA boundary the incident was applied equally to both LSOAs. The LSOA level data were constrained to the Department for Transport's local authority district counts for each severity type (slight, serious and fatal). Weights were applied to the total counts of the three severity types: single for slight, double for serious and triple for fatal. The numerator is a weighted average count of injuries for the three years combined. A final road traffic accident score was then calculated. The shrinkage technique was applied to the indicator.

[15] www.stats19.org.uk/html/stats_20_notes.html

Data quality

The data used for this indicator were derived from administrative records of traffic accidents reported to the police, involving death or personal injury. Very few, if any, road accident fatalities are not reported but it is known that a considerable proportion of non-fatal casualties are not reported to the police. The raw administrative records used to construct the indicator are the same as those used to produce published National Statistics.[16]

Combining the indicators

The indicators within each of the sub-domains were standardised by ranking and transforming to a normal distribution, and combined using equal weights. The sub-domains were then standardised by ranking and transformed to an exponential distribution. The sub-domains were weighted according to patterns of 'indoors' and 'outdoors' time use within the UK Time Use Survey 2000 so that the Indoors Living Environment sub-domain is given two thirds of the domain's weight and the Outdoors Living Environment sub-domain is given one third of the domain's weight.

Changes since the ID2007

No changes have been made to the indicators or methodology. The only difference with the domain concerns the housing in poor condition indicator, which has not been updated from the ID2007 due to cost considerations. This indicator therefore relates to a time point of 2005 and is as used in the ID2007.

[16] Further information on the data sources can be found in: www.dft.gov.uk/adobepdf/162469/221412/221549/227755/rrcgb2009.pdf and www.dft.gov.uk/adobepdf/162469/221412/221549/227755/rrcgb2008.pdf

Chapter 4

Interpretation of results

Section 1: Lower layer Super Output Area indices

There are 10 indices for each Lower layer Super Output Area (LSOA) in England:

- Overall Index of Multiple Deprivation
- Seven domain indices (which are combined to make the overall Index of Multiple Deprivation)
- Supplementary Income Deprivation Affecting Children Index
- Supplementary Income Deprivation Affecting Older People Index.

The Index data is a rich resource with a large number of potential applications. In order to make best use of this data it is important to understand the ways in which the data can and cannot be used and interpreted. These are discussed below.

LSOAs are assigned a national rank in each of these 10 indices. There are 32,482 LSOAs in England. The most deprived LSOA for each index is given a rank of 1, and the least deprived LSOA is given a rank of 32,482.[17] The ranks show how a LSOA compares to all the other LSOAs in the country and are easily interpretable. It should be noted that the indices comprising the ID2010, and the predecessor Indices, are measures of *deprivation* and are designed to be more discriminating of deprivation than of 'non-deprivation'. Thus any reference to the position of an LSOA relative to another must be made with reference to deprivation rather than affluence (e.g. an area could be described as less deprived than another area, but not as more affluent).

The seven domain indices

Each domain index consists of a score which is then ranked. These domain indices can be used to describe each type of deprivation in an area. This is important as it allows users to focus on particular types of deprivation, and to compare this across LSOAs. There may be great variation within a district or larger area, and the LSOA level domain indices allow for a sophisticated analysis of deprivation.

The scores for the Income Deprivation Domain and the Employment Deprivation Domain are rates. So, for example, if an LSOA scores 0.38 in the Income Deprivation Domain, this

[17] During the process of constructing the Index of Multiple Deprivation a different convention was observed with the least deprived LSOA on each domain given a rank of 1 and the most deprived LSOA given a rank of 32,482.

means that 38% of the LSOA's total population is income deprived. The same applies to the Employment Deprivation Domain where the rate refers to the percentage of the working age population that is employment deprived.

The scores for the remaining five domains are not rates. Within a domain, the higher the score, the more deprived a LSOA is, although because the distribution of the data has been modified, it is not possible to say how much more deprived one area is than another. The scores should not be compared between domains as they have different minimum and maximum values and ranges. To compare between domains, only the ranks should be used. A rank of 1 is assigned to the most deprived LSOA, and a rank of 32,482 is assigned to the least deprived LSOA.

The overall Index of Multiple Deprivation 2010

The overall IMD 2010 describes the LSOA by combining information from all seven domains: Income Deprivation, Employment Deprivation, Health Deprivation and Disability, Education Skills and Training Deprivation, Barriers to Housing and Services, Living Environment Deprivation, and Crime. As indicated in **Chapter 2**, these were combined in two stages. First, each domain rank was transformed to a standard distribution – the exponential distribution. Then the domains were combined using the explicit domain weights chosen. The overall LSOA level IMD 2010 was then ranked in the same way as the domain indices.

The IMD 2010 score is the combined sum of the weighted, exponentially transformed domain rank of the domain score. Again, the bigger the IMD 2010 score, the more deprived the LSOA. However, because of the transformations undertaken, it is not possible to say, for example, that an LSOA with a score of 40 is twice as deprived as an LSOA with a score of 20. In order to make comparisons between LSOAs it is recommended that ranks should be used. The IMD 2010 is ranked in the same way as the domain indices, that is, a rank of 1 is assigned to the most deprived LSOA, and a rank of 32,482 is assigned to the least deprived LSOA.

The LSOA level scores and ranks for the domain indices and the overall Index of Multiple Deprivation can be obtained from the Department for Communities and Local Government's website. In order to reproduce the Index of Multiple Deprivation scores, the seven domain scores would need to be ranked the opposite way round (i.e. a rank of 1 for the least deprived LSOA and a rank of 32,482 for the most deprived LSOA), exponentially transformed (using the formula provided in **Annex G**) and combined with the weights set out in **Chapter 2**.

The supplementary Income Deprivation Affecting Children Index

The supplementary Income Deprivation Affecting Children Index is a subset of the Income Deprivation Domain, and shows the proportion of children in each LSOA that live in families that are income deprived (i.e. in receipt of Income Support, income-based Jobseeker's Allowance, Pension Credit (Guarantee) or Child Tax Credit below a given threshold). The

Income Deprivation Affecting Children Index is not combined with the other domains into the overall Index of Multiple Deprivation as the children are already captured in the Income Deprivation Domain.

Like the Income and Employment Deprivation Domain scores the Income Deprivation Affecting Children Index scores are rates, so a score of 0.24, for example, means that 24% of children aged less than 16 in that LSOA are living in families that are income deprived. Again, a rank of 1 is assigned to the most deprived LSOA, and a rank of 32,482 is assigned to the least deprived LSOA.

The supplementary Income Deprivation Affecting Older People Index

The supplementary Income Deprivation Affecting Older People Index is a subset of the Income Deprivation Domain. This comprises the proportion of a LSOA's population aged 60 and over who are Income Support, income-based Jobseeker's Allowance or Pension Credit (Guarantee) claimants aged 60 and over and their partners (if also aged 60 or over). The Income Deprivation Affecting Older People Index is not combined with the other domains into the overall Index of Multiple Deprivation as these income deprived older people are already captured in the Income Deprivation Domain. Again, a rank of 1 is assigned to the most deprived LSOA, and a rank of 32,482 is assigned to the least deprived LSOA.

The LSOA level scores and their ranks for the Income Deprivation Affecting Children Index and Income Deprivation Affecting Older People Index can be obtained from the Department for Communities and Local Government's website.

Section 2: Additional guidelines for data interpretation

Change over time

As has been indicated, the ID2010 were designed to be as similar as possible to the ID2007 in terms of geographical scale, domains, indicators and methodology. This was to maximise backwards comparability and help identify 'real' relative change. This has largely been achieved and therefore change over time can be examined to a certain extent. However, it is necessary to consider how this can be done in a meaningful way.

Relative and absolute deprivation

It is important to remember that the Index of Multiple Deprivation is a relative not an absolute measure of deprivation. It is also a snapshot at a particular point in time. Being a relative measure, there will always be, for example, 10% of areas that are defined as the most deprived 10%, even if significant improvements are made to the absolute levels of deprivation in the country. When examining the most deprived 10% of areas it is therefore important to remember that the absolute level of deprivation experienced by people living in these areas may vary between years.

When considering the various domain indices, the overall rank of an LSOA may not change, but this does not mean there have been no changes to the level of deprivation. Conversely, an area may increase or decrease in rank without any actual change in levels of deprivation occurring. This reflects the fact that all change is relative. For example, if an area sees no change in the rate of income deprivation between two Indices but other LSOAs do improve their figures, the LSOA in question may have a lower domain rank because it has been 'overtaken' by other LSOAs, even if its score is the same in both years.

Equally, when comparing the overall Index of Multiple Deprivation, if improvements in one domain are offset by a decline on another domain, the overall Index of Multiple Deprivation position may be the same even if significant changes have occurred to the domains.

Methodological changes

Changes to the underlying indicators and methodology weaken the temporal consistency of the Index and undermine the validity of comparisons over time. Although the objective of the ID2010 was to produce a direct update of the ID2007, as was noted in **Chapter 3**, some small changes to various indicators and indicator weights derived using factor analysis have taken place. This will have had some impact on the score or rank of a domain, in addition to real change.

A further important development since the ID2007 is the re-basing by the Office for National Statistics of all local authority district level mid-year population estimates and the resultant re-basing of the LSOA level population estimates that form the denominators for almost all indicators contained within the ID2010. Changes in the level of deprivation observed between the ID2007 and ID2010 may therefore be a function of the re-basing of the population denominators rather than real change in deprivation.

Importance of local knowledge

Local knowledge of the area is very important when interpreting the data, especially when understanding change. For example, knowing that a traffic calming scheme has been imposed means that improvements to road traffic accidents can more confidently be attributed to real change.

Comparisons with the other UK indices of deprivation

The scores and ranks for the English Indices of Deprivation cannot be compared with those from indices produced in Wales, Scotland and Northern Ireland. Although based on the same concept and general methodology, there are differences in the domains and indicators, the spatial scale at which the indices are presented and the time points on which they are based.

Conceptually speaking it is also inadvisable to compare indices from different countries. The constituent countries of the UK each have their own characteristics and the chosen indicators must be capable of discriminating between the relative deprivation of different areas. These indicators are likely to vary between countries to reflect local priorities.

In order to compare areas in the different constituent countries, a UK wide set of indices would need to be constructed. Discussions are ongoing between the constituent countries about the appropriateness of a UK wide set of Indices of Deprivation.

Section 3: Local authority district level summary measures

Six summary measures of the overall IMD 2010 have been produced at local authority district ('district') level which describe differences between districts. The following section describes the creation of the district level summaries of the IMD 2010. The district level summaries can be obtained from the Department for Communities and Local Government's website.

The summary measures at district level focus on different aspects of multiple deprivation within each district. No single summary measure is favoured over another, as there is no single best way of describing or comparing districts. All of the summary measures need to be considered together to give a full description of an area's deprivation. Given the different patterns of deprivation within districts, it is important to have a variety of measures to capture this variation.

There are a number of reasons why districts are complex to describe as a whole and to compare. Districts can vary enormously in both geographic and population size. Districts also have very different populations. Some contain more variation in deprivation while in other places deprivation may be concentrated in severe pockets rather than being more evenly spread. This makes an overall picture more difficult to establish. All areas experiencing high levels of deprivation will be identified by one or more of these six measures, as they are designed to capture deprivation in areas of different sizes with different levels of heterogeneity.

Six measures have been devised which take account of these issues and allow users to focus on the most suitable indicator for their needs. These measures examine the most deprived populations, the most deprived LSOAs, as well as the average of the LSOAs.

For a more detailed or subtle description of deprivation across a district the LSOA results should be used as the LSOA level Index of Multiple Deprivation contains the most detailed account of local deprivation. At the LSOA level much more information is retained than with the district level summaries.

The summary measures are discussed individually below. For each measure each district is given a rank and score (with the exception of Extent, as explained below). As with the LSOA results a rank of 1 indicates that the district is the most deprived according to the measure and a rank of 326 indicates that the district is the least deprived. The meaning of the scores for each of the measures is detailed below.

Local concentration

Population weighted average of the ranks of a district's most deprived LSOAs that contain exactly 10% of the district's population

Local concentration is an important way of identifying districts' 'hot spots' of deprivation. The measure defines these hot spots by reference to a percentage of the district's population. This involves taking the mean of the population weighted rank of a district's most deprived LSOAs that capture exactly 10% of the district's population. In many cases this was not a whole number of LSOAs.

Worked example

A district contains 20,000 people; 10% of this population is 2,000 people. The local concentration measure calculates the score of the most deprived LSOAs containing exactly 2,000 people. Having sorted the LSOAs in descending order of deprivation, the most deprived LSOA contains 1,600 people and has a rank of 4,000. The next most deprived LSOA contains 1,400 people and has a rank of 3,000. 400 people from the second LSOA are required to reach the total of 2,000 people (i.e. 10% of the district's population). The local concentration score for the district would be:

$$((1{,}600/2{,}000) \times 4{,}000) + ((400/2{,}000) \times 3{,}000)$$
$$= (0.8 \times 4{,}000) + (0.2 \times 3{,}000)$$
$$= 3{,}800$$

The district scores are ranked in descending order, and the most deprived district (which has the largest score) is given a rank of 1.

Extent

Proportion of a district's population living in the most deprived LSOAs in the country

The aim of this measure is to portray how widespread high levels of deprivation are in a district. It only includes districts containing LSOAs which fall within the most deprived 30% of LSOAs in England. Therefore some districts do not have an overall score for this measure and they are given a joint rank of 294. In this measure, 100% of the people living in the 10% most deprived LSOAs in England are captured in the numerator, plus a proportion of the population of those LSOAs in the next two deciles on a sliding scale – that is 95% of the population of the LSOA at the 11th percentile, and 5% of the population of the LSOA at the 29th percentile. This describes districts that contain high levels of deprivation when compared across England but with a less abrupt cut-off point than that adopted in the ID2000.

Scale (two measures)

Income scale is the number of people who are income deprived; employment scale is the number of people who are employment deprived

This measure is designed to give an indication of the sheer number of people experiencing income deprivation and employment deprivation at district level. The income scale score is a count of individuals experiencing income deprivation. The employment scale score is a count of individuals experiencing employment deprivation. It is useful to present both measures as they are real counts of the individuals experiencing these deprivations.

It is important to note that the scale measures do not pick up large populations, but large *deprived* populations. If two districts have the same percentage of income deprived people, the larger district will be ranked as more deprived on the Income Scale measure because more people are experiencing the deprivation. This measure will therefore inevitably identify districts with large numbers of people experiencing deprivation.

Worked example

A district contains five LSOAs. The number of people in low income families in each LSOA (i.e. the Income Deprivation Domain numerator) is 1,563, 1,672, 1,745, 1,499 and 1,812. The income scale score would therefore be:

1,563 + 1,672 + 1,745 + 1,499 + 1,812
= 8,291

The employment scale score is calculated in the same way using the numerator of the Employment Deprivation Domain.

In both cases the district scores are ranked in descending order, and the most deprived district (which has the largest number of income or employment deprived people) is given a rank of 1.

Average of LSOA ranks

Population weighted average of the combined ranks for the LSOAs in a district

This measure is useful because it summarises the district taken as a whole, including both deprived and less deprived LSOAs. All the LSOAs in a district need to be included to obtain such an average, as each LSOA contributes to the character of that district. This measure is calculated by averaging all of the LSOA ranks in each district. The LSOA ranks are population weighted within a district to take account of the fact that LSOA size can vary.

The nature of this measure means that a highly polarised district would not score highly because extremely deprived and less deprived LSOAs will 'average out'. Conversely, a district that is more homogenously poor will have a greater chance of scoring highly on an average measure.

Worked example

A district has five LSOAs with populations of 1,200, 1,800, 1,400, 1,500 and 1,700. These LSOAs rank 100, 278, 5,000, 489 and 2,780 respectively (for the purposes of the calculation the ranks are such that 1=least deprived). The total district population is 7,600. In order to calculate the score, each LSOA rank is multiplied by the proportion of the district's population that falls in that LSOA. These are summed to make the district score. Thus the average LSOA rank for this district would be:

((1,200/7,600) x 100) + ((1,800/7,600) x 278) + ((1,400/7,600) x 5,000) +
((1,500/7,600) x 489) + ((1,700/7,600) x 2,780)

= 15.79 + 65.84 + 921.05 + 96.51 + 621.84

= 1,721.04

The district scores are ranked in descending order, and the most deprived district (which has the largest score) is given a rank of 1.

Average of LSOA scores

Population weighted average of the combined scores for the LSOAs in a district

This measure also describes the district as a whole, taking into account the full range of LSOA scores across a district. The advantage of this measure is that it describes the LSOA by retaining the fact that more deprived LSOAs may have more 'extreme' scores, which is not revealed to the same extent if the ranks are used. This measure is calculated by averaging the LSOA scores in each district after they have been population weighted.

Worked example

This is calculated in exactly the same way as the average of LSOA ranks, except that the Index of Multiple Deprivation LSOA score is used instead of the LSOA rank.

The district scores are ranked in descending order, and the most deprived district (which has the largest score) is given a rank of 1.

Chapter 5

The geography of deprivation

Introduction

This chapter presents some key findings detailing the geography of deprivation across England.

- **Section 1** presents the maps of the IMD 2010 for each region, with an overview of multiple deprivation in England.
- **Section 2** consists of a breakdown of the most deprived and least deprived 20% Lower layer Super Output Areas (LSOAs) on the IMD 2010.
- **Section 3** examines the distribution of the most deprived 10%, 5% and 1% of LSOAs on the IMD 2010.
- **Section 4** presents key findings about each of the domains, focusing in detail on the Income and Employment Deprivation Domains and the supplementary Income Deprivation Affecting Children Index and Income Deprivation Affecting Older People Index.
- **Section 5** gives a summary of changes between the IMD 2004, IMD 2007 and IMD 2010.

The patterns of deprivation across England are complex. The most deprived LSOAs and least deprived LSOAs are spread throughout all nine regions of England.
It is important to recognise that not every person in a highly deprived LSOA will themselves be deprived. Equally, there will be some deprived people living in the least deprived LSOAs.

Furthermore, identifying LSOAs as being among the least deprived does not mean that these LSOAs necessarily contain large numbers of, for example, very rich people. The Index of Multiple Deprivation specifically measures levels of deprivation and as such says nothing about levels of affluence.

Section 1: An overview of the patterns of multiple deprivation in England and regional maps of LSOA level IMD 2010

The ID2010 allow examination of the composition of deprivation in an area. Taking the most deprived 10% (decile) of LSOAs on the overall IMD 2010, it is possible to ascertain the number of component domains on which each LSOA ranks within the most deprived 10% of LSOAs nationally. **Table 5.1** summarises this information. The key points are:

- Just five of the most deprived 3,248 LSOAs on the overall Index of Multiple Deprivation rank in the most deprived 10% of LSOAs on all seven component domains.
- Over a quarter of the 3,248 LSOAs rank in the most deprived 10% of LSOAs on five or more domains.
- The majority (61.5%) of the 3,248 LSOAs rank in the most deprived 10% of LSOAs on four or more domains.
- Almost all (99.2%) of the 3,248 LSOAs rank in the most deprived 10% of LSOAs on two or more domains.
- All of the 3,248 LSOAs rank in the most deprived 10% of LSOAs on at least one domain.

Table 5.1: Number of domains on which the most deprived 10% of LSOAS are in the most deprived decile

Number of domains	Number of LSOAs	Percentage of LSOAs	Cumulative percentage of LSOAs
7	5	0.2	0.2
6	140	4.3	4.5
5	708	21.8	26.3
4	1,143	35.2	61.5
3	913	28.1	89.6
2	312	9.6	99.2
1	27	0.8	100.0
0	0	0.0	100.0
Total	3,248	100.0	

As is apparent from Table 5.1, there are 145 LSOAs in England that are in the 10% most deprived LSOAs on six or seven domains of deprivation. These 145 LSOAs are not evenly distributed across England. As can be seen from **Table 5.2**, Liverpool local authority district

contains 18 of these 145 LSOAs, and Blackpool a further 14 of the LSOAs. Table 5.2 lists the 11 local authority districts that contain five or more of these 145 LSOAs. The 11 districts together contain 95 of the 145 LSOAs. The remaining 50 LSOAs in the 10% most deprived LSOAs on six or seven domains of deprivation are split between a further 33 districts.

Three of the five LSOAs that are in the most deprived 10% on all seven domains are located in Blackpool. The other two LSOAs are located in Birmingham and Tendring districts.

Table 5.2: Number of LSOAs in the district that are deprived on six or seven domains

Local authority district	Region	Number of LSOAs
Liverpool	North West	18
Blackpool	North West	14
Birmingham	West Midlands	13
Leeds	Yorkshire and the Humber	10
Bradford	Yorkshire and the Humber	9
Burnley	North West	6
Kirklees	Yorkshire and the Humber	5
City of Kingston-upon-Hull	Yorkshire and the Humber	5
North East Lincolnshire	Yorkshire and the Humber	5
Middlesbrough	North East	5
City of Stoke-on-Trent	West Midlands	5

Regional maps of LSOA level multiple deprivation

The following maps show the LSOA level IMD 2010 for each region in England. The LSOAs have been divided into 10 equal groups (deciles). LSOAs shaded dark blue are the most deprived 10% of LSOAs in England, and LSOAs shaded bright yellow are the least deprived 10% of LSOAs in England. Maps showing the local authority district boundaries and names are also included for each region.

Main spatial patterns of deprivation

As was the case in previous Indices, most urban centres contain areas with high levels of multiple deprivation. The conurbations of Manchester, Liverpool and Newcastle together with neighbouring metropolitan areas contain many highly deprived LSOAs. This is also the case for the large metropolitan areas in Yorkshire and the Humber and the West Midlands. These are areas that have historically had large heavy industry, manufacturing and/or mining sectors which have seen sustained decline over recent decades. Areas such

as Easington, Middlesbrough and Hartlepool in the North East region, plus Kingston-upon-Hull in Yorkshire and the Humber, Barrow-in-Furness in the North West and Penwith in the South West are similar in this respect.

The north east quarter of London remains particularly deprived, with Newham, Hackney and Tower Hamlets continuing to exhibit very high levels of deprivation. Newham and Hackney contain no LSOAs which fall among the 50% least deprived nationally, showing a relatively high uniform overall level of deprivation in these areas.

Seaside resort towns, such as Blackpool, Great Yarmouth, Margate, and Hastings continue to show high levels of deprivation.

Homogeneity or heterogeneity of patterns within local authority district

As noted above, Newham and Hackney contain no LSOAs in the least deprived 50% nationally. These are the only two local authority districts where this is the case (excluding Isles of Scilly which consists of just a single LSOA). In a further nine London boroughs (Islington, Lewisham, Barking and Dagenham, Waltham Forest, Lambeth, Tower Hamlets, Haringey, Greenwich and Brent) and three non-London boroughs (West Somerset, Manchester and Blackpool) less than 10% of the constituent LSOAs fall within the least deprived 50% nationally. Local authority districts such as these can therefore be regarded as relatively homogenous in the sense that they contain few LSOAs in the least deprived half of the national distribution.

In contrast, some local authorities contain a relatively heterogeneous mix of levels of deprivation. It is sometimes the case that very deprived LSOAs are in fact located in close geographical proximity to less deprived LSOAs. For instance, over 10% of the LSOAs in Stockton-on-Tees fall within the most deprived 10% nationally whilst a further 10% of LSOAs in that district fall within the 10% least deprived nationally.

Out of the total 326 local authority districts in England, 184 districts have one or more LSOA in the most deprived 10% of LSOAs nationally. This compares to 259 districts that have one or more LSOA in the 10% least deprived LSOAs nationally, indicating that that the more deprived neighbourhoods are geographically concentrated within a smaller number of districts than the least deprived neighbourhoods.

East of England

The East of England has in total 3,550 LSOAs of which just 99 LSOAs (2.8%) are within the 10% most deprived on the IMD 2010. The East region has 65.4% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

The largest concentrations of deprived LSOAs within the East region are within the larger urban areas of Luton, Norwich and Ipswich and some of the smaller urban areas, primarily located on or close to the coast, such as Kings Lynn, Great Yarmouth, Lowestoft, Clacton-on-Sea and Southend-on-Sea.

East Midlands

The East Midlands has 201 of the 10% most deprived LSOAs in England. There are 2,732 LSOAs in total so 7.4% of all its LSOAs are within these 10% most deprived LSOAs on the IMD 2010. The East Midlands has 53.6% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

The deprived LSOAs of the East Midlands are concentrated around the population centres of Leicester, Derby, and Nottingham. The former Nottinghamshire and Derbyshire coalfield districts of Mansfield, Ashfield, Bassetlaw, Chesterfield and Bolsover all contain concentrations of LSOAs experiencing severe deprivation.

London

London contains 402 of the 10% most deprived LSOAs in England. London has 4,765 LSOAs in total so 8.4% of all its LSOAs are in the 10% most deprived nationally. London has just one third (33.3%) of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

As has been indicated, London's share of the 10% most deprived LSOAs are concentrated in inner London boroughs particularly (though not exclusively) to the 'inner' north east, such as Tower Hamlets, Newham and Hackney.

North East

281 of the 10% most deprived LSOAs on the IMD in England are located in this region. The North East has 1,656 LSOAs in total so 17.0% of all its LSOAs are amongst the 10% most deprived in England. The North East region has only 35.0% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

The pattern of severe multiple deprivation remains similar to previous Indices, with the former steel, shipbuilding and mining areas such as Easington, Middlesbrough, Hartlepool, Redcar and Cleveland, and Stockton-on-Tees containing many of the most deprived LSOAs. There are also concentrations of very deprived LSOAs in Newcastle-upon-Tyne, South Tyneside, Sunderland and Gateshead.

North West

The North West has 900 of the 10% most deprived LSOAs in England. There are 4,459 LSOAs in total in the North West, therefore over a fifth (20.2%) of all its LSOAs are in the 10% most deprived. The North West has a greater proportion of its LSOAs in the most deprived 10% than any other region. The North West region has 41.0% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

Severe deprivation is evident in most of the districts across the North West. Concentrations of LSOAs showing deprivation in the most deprived decile are found in the urban areas in and around Liverpool and Manchester. As with the previous Indices, the Merseyside districts of Liverpool, Sefton, Knowsley, and St Helens, along with the area of Birkenhead on the Wirral, stand out as containing large concentrations of LSOAs with high levels

of deprivation, as do many of the districts in Greater Manchester including Manchester, Wigan, Bolton, Salford and Oldham.

Further concentrations of deprived areas can be seen in the coastal resort town of Blackpool and also in the series of towns running from the head of the Ribble Valley at Preston through Blackburn, Hyndburn, Burnley and Pendle.

South East

The South East has 124 of the 10% most deprived LSOAs in England. The South East has 5,319 LSOAs in total so only 2.3% of all its LSOAs are within the 10% most deprived. The South East region has more of its LSOAs in the 50% least deprived LSOAs on the IMD 2010 than any other region (68.5%).

The most deprived LSOAs are concentrated in the urban centres of Southampton and Portsmouth plus some of the coastal resorts such as Brighton and Hove, Thanet and Hastings. Elsewhere there are isolated LSOAs within the 10% most deprived LSOAs in England.

South West

The South West has 121 LSOAs which are amongst the 10% most deprived LSOAs in England. In total this region has 3,226 LSOAs, so 3.8% of all its LSOAs are within the 10% most deprived. The South West region has 58.3% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

Severe deprivation is concentrated in the urban areas of Plymouth and the city of Bristol as well as in parts of Cornwall, especially in the former tin mining area of Penwith.

West Midlands

The West Midlands has 557 LSOAs in the 10% most deprived LSOAs. The region has 3,482 LSOAs in total so this means that 16.0% of all its LSOAs are in the 10% most deprived. The West Midlands region has 42.2% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

The metropolitan area of Birmingham has very high levels of severe multiple deprivation. The districts of Wolverhampton, Walsall and Sandwell all have severely deprived LSOAs. Further concentrations of these severely deprived LSOAs are to be found in Coventry and Stoke-on-Trent.

Yorkshire and the Humber

Yorkshire and the Humber contains 563 of the 10% most deprived LSOAs in England. Yorkshire and the Humber has 3,293 LSOAs in total, so 17.1% of all its LSOAs are in the 10% most deprived in England. Yorkshire and the Humber has 44.5% of its LSOAs in the 50% least deprived LSOAs on the IMD 2010.

Much of Yorkshire and the Humber's severe deprivation is concentrated within towns and cities such as Kingston-upon-Hull, Sheffield, Leeds, Bradford, Kirklees (Huddersfield, Dewsbury) and Rotherham. Severe deprivation is also to be found around the former coalfields of the region, in the districts of Doncaster, Wakefield and Barnsley.

Local Authorities in the East of England Region

East of England Region Index of Multiple Deprivation 2010

Local Authorities in the East Midlands Region

East Midlands Region Index of Multiple Deprivation 2010

Local Authorities in London Region

London Region Index of Multiple Deprivation 2010

Local Authorities in the North East Region

North East Region Index of Multiple Deprivation 2010

Local Authorities in the North West Region

North West Region Index of Multiple Deprivation 2010

Local Authorities in the South East Region

South East Region Index of Multiple Deprivation 2010

Local Authorities in the South West Region

South West Region Index of Multiple Deprivation 2010

Local Authorities in the West Midlands Region

West Midlands Region Index of Multiple Deprivation 2010

Local Authorities in the Yorkshire and the Humber Region

Yorkshire and the Humber Region Index of Multiple Deprivation 2010

Section 2: The most deprived and the least deprived 20% of LSOAs in England on the IMD 2010

The most deprived 20% of LSOAs in England on the IMD 2010

Some key characteristics of the group of the most deprived 20% (quintile) of LSOAs on the IMD 2010 are as follows:

- There are 6,496 LSOAs in the most deprived quintile in England and 10.2 million people live in these LSOAs – this represents almost exactly 20% of the population of England. However, it is important to remember that not all people living in these LSOAs are deprived.
- On average, just under a third (32.6%) of people living in these LSOAs are income deprived.
- One in five (20.0%) of the working age population (women aged 18 to 59 and men aged 18 to 64) in these LSOAs are employment deprived.
- Just under half (45.9%) of children in these LSOAs live in families that are income deprived.
- Almost two in five (38.9%) older people in these LSOAs are income deprived.

The regional picture

Chart 5.1 and **Table 5.3** show the percentage of LSOAs in a region that fall within the most deprived 20% of LSOAs in England on the IMD 2010, and the percentage of LSOAs which fall within the least deprived quintile. The North East, the North West, Yorkshire and the Humber, London and the West Midlands all have the highest percentage of their LSOAs in the most deprived 20%. As discussed in more detail below, these five regions also have the lowest percentage of their LSOAs in the least deprived 20%.

The North East has the greatest percentage of its LSOAs in the most deprived quintile (32.7%). The North West is the region with the next highest percentage of LSOAs in the most deprived quintile (32%). The North West has the greatest number of LSOAs in the most deprived 20% (1,425), followed by London with 1,250.

However, it is also significant to note that less deprived regions – the South East, South West and East – each have between 7% and 9% of their LSOAs falling in the 20% most deprived in England.

Chart 5.1: Percentage of LSOAs in the most and least deprived 20% of LSOAs in England on the IMD 2010 by region

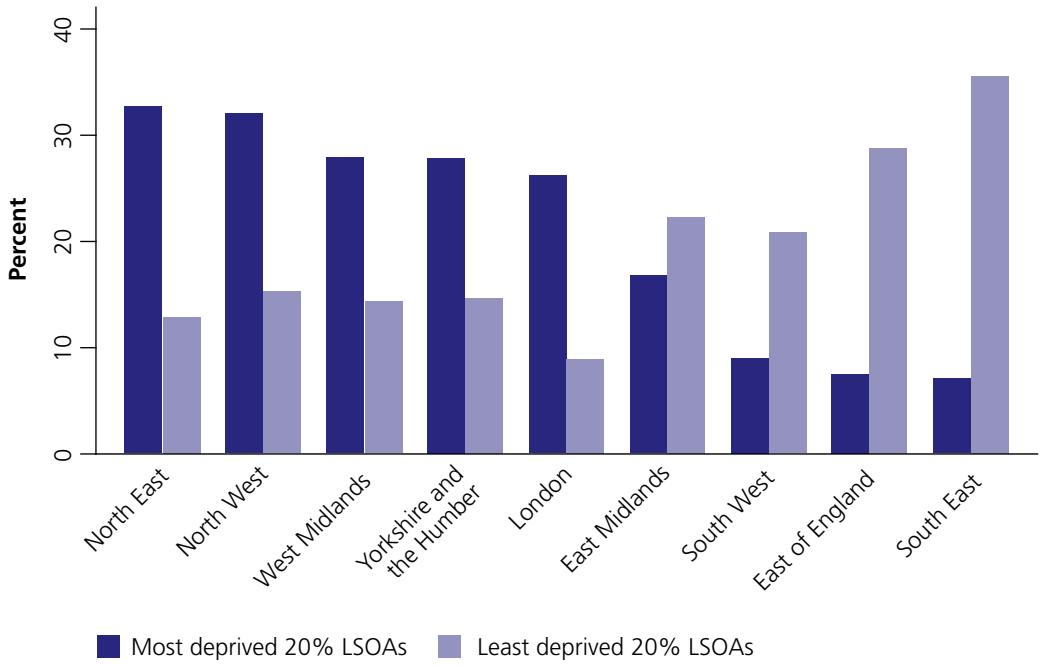


Table 5.3: LSOAs in the most deprived 20% of LSOAs in England on the IMD 2010 by region

	Number of LSOAs in most deprived 20% of LSOAs in England	Number of LSOAs in the region	Percentage of LSOAs in the region falling in most deprived 20% of LSOAs in England
East Midlands	458	2,732	16.8
East	267	3,550	7.5
London	1,250	4,765	26.2
North East	541	1,656	32.7
North West	1,425	4,459	32.0
South East (excluding London)	377	5,319	7.1
South West	291	3,226	9.0
West Midlands	971	3,482	27.9
Yorkshire and The Humber	916	3,293	27.8
Total	6,496	32,482	20.0

The North East has the largest percentage of its population (32%) living in the most deprived 20% of LSOAs in England.

The North West has the largest number of people living in the 20% most deprived LSOAs (2.2 million), followed by London, which has 2 million people living in one of these LSOAs.

Of those who live in the 20% most deprived LSOAs in England, over a fifth (21.5%) live in the North West, and just under a fifth (19.6%) live in London.

Table 5.4: People living in the most deprived 20% of LSOAs in England on the IMD 2010 by region

	Population in most deprived 20% of LSOAs in England (thousands)	Regional population (thousands)	Percentage of regional population living in most deprived 20% of LSOAs in England	Percentage of England population living in most deprived 20% of LSOAs in England	Percentage of people living in most deprived 20% of LSOAs in England
East Midlands	735	4,423	16.6	1.4	7.2
East of England	426	5,713	7.5	0.8	4.2
London	1,996	7,667	26.0	3.9	19.6
North East	821	2,568	32.0	1.6	8.1
North West	2,187	6,868	31.8	4.3	21.5
South East	588	8,361	7.0	1.1	5.8
South West	468	5,207	9.0	0.9	4.6
West Midlands	1,514	5,404	28.0	2.9	14.9
Yorkshire and The Humber	1,431	5,212	27.4	2.8	14.1
Total	10,165	51,423	–	19.8	100.0

The least deprived 20% of LSOAs in England on the IMD 2010

The 20% least deprived LSOAs in England on the IMD 2010 have the following characteristics:

- 10.4 million people live in these LSOAs – this is 20.2% of the population of England.
- Over one third (35.6%) of these least deprived LSOAs are in the South East.

- 4.3% of people in these LSOAs are income deprived.
- 3.7% of the working age population (women aged 18 to 59 and men aged 18 to 64) are employment deprived.
- 4.8% of children live in families that are income deprived.
- 7.2% of older people are income deprived.

The South East has the largest number of LSOAs (1,892) falling in the least deprived 20% of LSOAs in England. It also has the highest percentage of its LSOAs falling in this category (35.6%). The percentage for this region is far greater than for the other regions. In contrast, London has only 8.9% of its LSOAs falling in the least deprived quintile of LSOAs in England.

Table 5.5: LSOAs in the least deprived 20% of LSOAs in England on the IMD 2010 by region

	Number of LSOAs in least deprived 20% of LSOAs in England	Number of LSOAs in the region	Percentage of LSOAs in the region falling in least deprived 20% of LSOAs in England
East Midlands	609	2,732	22.3
East of England	1,022	3,550	28.8
London	423	4,765	8.9
North East	214	1,656	12.9
North West	684	4,459	15.3
South East	1,892	5,319	35.6
South West	671	3,226	20.8
West Midlands	497	3,482	14.3
Yorkshire and The Humber	485	3,293	14.7
Total	6,497	32,482	20.0

Section 3: The most deprived 10%, 5% and 1% of LSOAs in England on the IMD 2010

The choice of threshold to adopt in defining areas as 'deprived' is completely arbitrary. In Section 2 of this chapter a cut-off of the 20% most and least deprived LSOAs was adopted. In this section three more stringent thresholds are examined: the most deprived 10%, 5% and 1% of LSOAs nationally on the IMD 2010. Three summary tables are presented, each one listing the 10 local authority districts with the highest proportion of LSOAs falling within each of these three thresholds respectively.

It is evident from **Table 5.6** that four of the 10 highest ranked local authority districts on this particular measure are located in the North West region, with the other six districts located in the North East, Yorkshire and the Humber, London and the West Midlands. In Liverpool, over half (50.9%) of the LSOAs are within the most deprived 10% nationally. In all 10 local authority districts listed in Table 5.6, over one third of the LSOAs are within the most deprived 10% nationally.

Of the 326 local authority districts in England, 184 have at least one LSOA in the most deprived 10% of areas nationally.

Table 5.6: The 10 local authority districts with the highest proportion of LSOAs in the most deprived 10% nationally

Local authority district	Region	Number of LSOAs in most deprived 10% of LSOAs in England	Number of LSOAs in the district	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England
Liverpool	North West	148	291	50.9
Middlesbrough	North East	41	88	46.6
Manchester	North West	118	259	45.6
Knowsley	North West	45	99	45.5
City of Kingston-upon-Hull	Yorkshire and the Humber	70	163	42.9
Hackney	London	57	137	41.6
Tower Hamlets	London	52	130	40.0
Birmingham	West Midlands	251	641	39.2
Blackpool	North West	35	94	37.2
Hartlepool	North East	21	58	36.2

In **Table 5.7** the 10 local authority districts with the highest proportion of LSOAs in the most deprived 5% of areas nationally are shown. Seven of the 10 districts are located in the North West, with the other three districts located in the North East, Yorkshire and the Humber and the West Midlands. None of the 10 districts listed here are in London. In both Liverpool and Knowsley, almost two in five LSOAs (39.5% and 39.4% respectively) are in the most deprived 5% of areas nationally. In addition to these two Merseyside districts, there are two districts in Greater Manchester (Manchester and Salford), three in Lancashire (Blackpool, Burnley and Blackburn with Darwen), plus Middlesbrough, Kingston upon Hull

and Birmingham. In each of these 10 local authority districts, more than one in five LSOAs fall within the 5% most deprived areas nationally.

Of the 326 local authority districts in England, 140 have at least one LSOA in the most deprived 5% of areas nationally.

Table 5.7: The 10 local authority districts with the highest proportion of LSOAs in the most deprived 5% nationally

Local authority district	Region	Number of LSOAs in most deprived 5% of LSOAs in England	Number of LSOAs in the district	Percentage of LSOAs in the district falling in most deprived 5% of LSOAs in England
Liverpool	North West	115	291	39.5
Knowsley	North West	39	99	39.4
Middlesbrough	North East	28	88	31.8
Blackpool	North West	25	94	26.6
Manchester	North West	66	259	25.5
Burnley	North West	14	60	23.3
City of Kingston-upon-Hull	Yorkshire and The Humber	38	163	23.3
Birmingham	West Midlands	144	641	22.5
Blackburn with Darwen	North West	19	91	20.9
Salford	North West	30	144	20.8

The 10 local authority districts listed in **Table 5.8** are those with the highest proportion of LSOAs in the most deprived 1% of LSOAs nationally. As such, these districts contain some of the LSOAs with the very highest levels of multiple deprivation in England. Seven of the 10 authorities are located in the North West, two in the North East and one in Yorkshire and the Humber. Again, none of the 10 districts listed are in London. In Blackpool, 17% of the LSOAs are within the most deprived 1% of areas nationally. A further three districts have over one in 10 LSOAs in the most deprived 1% nationally (Knowsley, Liverpool and Burnley).

Of the 326 local authority districts in England, 66 have at least one LSOA in the most deprived 10% of areas nationally.

Table 5.8: The 10 local authorities with the highest proportion of LSOAs in the most deprived 1% nationally

Local authority district	Region	Number of LSOAs in most deprived 1% of LSOAs in England	Number of LSOAs in the district	Percentage of LSOAs in the district falling in most deprived 1% of LSOAs in England
Blackpool	North West	16	94	17.0
Knowsley	North West	16	99	16.2
Liverpool	North West	42	291	14.4
Burnley	North West	7	60	11.7
Middlesbrough	North East	8	88	9.1
Blackburn with Darwen	North West	8	91	8.8
Manchester	North West	19	259	7.3
Salford	North West	10	144	6.9
City of Kingston-upon-Hull	Yorkshire and the Humber	11	163	6.7
Redcar and Cleveland	North East	6	92	6.5

A comparison of Tables 5.6 and 5.8 reveals that 37.2% of Blackpool's LSOAs fall within the most deprived 10% of areas nationally and 17.0% of Blackpool's LSOAs fall within the most deprived 1% nationally. The figures in Table 5.8 highlight a concentration of extreme levels of relative multiple deprivation in parts of Blackpool which may not be so apparent if only Table 5.6 is examined.

Section 4: The domain indices, the IDACI, the IDAOPI and the IMD 2010

In this section analysis of the domain indices, the Income Deprivation Affecting Children Index (IDACI), the Income Deprivation Affecting Older People Index (IDAOPI), and the Index of Multiple Deprivation are presented. Throughout the analysis, a rank of 1 is assigned to the most deprived LSOA, and a rank of 32,482 is assigned to the least deprived LSOA.

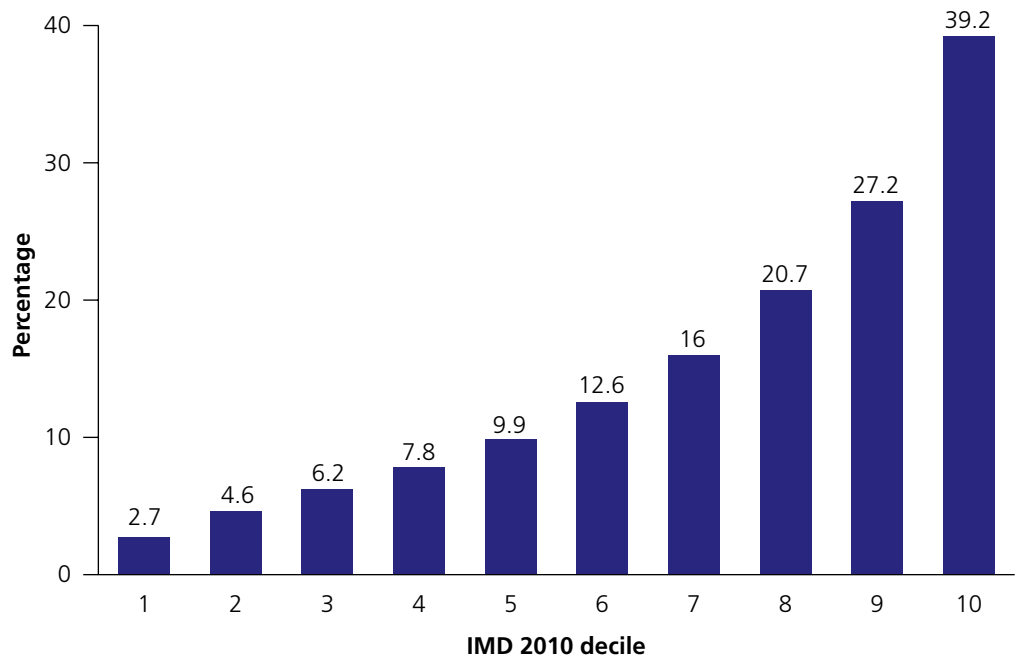
For the Income and Employment Deprivation Domain scores, plus the Income Deprivation Affecting Children Index and Income Deprivation Affecting Older People Index, it is possible to examine the actual numbers of individuals deprived on each measure and

also the proportion of the relevant population that is deprived on each measure. This is because the Income and Employment Deprivation Domains are each constructed as non-overlapping counts of deprived individuals. It is not possible to present equivalent analyses for the other five domains as these are constructed in different ways, making it impossible to say that a certain number or percentage of the population is deprived on that domain.

Income Deprivation Domain

Chart 5.2 shows the range of income deprivation for deciles of LSOAs. In the most income deprived decile of LSOAs in England, an average of 39.2% of the population are income deprived. Within this decile, the range is from 76.6% to 31.5%, showing the high rates of deprivation that exist in the most deprived LSOAs. The least income deprived decile of LSOAs has on average only 2.7% of people living in income deprived households.

Chart 5.2: Proportion of population in income deprivation in England by IMD 2010 decile



There are 223 LSOAs in England where more than half of all people live in income deprivation. The local authority districts with the highest numbers of these LSOAs are Birmingham (26 LSOAs), Liverpool (24 LSOAs), Wirral (12 LSOAs), Knowsley (11 LSOAs) and Manchester (10 LSOAs). Using a less stringent approach, there are 2,702 LSOAs where more than one third of people live in income deprivation.

At the other end of the spectrum, there are 5,404 LSOAs where fewer than one in 20 people live in income deprivation. There are 11 local authority districts (excluding the Isles of Scilly) where half or more of the LSOAs contain less than one in 20 people living

in income deprivation (Hart, Wokingham, City of London, Chiltern, Epsom and Ewell, Surrey Heath, South Northamptonshire, Mole Valley, Guildford, Mid Sussex and Windsor and Maidenhead). There are 14,768 LSOAs where fewer than one in 10 people live in income deprivation.

Chart 5.3 shows the minimum, maximum and median rank plus the interquartile range of LSOAs in each region for the Income Deprivation Domain. On the chart the vertical line and end bars indicate the range of the ranks of the LSOAs in each region. The box for each region shows the range of the Income Deprivation Domain ranks for the middle 50% of LSOAs in the region (the interquartile range[18]), and the horizontal line within the box represents the rank of the median LSOA within the region. If the box is relatively short this indicates that LSOAs are ranked in a narrow range, with similar income deprivation ranks (and therefore similar levels of income deprivation). If this box sits towards the bottom of the chart it tells us that the income deprivation ranks of the LSOAs in the region are concentrated in the most deprived part of the national distribution. If the box sits towards the top of the chart it tells us that ranks of the LSOAs in the region are concentrated in the least deprived part of the national distribution.

In Chart 5.3 and the subsequent box plots in this section, any LSOA data point that lies more than 1.5 times the interquartile range away from the nearer quartile value is plotted separately and shown by a small dot on the chart. As can be seen, no LSOAs meet this criterion in Chart 5.3.

The chart shows that all regions contain LSOAs that are both highly income deprived and those that are not highly income deprived. However, the median ranks of LSOAs in each region differ and show substantial variation within England. London has on average the most income deprivation (median rank 10,433) whilst the South East region is, on average, the least income deprived (median rank 21,101).

[18] The interquartile range (IQR) is 'a measure of dispersion calculated by taking the difference between the first and third quartiles (that is, the 25th and 75th percentiles). In short, the IQR is the middle half of a distribution' (Vogt, 1999, p.143).

Chart 5.3: Rank of Income Deprivation Domain score by region: interquartile range

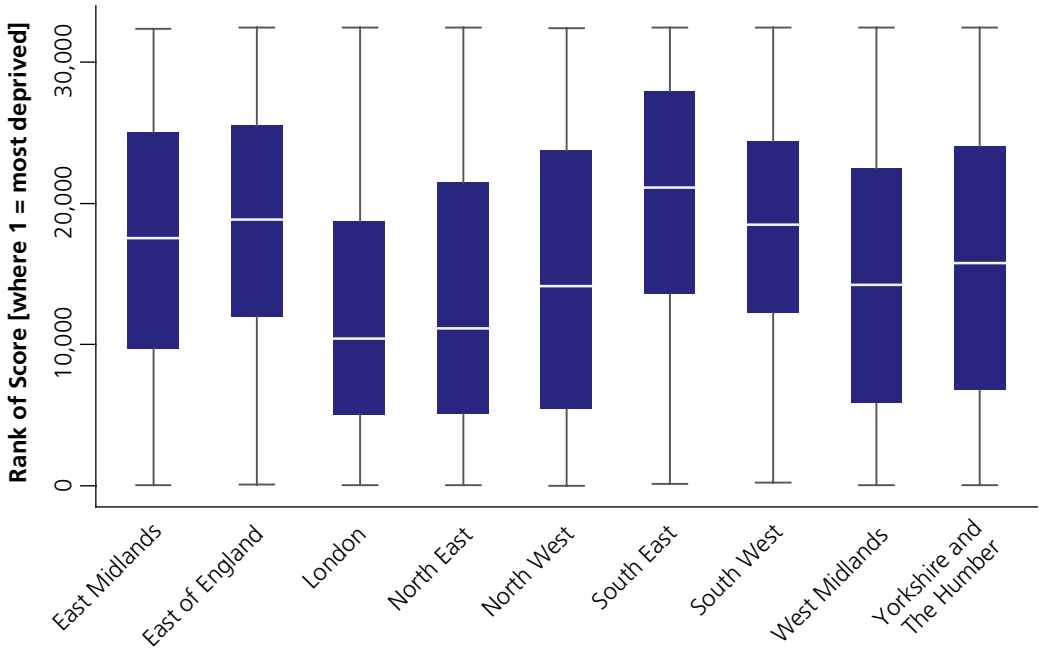


Table 5.9 shows the five local authority districts with the highest proportion of the population counted as income deprived. In all five districts, over one in four people are income deprived. Tower Hamlets, Newham and Hackney are in London while Knowsley and Liverpool are in the North West.

Table 5.9: The five local authority districts with the highest levels of income deprivation

Local authority district	Region	Percentage of people in income deprived families
Tower Hamlets	London	32.8
Newham	London	32.7
Hackney	London	31.3
Knowsley	North West	27.6
Liverpool	North West	27.1

Table 5.10 shows the five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Income Deprivation Domain. In Tower Hamlets, Newham and Hackney over half the LSOAs are in the 10% most deprived LSOAs nationally on the Income Deprivation Domain. Of the five highest ranked local authority districts presented in the table, four are in London and one (Knowsley) is in the North West.

Table 5.10: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Income Deprivation Domain

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Income Deprivation Domain
Tower Hamlets	London	63.1
Newham	London	55.3
Hackney	London	52.6
Knowsley	North West	44.4
Haringey	London	41.7

Income Deprivation Affecting Children Index

Chart 5.4 shows the range of the Income Deprivation Affecting Children Index rates for every LSOA in England. This goes from a high of 99.4% of children aged under 16 living in income deprived households, down to 0.4% of children in the least deprived LSOA on this measure. Seven LSOAs have Income Deprivation Affecting Children Index rates of over 95% and these are located within the local authority districts of Westminster, Islington, Tower Hamlets, Manchester, Salford and Wolverhampton.

Chart 5.4: Rates of the Income Deprivation Affecting Children Index for all LSOAs in England

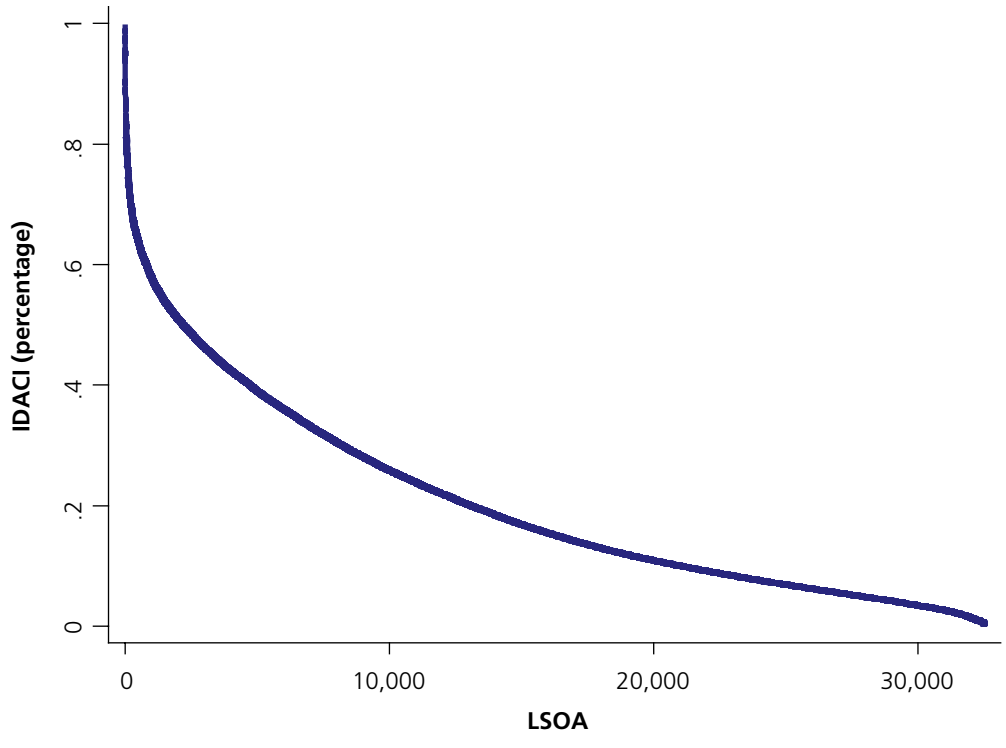
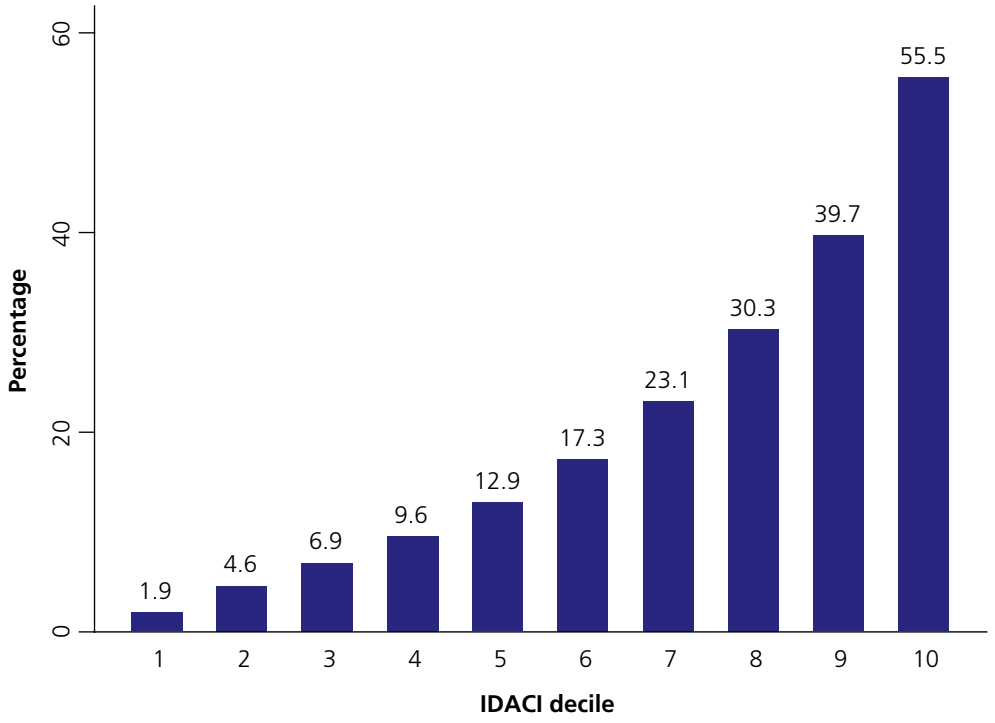


Chart 5.5 shows that the most deprived decile of LSOAs on the Income Deprivation Affecting Children Index have on average 55.5% of children aged less than 16 living in income deprived households. Within this decile, the range is from 99.4% to 45.2%, showing the extreme rates of deprivation that exist in the most deprived LSOAs. The least deprived decile of LSOAs in terms of the Income Deprivation Affecting Children Index have on average only 1.9% of children aged less than 16 living in income deprived households.

Chart 5.5: Income Deprivation Affecting Children Index in England by decile



In England there are 325 LSOAs where more than two thirds of children live in income deprived households. Over half (55.1%) of these 325 LSOAs are contained within 12 districts (Tower Hamlets, Manchester, Liverpool, Birmingham, Westminster, Haringey, Islington, Salford, Nottingham, Knowsley, Newcastle upon Tyne and Wirral).

There are 2,185 LSOAs where more than half of all children live in income deprived households. There are 6,928 LSOAs where more than one third of children live in income deprived households.

On the other hand there are 4,711 LSOAs where fewer than 5% of children live in income deprived households. A quarter of these 4,711 LSOAs are located in the South East, with the remainder split between the other eight regions.

There are 11,473 LSOAs where fewer than one in 10 children live in income deprived households.

Chart 5.6 shows the percentage of children in each region who are living in income deprived households. **Chart 5.7** shows the number of children in these households. The region with the highest percentage of children in income deprived households is London. This region also has the highest number of children living in income deprived households. The North East has the lowest number of children living in income deprived households but it has the second highest percentage. The South East has the lowest percentage of children living in income deprived households, followed by the South West and East of England regions.

Chart 5.6: Income Deprivation Affecting Children Index regional rates

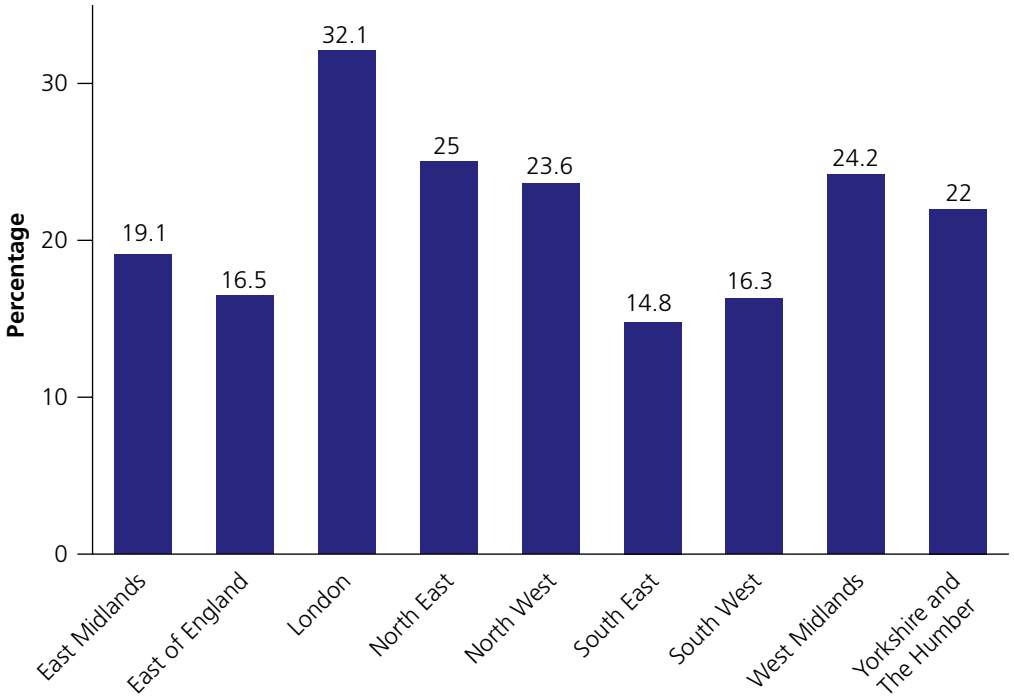


Chart 5.7: Income Deprivation Affecting Children Index regional numbers

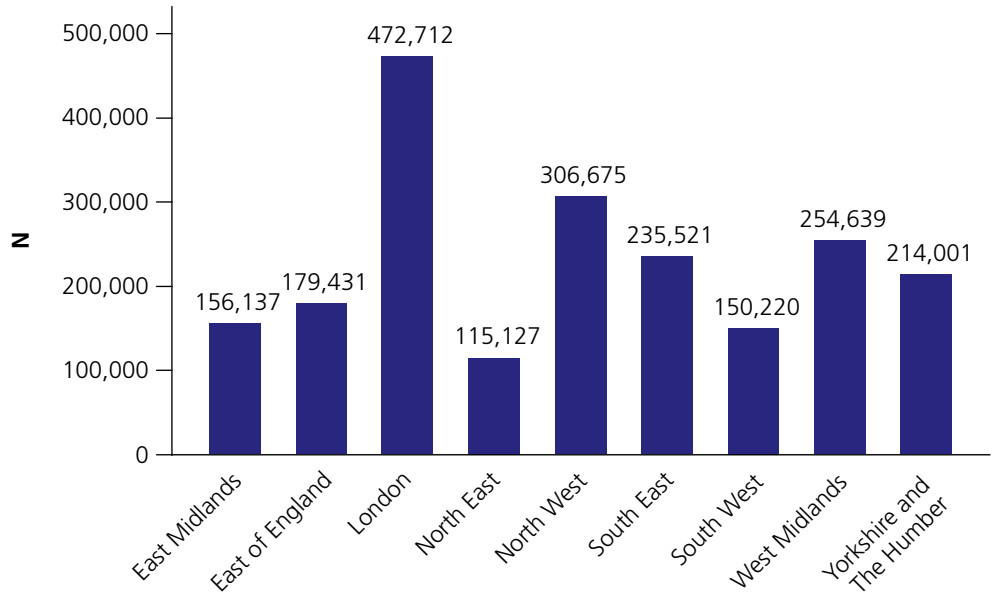


Chart 5.8 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Income Deprivation Affecting Children Index. This chart shows that in all regions there is a wide range of LSOA ranks. From the position of the box depicting the interquartile range it is clear that London has the highest level of children living in households affected by income deprivation compared with other regions (median rank 8,382). The South East region, on the other hand, has on average the lowest level of children in households affected by income deprivation (median rank 20,084).

Chart 5.8: Rank of Income Deprivation Affecting Children Index score by region: interquartile range

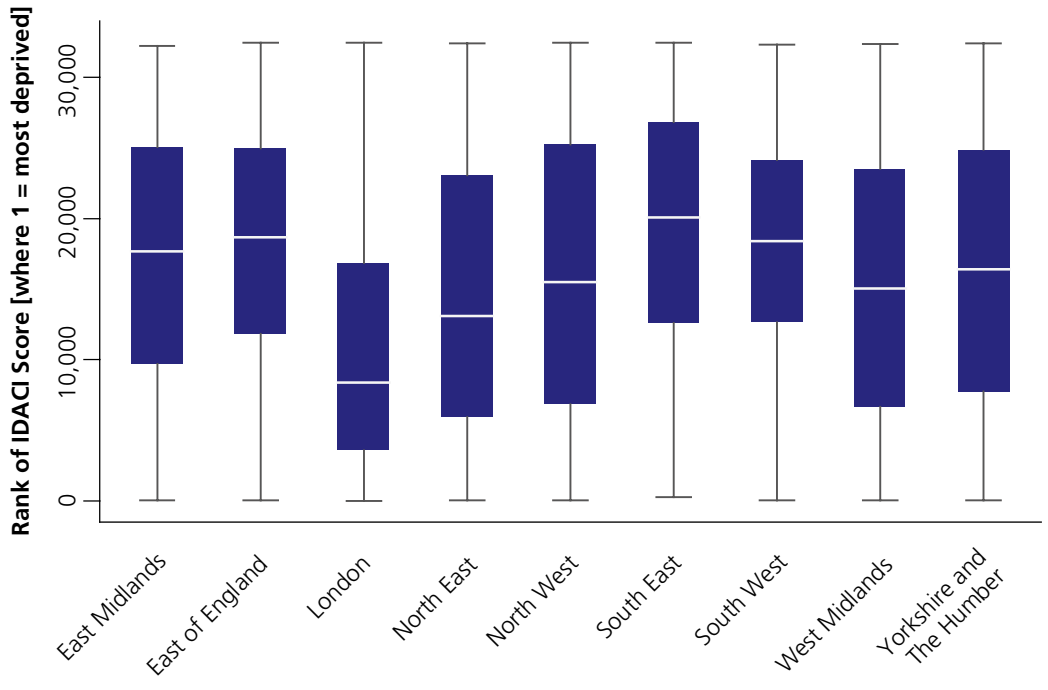


Table 5.11 shows the five local authority districts with the highest proportion of children counted as income deprived. In all five districts, over two in five children are income deprived. All five districts are located in London.

Table 5.11: The five local authority districts with the highest levels of income deprivation affecting children

Local authority district	Region	Percentage of children in income deprived families
Tower Hamlets	London	59.1
Islington	London	48.6
Hackney	London	47.8
Newham	London	47.8
Haringey	London	45.2

Table 5.12 shows the five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Income Deprivation Affecting Children Index. In all five districts presented in the table, over half the LSOAs are in the 10% most deprived LSOAs nationally on this measure. All five districts are located in London.

Table 5.12: The five local authority districts with the highest proportions of LSOAs in the most deprived 10% of LSOAs nationally on the Income Deprivation Affecting Children Index

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Income Deprivation Affecting Children Index
Tower Hamlets	London	83.8
Hackney	London	59.9
Islington	London	55.9
Newham	London	55.3
Haringey	London	53.5

Income Deprivation Affecting Older People Index

Chart 5.9 shows the range of the Income Deprivation Affecting Older People Index rates for every LSOA in England. This goes from a high of 98.5% of older people affected by income deprivation, down to less than 1% of older people in the least deprived LSOA on this measure.

Chart 5.9: Rates of the Income Deprivation Affecting Older People Index for all LSOAs in England

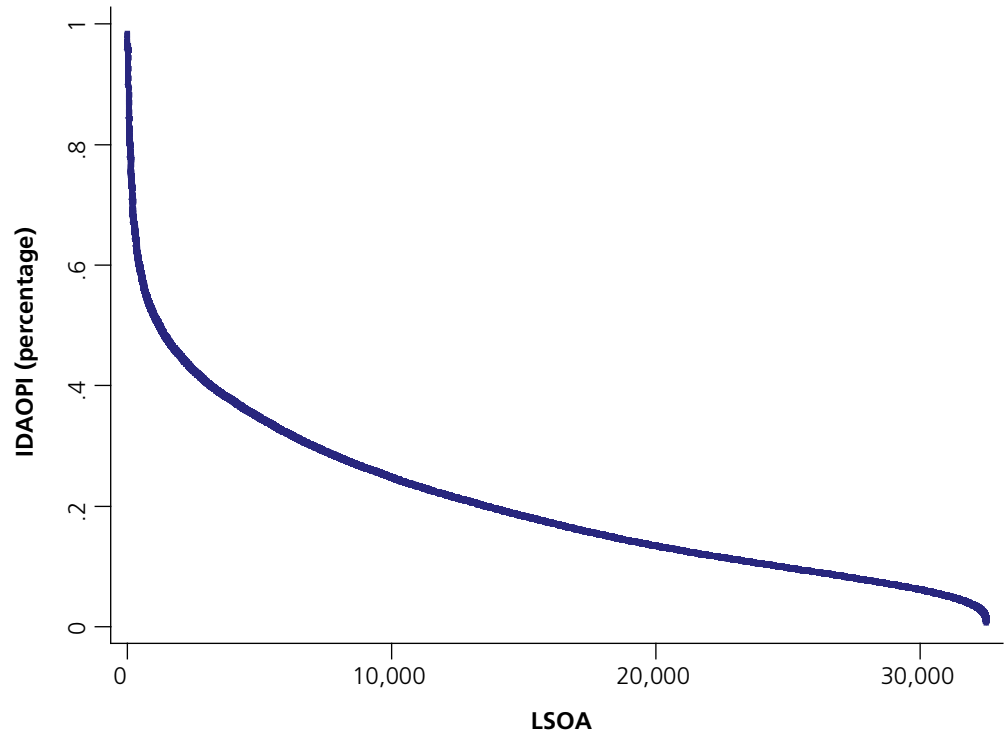
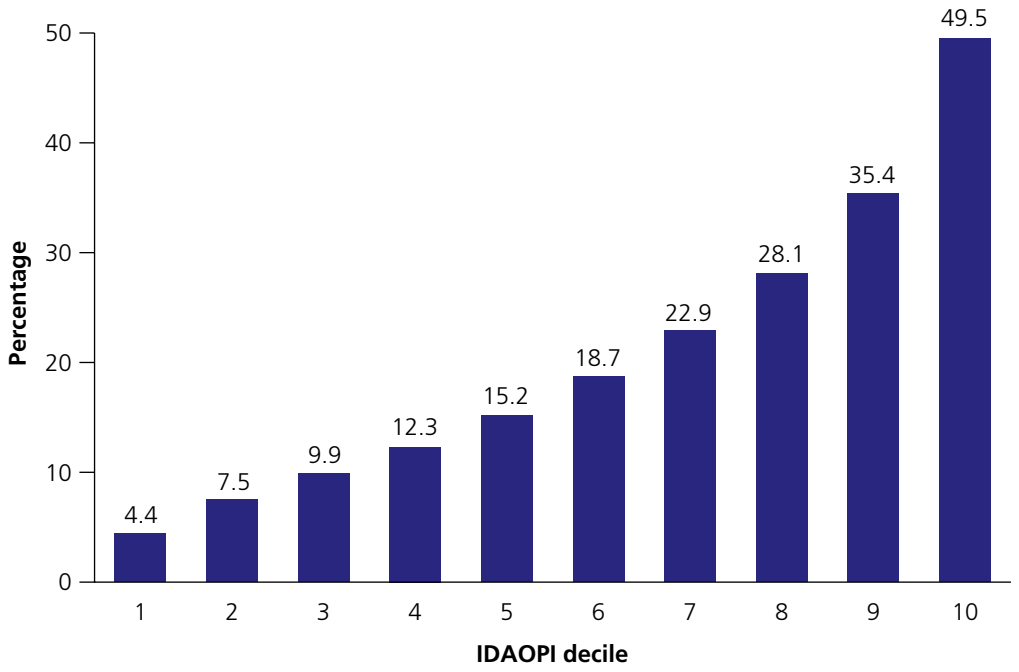


Chart 5.10 shows that the most deprived decile of LSOAs on the Income Deprivation Affecting Older People Index has on average 49.5% of older people affected by income deprivation. Within this decile, the range is from 98.5% to 39.6%, again showing the extreme rates of deprivation that exist in the most deprived LSOAs. The least deprived decile of LSOAs in terms of the Income Deprivation Affecting Older People Index have on average only 4.4% of older people affected by income deprivation.

Chart 5.10: Income Deprivation Affecting Older People Index in England by decile



In England there are 243 LSOAs where more than two thirds of older people are affected by income deprivation. Sixty-four of these LSOAs are located in Birmingham, with a further 31 in Tower Hamlets, 25 in Bradford, 19 in Leicester and 11 in Liverpool.

There are 1,187 LSOAs where more than half of all older people are affected by income deprivation. There are 5,538 LSOAs where more than one third of older people are affected by income deprivation.

On the other hand there are 1,382 LSOAs where fewer than 5% of older people are affected by income deprivation. Two fifths of these 1,382 LSOAs are located in the South East region with the remainder split between the other eight regions.

There are 7,840 LSOAs where fewer than one in 10 older people are affected by income deprivation.

Chart 5.11 shows the percentage of older people in each region who are affected by income deprivation. **Chart 5.12** shows the number of older people affected by income deprivation. London has the highest percentage of older people affected by income deprivation (23.8%) and the North West has the highest number. The North East has the lowest number of older people affected by income deprivation. The South East has the lowest percentage of older people affected by income deprivation (13.0%).

Chart 5.11: Income Deprivation Affecting Older People Index regional rates

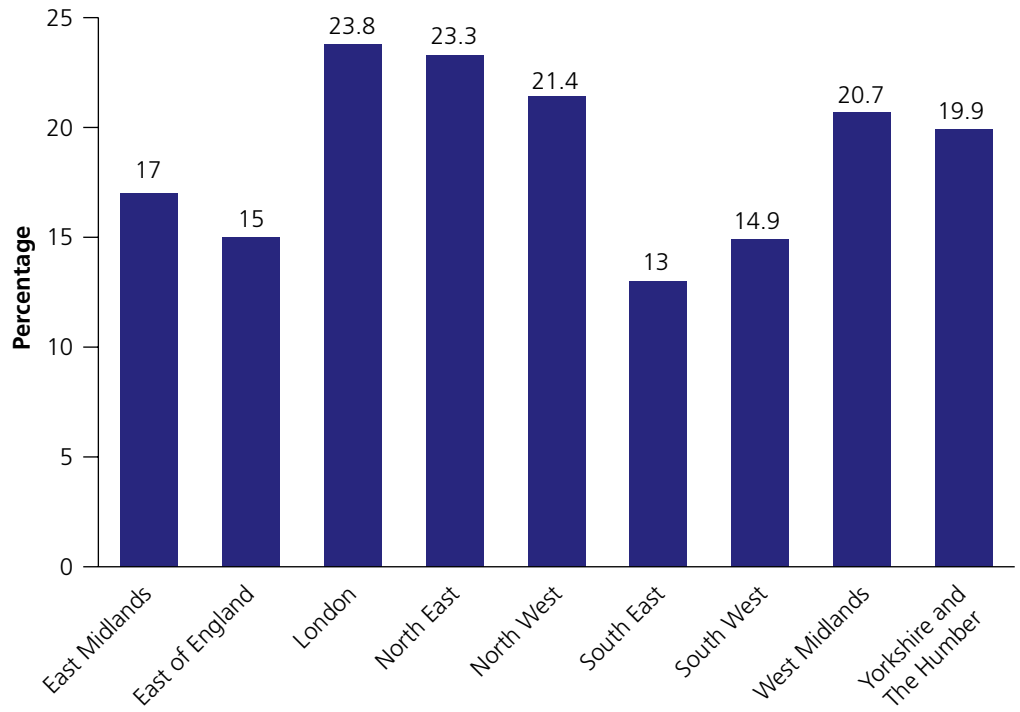


Chart 5.12: Income Deprivation Affecting Older People Index regional numbers

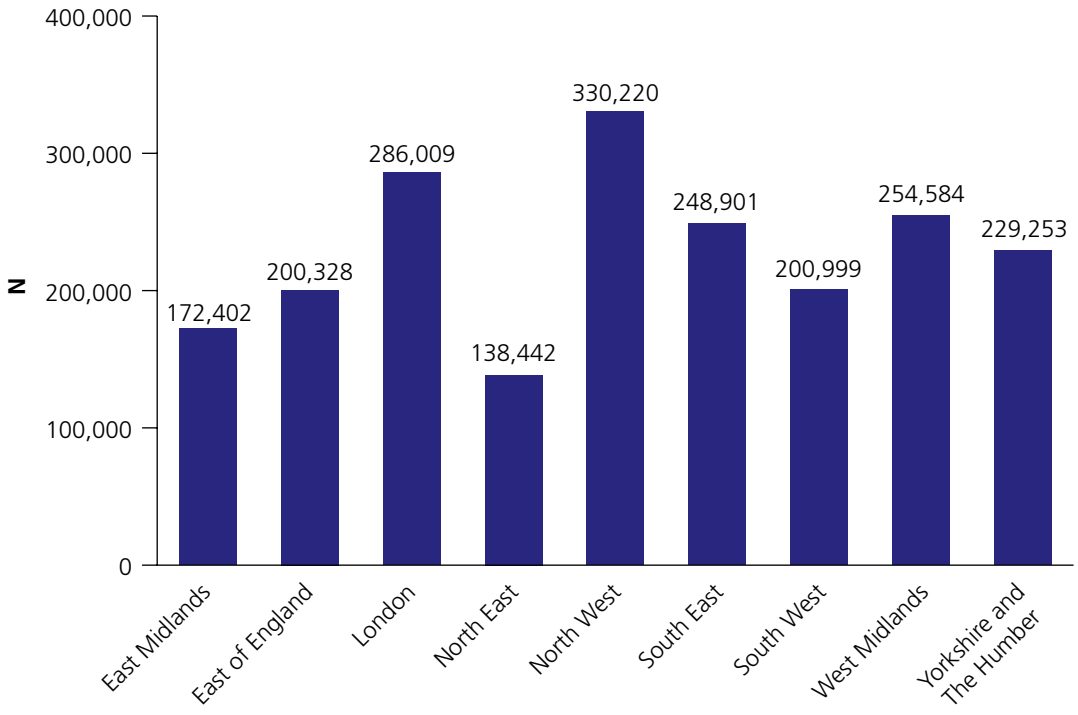


Chart 5.13 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Income Deprivation Affecting Older People Index. This chart also shows that in all regions there is a wide range of LSOA ranks. London (median rank 9,659) followed by the North East (median rank 10,627) have the highest levels of older people affected by income deprivation compared with other regions, while the South East region has on average the lowest levels of older people affected by income deprivation (median rank 22,113).

Chart 5.13: Rank of Income Deprivation Affecting Older People Index score by region: interquartile range

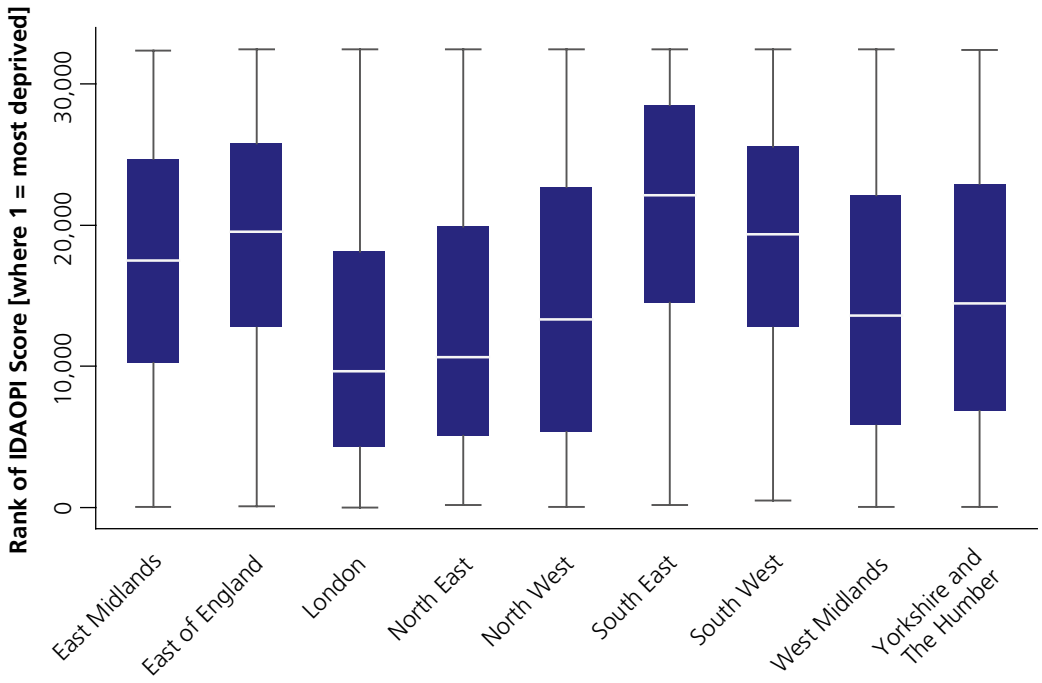


Table 5.13 shows the five local authority districts with the highest proportions of older people counted as income deprived. In all five districts, over one in three older people are income deprived. In Tower Hamlets, over one in two older people are income deprived. Liverpool is located in the North West region and the other four districts are located in London.

Table 5.13: The five local authority districts with the highest levels of income deprivation affecting older people

Local authority district	Region	Percentage of older people in income deprived families
Tower Hamlets	London	52.5
Newham	London	45.8
Hackney	London	44.7
Islington	London	41.4
Liverpool	North West	37.3

Table 5.14 shows the five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Income Deprivation Affecting Older People Index. In all five districts presented in the table, over half the LSOAs are in the 10% most deprived LSOAs nationally on this measure. In Tower Hamlets, almost four out of every five LSOAs (79.2%) are in the most deprived 10% nationally. All five districts presented are in London.

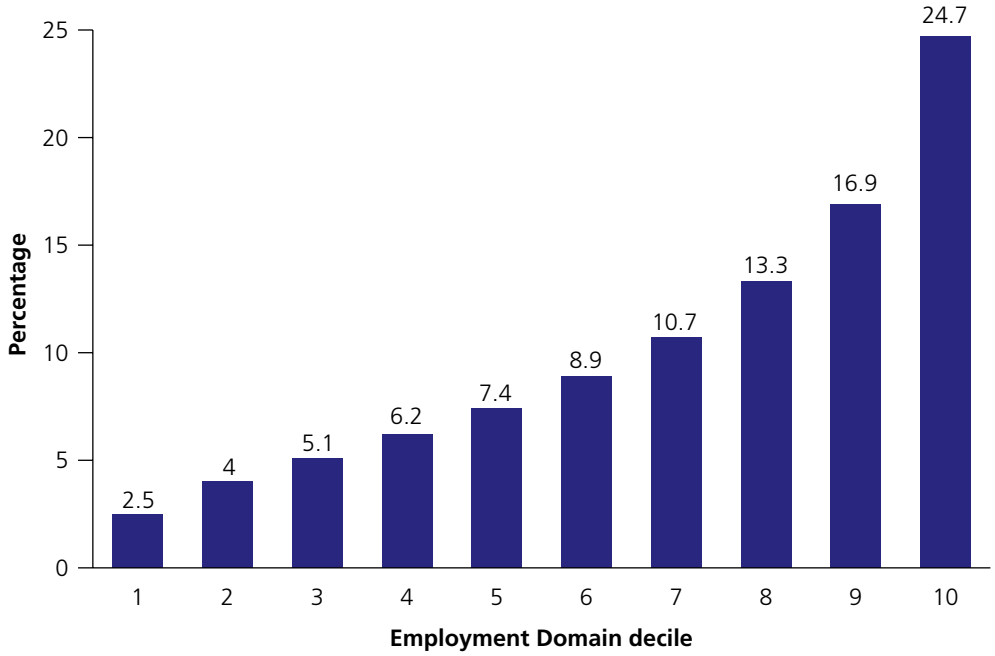
Table 5.14: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Income Deprivation Affecting Older People Index

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Income Deprivation Affecting Older People Index
Tower Hamlets	London	79.2
Newham	London	73.6
Hackney	London	69.3
Islington	London	56.8
Haringey	London	52.1

Employment Domain

Chart 5.14 shows employment deprivation in England by decile. In the most employment deprived decile of LSOAs, an average of 24.7% of the relevant group of adults (women aged 18 to 59 and men aged 18 to 64) are employment deprived. Within this decile, the range is from 75.5% to 19.3%, showing the high rates of deprivation that exist in the most deprived LSOAs. This compares with 2.5% in the least employment deprived decile of LSOAs in England.

Chart 5.14: Proportion of population in employment deprivation in England by IMD 2010 decile



There are 1,155 LSOAs in England where more than one quarter of relevant adults (women aged 18 to 59 and men aged 18 to 64) experience employment deprivation. At the other end of the spectrum there are 7,299 LSOAs where less than 5% of all relevant adults (defined as above) are employment deprived. There are 30 LSOAs where less than 1% of adults (defined as above) are employment deprived.

Chart 5.15 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Employment Deprivation Domain. The North East region is the most employment deprived – the inter quartile range is narrower and towards the deprived end of the distribution (median rank 7,806). This is in sharp contrast to the South East region (median rank 23,225).

Chart 5.15: Rank of Employment Deprivation Domain score by region: interquartile range

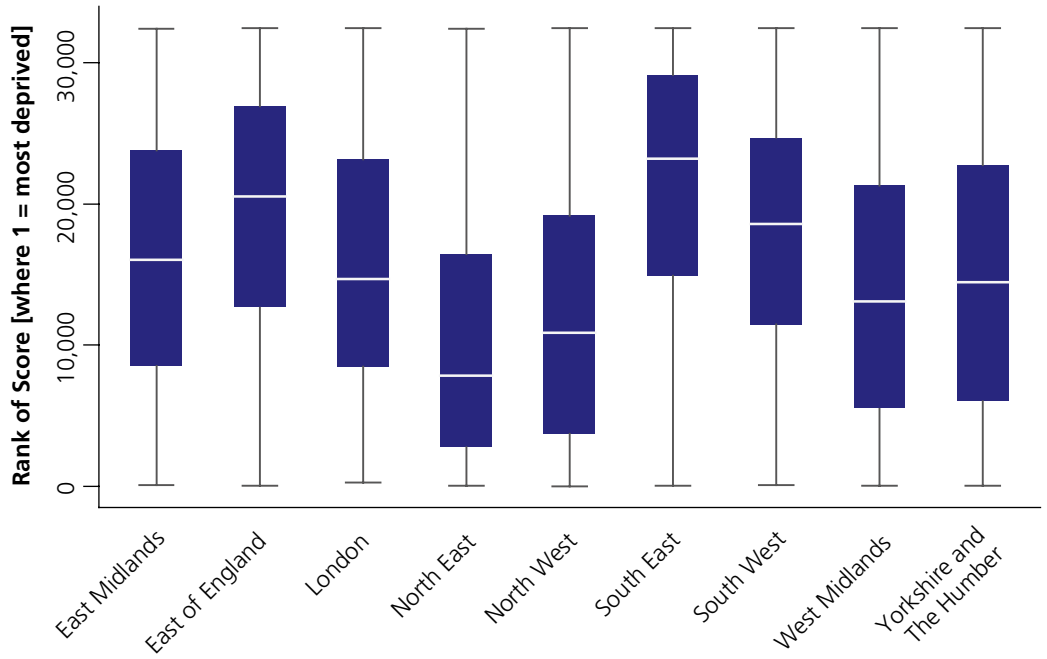


Table 5.15 shows the five local authority districts with the highest proportion of the working age population counted as employment deprived. Easington and Hartlepool are located in the North East region while Knowsley, Liverpool and Blackpool are located in the North West.

Table 5.15: The five local authority districts with the highest levels of employment deprivation amongst the population of working age

Local authority district	Region	Percentage of working age population in employment deprivation
Easington	North East	21.1
Knowsley	North West	19.8
Liverpool	North West	19.4
Hartlepool	North East	19.0
Blackpool	North West	18.5

Table 5.16 shows the five local authority districts with the highest proportion of LSOAs in the most deprived decile of LSOAs nationally on the Employment Deprivation Domain. Over half the LSOAs in Liverpool and Hartlepool, plus almost half the LSOAs in Knowsley, are in the 10% most deprived nationally on this measure. Liverpool and Knowsley are in the North West region whereas Hartlepool, Middlesbrough and South Tyneside are in the North East.

Table 5.16: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Employment Deprivation Domain

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Employment Deprivation Domain
Liverpool	North West	51.9
Hartlepool	North East	51.7
Knowsley	North West	49.5
Middlesbrough	North East	45.5
South Tyneside	North East	43.7

Health Deprivation and Disability Domain

Chart 5.16 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Health Deprivation and Disability Domain. The North East and the North West regions show much higher levels of health deprivation, compared with other regions, with respective median ranks of 6,649 and 7,916. The North East has a smaller range of LSOA ranks than other regions. The least health deprived region is the East of England with a median rank of 23,142, followed by the South East with a median LSOA rank of 23,018.

As noted above, in the box plots shown throughout this section any LSOA data point that lies more than 1.5 times the interquartile range away from the nearer quartile value is plotted separately and shown by a small dot on the chart. As can be seen in Chart 5.16, the North East region does contain such data points at the least deprived end of the distribution.

Chart 5.16: Rank of Health Deprivation and Disability Domain score by region: interquartile range

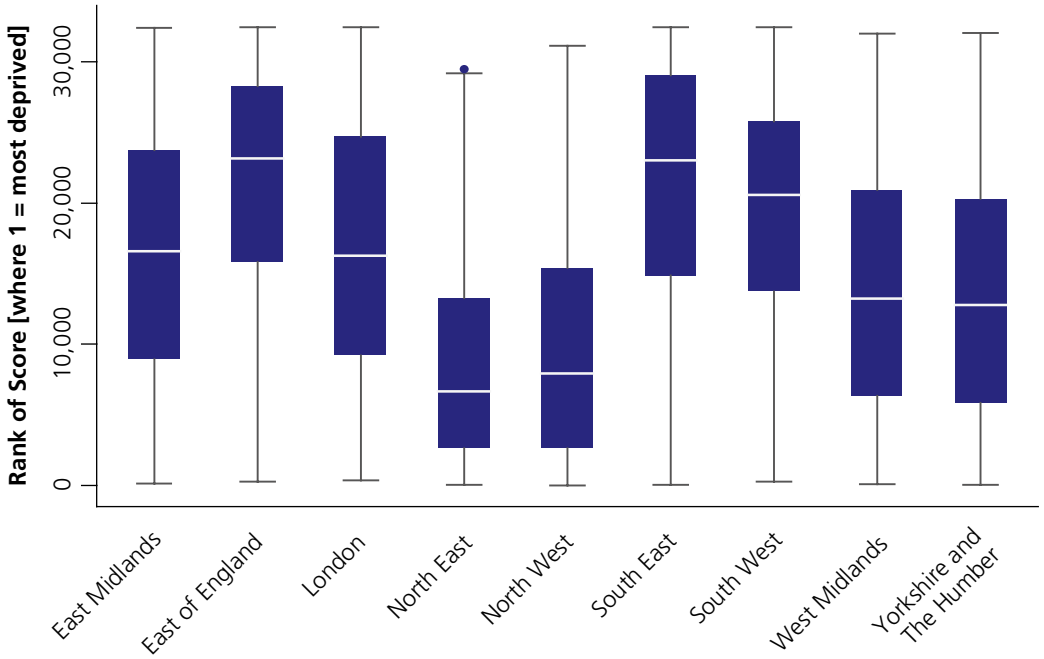


Table 5.17 shows the five local authority districts with the highest proportion of LSOAs in the most deprived decile of LSOAs nationally on the Health Deprivation and Disability Domain. In all five districts presented, over half the LSOAs are in the 10% most deprived LSOAs nationally on this measure. In Manchester, over seven out of every 10 LSOAs (72.2%) are in the 10% most deprived nationally. Four of the districts in the table are located in the North West and one (Middlesbrough) is located in the North East.

Table 5.17: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Health Deprivation and Disability Domain

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Health Deprivation and Disability Domain
Manchester	North West	72.2
Liverpool	North West	61.9
Middlesbrough	North East	59.1
Barrow-in-Furness	North West	54.0
Knowsley	North West	51.5

Education, Skills and Training Domain

Chart 5.17 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Education, Skills and Training Deprivation Domain.

This chart shows that in all regions there is again a wide range of LSOA ranks. However, unlike in the other domain boxplots, in Chart 5.17 the median rank for each region lies between 10,000 and 20,000 indicating a more evenly distributed pattern of education deprivation across the regions than in other domains. The most education deprived regions are the North East (median rank 10,912) and Yorkshire and the Humber (median rank 12,256). The least education deprived regions on average are the South East (median rank 19,673) and London (median rank 19,514).

Chart 5.17: Rank of Education, Skills and Training Deprivation Domain score by region: interquartile range

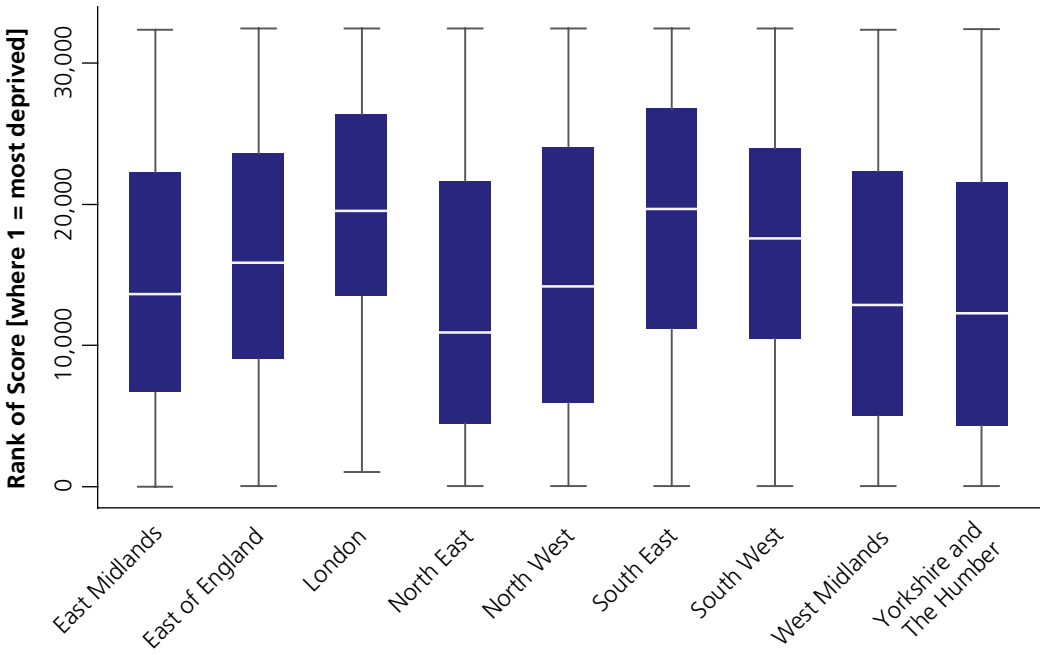


Table 5.18 shows the five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Education, Skills and Training Deprivation Domain. In each of the five districts presented in the table, over one third of LSOAs are in the 10% most deprived nationally on this measure. The five districts presented are spread across five different regions: Yorkshire and the Humber, North East, North West, East of England and West Midlands.

Table 5.18: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Education, Skills and Training Deprivation Domain

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Education, Skills and Training Deprivation Domain
City of Kingston-upon-Hull	Yorkshire and The Humber	46.0
Middlesbrough	North East	39.8
Knowsley	North West	39.4
Norwich	East of England	35.4
Walsall	West Midlands	34.9

Barriers to Housing and Services Domain

Chart 5.18 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Barriers to Housing and Services Domain. London is by far the most deprived region in England (median rank 5,810). The North East and North West regions are the least deprived on this domain (median ranks 23,050 and 24,014 respectively).

London has the least deprived median rank (24,786) of all regions on the Geographical Barriers sub-domain but the most deprived median rank (2,703) of all regions on the Wider Barriers sub-domain. Due to the way cancellation effects are controlled when combining the two sub-domains to create the overall domain score, London can be seen to have a more deprived median rank on the overall domain than any of the other regions.

As can be seen in Chart 5.18, the London region contains a number of data points that lie more than 1.5 times the interquartile range away from the nearer quartile value and which are therefore plotted separately and shown by small dots on the chart. These cases are at the least deprived end of the distribution.

Chart 5.18: Rank of Barriers to Housing and Services Domain score by region: interquartile range

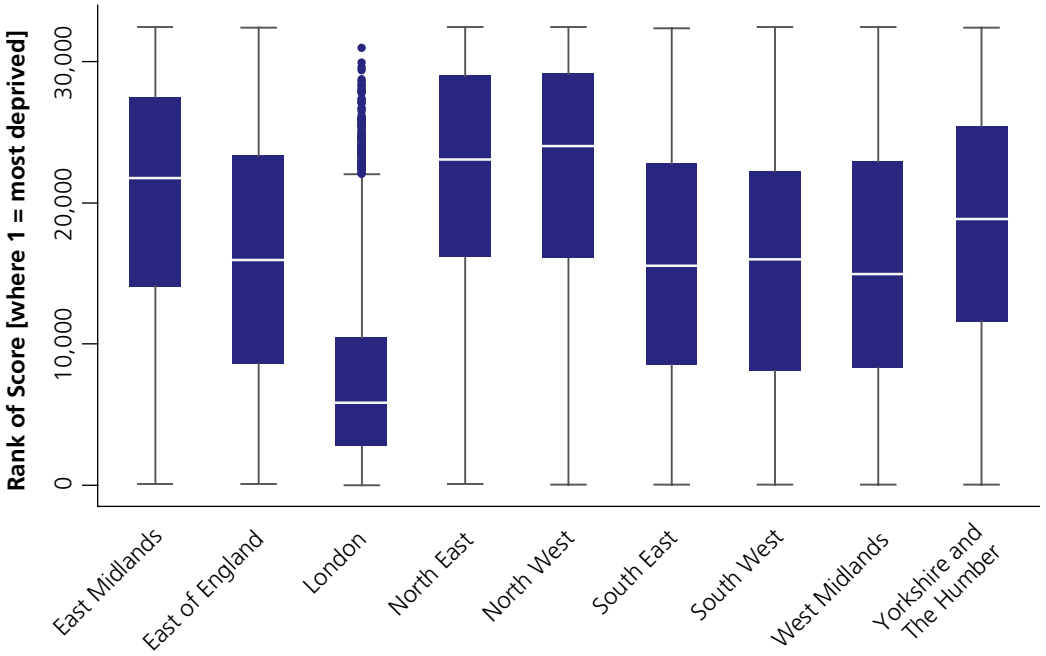


Table 5.19 shows the five local authority districts with the highest proportion of LSOAs in the most deprived decile of LSOAs nationally on the Barriers to Housing and Services Deprivation Domain. The five districts presented are all located in London. Every LSOA in Hackney is in the 10% most deprived LSOAs nationally on this measure. In Newham, Haringey and Waltham Forest over nine out of 10 LSOAs are in the 10% most deprived nationally.

Table 5.19: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Barriers to Housing and Services Domain

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Barriers to Housing and Services Domain
Hackney	London	100.0
Newham	London	98.1
Haringey	London	96.5
Waltham Forest	London	94.5
Kensington and Chelsea	London	85.4

Crime Domain

Chart 5.19 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Crime Domain. As with the Barriers to Housing and Services Domain, the London region is the most deprived in terms of crime in England (median rank 9,897). The South West (median rank 21,221) and East regions (median rank 21,215) are the least crime deprived.

As can be seen in Chart 5.19, the London region contains a number of data points that lie more than 1.5 times the interquartile range away from the nearer quartile value and which are therefore plotted separately and shown by small dots on the chart. These cases are at the least deprived end of the distribution.

Chart 5.19: Rank of Crime Domain score by region: interquartile range

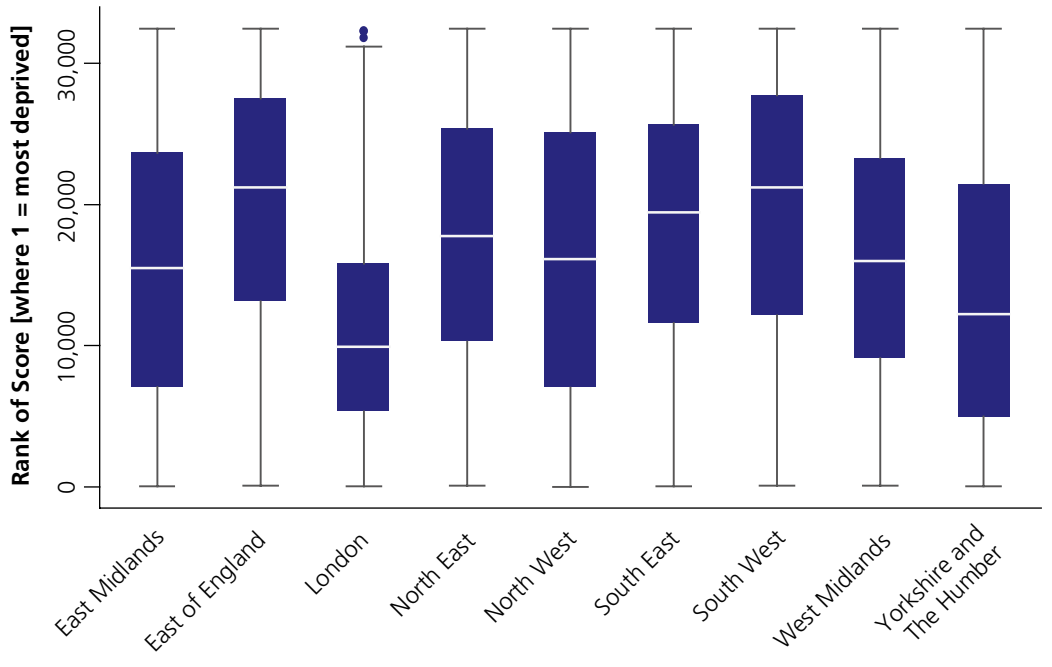


Table 5.20 shows the five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Crime Domain. In Manchester and Slough over half the LSOAs are in the 10% most deprived nationally on this measure. Almost half of the LSOAs in Nottingham (49.4%) are in the 10% most deprived nationally. The five districts presented in the table are spread across five different regions: South East, North West, East Midlands, London and North East.

Table 5.20: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Crime Domain		
Local authority district	**Region**	**Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Crime Domain**
Slough	South East	51.3
Manchester	North West	50.6
City of Nottingham	East Midlands	49.4
Newham	London	44.0
Middlesbrough	North East	43.2

Living Environment Domain

Chart 5.20 shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the Living Environment Deprivation Domain. The most deprived region on the Living Environment Deprivation Domain is London (median rank 7,615). The North East region (median rank 26,121) is considerably less deprived on this domain, compared with the other regions.

As can be seen in Chart 5.20, the London and North East regions contain a number of data points that lie more than 1.5 times the interquartile range away from the nearer quartile value and which are therefore plotted separately and shown by small dots on the chart. In London these cases are at the least deprived end of the distribution whilst in the North East the cases are at the most deprived end of the distribution.

Chart 5.20: Rank of Living Environment Deprivation Domain score by region: interquartile range

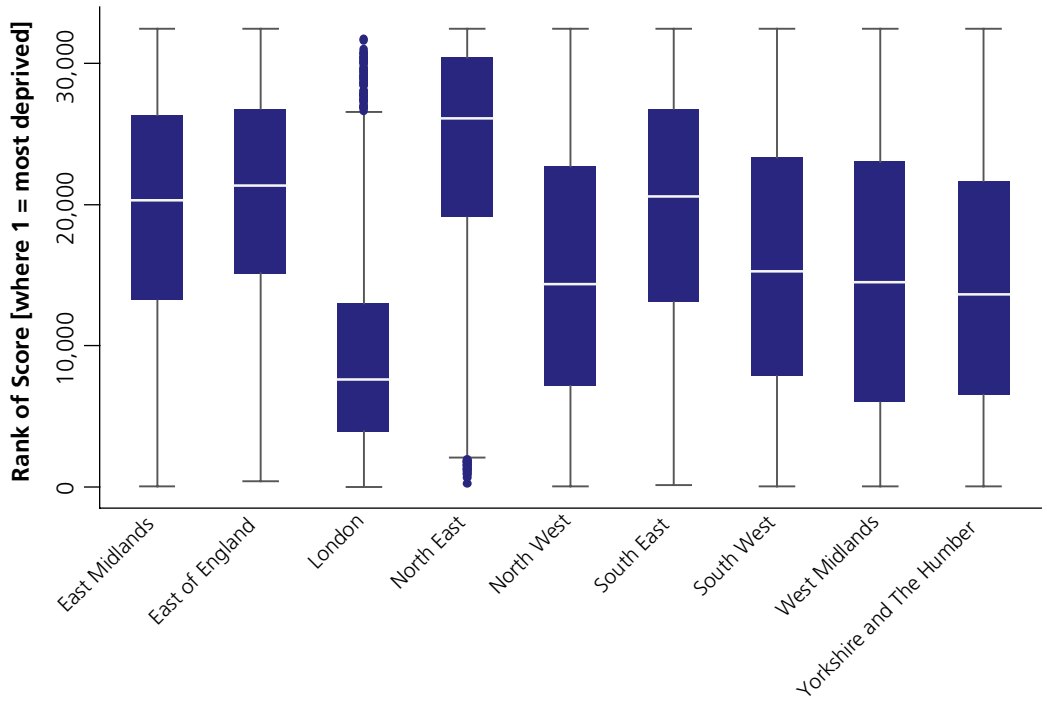


Table 5.21 shows the five local authority districts with the highest proportion of LSOAs in the most deprived decile of LSOAs nationally on the Living Environment Deprivation Domain. In all five of the districts presented in the table, over half the LSOAs are in the 10% most deprived LSOAs nationally on this measure. In Kensington and Chelsea, over two thirds of the LSOAs are in the 10% most deprived nationally. Four of the five districts in the table are in London and one (Liverpool) is in the North West.

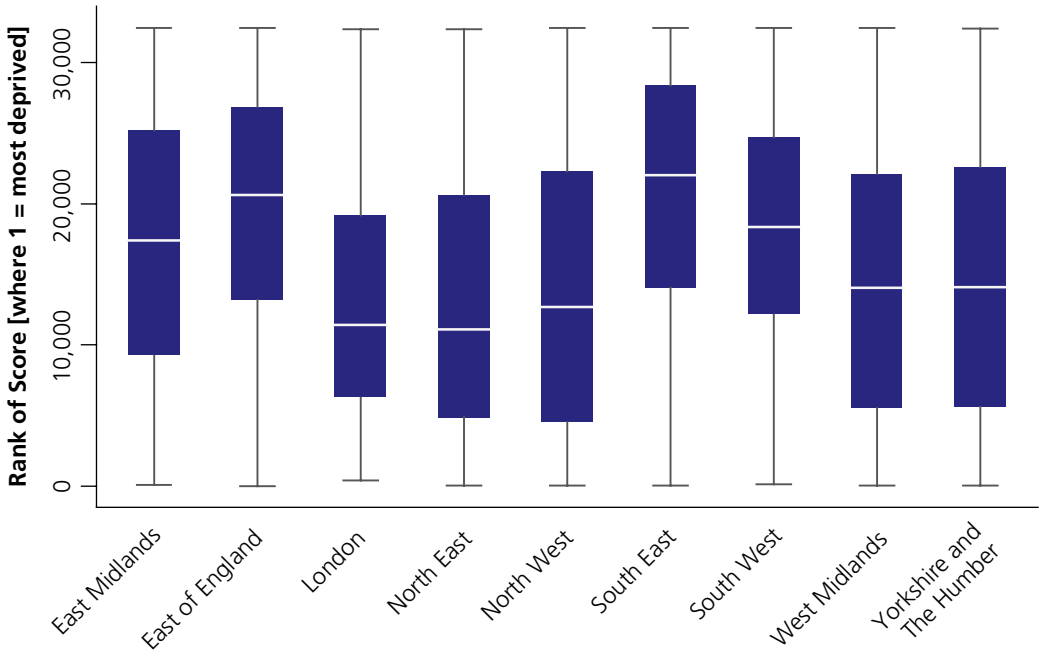
Table 5.21: The five local authority districts with the highest proportion of LSOAs in the most deprived 10% of LSOAs nationally on the Living Environment Deprivation Domain

Local authority district	Region	Percentage of LSOAs in the district falling in most deprived 10% of LSOAs in England on the Living Environment Deprivation Domain
Kensington and Chelsea	London	68.9
Hackney	London	60.6
City of Westminster	London	54.2
Lambeth	London	51.4
Liverpool	North West	51.2

Index of Multiple Deprivation 2010

Finally **Chart 5.21** shows the minimum, maximum and median rank of LSOAs in each region, and the interquartile range, for the IMD 2010. As with all the domain indices, a rank of 1 is assigned to the most deprived LSOA, and 32,482 to the least deprived LSOA. This chart shows that in all regions there is a wide range of LSOA ranks. The region with LSOAs with the highest levels of multiple deprivation on average is the North East region, with a median LSOA rank of 11,076, followed by London with a median LSOA rank of 11,401 and the North West with a median LSOA rank of 12,680. The least multiply deprived regions are the South East, with a median LSOA rank of 22,004, followed by the East of England with a median LSOA rank of 20,599.

Chart 5.21: Rank of IMD 2010 score by region: interquartile range



Section 5: Real and relative change between ID2004, ID2007 and ID2010

The ID2007 and ID2010 are direct updates of the ID2004. A key motivation for designing the ID2007 and ID2010 as direct data updates was the aim of facilitating analysis of change over time.

The same seven domains of deprivation and the same geographical units of analysis (LSOAs) are used in all three Indices. Most of the component indicators with the domains have remained the same or very similar across the three Indices. The overall methodological model of multiple deprivation adopted is the same across all three Indices. However, it is important to acknowledge a number of factors that complicate analyses of change over time between the three Indices.

First, due to changes in the way that certain datasets are collected by the data owning organisations, there have necessarily been some changes to the component indicators within the three Indices. For example, various changes to the benefit and tax credit systems have taken place since the ID2004 was constructed, such as the introduction of Working Tax Credit and Child Tax Credit, plus the introduction of Employment and Support Allowance in place of Incapacity Benefit. In cases such as these, the goal has been to maximise the degree of consistency in the measure of deprivation over time.

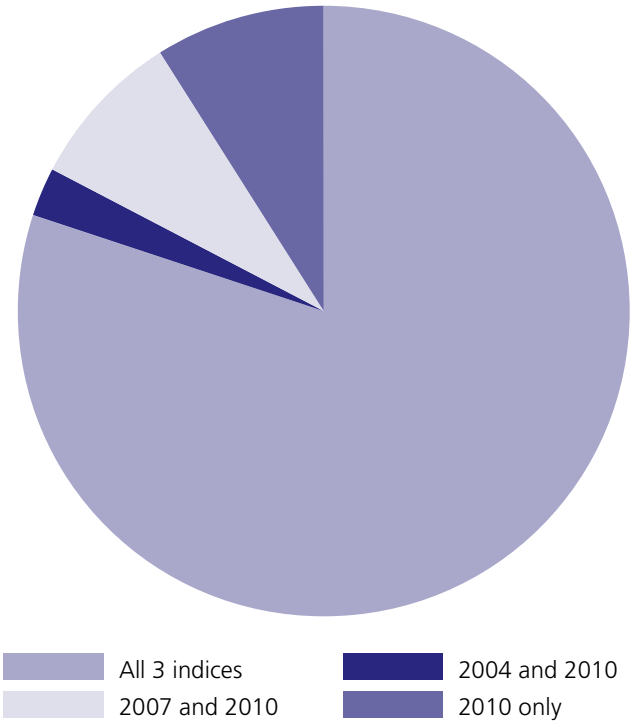
Second, the denominators used within many of the component indicators in the Indices have been re-based over time. In the ID2004 the population denominators were created by the index research team at the Social Disadvantage Research Centre as no other LSOA level population estimates were available at the time. In the ID2007 and the ID2010, population denominators were provided by the Office for National Statistics using a similar yet not identical method to that used by the research team in the ID2004. In addition to this methodological change, the Office for National Statistics has re-based its local authority district level mid-year population estimates on a number of occasions since the ID2004 was constructed. As the LSOA level population estimates are constrained to the local authority district mid-year population estimates, this has resulted in a re-basing of the denominators used in the three Indices.

In summary, the data sources used in the three Indices are similar but not identical. As such, any observed change in the level of deprivation in an area between the three indices could be due to either 'real change' or change caused by the redefinition of indicators or by the re-basing of population denominators.

Chart 5.22 is focused on the 3,248 LSOAs that represent the 10% most deprived LSOAs on the IMD 2010. It shows what proportion of this group of deprived LSOAs on the IMD 2010 were also deprived on both of the two earlier indices, on just one of the two earlier indices or on neither of the two earlier indices.

It is apparent from Chart 5.22 that the overwhelming majority (80.1%) of LSOAs that formed the 10% most deprived areas on the IMD 2010 were also in the most deprived decile of areas on both the IMD 2004 and the IMD 2007. A further 2.6% were in the most deprived 10% in the IMD 2004 but not in the IMD 2007. An additional 8.4% were in the 10% most deprived in the IMD 2007 but not in the IMD 2004. Finally, a further 9.0% were not in the 10% most deprived areas in either the IMD 2004 or the IMD 2007. These findings demonstrate that the most deprived LSOAs on the IMD 2010 are most likely to have been very deprived for a number of years prior to the IMD 2010.

Chart 5.22: Trajectories into most deprived decile of the IMD 2010



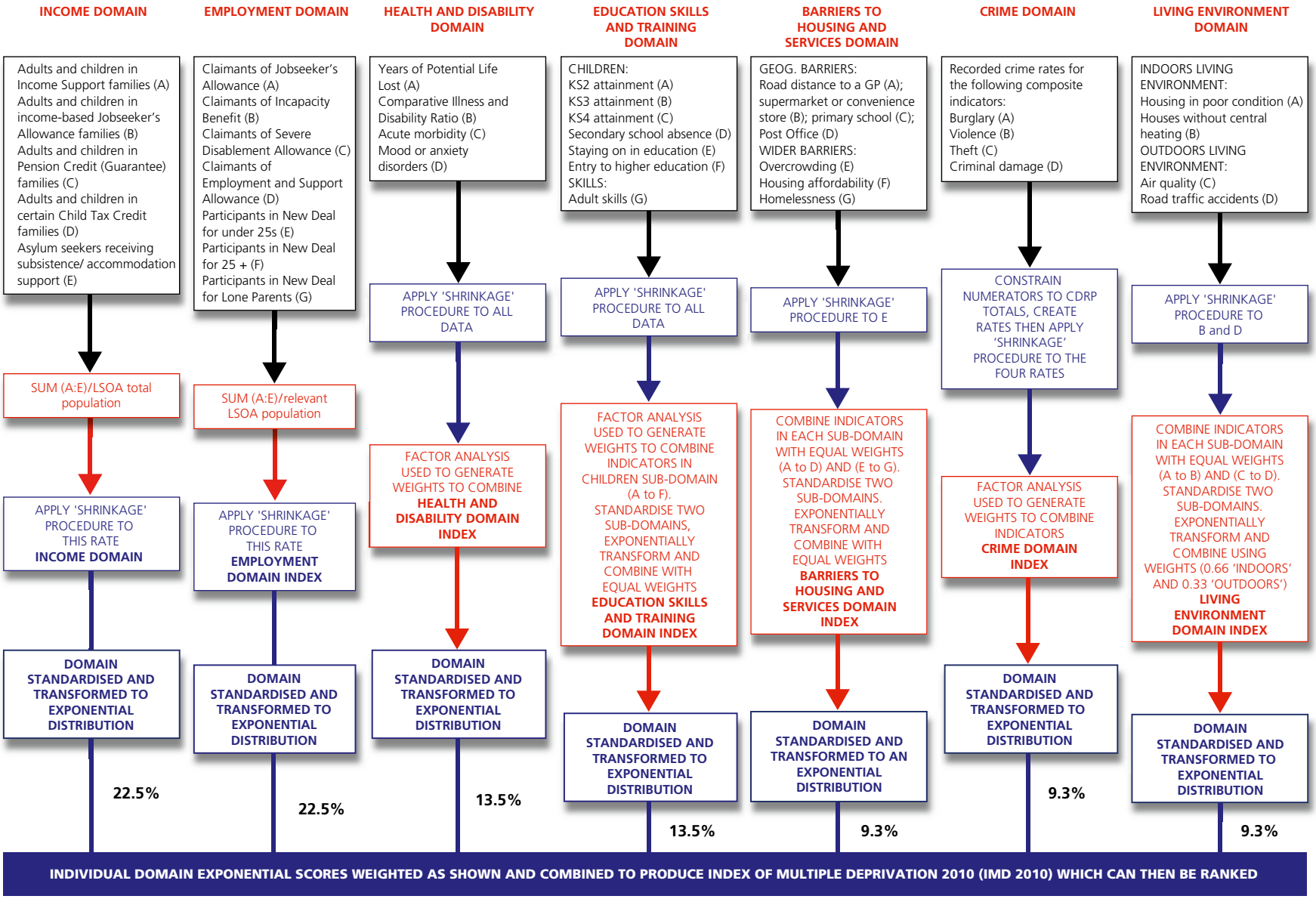
Annex A: Consultation

The Department for Communities and Local Government published a public consultation document: *English Indices of Deprivation – Consultation*. Ninety-eight responses were received as part of the consultation which lasted from 30 March to 10 May 2010. The responses represent the views of local and central government, voluntary organisations and other interested parties and are summarised in *English Indices of Deprivation 2007: Consultation – Summary of Responses* available on the Department for Communities and Local Government's website: www.communities.gov.uk/publications/communities/indicesdeprivation07responses.

Respondents welcomed the opportunity to comment on the proposals and were generally very supportive of the idea of producing an update to the ID2007. Most users indicated a desire for this update to be produced with minimal changes to the methodology used in the ID2007, and thereby maximise the comparability between the ID2007 and the ID2010.

Because the ID2010 did not involve any methodological changes, the Department for Communities and Local Government did not see the need for further peer review. In preparation for the ID2007, a peer review was undertaken during spring 2006 by Professor Peter Alcock of the University of Birmingham (Alcock, 2007). Professor Alcock gave overall support to the proposal to update the Indices and gave general approval to the approach adopted. An academic peer review was also conducted by Professor Jonathan Bradshaw from the University of York in advance of the ID2004 (Bradshaw, 2003).

Annex B: Components of the Index of Multiple Deprivation 2010



Annex C: Indicator details and data sources

This annex provides numerator and denominator details for each of the 38 indicators included in the Indices of Deprivation 2010.

Unless otherwise stated, the data time point is mid-2008 or as close as possible to this date. Where the denominator is detailed as residential population, this includes the communal establishment population, but excludes any prison population.

Income Deprivation Domain

1. **Adults and children in Income Support families**
   Numerator: As described, 2008 (Department for Work and Pensions)
   Denominator (for summed Income Domain indicators): Total resident population, 2008 (Office for National Statistics population estimates)

2. **Adults and children in income-based Jobseeker's Allowance families**
   Numerator: As described, 2008 (Department for Work and Pensions)
   Denominator (for summed Income Domain indicators): Total resident population, 2008 (Office for National Statistics population estimates)

3. **Adults and children in Pension Credit (Guarantee) families**
   Numerator: As described, 2008 (Department for Work and Pensions)
   Denominator (for summed Income Domain indicators): Total resident population, 2008 (Office for National Statistics population estimates)

4. **Adults and children in Child Tax Credit families (who are not claiming Income Support, income-based Jobseeker's Allowance or Pension Credit) whose equivalised income (excluding housing benefits) is below 60% of the median before housing costs**
   Numerator: As described, 2008 (HM Revenue and Customs)
   Denominator (for summed Income Domain indicators): Total resident population, 2008 (Office for National Statistics population estimates)

5. **Asylum seekers in England in receipt of subsistence support, accommodation support, or both**
   Numerator: As described, 2008 (Home Office)
   Denominator (for summed Income Domain indicators): Total resident population, 2008 (Office for National Statistics population estimates)

Employment Deprivation Domain

6. **Claimants of Jobseeker's Allowance (both contribution-based and income-based) women aged 18-59 and men aged 18-64, averaged over four quarters**
   Numerator: As described, February 2008, May 2008, August 2008 and November 2008 (Department for Work and Pensions)
   Denominator (for summed Employment Domain indicators): Total resident population for women aged 18-59 and men aged 18-64 2008 (Office for National Statistics population estimates)

7. **Claimants of Incapacity Benefit women aged 18-59 and men aged 18-64, averaged over four quarters**
   Numerator: As described, February 2008, May 2008, August 2008 and November 2008 (Department for Work and Pensions)
   Denominator (for summed Employment Domain indicators): Total resident population for women aged 18-59 and men aged 18-64, 2008 (Office for National Statistics population estimates)

8. **Claimants of Severe Disablement Allowance women aged 18-59 and men aged 18-64, averaged over four quarters**
   Numerator: As described, February 2008, May 2008, August 2008 and November 2008 (Department for Work and Pensions)
   Denominator (for summed Employment Domain indicators): Total resident population for women aged 18-59 and men aged 18-64, 2008 (Office for National Statistics population estimates)

9. **Claimants of Employment and Support Allowance (those with a contribution-based element) women aged 18-59 and men aged 18-64**
   Numerator: As described, November 2008 only (Department for Work and Pensions)
   Denominator (for summed Employment Domain indicators): Total resident population for women aged 18-59 and men aged 18-64, 2008 (Office for National Statistics population estimates)

10. **Participants in New Deal for the 18-24s who are not in receipt of Jobseeker's Allowance, averaged over four quarters**
    Numerator: As described, February 2008, May 2008, August 2008 and November 2008 (Department for Work and Pensions)
    Denominator (for summed Employment Domain indicators): Total resident population for women aged 18-59 and men aged 18-64, 2008 (Office for National Statistics population estimates)

11. Participants in New Deal for 25+ who are not in receipt of Jobseeker's Allowance, averaged over four quarters

Numerator: As described, February 2008, May 2008, August 2008 and November 2008 (Department for Work and Pensions)
Denominator (for summed Employment Domain indicators): Total resident population for women aged 18-59 and men aged 18-64, 2008 (Office for National Statistics population estimates)

12. Participants in New Deal for Lone Parents (after initial interview) aged 18 and over, averaged over four quarters

Numerator: As described, February 2008, May 2008, August 2008 and November 2008 (Department for Work and Pensions)
Denominator (for summed Employment Domain indicators): Total resident population for women aged 18-59 and men aged 18-64, 2008 (Office for National Statistics population estimates)

Health Deprivation and Disability Domain

13. Years of Potential Life Lost

Numerator: Mortality data in five year age-sex bands, 2004-2008 (Office for National Statistics)
Denominator: Total resident population in five year age-sex bands, 2008 (Office for National Statistics population estimates)

14. Comparative Illness and Disability Ratio

Numerator: Non-overlapping counts of people in receipt of Income Support, Disability Premium, Attendance Allowance, Disability Living Allowance, Severe Disablement Allowance, Incapacity Benefit in five year age-sex bands, 2008 (Department for Work and Pensions)
Denominator: Total resident population in five year age-sex bands, 2008 (Office for National Statistics population estimates)

15. Acute morbidity

Numerator: Hospital spells starting with admission in an emergency in five year age-sex bands, 2006-07 and 2007-08 (NHS Information Centre)
Denominator: Total resident population in five year age-sex bands, 2008 (Office for National Statistics population estimates)

16. Mood or anxiety disorders

Measure of adults under 60 suffering from mood (affective), neurotic, stress-related and somatoform disorders, based on prescribing data for 2005 (NHS Prescription Services), hospital episodes data for 2006-07 and 2007-08 (NHS Information Centre), suicide mortality data for 2004-2008 (Office for National Statistics) and health benefits data for 2008 (Department for Work and Pensions).

Education Skills and Training Deprivation Domain

17. Key Stage 2 attainment

Numerator: Total score of pupils taking English, maths and science Key Stage 2 exams in maintained schools, 2006-07 and 2007-08 (Department for Education)
Denominator: Total number of Key Stage 2 subjects taken by pupils in maintained schools, 2006-07 and 2007-08 (Department for Education)

18. Key Stage 3 attainment

Numerator: Total score of pupils taking English, maths and science Key Stage 3 exams in maintained schools, 2006-07 and 2007-08 (Department for Education)
Denominator: Total number of Key Stage 3 subjects taken by pupils in maintained schools, 2006-07 and 2007-08 (Department for Education)

19. Key Stage 4 attainment

Numerator: Total capped (best 8) score of pupils taking Key Stage 4 in maintained schools, 2006-07 and 2007-08 (Department for Education)
Denominator: All pupils in maintained schools who took Key Stage 4 exams, 2006-07 and 2007-08 (Department for Education)

20. Secondary school absence

Numerator: Number of authorised and unauthorised absences from secondary school, 2007-08 and 2008-09 (Department for Education)
Denominator: Total number of possible sessions, 2007-08 and 2008-09 (Department for Education)

21. Staying on in education post 16

Numerator: Young people aged 17 receiving Child Benefit in 2009 (HM Revenue and Customs)
Denominator: Young people aged 15 receiving Child Benefit in 2007 (HM Revenue and Customs)
The indicator is subtracted from 1 to produce the proportion *not* staying in education

22. Entry to higher education
Numerator: Successful entrants under 21 to higher education, four year average 2005-06–2008-09 (Higher Education Statistics Agency)
Denominator: Population aged 14-17, 2001 (Census)
The indicator is subtracted from 1 to produce the proportion *not* entering higher education

23. Adult skills
Numerator: Adults aged 25-54 with no qualifications or with qualifications below NVQ Level 2, 2001 (Census)
Denominator: All adults aged 25-54, 2001 (Census)

Barriers to Housing and Services Domain

24. Household overcrowding
Numerator: Overcrowded households, 2001 (Census)
Denominator: Total number of households, 2001 (Census)

25. Homelessness
Numerator: Number of accepted decisions for assistance under the homelessness provisions of housing legislation, 2008-09 (Department for Communities and Local Government)
Denominator: Household estimates, 2006 (Department for Communities and Local Government)

26. Housing affordability
Modelled proportion of households unable to afford to enter owner occupation on the basis of their income, estimated primarily from the Family Resources Survey and Regulated Mortgage Survey, 2008 (estimates produced by Heriot-Watt University)

27. Road distance to a GP surgery
Population weighted mean of Output Area road distance score (the road distance from the population weighted Output Area centroid to nearest GP premises), 2008 (NHS Connecting for Health)

28. Road distance to a supermarket or convenience store
Population weighted mean of Output Area road distance score (the road distance from the populated weighted Output Area centroid to nearest supermarket or convenience store), 2008 (MapInfo Ltd)

29. Road distance to a primary school

Population weighted mean of Output Area road distance score (the road distance from the populated weighted Output Area centroid to nearest primary school), 2008 (Department for Education Edubase)

30. Road distance to a Post Office

Population weighted mean of Output Area road distance score (the road distance from the populated weighted Output Area centroid to nearest Post Office), 2008 (Post Office Ltd)

Crime Domain

31. Violence

Numerator: 19 recorded crime offence types, April 2008–March 2009 (Police Force data, constrained to Crime and Disorder Reduction Partnership level data provided by the Home Office)
Denominator: Resident population, 2008 (Office for National Statistics population estimates), plus non-resident working population, 2001 (Census)

32. Burglary

Numerator: Four recorded crime offence types, April 2008–March 2009 (Police Force data, constrained to Crime and Disorder Reduction Partnership level data provided by the Home Office)
Denominator: Total dwellings, 2001 (Census), plus business addresses (Ordnance Survey Address Point database)

33. Theft

Numerator: Five recorded crime offence types, April 2008–March 2009 (Police Force data, constrained to Crime and Disorder Reduction Partnership level data provided by the Home Office)
Denominator: Resident population, 2008 (Office for National Statistics population estimates), plus non-resident working population, 2001 (Census)

34. Criminal damage

Numerator: 11 recorded crime offence types, April 2008–March 2009 (Police Force data, constrained to Crime and Disorder Reduction Partnership level data provided by the Home Office)
Denominator: Resident population, 2008 (Office for National Statistics population estimates), plus non-resident working population, 2001 (Census)
Living Environment Deprivation Domain

35. Housing in poor condition

Estimate of the probability that any given dwelling in the Output Area (aggregated to LSOA level) fails to meet the decent standard, modelled primarily from the English House Condition Survey, 2005 (estimates produced by the Building Research Establishment Ltd)

36. Houses without central heating

Numerator: As described, 2001 (Census)
Denominator: Total number of households, 2001 (Census)

37. Air quality

Modelled estimates of air quality based on the concentration of four pollutants (nitrogen dioxide, benzene, sulphur dioxide and particulates), 2008 (estimates produced by Staffordshire University)

38. Road traffic accidents

Numerator: Injuries to pedestrians and cyclists caused by road traffic accidents, 2007-2009 (Department for Transport)
Denominator: Total resident population, 2008 (Office for National Statistics population estimates), plus non-resident working population, 2001 (Census)

Annex D: Denominators

The majority of the 38 indicators discussed in this report are expressed as rates or proportions and thus require a numerator (e.g. the number of people experiencing a particular form of deprivation in an area) and a suitable denominator (e.g. the total number of people 'at-risk' of the deprivation in the same area). This annex details the issues involved and the data and methodology employed in the construction of estimates of the at-risk population for the various indicators.

Choosing suitable denominators

A denominator should represent the population at-risk of experiencing a given type of deprivation and therefore it is important to choose a denominator that relates to the numerator with which it will be combined. Certain indicators use numerators and denominators derived from the same data source, while other indicators require their numerators and denominators to be constructed from different sources. Whichever is required, it is important to try to ensure that each denominator includes only those individuals (or households, properties etc) that are at-risk of experiencing the particular form of deprivation being measured by that indicator.

So, for example, in the Education, Skills and Training Deprivation Domain, the Key Stage 2 attainment indicator is constructed by deriving both the numerator (the sum of points achieved in English, maths and science by pupils living in an LSOA) and the denominator (the sum of number of subjects taken by pupils living in an LSOA) from the National Pupil Database dataset. For the three indicators where numerators were derived from the 2001 Census, the denominators were also drawn from the Census. Deriving both numerator and denominator using a single data source rules out any systematic error that arises from datasets of different coverage or representativeness.

For a considerable number of indicators, however, estimates of the at-risk population need to be constructed using external data sources. This is discussed below.

Data for the denominators

Population estimates at LSOA level for mid 2008 (revised in September 2010) were provided by the Office for National Statistics' Small Area Population Estimation Unit. These are single year of age and sex mid-year estimates that are published in the intercensal years. They are derived by 'aging' the previous Census estimates by adding in births, subtracting deaths and adjusting for migration. The Office for National Statistics also supplied the Output Area level population denominators used to create the four road distance indicators in the Barriers to Housing and Services Domain. These denominators relate to 2007, the latest year for which these data are available.

Data were also obtained on the number of prisoners per single year of age and sex for each LSOA containing a prison from the Home Office.

Defining the at-risk population

The population estimates employed as denominators in a considerable number of ID2010 indicators included resident population and communal establishment population, but excluded prison population. Prisoners were not included as they are not at risk of many forms of deprivation captured in the ID2010. Other types of communal establishment population (e.g. students; persons in care establishments; children in local authority homes) are at risk of experiencing these forms of deprivation (age/sex restrictions allowing) and so were included in the denominator. This is the same definition of at-risk populations that was adopted for previous Indices.

The final population estimates can thus be summarised as follows:

[1] $$a_{ij} = r_{ij} + c_{ij} - p_{ij}$$

where:
- a represents the at-risk population in area i at time j
- r represents the resident population in area i at time j
- c represents the communal establishment population in area i at time j
- p represents the prison population in area i at time j

Age and sex profile

Some indicators required estimates of the total population for the denominator while others required estimates of the population of a specific age and sex. Population estimates by quinary age band and sex and by non-standard age/sex groupings as required by particular indicators were created for the ID2010 by the research team from the population estimates supplied by the Office for National Statistics. For example, the Employment Deprivation Domain required a denominator of males aged 18-64 and females aged 18-59 while the standardised health indicators required a denominator disaggregated by quinary age and sex.

Annex E: The shrinkage technique

It could be argued that shrinkage estimation is inappropriate for administrative data which are, in effect, a census. This is not correct. The problem exists not only where data are derived from samples but also where scans of administrative data effectively mean that an entire census of a particular group is being considered. This is because such censuses can be regarded as samples from 'super-populations', which one could consider to be samples in time. Taking the Health Deprivation and Disability Domain as an example, in a specific small geographical area there may be only three adults under 60 in a particular year, one of whom was suffering from a mood or anxiety disorder. If another year was considered there may have been four adults under 60, one of whom was suffering from a mood or anxiety disorder. With such a small at-risk population, the proportions thus fluctuate greatly between a third and a quarter, probably due to random fluctuation. By contrast another area might have 200 adults under 60 in a given year, with 20 adults suffering from mood or anxiety disorders. The 10% of the population this represents is less likely to be the result of random fluctuation. All the data from administrative sources and the 2001 Census are treated as samples from a super-population, and the shrinkage technique has been applied to indicators which use these data. The exceptions are the modelled indicators, road distance indicators and indicators supplied at local authority district level.

The shrinkage technique is designed to deal with the problems associated with small numbers in an LSOA (i.e. where the population at-risk is small). In some areas – particularly where populations are small – data may be 'unreliable', that is more likely to be affected by sampling and other sources of error. The extent of a score's unreliability can be measured by calculating its standard error. Without shrinkage, some LSOAs would have scores which do not reliably describe the deprivation in the area due to chance fluctuations from year to year, as described above.

Shrinkage estimation (i.e. empirical Bayesian estimation) involves moving LSOA scores towards another more robust score, often relating to a higher geographical level. All LSOA scores will move somewhat through shrinkage, but those with large standard errors (i.e. the most 'unreliable' scores) will move the most. The LSOA score may be moved towards more deprivation or less deprivation through shrinkage estimation. Possible candidates for the more robust score to which an unreliable score could move include the national mean, the local authority district mean, the mean of LSOAs with similar characteristics, or the mean of adjacent LSOAs. The national mean seems inappropriate because of the large variation across the country and because it would be preferable to take into account local circumstances, while shrinking to adjacent LSOAs would be difficult to apply technically for the whole country and could be problematic especially near the edges of towns. Although shrinking to the mean of LSOAs with similar characteristics using a classification such as the Output Area Classification is possible, in the case of the ID2010 and previous Indices, shrinkage to the relevant local authority district mean was selected as being the most

logical and appropriate procedure. Local authority districts are 'natural' administrative units and, because of this, may share many socio-economic characteristics.

The actual mechanism of the procedure is to estimate deprivation in a particular LSOA using a weighted combination of (a) data from the LSOA, and (b) data from another more robust score (e.g. the local authority district mean). The weight attempts to increase the efficiency of the estimation, while not increasing its bias. If the LSOA has a large standard error and a local authority district appears to be an unbiased estimation of the LSOA score then the LSOA score moves towards the district score. The amount of movement depends on both the size of the standard error and the amount of heterogeneity amongst the LSOAs in a local authority district.

Figures E1 and E2 show the impact of shrinkage, by plotting the indicator pre-shrinkage against the indicator after shrinkage has been applied. Figure E1 shows the Employment Deprivation Domain as an example of shrinkage applied to a proportion, while Figure E2 shows the burglary indicator to illustrate shrinkage applied to a score. These two examples demonstrate that for the majority of LSOAs, the impact of shrinkage is negligible. The specific pattern of movement varies between indicators, but in general, most scores move by a small amount and only those LSOAS with large standard errors move significantly.

Figure E1: LSOA scores for the Employment Deprivation Domain before and after shrinkage

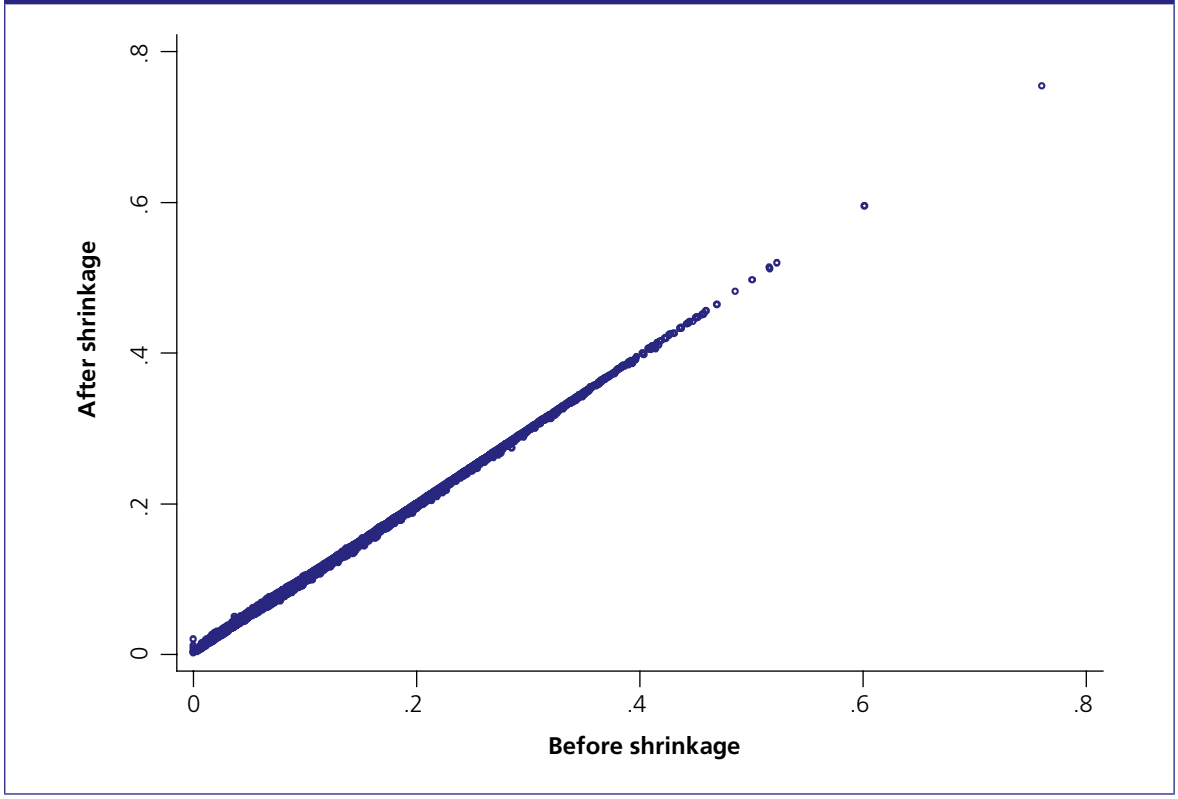
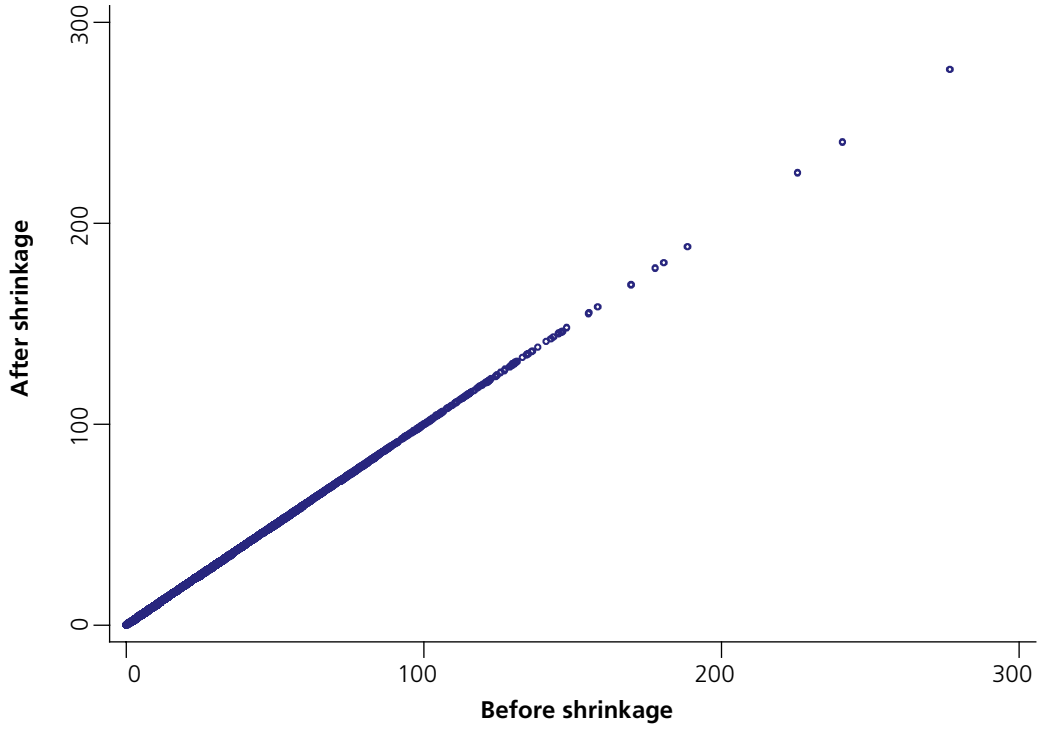


Figure E2: LSOA scores for the burglary indicator before and after shrinkage



The shrinkage calculation

The 'shrunken' estimate of a LSOA level score is a weighted average of the two 'raw' scores for the LSOA and for the corresponding local authority district.[19] The weights used are determined by the relative magnitudes of within-district and between-LSOA variability.

If the score for a particular indicator in LSOA j is r_j events out of a population of n_j, the empirical logit for each LSOA is:

$$m_j = \log\left[\frac{(r_j + 0.5)}{(n_j - r_j + 0.5)}\right] \qquad [1]$$

whose estimated standard error (s_j) is the square root of:

$$s_j^2 = \frac{(n_j + 1)(n_j + 2)}{n_j(r_j + 1)(n_j - r_j + 1)} \qquad [2]$$

[19] Where appropriate the weighted average is calculated on the logit scale, for technical reasons, principally because the logit of a proportion is more nearly normally distributed than the proportion itself.

The corresponding counts r out of n for the district LSOA j lies within gives the district level logit:

$$M = \log\left[\frac{(r+0.5)}{(n-r+0.5)}\right] \qquad [3]$$

The shrunken LSOA level logit is then the weighted average:

$$m_j^* = w_j m_j + (1-w_j)M \qquad [4]$$

where w_j is the weight given to the 'raw' LSOA-j data and $(1-w_j)$ the weight given to the overall rate for the district. The formula used to determine w_j is:

$$w_j = \frac{1/s_j^2}{1/s_j^2 + 1/t^2} \qquad [5]$$

where t^2 is the inter-LSOA variance for the k LSOAs in the district, calculated as:

$$t^2 = \frac{1}{k-1}\sum_{j=1}^{k}(m_j - M)^2 \qquad [6]$$

Thus large LSOAs, where precision $1/s_j^2$ is relatively large, have weight w_j close to 1 and so shrinkage has little effect. The shrinkage effect is greatest for small LSOAs in relatively homogeneous districts.

The final step is to back-transform the shrunken logit m_j^* using the 'anti-logit', to obtain the shrunken LSOA level proportion:

$$z_j = \frac{\exp(m_j^*)}{1+\exp(m_j^*)} \qquad [7]$$

for each LSOA.

Annex F: Factor analysis

Factor analysis is used in some domains and sub-domains of the Index of Multiple Deprivation as a method for obtaining weights for a set of indicators in order to combine the indicators into a single domain score.

If one assumes the existence of a latent construct of the domain of deprivation in question, factor analysis can be used to generate weights to combine the indicators. There are a number of problems associated with the accurate identification of such an underlying factor. The variables: (i) are measured on different scales, (ii) have different levels of statistical accuracy, (iii) have different distributions, (iv) may or may not apply to the same individual, and (v) measure, to different degrees, the underlying factor imperfectly. The common factor analysis Maximum Likelihood technique was used in the ID2010 to overcome these problems and construct the indicator weights for the Health Deprivation and Disability Domain, the Children and Young People sub-domain of the Education, Skills and Training Deprivation Domain and the Crime Domain.

Alternative statistical methods, such as Principal Components Analysis, do not address all these problems. Principal Components Analysis, for example, ignores measurement error (error variance) or the variables' imperfect measurement of the underlying construct (specific variance). This is because it does not attempt to separate common variance (i.e. variance shared between three or more variables) from specific variance and error variance. The appropriate technique, where specific and error variance are suspected, is a form of common factor analysis of which Maximum Likelihood factor analysis is a type.

The premise behind a one-common-factor model is that there is an underlying factor at the local level (e.g. health deprivation) that makes these different states likely to exist together in the same area. This underlying factor cannot be measured directly but can be measured through its effects on specific individual measures (e.g. premature death, mood and anxiety disorders etc). The indicators measure, with different levels of accuracy, the underlying factor. It is assumed that although the measurement is imperfect, the indicators that are most highly correlated with the underlying factor will also be highly correlated with the other indicators. By looking at the correlations between indicators it is therefore possible to make inferences about the common factor and as a result estimate a factor score for each LSOA. Factor analysis generates a set of weights for the indicators in a domain, which are combined to make the factor score, or, in other words, the domain index score for each LSOA. Because factor analysis assumes that indicators measure the underlying construct with varying degrees of accuracy, indicators that do not correlate highly with the common factor (i.e. have a low common factor loading) are given a lower weight in the construction of the factor score.

It is not the aim of this analysis to reduce a large number of variables into a number of theoretically significant factors as in usual in much social science use of factor analysis. The indicators within a domain have been chosen because they are held to measure a single area deprivation factor. The analysis therefore involves exploring a one-common-factor model against the possibility of there being more than one meaningful factor. If a meaningful second common factor is found it would suggest the need for a new domain or the removal of variables. This possibility can be examined through standard tests and criteria, such as examination of Eigen values. Meaningful second factors (i.e. second factors that measured deprivation) did not emerge in any of the domains.

The method for using factor analysis to combine indicators

The process of combining indicators using factor analysis comprised the following stages:

1. All indicators were converted to the standard normal distribution (following shrinkage, where appropriate).
2. The standardised scores were factor analysed (using the Maximum Likelihood method), deriving a set of weights.
3. The indicators were then combined using these weights.

Annex G: Exponential transformation

In order to combine the domains into an overall Index of Multiple Deprivation, the domain scores are first standardised by ranking and then the ranks are transformed to an exponential distribution. The exponential distribution has a number of properties, most importantly that it enables control over cancellation and it helps identify the most deprived LSOAs.

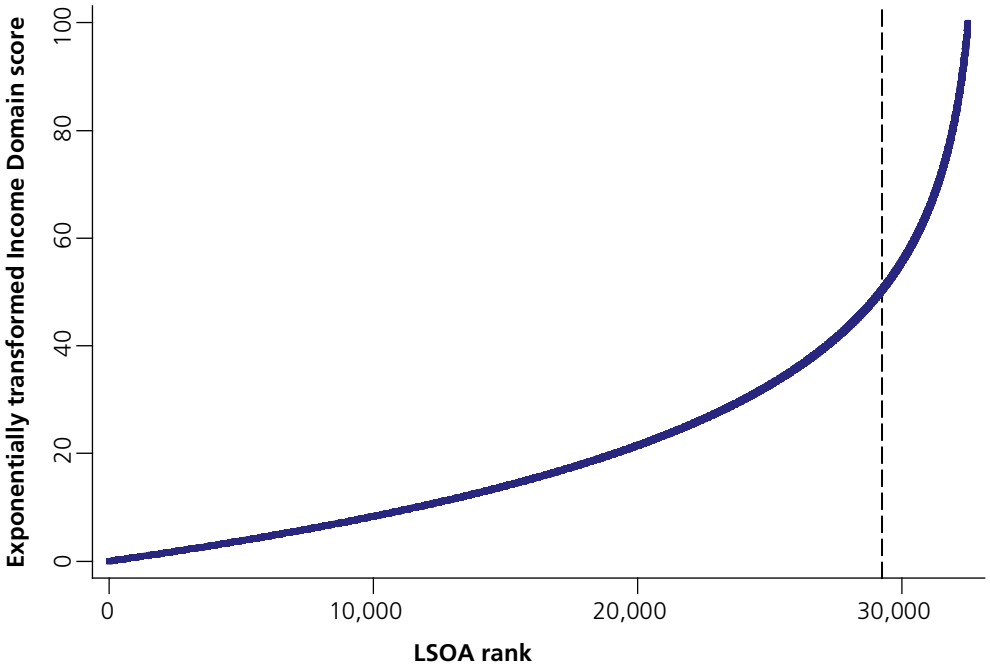
The exponential transformation procedure gives control over the extent to which lack of deprivation in one domain cancels or compensates for deprivation in another domain. It allows precise regulation, although not elimination, of these cancellation effects. The exponential transformation formula selected (see below) gives approximately 10% cancellation. This means, therefore, that a LSOA ranked top in one domain but bottom in another would overall be ranked at the 90th percentile (if the two domains were equally weighted). This compares with the 50th percentile if the untransformed ranks or a normal distribution had been used instead.

The exponential transformation formula selected also enables the most deprived LSOAs to be identified. The formula distributes the scores to stretch out the 10% highest scoring (most deprived) LSOAs and compress the less deprived end of the distribution.

Once the domain scores have been standardised by ranking, exponential transformation assigns the ranks a value between 0 (least deprived) and 100 (most deprived), on an exponential basis, that is higher (more deprived) scores are given greater weight. The exponential transformation stretches out the distribution so that higher levels of deprivation score more highly. The method used in the ID2010 and previous Indices gives the most deprived 10% of LSOAs values between 50 and 100, and those outside the most deprived 10% receive a value of 0 to 50. This is a smooth process across the distribution, and so a LSOA that falls just outside the 10% most deprived will score a little below 50 and one that is just inside the 10% most deprived will score just above 50.

Figure G1 illustrates the exponential distribution using the Income Deprivation Domain as an example. The horizontal axis shows the LSOA rank (based on the construction ranks), where a rank of 1 is the least deprived LSOA. The vertical axis shows the exponentially transformed Income Deprivation Domain scores. The 10% most deprived LSOAs (numbering 3,248) are identified by the dashed line. These LSOAs have an exponentially transformed score between 50 and 100. The remaining 90% have an exponentially transformed domain score between 0 and 50.

Figure G1: The exponentially transformed Income Deprivation Domain distribution



The part of the exponential to the right of the dashed line is the 10% most depived LSOAs

The formula for exponential transformation

The transformation used is as follows. For any LSOA, denote its rank on the domain, scaled to the range [0,1], by R (with R=1/N for the least deprived, and R=N/N, i.e. R=1, for the most deprived, where N=the number of LSOAs in England).

The transformed domain, E say, is $E = -23*\ln\{1 - R*[1 - \exp(-100/23)]\}$

where ln denotes natural logarithm and exp the exponential or antilog transformation.

Annex H: Categories of recorded crime

Home Office offence code	Offence name (note: post April 2008 counting rule changes)	
Violence:		
1	Murder	Homicide
4.1	Manslaughter	
4.2	Infanticide	
2	Attempted murder	
37.1	Causing death by aggravated vehicle taking	
5A	Inflicting grievous bodily harm with intent	
5B	Use of substance or object to endanger life	
5C	Possession of items to endanger life	
8F	Inflicting grievous bodily harm without intent	
8G	Actual bodily harm and other injury	
8H	Racially or Religiously aggravated inflicting grievous bodily harm without intent	
8J	Racially or Religiously aggravated actual bodily harm or other injury	
8K	Poisoning or female genital mutilation	
8L	Harassment	
8M	Racially or Religiously aggravated harassment	
9A	Public fear, alarm or distress	
9B	Racially or Religiously aggravated public fear, alarm or distress	
105A	Assault without injury	
105B	Racially or Religiously aggravated assault without injury	
34A	Robbery of business property	
34B	Robbery of personal property	
Burglary:		
28	Burglary in a dwelling	
29	Aggravated burglary in a dwelling	
30	Burglary in a building other than a dwelling	
31	Aggravated burglary in a building other than a dwelling	

Home Office offence code	Offence name (note: post April 2008 counting rule changes)
Theft:	
37.2	Aggravated vehicle taking
39	Theft from the person
45	Theft from a vehicle
48	Theft or unauthorised taking of motor vehicle
126	Interfering with a motor vehicle
Criminal damage:	
56A	Arson endangering life
56B	Arson not endangering life
58A	Criminal damage to a dwelling
58B	Criminal damage to a building other than a dwelling
58C	Criminal damage to a vehicle
58D	Other criminal damage
58E	Racially or Religiously aggravated criminal damage to a dwelling
58F	Racially or Religiously aggravated criminal damage to a building other than a dwelling
58G	Racially or Religiously aggravated criminal damage to a vehicle
58H	Racially or Religiously aggravated other criminal damage
59	Threat etc. to commit criminal damage

Annex I: Quality assurance checks

A range of procedures have been undertaken to check the quality of all elements of the ID2010, including comparison of the ID2010 data with the ID2007 data, reality checking of patterns in the data, and comparisons with equivalent published data.

The ID2010 were checked separately by an external academic to provide independent verification. This included scrutiny of the methods and the accuracy of syntax, as well as checks against the ID2007.

Indicator quality

The majority of the datasets used in the ID2010 were derived from administrative records, which have close to 100% coverage and are not subject to sampling error. In many instances the raw administrative records are the same as those used to produce published National Statistics.

Many of the indicators were produced exclusively by the research team using the best sources of data that enabled consistency between the ID2007 and ID2010. These indicators were subjected to rigorous checks throughout the indicator construction process, some of which are detailed below. Other indicators, however, were supplied to the research team in their almost final format and required little additional processing. These include:

National Statistics indicators: Some indicators, for example the Key Stage attainment indicators, are National Statistics, which means that the data fully comply with the National Statistics Code of Practice. Their quality has therefore already been independently verified. They will not exactly match the published figures because minor processing steps such as shrinkage estimation have been undertaken.

Census indicators: The three Census indicators of adults with no or low qualifications, household overcrowding and houses without central heating were obtained from the Office for National Statistics ready to be used. Because these indicators are taken from the Census, data from which are National Statistics, their quality is already validated. Again, they will not exactly match the published figures because minor processing steps such as shrinkage estimation have been undertaken.

Indicators supplied by external consultants: In addition to the National Statistics and Census indicators, there are a few indicators that are created by external consultants. These are the three modelled indicators (housing in poor condition, air quality and housing affordability) and the indicators that comprise the Health Deprivation and Disability Domain. The quality of these indicators has been assured by the suppliers, who are leading experts in their field.

Checks performed on the ID2010

Comparisons of raw data

The data supplied to the research team are liable to change between years as definitions and methodology are modified over time and the function of different databases is amended. This means that equivalent data are not necessarily received each year. For this reason, the raw datasets were compared thoroughly with the raw data from the ID2007 before being processed to check for any large differences that could indicate a methodological change in the data between years.

Examining the raw data also helps contextualise differences seen at a later stage of data processing. For example, the number of road traffic accidents recorded for 2007-2009 is smaller than for the period 2004-2006, because safety on the roads is improving. Knowing that the raw figures express a decline in accidents can be borne in mind when judging whether the change between years is realistic.

Comparisons of shrunk and unshrunk data

For indicators where shrinkage was applied, the shrunk and unshrunk data were compared to ensure that the function had operated correctly, and to examine the extent of movement of unreliable scores.

Comparisons of data from 2010 and 2007

An important part of the checking process is to compare the ID2010 data against the data used to construct the ID2007, at all stages in the process. A range of methods were used, including plotting histograms and boxplots to examine the range and distribution of data and scatterplots and correlations to determine the overall association of data between years.

Comparisons against published data

Where possible, data used in the ID2010 were compared to equivalent published data to check that they are broadly similar. Small differences between the ID2010 data and published data are inevitable due to methodological differences, but significant differences could indicate a processing error. Published data is typically not available at LSOA level so comparisons must be made at a spatial scale that is possible, most commonly at local authority district level.

Reality checking

In addition to checking the data for consistency with previous data and published data, some simple reality checks were undertaken to consider whether the ID2010 data correspond with the expected pattern of deprivation. For example, overcrowding is expected to be more severe in urban areas than rural locations because cities are more

densely populated. Examining the data to confirm this pattern is an important test of correct data processing. Reality checking also provides an additional check that the indicators and overall Index of Multiple Deprivation have been correctly ranked.

The deprivation deciles of each indicator, sub-domain and domain were mapped and the geographical pattern of deprivation examined. England wide checks of the overall distribution of deprivation were accompanied by more detailed checks of small areas known to the research team.

Annex J: History of the indices

The ID2000 was an attempt to measure multiple deprivation with respect to a single overall index as well as separate domain indices. Previous indices (1981 z-scores, 1991 Index of Local Conditions and 1998 Index of Local Deprivation) that had been constructed did not attempt to measure each domain of deprivation separately before combining the indicators into an overall index; these earlier indices also comprised a smaller number of indicators, utilised proxy measures and relied heavily on Census data. The ID2000 therefore reflected an attempt to refine the conceptualisation of multiple deprivation and the methodology for constructing the indices, and included new and more up-to-date indicators.

Since 2000, the number of domains and indicators has increased as more data sources become accessible, and the methodology has gradually been refined. The main focus in recent years has been to maintain a consistent methodology to allow meaningful comparisons between years.

The IMD 2000 consisted of six domains: Income Deprivation; Employment Deprivation; Health Deprivation and Disability; Education, Skills and Training Deprivation; Housing Deprivation; and Geographical Access to Services Deprivation.

In 2004 the Indices were updated, with the main change being the addition of the Crime Domain. Some changes were made to the Housing Deprivation Domain and the Geographical Access to Services Deprivation Domain, which became the Living Environment Deprivation Domain and the Barriers to Housing and Services Domain respectively. A small number of indicators were redistributed into these new domains. There was also a change to the geography used, from wards in the ID2000 to LSOAs in the ID2004. The intention has always been to construct the Indices at the smallest practicable spatial scale to provide a detailed measure of deprivation at a small spatial unit. The ID2004 and all subsequent Indices have been constructed at LSOA level. The LSOA geography is a statistical geography which has more even and (on average) smaller population sizes than wards and has not (thus far) been subject to boundary changes (which happen regularly with wards). LSOAs are aggregations of Census Output Areas, the base unit for Census data releases, and therefore will be reviewed following the 2011 Census.[20]

The ID2007 aimed to maintain the methodology of previous Indices and no changes were made to the domains or spatial scale. The same is true of the ID2010.

[20] For further information about LSOAs see: www.neighbourhood.statistics.gov.uk/dissemination/Info.do?page=aboutneighbourhood/geography/superoutputareas/soa-intro.htm

The following table shows the development of the domains over time.

Table J1: Domains included in the four Indices of Deprivation			
2000	**2004**	**2007**	**2010**
Income	Income	Income	Income
Employment	Employment	Employment	Employment
Health	Health	Health	Health
Education, Skills and Training	Education, Skills and Training	Education, Skills and Training	Education, Skills and Training
Housing			
Geographical Access to Services			
	Barriers to Housing and Services	Barriers to Housing and Services	Barriers to Housing and Services
	Living Environment	Living Environment	Living Environment
	Crime	Crime	Crime

References

Alcock, P. (2007) *Updating the English Indices of Deprivation 2004: Stage Two 'Blueprint' Peer Review*. London: Department for Communities and Local Government. Available from: www.communities.gov.uk/documents/communities/pdf/321700.pdf

Bradshaw, J. (2003) *Review for the Neighbourhood Renewal Unit of the Blueprint for the Index of Multiple Deprivation at Small Area Level*. London: Neighbourhood Renewal Unit, Office of the Deputy Prime Minister. Available from: www.york.ac.uk/inst/spru/research/pdf/BlueprintIndexMultipleDeprivation.pdf

Bramley, G. (2003) 'Updating the English Indices of Deprivation 2000: Proposals for the Construction of the Indicator "Difficulty of Access to Owner Occupation"'. Available from: www.neighbourhood.gov.uk

Dibben, C., Atherton, I., Cox, M., Watson, V., Ryan, M. and Sutton, M. (2007) *Investigating the Impact of Changing the Weights that Underpin the Index of Multiple Deprivation 2004*. London: Department for Communities and Local Government. Available from: www.communities.gov.uk/documents/communities/pdf/323211.pdf

Gordon, D., Levitas, R., Pantazis, C., Payne, S., Townsend, P., Adelman, L., Ashworth, K., Middleton, S., Bradshaw, J. and Williams, J. (2000) *Poverty and Social Exclusion in Britain.* York: Joseph Rowntree Foundation.

Grice, S.E., Lingard, J.J.N., Stedman, J.R., Cooke, S.L., Yap, F.W., Kent, A.J., Bush, T.J., Vincent, K.J. and Abbott, J. (2010) *UK Air Quality Modelling for Annual Reporting 2008 on Ambient Air Quality Assessment under Council Directives 96/62/EC, 1999/30/EC and 2000/69/EC*, AEAT/ENV/R/2859 Issue 1. Didcot: AEA Technology. Available from: http://uk-air.defra.gov.uk/library/

Inskip, H.M., Harris, E.C. and Barraclough, B. (1998) 'Lifetime risk of suicide for affective disorder, alcoholism and schizophrenia'. *British Journal of Psychiatry*, 172: 35-7.

Murrells, T.P., Passant, N.R., Thistlethwaite, G., Wagner, A., Li, Y., Bush, T., Norris, J., Coleman, P.J., Walker, C., Stewart, R.A., Tsagatakis, I., Conolly, C., Brophy, N.C.J. and Okamura, S. (2009) *UK Emissions of Air Pollutants 1970 to 2007*. Report AEAT/ENV/R/2856. Didcot: National Atmospheric Emissions Inventory, AEA Technology. Available from: www.naei.org.uk/reports.php

Noble, M., Smith, G.A.N., Penhale, B., Wright, G., Dibben, C., Owen, T. and Lloyd, M. (2000) *Measuring Multiple Deprivation at the Small Area Level: The Indices of Deprivation 2000*, Regeneration Research Summary, Number 37. London: Department of the Environment, Transport and the Regions. Available from: www.communities.gov.uk/publications/regeneration/measuringmultipledeprivation

Noble, M., Wright, G., Dibben, C., Smith, G.A.N., McLennan, D., Anttila, C., Barnes, H., Mokhtar, C., Noble, S., Gardner, J., Braswell, S., Covizzi, I. and Lloyd, M. (2004) *The English Indices of Deprivation 2004.* London: Office of the Deputy Prime Minister. Available from: www.communities.gov.uk/publications/communities/englishindices

Noble, M., McLennan, D., Wilkinson, K., Whitworth, A., Barnes, H**.** and Dibben, C. (2008) *The English Indices of Deprivation 2007.* London: Department for Communities and Local Government. Available from: www.communities.gov.uk/publications/communities/indiciesdeprivation07

Nolan, B. and Whelan, C. (1996), *Resources, Deprivation and Poverty.* Oxford: Clarendon Press.

Norman, P. (2010) 'Identifying Change Over Time in Small Area Socio-Economic Deprivation'. *Applied Spatial Analysis and Policy*, 3: 107–138.

Norman, P., Purdam, K., Tajar, A., and Simpson, S. (2007) 'Representation and Local Democracy: Geographical Variations in Elector to Councillor Ratios'. *Political Geography*, 26: 57–77.

Office of the Deputy Prime Minister (2004) *A Decent Home – The Definition and Guidance for Implementation.* London: Office of the Deputy Prime Minister. Available from: www.communities.gov.uk/publications/housing/decenthome

Townsend, P. (1987) 'Deprivation'. *Journal of Social Policy*, 16(2): 125-146.

Townsend, P. (1979) *Poverty in the United Kingdom.* Harmondsworth: Penguin.

Vogt, W.P, (1999) *Dictionary of Statistics and Methodology: A Nontechnical Guide for the Social Sciences*, Second Edition. Thousand Oaks, California: SAGE Publications.

Wilcox, S. and Bramley, G. (2010) *Evaluating Requirements for Market and Affordable Housing*. Fareham: National Housing and Planning Advice Unit. Available from: www.communities.gov.uk/documents/507390/pdf/1465577.pdf

ISBN 978-1-4098-2922-5

ISBN: 978-1-4098-2922-5