An English Atlas of Inequality

Alasdair Rae and Elvis Nyanzu

University of Sheffield

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About the front cover background image

The image on the front cover is an extract of a graphic produced as part of this project. Each row relates to an individual local authority area and each column relates to an individual percentile on the 2019 Index of Multiple Deprivation. Individual cells are coloured according to the proportion of an area's LSOAs that fall within a particular percentile, with the most deprived areas being on the left and the least deprived on the right of the image. A full size version of this image, with labels, is available online.

http://ajrae.staff.shef.ac.uk/img/imd_by_percentiles_nuffield_colours_31_oct_correct.png

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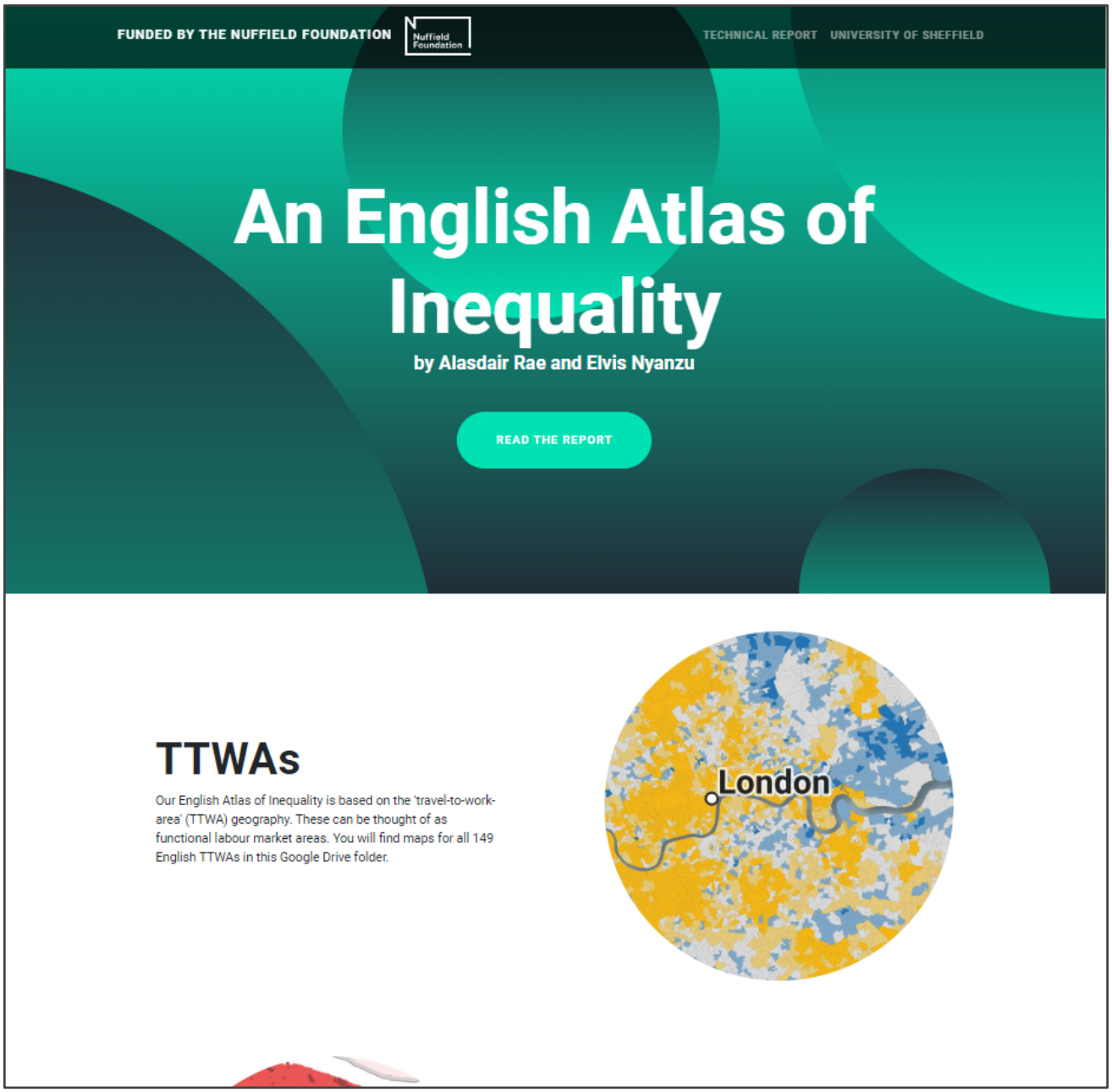
ONLINE MATERIAL

This Atlas is accompanied by a set of online maps that we produced as part of the project. You can find maps for every English travel to work area (TTWA), local authority and parliamentary constituency at the following web address:

ajrae.staff.shef.ac.uk/atlasofinequality



SUMMARY

This Summary provides an overview of our full English Atlas of Inequality report but it can also be read as a standalone briefing paper. It outlines our main research focus, describes our approach, highlights key findings, and offers four practical recommendations. Our Atlas is aimed at local and national policymakers, researchers, and anyone with an interest in socio-economic inequality.

What is an Atlas of Inequality and why do we need one?

In 2014, OECD Secretary General Angel Gurría stated that 'addressing high and growing inequality is critical to promote strong and sustained growth and needs to be at the centre of the policy debate'. In the UK, during the 2017 General Election campaign, all main party manifestos highlighted inequality as a serious social problem that needed to be tackled, with the Conservative Party manifesto stating that 'we abhor social division, injustice, unfairness and inequality' (Conservative Party, 2017, p. 9).

As much as we might think of inequality as a contemporary concern, it has been recognised from antiquity as a serious social issue worth talking about. Thus, we have the statement in Plato's *Republic* (380BC) that 'any city, however small, is in fact divided into two, one the city of the poor, the other of the rich'. And much later, in Benjamin Disraeli's *Sybil*, which explores the plight of the working classes, he talks of 'two nations', 'between whom there is no intercourse and no sympathy', as if they were 'dwellers in different zones' (Disraeli, 1845). The current focus on inequality as a cause for concern is perhaps not surprising, given slow wage growth, stagnating living standards and a decade of austerity in the UK (e.g. Obolenskaya and Hills, 2019).

Despite a long-held belief that inequality is a problem, the more recent body of scholarly work on the topic (e.g. Brewer et al., 2008; Wilkinson and Pickett, 2009; Hills, 2010), and high-level reports by the IMF and OECD (Dabla-Norris et al., 2015; Cingano, 2014), there still appears to be a knowledge gap in relation to local manifestations of inequality (Glaeser et al., 2009). We may know a lot about local patterns of poverty and deprivation, such as those forensically mapped out using data from the English Indices of Deprivation (MHCLG, 2019), but we know less about the geography of inequality at the sub-national level. Furthermore, inequality in the UK is often boiled down to a single figure for the whole nation, using the Gini coefficient. While this is necessary and useful in many respects, we argue it is also important to understand inequality as a local issue.

For these reasons, we believe an English Atlas of Inequality can *i)* inform debate and discussion on the topic of inequality; *ii)* help challenge simple conceptions about 'rich' and 'poor' areas; and *iii)* provide easy-to-understand evidence on the nature of the inequality problem in England. In doing so, we do not attempt to identify causal connections between inequality and outcomes, but instead seek to answer the question of how local inequality is best measured, which areas of England are most unequal, and which parts of the country have the poorest outcomes in relation to a small group of key indicators.

Our approach

We are keen to ensure that our research builds on existing work, so we draw upon the body of literature on inequality, including ongoing work from Lord Kerslake's UK2070 Commission on regional inequalities, and the recently-established IFS Deaton Review (Joyce and Xu, 2019, p. 2), which emphasised the need for a more nuanced, multifaceted approach to understanding inequality:

> *'Too often the debate takes place in silos, focusing on just one type of inequality, a specific alleged cause or a specific proposed solution. We need to step back and ask: how are different kinds of inequality related and which matter most?'*

Despite emerging debates about what kind of inequality should be the focus of attention, the idea of inequality as a barrier rather than a precondition of growth has in recent years entered the economic mainstream (e.g. Ostry et al., 2014), or at least its margins, and there is now widespread acceptance that it should be tackled through concerted action. Whether it is for economic injustice reasons, for reasons relating to political fallout associated with rising disaffection, or because it acts as a drag on growth, we are now in a situation where inequality is being discussed at the highest levels of government. However, in the public domain these discussions too frequently become bogged down in debates about methods and metrics, so our Atlas is also an attempt to move beyond these rather arcane questions and towards some kind of consensus on the need for methodological diversity.

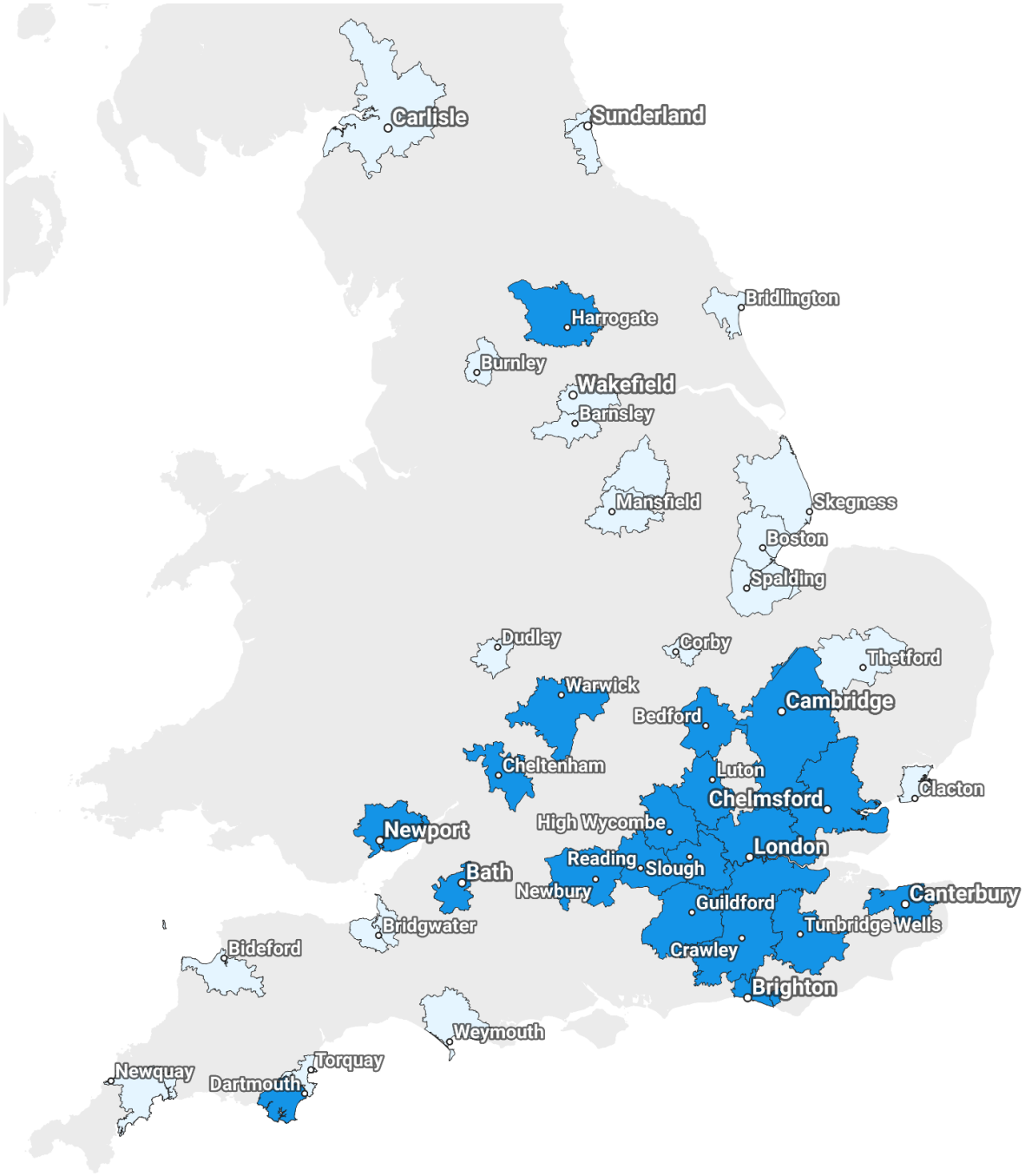
We use the most common existing approach to understanding inequality from a **distributional** point of view (the Gini coefficient, e.g. Arnold and Blöchliger, 2016) and supplement it with two other measures. One relates to the level of economic **imbalance** within areas (e.g. Beatty and Fothergill, 1996) and the other to the level of geographic **clustering** of different income groups (e.g. Rae, 2012). To be clear, our focus on inequality relates to *income* inequality (before housing costs) and because of this we report our results in the Atlas for functional economic areas rather than administrative boundaries (though results for local authorities and parliamentary constituencies are available on the project website – see p. 3 above). Our imbalance measure (the 20:20 Index) is the ratio of small areas within each travel to work area that fall within the most or least deprived 20% nationally on the *income* domain of the English Indices of Deprivation. Our geographic clustering method (Moran's I) uses the same dataset to understand how clustered, or dispersed, individual neighbourhoods are within each area across England.

The development of these three metrics is intended as the main contribution of the Atlas, but we also examine our results in relation to mortality, poverty and progression to higher education. We bring together the individual strands of our approach and attempt to answer the question of 'which areas are most unequal?' across the board, with respect to distribution, imbalance and geography. Our results demonstrate that when we shift the focus to inequality, from poverty or deprivation, a different geography of England emerges and this varies in relation to how we conceptualise inequality in the first place.

Findings

One finding from our work is that the level of inequality we find depends upon how we measure it. This is obvious yet important, since it highlights the fact that using just one metric is unlikely to tell the whole story. The map below, for example, shows the 20 most and least unequal areas of England based on the Gini coefficient. Notable here is the extent to which many of the more equal areas are also poorer coastal and ex-industrial towns.

The 20 most and least unequal TTWAs in England (Gini coefficient)



If inequality alone was seen as a policy problem worth tackling, and the Gini coefficient was the only way we measured it, one could conclude that some of England's most deprived seaside towns should not be the focal point. We believe such a conclusion would be incorrect. This is why we take a multi-faceted approach to understanding inequality at the sub-national level, and when we compare the most unequal areas on all three of our inequality metrics (see below), a more mixed pattern emerges.

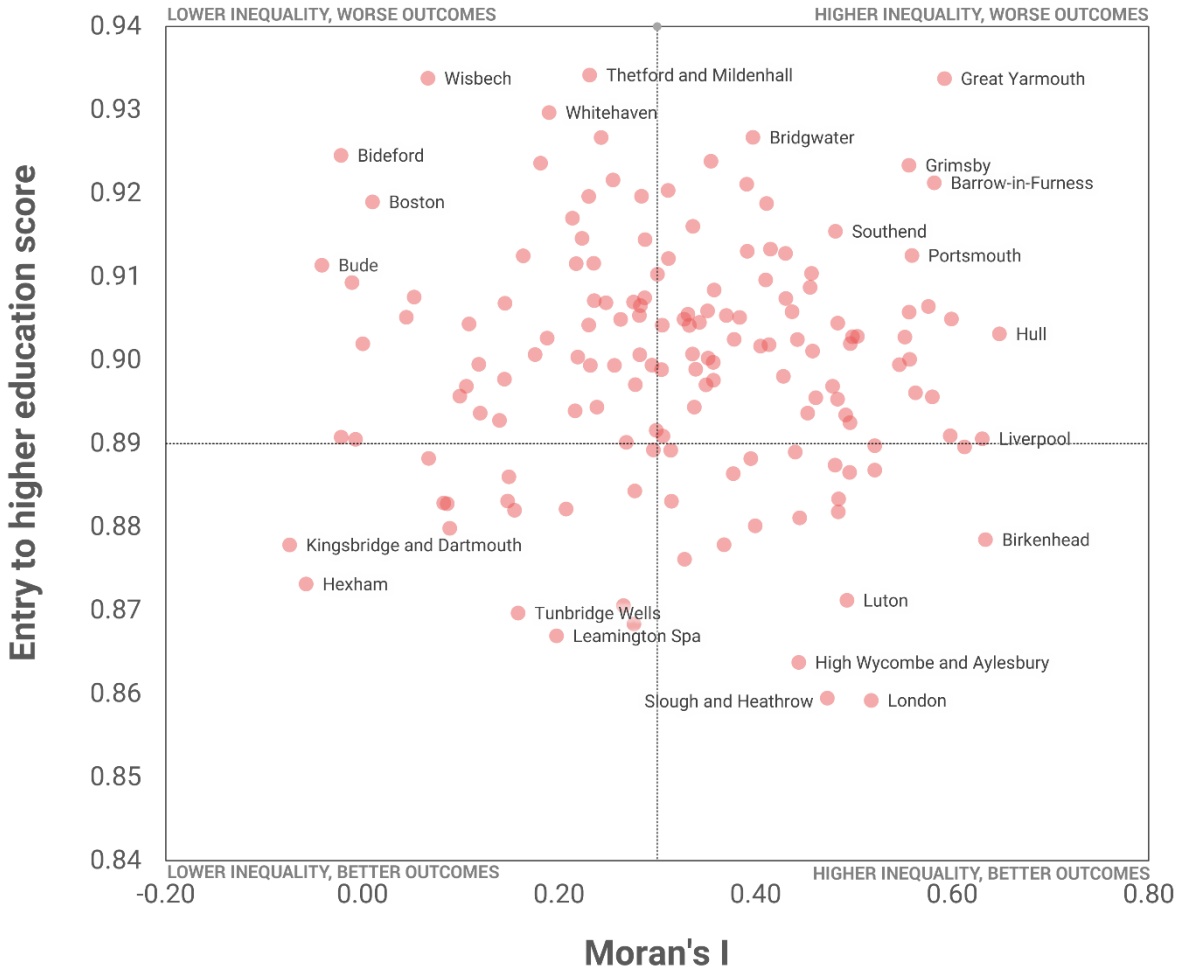
England's most unequal TTWAs using three different measures

Gini Rank	TTWA	20:20 Rank	TTWA	Moran's I Rank	TTWA
1	**London**	1	Basingstoke	1	Hull
2	**Tunbridge Wells**	**2**	**Guildford and Aldershot**	2	Birkenhead
3	**High Wycombe and Aylesbury**	3	Kendal	**3**	**Liverpool**
4	Slough and Heathrow	**4**	**High Wycombe and Aylesbury**	4	Birmingham
5	**Guildford and Aldershot**	5	Hartlepool	5	Derby
6	Luton	6	Andover	6	Leeds
7	Brighton	**7**	**Harrogate**	7	Great Yarmouth
8	Kingsbridge and Dartmouth	8	Northallerton	8	Barrow-in-Furness
9	**Leamington Spa**	**9**	**Reading**	9	Blackpool
10	Chelmsford	**10**	**Crawley**	10	Bradford
11	**Newbury**	**11**	**Newbury**	11	Wolverhampton and Walsall
12	**Reading**	12	Bridlington	12	Portsmouth
13	**Crawley**	13	York	13	Middlesbrough and Stockton
14	**Cambridge**	14	Oxford	14	Sheffield
15	Bath	**15**	**Cambridge**	15	Grimsby
16	Canterbury	**16**	**Liverpool**	16	Weston-super-Mare
17	Bedford	**17**	**Leamington Spa**	17	Bristol
18	Cheltenham	**18**	**Tunbridge Wells**	18	Leicester
19	**Harrogate**	19	Sunderland	19	Manchester
20	Colchester	20	Huntingdon	**20**	**London**

*Bold text indicates an area appears in more than one column

Only the third approach to understanding inequality in the table above (Moran's I) is explicitly spatial, and it is the one most closely associated with poorer outcomes (as shown in the scatterplot below). We believe this helps highlight the spatial dimensions of inequality in that it shows how Disraeli's concept of 'dwellers in different zones' is not only true for much of England but that where it *is* true local areas often experience poorer outcomes. Having said this, the results across the board are quite mixed and even on this measure there are some more unequal areas where mortality and poverty is lower, and progression to higher education higher (e.g. in London).

Spatial clustering of deprivation (Moran's I) vs progression to higher education



Following the analysis of different inequality indicators, we highlight four key findings in our Atlas, in relation to the following four themes.

1. **Many areas are relatively equal, but poor:** inequality across England, no matter how we measure it, is often quite stark. Many locations are relatively equal, yet among the poorest in England. This is particularly true of the Gini coefficient, where many of the most unequal areas have among the best outcomes in England. However, it is mostly not true when we look at inequality using the Moran's I measure.

2. **For inequality, location matters:** when we look at the maps of the most and least unequal places in England, we can see some clear spatial patterns. On the one hand this may relate to a cluster of high inequality areas in and around London, and on the other it may relate to the relative geographical dislocation of many of England's large seaside towns. Yet whichever way we look at it, there is a clear geography of inequality in England.

3. **Not all poor people live in poor places:** although we believe the preceding point to be true, our analysis of income and deprivation data has demonstrated that many of the

poorest people *do not* live in the poorest locations, and we believe there is a need to examine this in more depth if future policies are to be effective. Without understanding this critical methodological question, policies which seek to remedy poverty and inequality may miss their targets.

4. **Spatial segregation matters:** of the three inequality measures we present in this Atlas, it is the one relating to spatial inequality where the most unequal areas also have the worst outcomes. This may point to the fact that spatial dimensions of inequality matter in relation to key outcomes and have, to date, been under emphasised. Alternatively, it may point to the fact that there actually are some compounding effects associated with areas of concentrated poverty.

Recommendations

Our recommendations are not about tackling inequalities directly, since that is not the aim of this Atlas. Instead, they are about providing a much more nuanced geographical evidence base from which action can be taken.

Recommendation 1 Our first recommendation is that when considering questions of inequality from a policy perspective, *we should take into account the fact that many of the poorest local economies in the country are also the most equal*. This is more of a conceptual than a practical recommendation but from an applied policy point of view it suggests that the objective of decreasing income inequality, as measured by the Gini coefficient or other similar measures, would only be effective if it is accompanied by targets for increased prosperity in the most deprived locations. Equality alone is not enough.

Recommendation 2 Our second recommendation is for *increased policy focus on the links between geographic dislocation, deprivation and inequality*. Previous work by Crisp, et al. (2018) has highlighted the importance of these links at the neighbourhood level but we believe it is also important to consider wider questions of regional and sub-national connectivity and links to the drivers of inequality. Therefore, there are important connections to be made between transport policy and welfare policy and as such an inter-departmental approach to tackling geographic dislocation is likely to be necessary.

Recommendation 3 Our third recommendation is for *a thorough review of the evidence relating to the issue of whether the 'majority of deprived individuals and families did not live in the most deprived areas'* (Smith et al., 2001; Barnes and Lucas, 1975). Rather than viewing this issue as an arcane methodological question, we believe that finding a definitive answer to it should be a policy priority if we are serious about tackling poverty and inequality in England. When it comes to tackling persistent poverty through policy intervention, it may be right to focus on the most deprived locations if they contain the highest proportions of poor households and residents, yet doing this in isolation may lead to reduced effectiveness if poorer residents living elsewhere are overlooked. This is a fairly obvious point, yet there appears to be something of a gap in the academic and policy

literature in relation to finding definitive answers to the question of the proportion of ‘poor people’ who do or don’t live in ‘poor areas’.

Recommendation 4 Our final recommendation is not related directly to the specific geographic measure we adopt here, since there are several different ways to calculate spatial inequalities. Instead, *we simply recommend that any approaches which seek to understand the true nature of inequalities should incorporate an explicit measure of spatial disparity*. Put another way, it seems clear from our analysis in this Atlas that the story of inequality in England is an inherently spatial one and as such we believe it should also be measured as one, in addition to indicators such as the Gini coefficient. This point is threaded through the literature on urban and regional inequalities (e.g. Beatty and Fothergill, 1996; Bell et al., 2018), which often highlights quite striking spatial imbalances at the regional level. Therefore, if geography is an important part of the inequality equation, we believe it is necessary to include a robust spatial-empirical approach in order to understand it better.

1. INTRODUCTION

1.1 Setting the scene

Inequality has been recognised from antiquity as a social problem worth talking about. For example, in Plato's *Republic* from 380BC he observes that 'any city, however small, is in fact divided into two, one the city of the poor, the other of the rich'. Contemporary research on the topic in England has tended to focus on slow wage growth, stagnating living standards and the distributional outcomes following a decade of austerity (e.g. Brewer, 2019; Obolenskaya and Hills, 2019). This is typically approached at the national rather than local level, yet as Glaeser et al. (2009) note: 'much of the inequality literature has focused on national inequality, but local inequality is also important'. These themes, and in particular the local geographical manifestations of income inequality, are the focus of this Atlas. It represents our attempt to understand local inequalities in England using a mix of established methods and contemporary data.

Thus, the basic purpose of the Atlas is to provide a detailed, England-wide, sub-national study of inequality that can *i)* inform debate and discussion; *ii)* help challenge simple conceptions about 'rich' and 'poor' areas; and *iii)* provide easy-to-understand evidence on the scale of the inequality problem in England. Although the issue of inequality in England is now very much on the policy map (e.g. Bourquin et al., 2019), we believe it has never really been properly *mapped*, so this Atlas represents our attempt to remedy the situation.

Inequality is of course an important global issue, firmly within the sights of international organisations such as the IMF and OECD (e.g. Dabla-Norris et al., 2015; Cingano, 2014), but in this Atlas we focus on the sub-national level and the kinds of inequalities that exist within English cities (e.g. Figure 1.1). These are often hidden in plain sight, or at least not always widely understood. The big question driving our research can be simply stated, as follows:

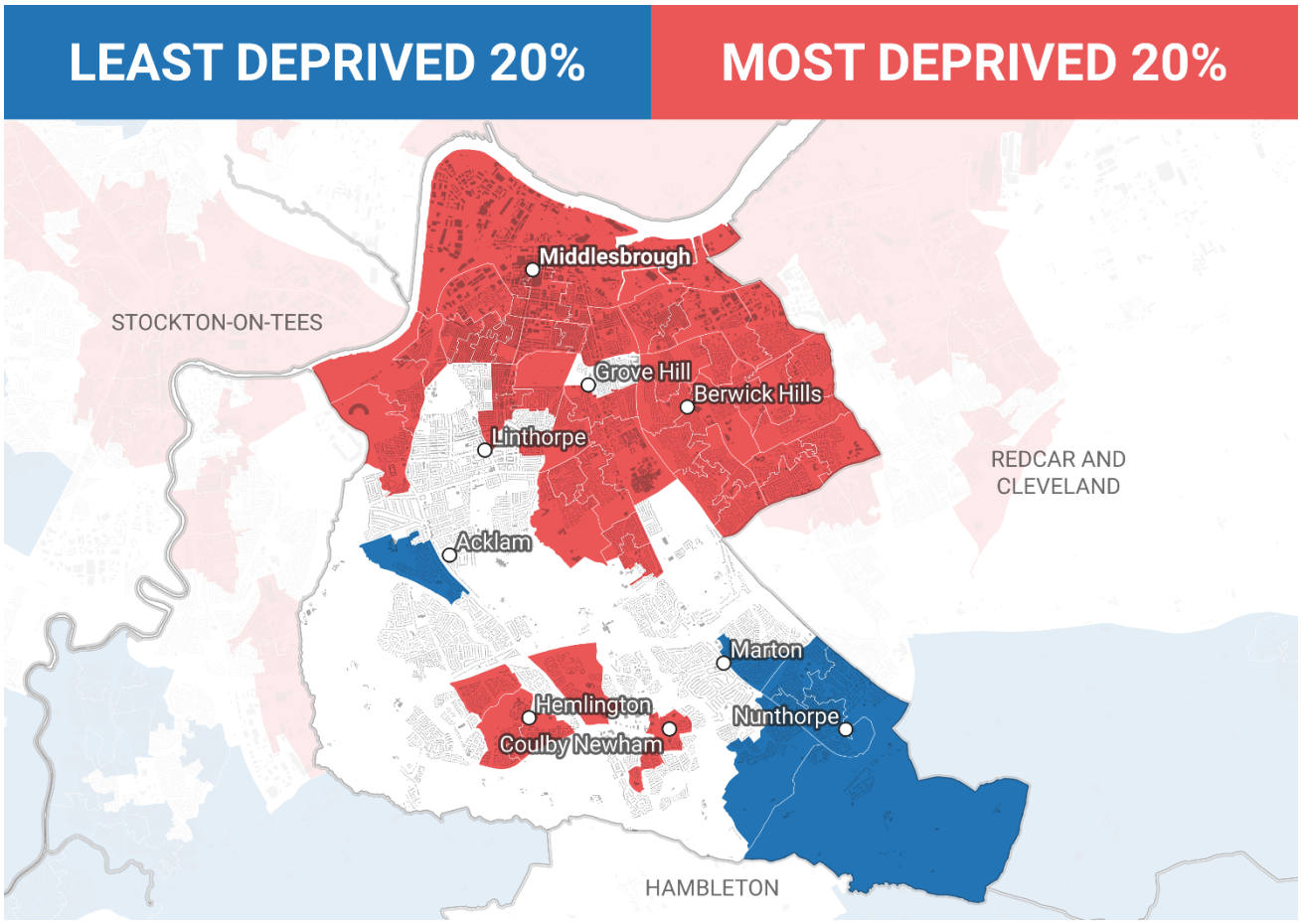
> *'How unequal are localities across England, and what impact does this have on the lives of local people?'*

We attempt to work towards an answer to this question in the Atlas through three interlinked sub-questions, as follows:

1. How is inequality best measured?
2. Which areas of England are most unequal?
3. Do more equal areas have better overall outcomes?

Before we proceed any further with the Atlas, it is important to pause to consider the question of why the topic of inequality merits attention in the first place, what kind of inequality we are talking about, and why it matters to policy and practice. We set out our reasons for this below.

FIGURE 1.1: Deprivation in Middlesbrough, 2019 (20% most/least deprived within England)



Source: English Indices of Deprivation, 2019

1.2 Inequality: what kind, and why should we care?

We live in an unequal world, and inequality can take many different forms (Joyce and Xu, 2019). For example, there may be significant inequalities in life expectancy between countries, or even within cities in the same country. Inequalities can also exist in education, where some people have access to the very best schools and universities, while others may have access to very little formal education. Political inequality and inequality of opportunity are two further ways in which divisions within societies can emerge and endure.

If people feel they have no voice, and no power to change the status quo in an unequal society then it can also lead to disaffection and resentment (Stiglitz, 2012). We have seen this at the ballot box in recent years in the United Kingdom, and although we are not looking at the connections between inequality and political instability in this project, it is not too much of a leap of faith to think that the two might be connected.

In our study, the main focus is on understanding inequalities relating to income, though this naturally overlaps with other areas of life since it is difficult to disentangle, say, income from health, or education from income. So when we talk about 'inequality' in this Atlas we are talking principally about differences in income levels between people who live relatively near to each other.

There is of course a vast and growing literature on the topic of income inequalities, including seminal contributions by John Hills, Kate Pickett and Richard Wilkinson, and Tony Atkinson, among others. More recently, in May 2019, the Institute for Fiscal Studies and the Nuffield Foundation jointly launched the IFS Deaton Review, as part of a five-year study headed by Nobel Laureate Sir Angus Deaton. In *Inequalities in the twenty-first century* (i.e. the introduction to the IFS Deaton Review), authors Robert Joyce and Xiaowei Xu refer to a body of work on geographical inequalities and the widening gap between more and less affluent places in the UK. They also provide new analysis on inequality, demonstrating that women in the least deprived parts of England live, on average, eight years longer than those in the most deprived neighbourhoods.

This is just one example of the ways in which people living in different areas experience different life outcomes, and in our Atlas we explore such themes further. But before proceeding, and drawing here upon the work of economist Branko Milanovic, we set out three reasons why policymakers ought to take action on inequality.

The first reason relates to the link between economic growth and inequality. Whereas many traditional approaches in neoclassical economics treated inequality as a necessary, if inconvenient, partner of economic growth it is now being seriously challenged in the mainstream, or at least at the margins of mainstream thought. For example, the basic thesis of Thomas Piketty's *Capital in the Twenty-First Century* is that income from capital is, increasingly, much less equally distributed than income from earnings. Or, to put it another way, while wages stagnate for many people, a small number of large business owners appear to be richer than ever. Therefore, the idea of inequality as a *barrier* rather than a *precondition* of growth has become influential.

If, as Milanovic has argued, these growing inequalities lead to low educational and health outcomes, workforce or financial exclusion (e.g. Hills, 2010), this cannot be good for the health of the economy, or the population at large. Such inequalities may also have an impact upon inter-generational mobility (e.g. Bell et al., 2018). Thus, the first principle here is what we would call an economic injustice argument, whereby a significant proportion of the population have limited access to wealth and opportunity.

Related to the question of economic injustice, the second reason why we believe inequality merits serious policy attention relates to political fallout. The growth of adversarial politics in the UK and elsewhere has in recent years led to an increasingly polarised public discourse often framed in relation to 'the people' versus 'the elite' (Draca and Schwarz, 2018). Too often, perhaps, this is hyperbole driven by social media, yet the political climate of 2019 in the United Kingdom suggests that we would be well advised to take this issue much more seriously.

A third reason we believe it is worth focusing on inequality is much more conventional: namely, that inequality is linked to weaker economic performance. This is the basic idea forwarded by Joseph Stiglitz over the past decade (e.g. Stiglitz, 2012), and is not without its

critics, yet it is a view that has gained important subscribers. For example, OECD Secretary General Angel Gurría stated in 2014 that 'This compelling evidence proves that addressing high and growing inequality is critical to promote strong and sustained growth and needs to be at the centre of the policy debate'(OECD, 2014).

These three reasons are fairly well rehearsed in the inequality literature, and each has its critics, yet we believe that regardless of one's perspective on inequalities or the rationale for examining them, we should at the very least have better evidence on patterns of inequality in England. We think this is a particularly pressing issue given the findings of the Social Mobility Commission's sixth report (2019), which stated that:

> *'social mobility has stagnated over the last four years at virtually all stages from birth to work. Being born privileged in Britain means that you are likely to remain privileged. Being born disadvantaged, however, means that you will have to overcome a series of barriers to ensure that you and your children are not stuck in the same trap'.*

1.3 The structure of this Atlas

Having set out or aim and rationale above, in the next Chapter of the Atlas we describe our methods. In doing so, we also refer to recent debates about how inequalities are measured and whether or not inequality is growing. These arguments are often highly technical, and focus on particular statistical indicators, most notably the Gini coefficient. Therefore, we describe in more detail here the calculation of our three inequality indicators, which relate to distribution, imbalance and geography.

The first is a local Gini coefficient which we have computed for sub-national areas using new research outputs from the Office for National Statistics. This is calculated in our Atlas for labour market areas, using the travel to work area (TTWA) geography for England and in doing so draws on recent similar work by the Centre for Cities (2017). This first measure relates to the income **distribution**, but it does not tell us about the geography of inequality, nor how imbalanced individual areas might be.

The second measure looks at how uneven income distributions are in local labour markets. That is, we look at the ratio between areas in each TTWA that are in the most deprived 20% versus least deprived 20% nationally in relation to income deprivation. The reason for doing this is to look beneath the headline figures provided by the Gini coefficient in order to understand more about local areas with respect to economic **imbalance**. These first two measures often have a strong spatial dimension, yet they are not in themselves spatial measures so we also describe our approach to understanding the **geography** of inequality.

For this, we use a geographical approach, which can be thought of as a kind of statistical 'cheek-by-jowl' measure (e.g. Rae, 2009; 2012) that highlights the extent to which areas at the opposite end of the income distribution are located near each other, or further away

from each other. Using a spatial autocorrelation method here allows us to say something about not only how geographically concentrated income inequality is, but also how it compares to other areas, or England as a whole.

Following our methods Chapter, we present results relating to our three different measures one by one, accompanied by a mixture of maps, charts and data. In the Atlas our chosen geography is one that relates most closely to the underlying issues we seek to understand, and for this reason we use travel-to-work areas (TTWAs) as our spatial unit of analysis. There are 149 TTWAs in England (plus six that straddle the border), compared to 317 local authorities and 533 parliamentary constituencies. A map, plus population data for all TTWAs, is provided in Appendix 1. Our supplementary material online includes analysis conducted at local authority and parliamentary constituency level (see p. 3).

Having described, developed and presented our inequality measures we then attempt to answer the question of 'which areas of England are most unequal?' before moving on to explore whether unequal areas have 'better' or 'worse' outcomes than more equal areas. The results here are at times somewhat counterintuitive in that it appears higher local income inequality is sometimes associated with better outcomes on some indicators. However, this analysis also provides a good demonstration of the need for cautious interpretation and the fact that the results we get will always depend on the underlying data and methods we deploy.

As with any kind of analysis, there are complications and confounding factors so we attempt to address these throughout and discuss two in particular in a separate 'Complications' section (Chapter 8). Following this, in our concluding Chapter, we move on to discuss the implications and recommendations of our work from a policy perspective. We also reflect back on the Atlas project as a whole and suggest that arriving at a better understanding of local inequalities in England is a necessary first step to taking action.

2. METHODS

2.1 Inequality: a methodological minefield?

Following the launch of the IFS Deaton Review in April 2019, social media was abuzz with commentary on the extent of the inequality problem in the UK. Ed Conway of Sky News noted that 'in fact, UK income inequality is DOWN over the past decade'. Torsten Bell, Director of the Resolution Foundation, countered that Conway was basing his interpretation on sub-optimal data and that at the time both Theresa May (claimed inequality was falling) and Jeremy Corbyn (claimed inequality was rising) were wrong in their analysis. John Hills and Polina Obolenskaya of the LSE have also recently noted that over the past two decades changes in inequality have appeared 'unremarkable', yet 'the nature and depth of economic inequalities have changed markedly for some groups even if overall levels remained relatively stable' (Hills and Obolenskaya, 2019, p. 22).

So, we need to deal with the methodological issue of measuring inequality at the beginning of our Atlas since it gets to the very heart of what we are talking about. Yet, essentially, it is clear that income inequality in the UK is relatively high compared to other OECD nations and has been since the 1980s. As Bell explained in an earlier article on inequality, the great gulf between rich and poor in the UK opened up during this decade, or, as he put it:

> *'British inequality is like bad music: It's all about the 1980s' (Bell, 2017)*

This may be the only area of consensus on inequality in the UK: that it took a great leap forward in the 1980s, and has remained relatively high ever since. One area where there is less consensus is on how best to measure it. Both Conway and Bell refer to measures of inequality as expressed by the Gini coefficient, but in doing so they rely on different underlying data and come to different conclusions. In his recent 'What do we Know' guide to inequality, Mike Brewer (2019) also discusses different approaches to measuring and visualising inequality. Therefore it is important for us to be clear on the approach we are taking here. Using ONS household income inequality, Conway was able to show flatlining or slightly declining levels of income inequality. By contrast, using more widely accepted data on equivalised disposable household incomes (i.e. the total income of a household, after tax and other deductions, that is available for spending or saving, divided by the number of household members), Bell was able to demonstrate that income inequality in the UK remains relatively high compared to other rich nations (see also Bourquin et al., 2019).

We adopt the latter measure here (using household income) since it is a standard international methodology used by the OECD. However, we do not rely on the Gini coefficient alone, and we think it is particularly important that any approach to understanding inequality incorporates measures that consider levels of economic imbalance, and its geography, as we do here. This latter point is particularly important, since the relatively high level of income inequality found in the UK also has a strong geographical dimension, as recent work by Philip McCann (2019) has demonstrated. In fact, he notes that:

> *'…what comes out when we compare the UK with 30 OECD countries is that the UK is one of the most interregionally unequal countries in the industrialised world, and almost certainly the most interregionally unequal large high-income country'.*

McCann shows, using 28 different measures of regional inequality, that the UK is always towards the top end of the scale when it comes to inequality. Therefore, despite some claims that inequality in the UK is not growing, or is not a significant problem, the empirical evidence would appear to suggest otherwise (see also Obolenskaya and Hills, 2019) - as do non-quantitative indicators, such as the rise of foodbanks over the past decade (e.g. in the past five years Trussell Trust food bank use has increased by 73%).

Therefore, if we wish to measure inequality, we need to be careful that we use a robust methodological approach. We set out our basic approach to this below. Further details of the methodology, with worked examples, is provided in a supplementary Technical Report.

2.2 Our basic approach

Put simply, we use the most common existing approach to understanding household inequality from a distributional point of view (the Gini coefficient) and supplement it with two other measures. One of these relates to the level of economic imbalance within areas and the other to the level of geographic clustering of different income groups. Taken as a whole, our hope is that these measures, used in combination, can shed new light on local inequalities in England and, in part, help mitigate some of the shortcomings of any of these measures on their own.

2.3 Developing a local Gini coefficient

Local Gini coefficients have been used in several previous studies (e.g. Persky, 1990; Glaeser et al., 2009) yet they are typically impossible to compute owing to lack of data. However, in their annual Cities Outlook report from 2017, the Centre for Cities published local Gini coefficients for England, based on a new set of individual income data from the Office for National Statistics. This resulted in a Gini coefficient of 0.41 for England as a whole, with the most equal cities, such as Barnsley, Blackburn and Burnley all having a figure of 0.37. The least equal cities on this measure were Cambridge (0.46) and Oxford (0.45). This 'before housing costs' (BHC) income data does not yet have the status of an 'official statistic' under the Statistics and Registration Service Act 2007. Nonetheless, it does provide researchers with potentially valuable new insights into the extent to which income inequality exists within different parts in the country in a way that cannot be determined from looking at a headline figure for England or the UK as a whole.

It is important to note that we use this new data source here as a way to understand better the local patterns of income inequality and not as a means to identify poverty or to determine living standards. Indeed, the ONS are very clear on this point:

> *'These outputs must not be interpreted as an indicator of poverty or living standards.' (ONS, 2019)*

Despite this disclaimer, our results – and those of others (e.g. Centre for Cities, 2017) – demonstrate that this new data source can help shed light on a critically important topic at a time when inequality and division are at the very heart of our national polity.

As we have stated above, it is important to consider carefully the geographical unit of analysis when conducting economic research and for this reason we have chosen to use English travel to work areas (TTWAs) as the core geography for reporting our results. We have also computed figures for local authorities and parliamentary constituencies, for reference, and these are available in our online archive (see p. 3). The reason for choosing the TTWA as the unit of analysis is because it is a *functional* economic geography and is therefore constructed with explicit reference to an area's underlying economic linkages. TTWAs are based on origin-destination commuting data and serve as a useful proxy geography for labour markets in a way that local authorities or other administrative units do not. A good example of the differences between administrative and functional geographies is in Manchester, where the City of Manchester (i.e. the local authority) is home to approximately 550,000 residents whereas the Manchester TTWA is home to 2.7 million residents and is therefore a much better reflection of the functional urban area.

The 'Income from Pay As You Earn (PAYE) and benefits for tax year ending 2016' data that we use to compute the Gini coefficient are available for the whole of England for all Lower-Layer Super Output Areas (LSOAs). These small areas have an average population of just under 1,700 (as of 2017) and there are 32,844 of them in England. The Gini coefficients we report in Chapter 3 relate to travel to work areas (TTWAs) since, as we note above, this functional geography provides a useful spatial approximation of the economic geography of the country. Further details of how we constructed our local Gini coefficient, plus a worked example, are available in our related Technical Report, but it is useful here to provide a little more information on the method.

The Gini coefficient primarily measures the distribution of a specific resource, usually income within a specified geographic unit, and returns a value on a scale of zero to one or zero percent to one hundred percent. A zero coefficient represents perfect equality (a situation where everyone has the same amount of resources) and a score of one represents perfect inequality (only one person has all the resources and the rest have none). A higher Gini coefficient (closer to 1 or 100%) indicates high inequality and a lower Gini coefficient (closer to 0 or 0%) indicates lower inequality.

Although the Gini coefficient is usually calculated for countries, the same approach can be applied to any geographic unit. As we mentioned above, the Centre for Cities previously produced Gini coefficients for Primary Urban Areas in the UK. A similar approach is adopted in this study, although our measure is based on *household* rather than individual income data. We calculated the Gini coefficient for every Travel to Work Area in England and ranked them from the most unequal to the least unequal. The full ranking is provided in Appendix 2, with the main results presented in Chapter 3.

2.4 Understanding extremes: the 20:20 Index

Perhaps owing to its simplicity and the ease with which it can be understood, in addition to its near-ubiquity as the inequality metric of choice, the Gini coefficient is at times used unquestioningly. However, it does not tell us much about the nature of the income distribution within areas. Thus, two countries may have a Gini coefficient of 0.45 (relatively high in the context of OECD nations, where most nations are below 0.35) but we cannot tell from the headline figure where this inequality comes from. For example, incomes could be bunched in the middle of the distribution, and this is a commonly-cited criticism of the Gini measure (see Atkinson, 1970), although recent research suggests Gini is actually more sensitive to changes in the lower and upper parts of the distribution (Gastwirth, 2017).

For these reasons, among others, scholars have attempted to come up with supplemental measures of inequality that help shed more light on income distributions. These are typically known as ratio measures and some common examples include looking at the ratio between the top and bottom 10% and the top and bottom 90% of the income distribution.

In this Atlas, we look at the proportion of Lower-Layer Super Output Areas (LSOAs) in each TTWA that are within the top and bottom 20% of the national distribution on the 'Income Deprivation' domain of the 2019 Indices of Deprivation, released in September 2019. This follows a similar approach used by the United Nations in their 'income quintile ratio', which looks at the top and bottom 20% of the population in relation to poverty (United Nations, 2015). The Income Deprivation domain measures the proportion of an area's population that experience deprivation relating to low-income, before housing costs (see MHCLG, 2019). It includes in-work poverty measures and is defined as follows:

> *'The definition of low income used includes both those people that are out-of-work, and those that are in work but who have low earnings (and who satisfy the respective means tests).'* MHCLG, 2019

The 20:20 Index is therefore a relative area-based measure that helps us understand more about the distribution of less and more deprived locations and the extent to which it is skewed. In cities like Liverpool, Manchester and Birmingham, regardless of whether we use local authority or TTWA boundaries, there are a far greater proportion of neighbourhoods in the most deprived quintile nationally than the least deprived. At the other end of the scale, in places like Winchester and St Albans, there are far more areas in the least deprived

quintile. This kind of economic imbalance represents another kind of inequality, but one that the Gini coefficient does not necessarily pick up.

In deploying this additional inequality measure, it is possible to say more about the nature of the income distribution as it relates to individual areas, but of course this measure is not in itself a spatial metric. That is, we may be able to say that an area has five times as many areas in the most deprived 20% nationally than the least deprived 20%, but we cannot tell from the ratio alone how they are distributed geographically. For this reason, we also use a spatial statistical approach to understanding the nature of local inequalities.

2.5 Understanding the spatial divide

One of the key areas we are seeking to add knowledge to with this Atlas is in relation to the geography of inequality in England. The Gini coefficient is a useful measure that helps shed light on inequality more generally, whereas the 20:20 Index is helpful in describing the extent to which areas are imbalanced in terms of their internal economic composition. Yet in order to understand the geographical nature of inequality at the local level within England, a slightly more sophisticated approach is needed. This is where we implement a spatial statistical approach similar to that adopted by one of the authors in previous academic research (Rae, 2009 and 2012). The basic principle here is that location matters, and it is important to understand the extent to which more deprived areas are located within much larger clusters of deprivation, or affluence. For example, whether a highly deprived area is located within a much wealthier area can have very important real life implications. One example would be in education, since schools in more affluent areas tend to perform better than those in deprived areas overall and school leavers in these areas often have better educational outcomes than those attending schools in much more highly deprived catchment areas (e.g. Evans and Whitehead, 2011).

Another reason why location might matter is more practical from a policy point of view. When data like the Indices of Deprivation are used to determine local need, as they often are, it is often done at a local authority or regional level based on the proportion of an area's neighbourhoods that sit within the bottom 10% or 20% of all areas nationally. In this sense, location really can have profound effects in that poor neighbourhoods in more affluent areas may not be eligible for the same level of funding as similar neighbourhoods in more deprived local authorities. This was the case in the past with the Neighbourhood Renewal Fund, which focused on England's 88 most deprived districts, meaning that smaller pockets of deprived areas across England were not eligible to receive funding as a result of their location in more affluent areas.

These examples highlight some of the practical implications of geography from a policy point of view and highlight the fact that the income divide is also often a spatial divide. Therefore, in this Atlas we use a spatial statistical approach, based on the English Indices of Deprivation 2019, to determining the extent to which less and more deprived neighbourhoods are clustered. We do this using a spatial autocorrelation approach, based

on the Moran's I measure. This is conceptually similar to a standard correlation coefficient, in that it ranges from -1.0 (a very mixed area, with rich and poor areas laid out like a chess board) to 1.0 (where rich and poor areas are completely segregated). A value of 0 would indicate that there was no significant geographic clustering. In effect, what this measure does it provide a statistical assessment of the extent to which rich and poor are living cheek-by-jowl and so we think of it here as a kind of 'Cheek-by-Jowl Index'.

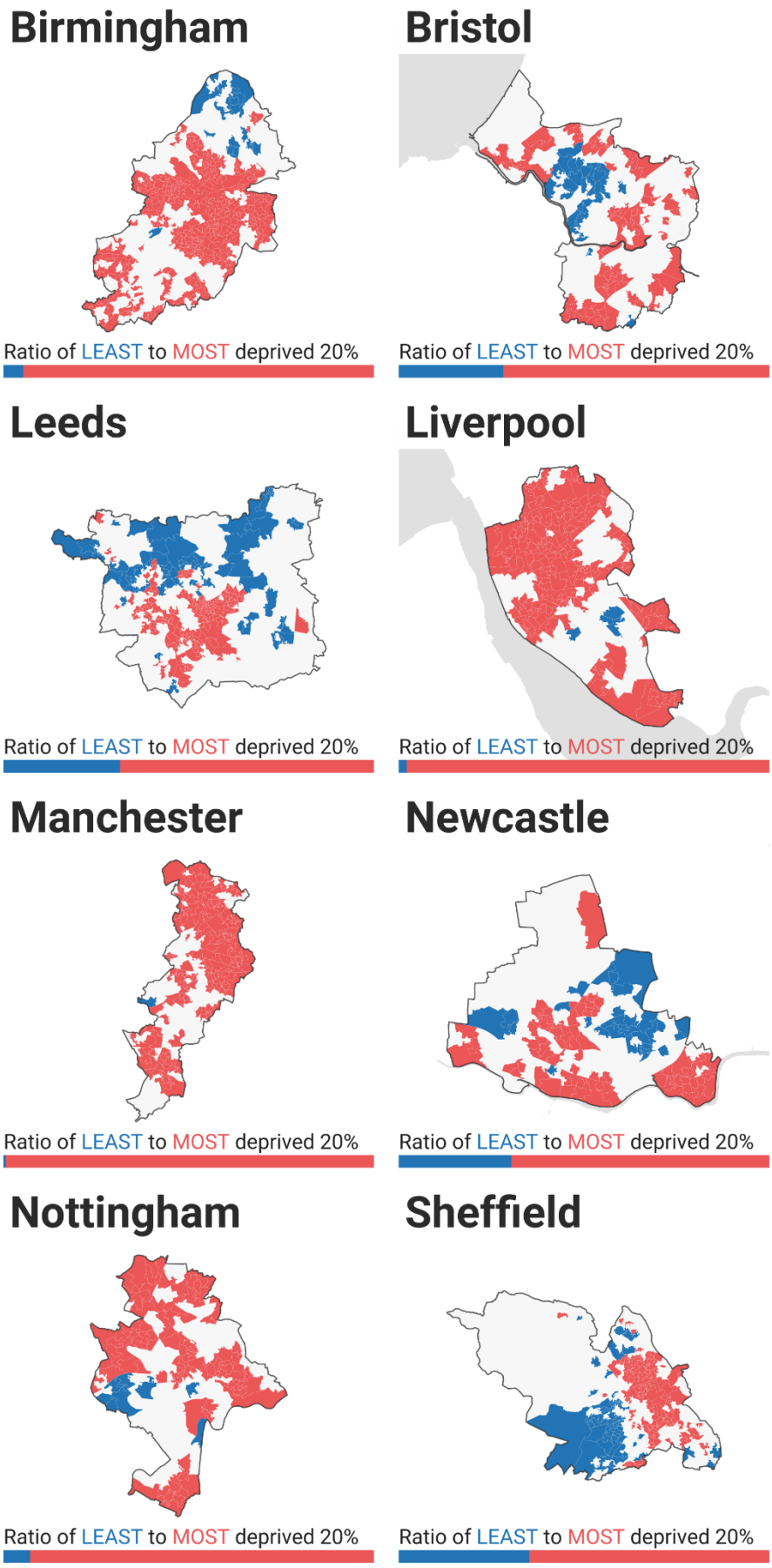
Previous studies have shown that economic deprivation within England is quite highly clustered, with a Moran's I value of 0.6 (Rae, 2012) although in the Atlas we move down a level to compute the statistic for all TTWAs, since this is our principal analytical geography. As an example of the kind of spatial divides that exist within English local authorities (which are smaller than TTWAs), Figure 2.1 provides a useful reference point since it shows the proportion of LSOAs in a selection of urban local authorities that fall within the most or least deprived on the English Indices of Deprivation 2019. The arbitrariness of administrative boundaries we discuss above (relative to TTWAs) is also evident here when we compare Leeds and Manchester, for example.

2.6 Bringing it all together: three strands of inequality

Each of the approaches to understanding inequality at the local level are dealt with in turn in the next three Chapters of the Atlas. Following this, we bring together the individual strands of our approach and attempt to answer the question of 'which areas are most unequal?' across the board, with respect to distribution, imbalance and geography. The results here demonstrate that when we shift the conceptual focus from 'deprivation' to inequality, a different geography of England emerges, and one that we hope helps reframe debates about both inequality and deprivation in the national policy discourse.

Yet we also hope to go beyond measurement so in the final empirical Chapter we consider the question of whether unequal areas have better or worse outcomes than more equal areas (and such outcomes may also be related to the sub-national impacts of welfare reform; e.g. Beatty and Fothergill, 2014). This is an important question for many reasons. From an academic point of view, it is important because the results might help challenge the view that 'inequality' *per se*, leads to poorer outcomes locally or that area deprivation alone is a determinant of life chances. Our results demonstrate that things are often more complex. From a policy point of view, this is an important question since it can help classify and categorise different areas and outcomes with respect to inequality and deprivation. That is, some areas that are highly deprived yet much more equal overall appear to have worse outcomes than highly deprived, unequal areas. We reflect on such issues in the concluding Chapter.

FIGURE 2.1: areas within England's most or least deprived 20% in 8 cities



Source: English Indices of Deprivation, 2019

3. LOCAL GINI COEFFICIENTS

3.1 Developing a local income inequality measure with new data

Typically, the Gini coefficient is used to assess the extent of income inequality within individual nations. If every household in a country had the same income, the Gini coefficient would be 0. If all the wealth was held by a single household the Gini coefficient would be 1[1]. Across OECD nations in 2016 the Gini coefficient varied from 0.24 in the Slovak Republic to 0.46 in Mexico, with the United States at 0.39 and the United Kingdom at 0.35. This measure relies on data not readily available at the local level, but it provides a useful headline figure for each country on the nature of national income inequality.

It is more difficult, and in fact often impossible, to compute Gini coefficients for sub-national areas owing to a lack of data on individual or household incomes. However, with the release of 'Income from Pay As You Earn (PAYE) and benefits for tax year ending 2016' from the Office for National Statistics, it became possible to do this for local areas in England, based on either individual income or equivalised household income. This is what the Centre for Cities did in their *Cities Outlook 2017* report, using individual income data and Primary Urban Areas, which are defined based on the extent of continuous built-up land, as the geographical unit of analysis across 58 cities in England and Wales.

In this Chapter we take a similar approach, although we use the equivalised household-level income data since it more closely matches the OECD method for calculating Gini. The OECD method uses equivalisation to adjust household incomes to reflect differences in household composition. Furthermore, rather than focusing on Primary Urban Areas, we have computed Gini coefficients for all 149 travel to work areas in England (plus the 6 that straddle the border). The results offer new insights into the distribution of incomes at a more local level than has previously been available in England and demonstrate that there is a noticeable geography to this. The next section presents the results of our analysis.

3.2 A local Gini coefficient for England

In Figure 3.1, the Gini coefficient for all TTWAs in England is shown. For England (plus a small number of cross-border TTWAs) using this measure, the Gini coefficient is 0.33 and for individual areas it varies from 0.30 in Bridlington (least unequal) to 0.38 in London (most unequal and by far the largest TTWA by population – see Appendix 1). There are some clear geographical patterns to these results, with most TTWAs around London and the wider South East exhibiting the highest levels of inequality nationally. Notable exceptions to this include places like Hastings, Margate and Clacton, which have lower Gini coefficients and therefore lower levels of income inequality.

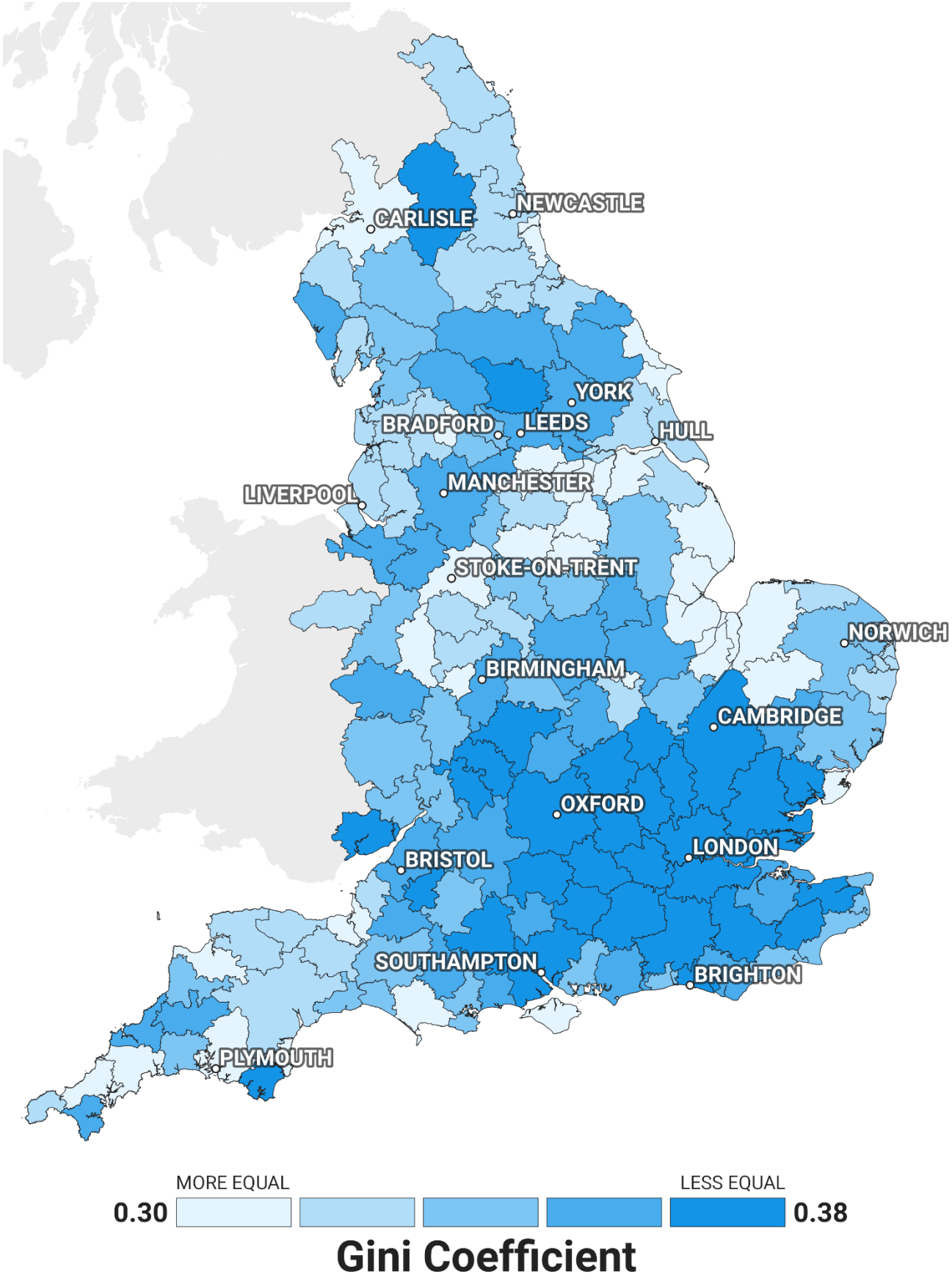
Several areas outside the south east of England also have higher levels of inequality, including Falmouth, York and Harrogate. Also notable in Figure 3.1 are the lower Gini

[1] The Gini coefficient is sometimes expressed as a number from 0 to 100 (e.g. by the World Bank) but here we use the more conventional 0 to 1 scale (as per the OECD).

coefficient values in many coastal areas, including Weymouth, Minehead, Skegness, Bridlington and Blackpool. The level of deprivation in English coastal areas is of course well researched and well documented (e.g. Beatty et al., 2011) so it is interesting to see here that many of these towns are also relatively equal, albeit typically quite deprived.

As shown in Figure 3.1, a small number of TTWAS spill over the English border into Scotland and Wales. There are six of these in total: Cinderford and Ross-on-Wye, Berwick, Carlisle, Chester, Newport, and Oswestry and we have included them in our analysis, for completeness, in addition to the 149 TTWAS wholly within England. One of these (Newport) features in the list of England's top 20 most unequal TTWAs, as shown in Table 3.1, although most of this area is within Wales.

FIGURE 3.1: Gini coefficient for all TTWAs in England



Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

Table 3.1: the 20 most unequal English TTWAs (Gini coefficient)

Rank	TTWA	Gini
1	London	0.383
2	Tunbridge Wells	0.380
3	High Wycombe and Aylesbury	0.371
4	Slough and Heathrow	0.370
5	Guildford and Aldershot	0.369
6	Luton	0.364
7	Brighton	0.364
8	Newport (Wales and England)	0.361
9	Kingsbridge and Dartmouth	0.361
10	Leamington Spa	0.359
11	Chelmsford	0.359
12	Newbury	0.358
13	Reading	0.357
14	Crawley	0.355
15	Canterbury	0.355
16	Cambridge	0.355
17	Bath	0.355
18	Bedford	0.352
19	Cheltenham	0.351
20	Harrogate	0.350

Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

The most obvious feature of Table 3.1 is perhaps the fact that the majority of areas are in the south of England (17 out of 20). It is perhaps no surprise that London should top the list, since London's high levels of income inequality are well documented (e.g. Trust for London, 2018). It is important to point out at this point that the figures in Table 3.1 are lower than those reported by the Centre for Cities in 2017. This is because our analysis is based on household rather than individual incomes. We base our analysis on *household* data because it is important to consider whether households, even where people are in work, have income adequate to meet their needs and because this follows the OECD approach. Nonetheless, there is a significant degree of overlap between Table 3.1 and the most unequal Primary Urban Areas reported in the Centre for Cities work.

In Table 3.2, we can see a list of the 20 most unequal English TTWAs. Northern TTWAs feature prominently here yet there is a lot more geographical variation, with several of the least unequal TTWAs appearing in the south of England (e.g. Clacton, Torquay and Paignton) and several more in the midlands or north. Particularly notable here is the extent to which coastal areas feature, with three of the top four in this category. The full list of Gini coefficients for all TTWAs is provided in Appendix 2.

Table 3.2: the 20 least unequal English TTWAs (Gini coefficient)

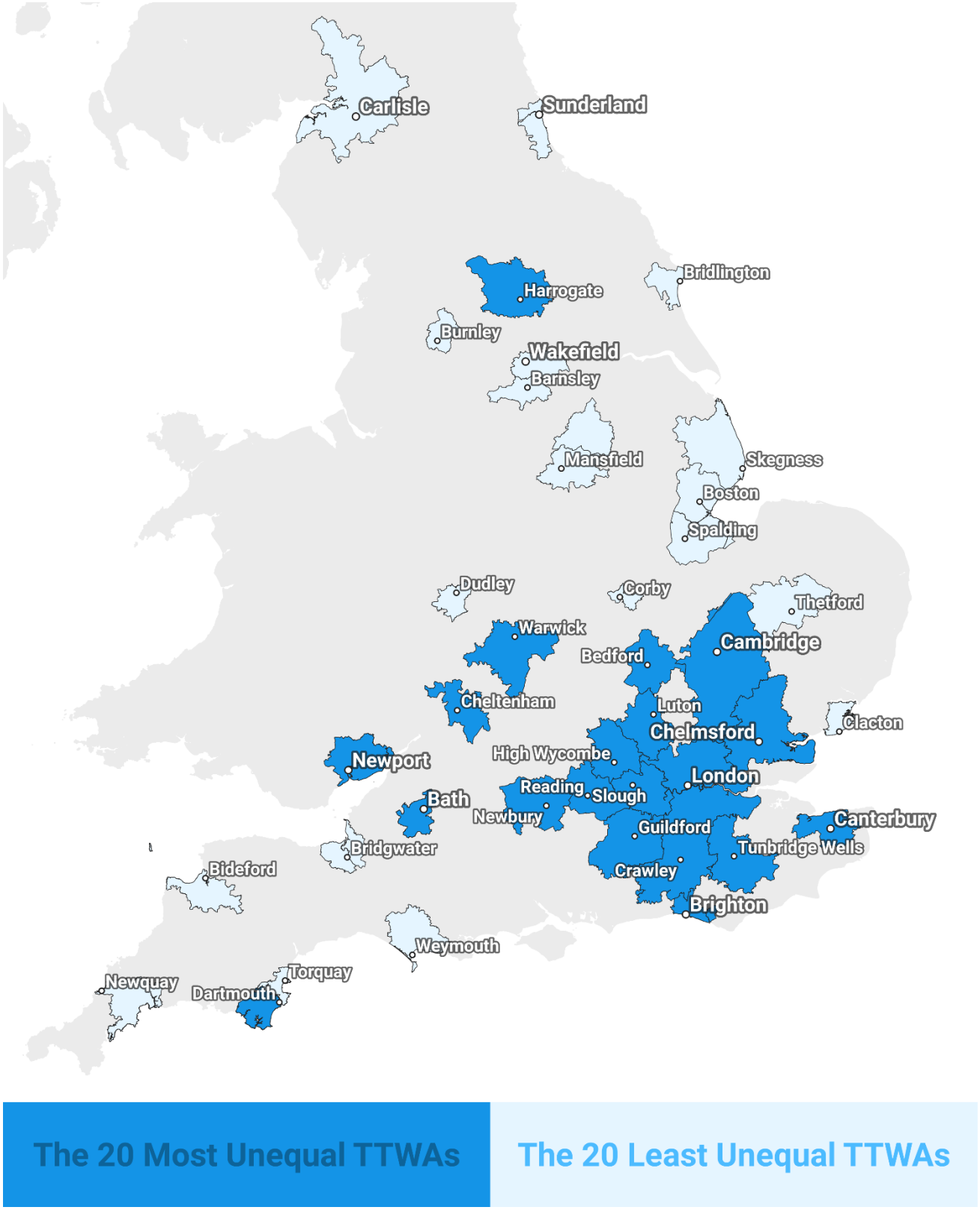
Rank	TTWA	Gini
1	Bridlington	0.296
2	Corby	0.296
3	Skegness and Louth	0.296
4	Boston	0.298
5	Barnsley	0.300
6	Wakefield and Castleford	0.302
7	Mansfield	0.303
8	Sunderland	0.303
9	Carlisle	0.304
10	St Austell and Newquay	0.305
11	Dorchester and Weymouth	0.306
12	Clacton	0.306
13	Spalding	0.307
14	Bideford	0.307
15	Dudley	0.307
16	Torquay and Paignton	0.307
17	Thetford and Mildenhall	0.308
18	Worksop and Retford	0.308
19	Bridgwater	0.309
20	Burnley	0.309

Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

In Figure 3.2, below, we have mapped the 20 most and least unequal TTWAs across England, in order to highlight both the geographical clustering of the most unequal locations and the geographical dispersion of the least unequal locations.

As we have discussed above, one of the issues with the Gini coefficient is that it does not provide any information on the nature of the income distribution within areas, since it effectively condenses the entire income distribution for an area into a single number. Of course, this was never intended to be the case, but by nature income distributions are inherently spatial, so as part of our analysis we also explored in more detail the spatial distribution of the data which we used to derive the Gini coefficients reported above. These are presented in the next section.

FIGURE 3.2: The 20 most and least unequal TTWAs in England (Gini coefficient)



Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

3.3 A closer look at within-area income distributions

In Figures 3.3 to 3.8 below, we have mapped the ONS PAYE data used in the calculation of our Gini coefficients for Lower-Layer Super Output Areas (LSOAs). These small, neighbourhood-sized spatial units have an average population of just under 1,700 or 700 households (as of 2017) and are the lowest level at which the ONS household income data are available. We have presented three maps showing some of the most unequal TTWAs (London, Canterbury and Harrogate) and three maps showing some of the least unequal TTWAs (Clacton, Dudley and Skegness and Louth).

Each map shows the proportion of households per LSOA where the annual equivalised household income is below £20,000 (this threshold is chosen because it is the closest available income band to 60% of £29,400, the current UK median household income). This figure is lower than the recommended minimum income standard by the Joseph Rowntree Foundation and it is important to remember that the ONS data covers PAYE and benefits income distributions, so income from sources such as self-employment or investments are not included. It also does not take into account housing costs, which vary significantly across the country, but also within local areas, often at the micro level. Nonetheless, the spatial patterns are revealing and highlight the extent to which there is a clear geography of inequality not only across England (as in Figure 3.2) but within functional economic zones such as the TTWAs used here.

Therefore, although much of London's TTWA has a low proportion of areas where household income is below £20,000 (Figure 3.3), there are many areas where the proportion of households with an income below £20,000 is actually relatively high, including much of inner East London, and places like Gravesend, which are beyond the boundaries of Greater London but within the London TTWA. Likewise, in Canterbury, the extremes of the income distribution are evident from the map (Figure 3.4), including in places like Herne Bay, where a significant majority of households in many LSOAs have an annual income below £20,000. Similar patterns can be observed in Harrogate (Figure 3.5), the only one of the top 20 most unequal TTWAs located in the north of England.

Looking at similar maps of areas amongst the least unequal in England according to the local Gini measure, Clacton (Figure 3.6) has many areas where a high proportion of households have an annual income below £20,000. There are fewer areas where this is the case and, from the underlying data, we can see that the distribution is much flatter here, with few wealthier areas. This pattern is repeated in Dudley (Figure 3.7) and Skegness and Louth (Figure 3.8), although in the case of Dudley there are more areas where the proportion of households below £20,000 is less than 40%. The maps serve as a useful reminder that the distillation of income data into a single inequality metric such as the Gini coefficient often masks important micro-spatial variation in the areas we seek to understand.

3.4 Looking beyond Gini

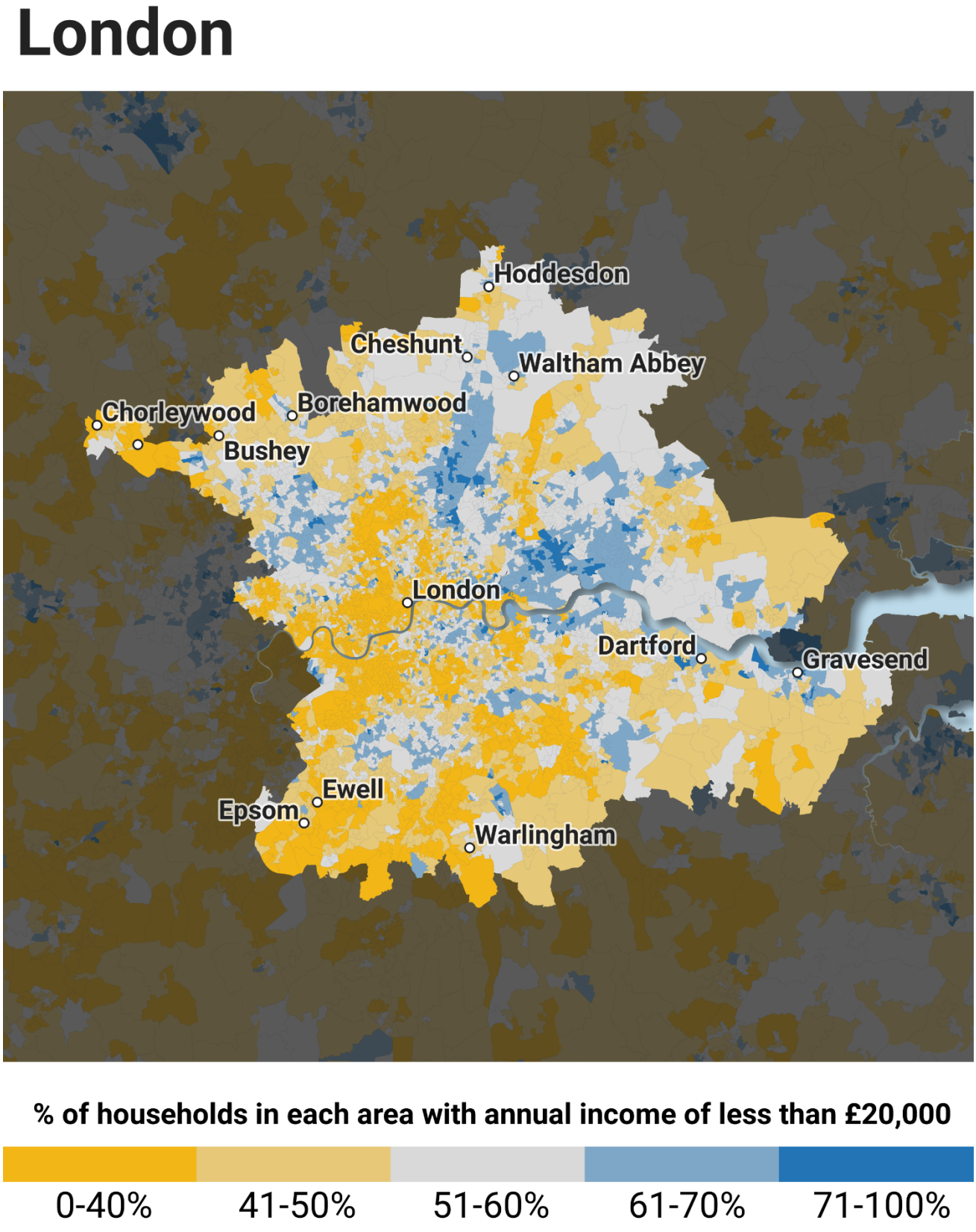
These spatial patterns help shed light on the nature of the income distribution within areas, but they also have important practical implications. For example, two recent studies published by the Joseph Rowntree Foundation (Rae, et al., 2016; Crisp, et al., 2018) have explored the extent to which spatial dislocation and poverty are related and often very difficult to overcome. For example, in more buoyant, well connected labour market areas like Cambridge or London access to jobs, services and educational choice is often far greater than in more geographically isolated coastal areas, such as Clacton or Skegness.

The key point here is that the location of poorer areas within their wider functional economic areas is particularly important. In relation to the bigger issue of how we interpret inequality of the kind discussed in this Chapter, we would argue that although greater income equality is naturally more desirable, it often appears to be the case in England that more equal areas are also poorer. This apparent lack of income diversity in some areas may lend itself to more restricted opportunities for social mixing at both ends of the spectrum than we see elsewhere, particularly in larger cities. Whether or not this is associated with worse outcomes on things like health, education and mortality is examined more closely in Chapter 7.

Despite its spatial shortcomings, and the somewhat experimental nature of the new data source, we believe there is considerable value in understanding places using this particular measure of income inequality. The Gini coefficients calculated here clearly demonstrate that the most unequal areas are geographically clustered in the south and east of England and the least unequal places are more dispersed, with several being located in coastal areas of England.

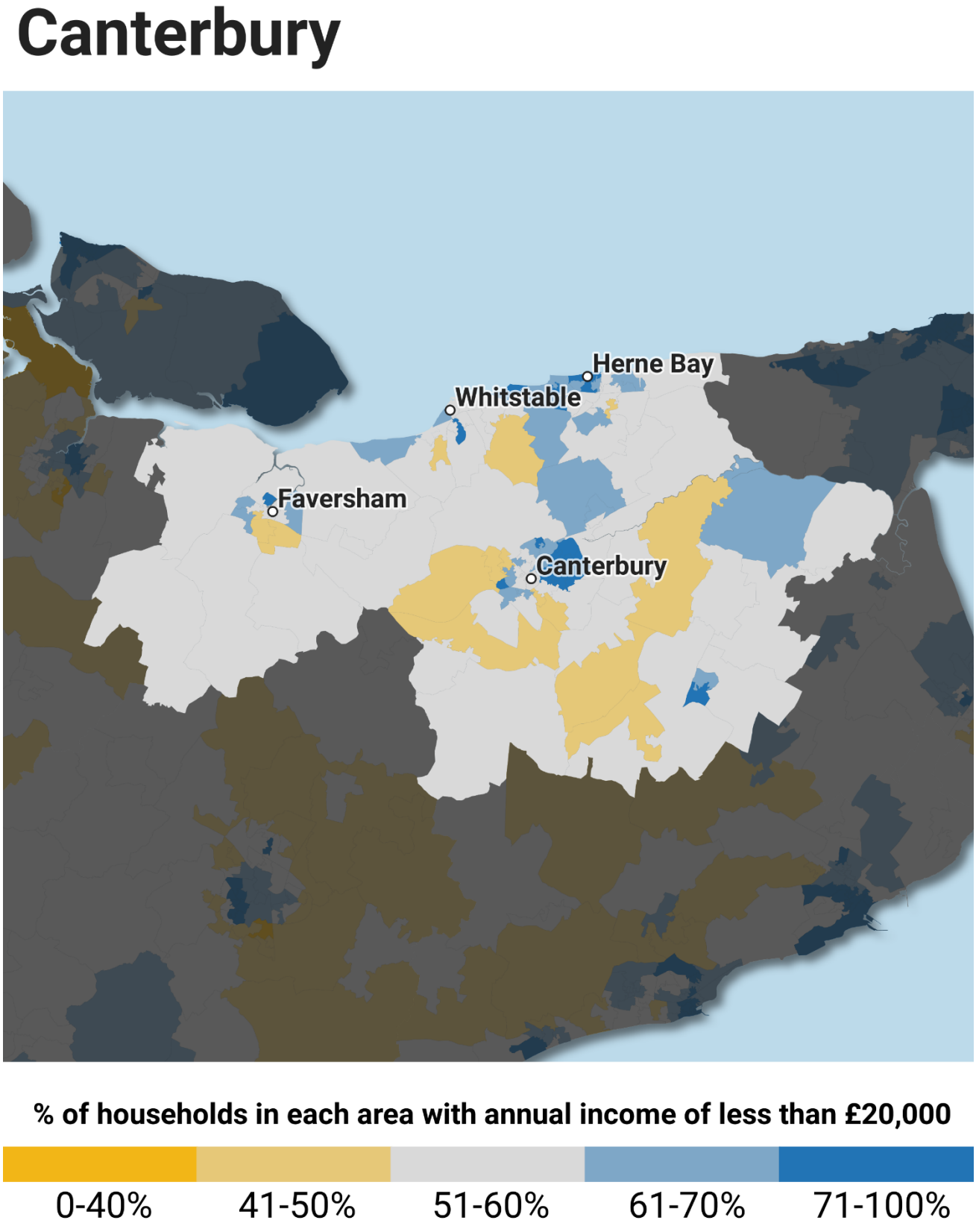
Yet it also appears that many of the most unequal locations are also the wealthiest, and many of the least unequal are in fact relatively poor from a household income point of view. Thus, we were keen to explore further the nature of income distributions within individual TTWAs. In order to assess the extent to which individual areas may be imbalanced economically, in Chapter 4 we develop the 20:20 Index, which looks at the proportion of areas in each TTWA that are within the top and bottom 20% nationally in terms of income deprivation.

FIGURE 3.3: the local household income distribution for London



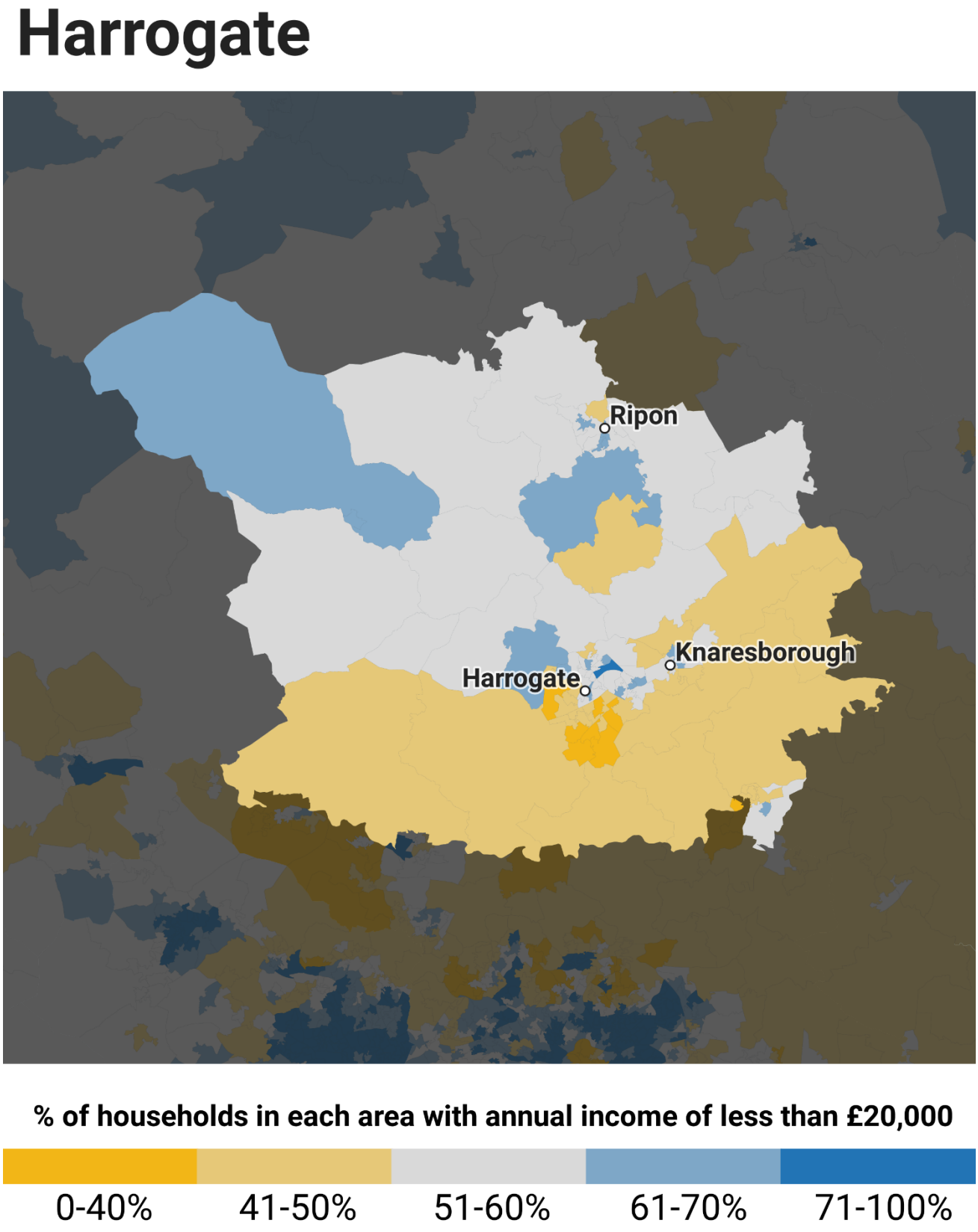
Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

FIGURE 3.4: the local household income distribution for Canterbury



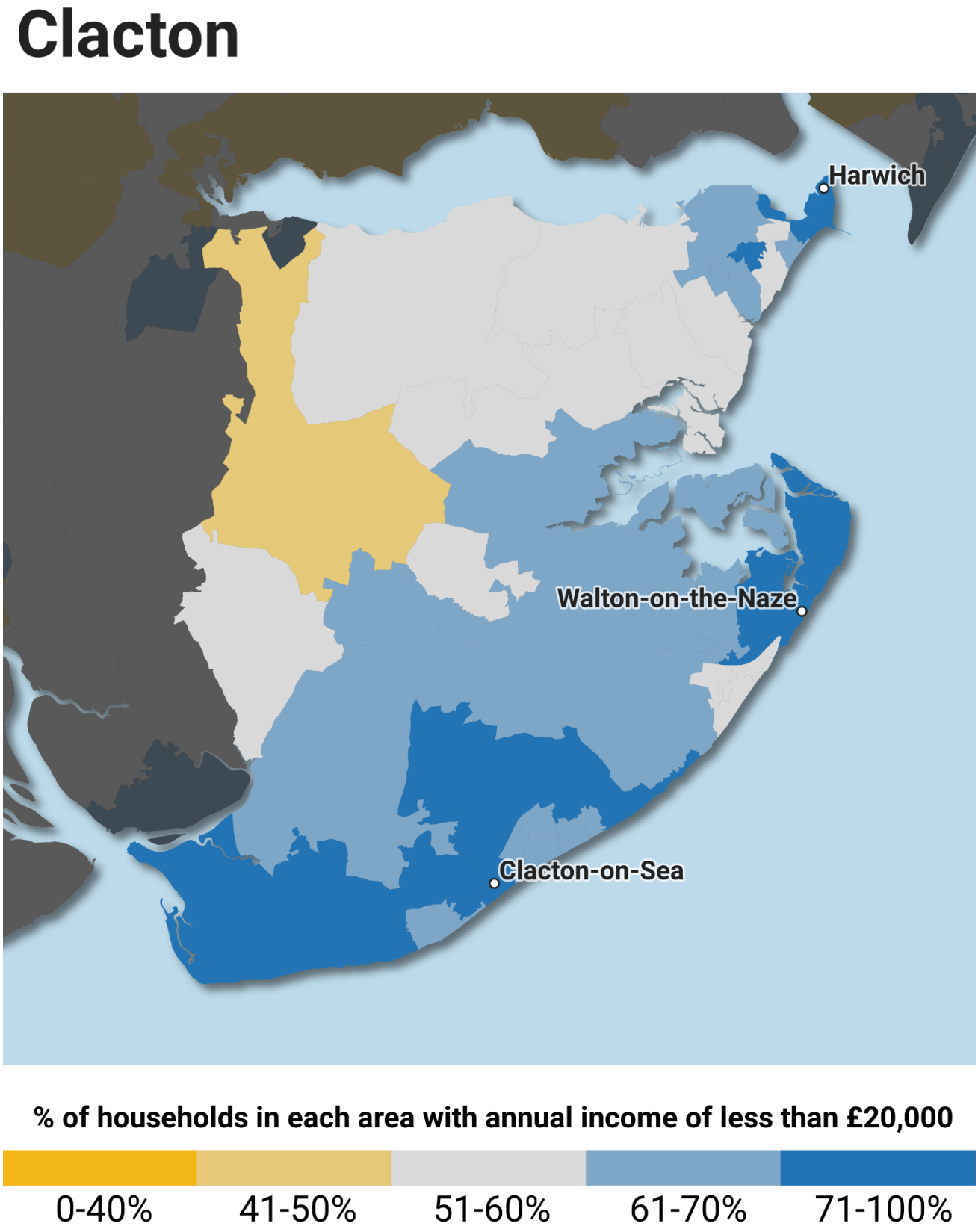
Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

FIGURE 3.5: the local household income distribution for Harrogate



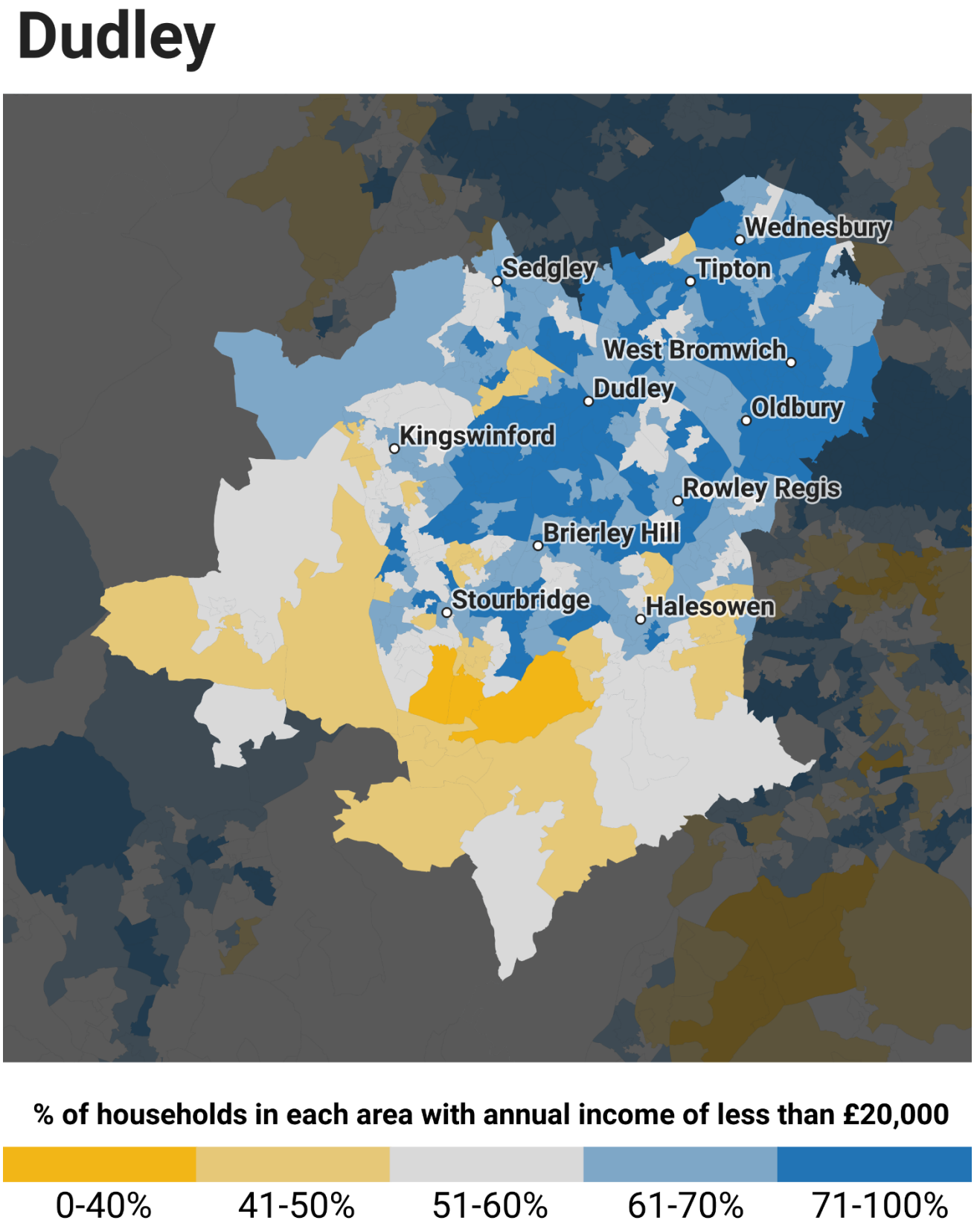
Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

FIGURE 3.6: the local household income distribution for Clacton



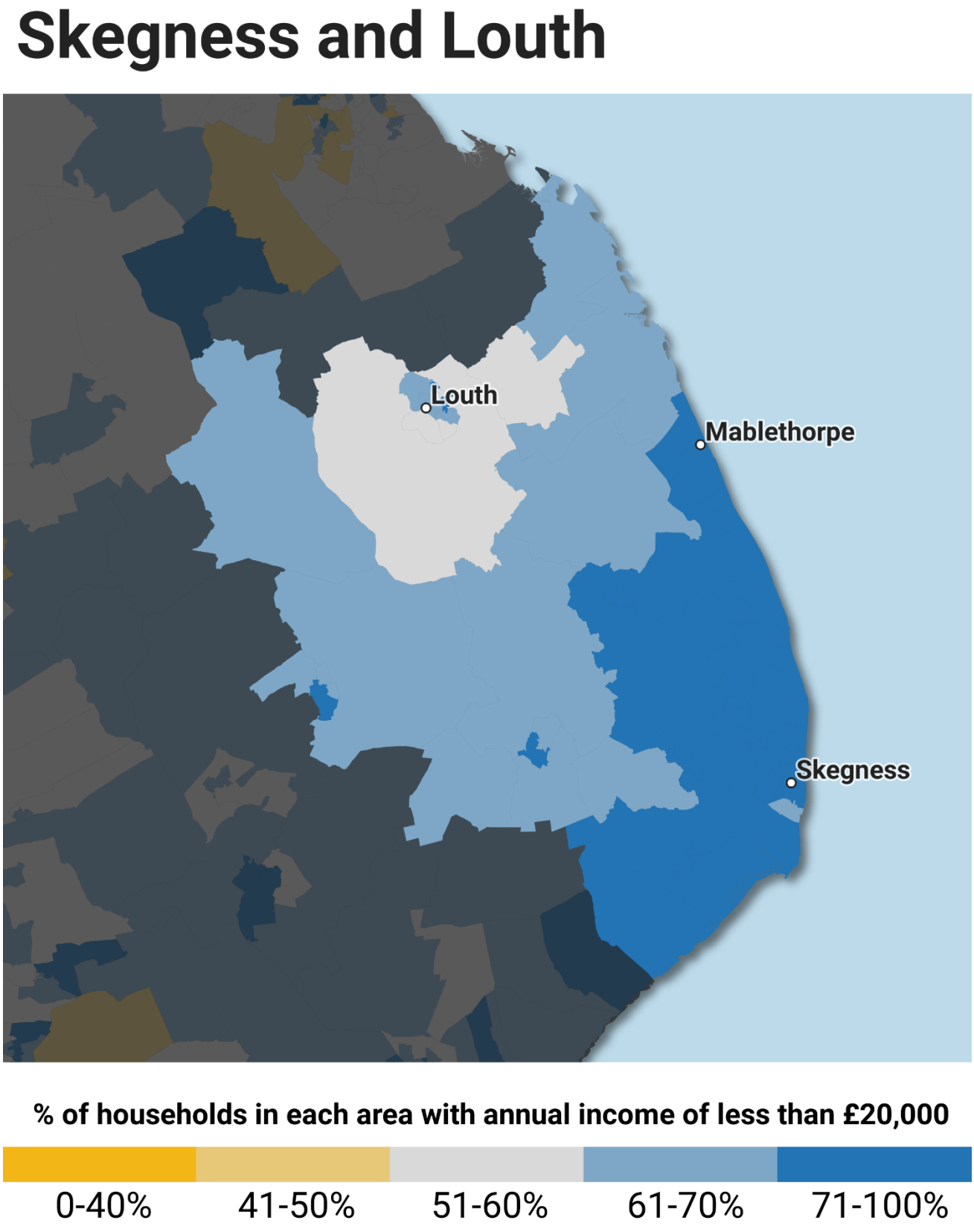
Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

FIGURE 3.7: the local household income distribution for Dudley



Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

FIGURE 3.8: the local household income distribution for Skegness and Louth



Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016

4. LOCAL EXTREMES: THE 20:20 INDEX

4.1 Understanding local economic imbalances

The Gini coefficient is the most common single metric used when attempting to understand income inequality. It has the advantage of being widely understood, relatively easy to compute, and suitable for use at different spatial scales. Yet it is only one of a suite of indicators that can be used to assess income inequality, and our view is that using the Gini coefficient in isolation is unlikely to be sufficient for developing the kind of deep, nuanced understanding of inequality that can help policymakers on the ground. Therefore, we seek here to supplement the Gini measure with two further metrics, one of which is presented in this Chapter and the other in Chapter 5.

Ideally, we would use fine-grained household income data to derive more detailed distributional measures of inequality to supplement the Gini coefficient, but this is not possible with the data currently available at a sub-national level. The reason for looking at the nature of the income disparities within areas is that the Gini coefficient is known to be sensitive to the nature of the underlying distribution, with recent work by Gastwirth (2017) suggesting that it is more sensitive to changes in the lower and upper parts of the distribution than the middle, as is often assumed.

In order to get a sense of the extent to which income distributions within areas across England might be imbalanced, we borrow conceptually from the United Nations, OECD and others in their use of a ratio measure of inequality. In particular, we drew inspiration from the 'income quintile ratio' presented in the United Nations Development Programme Human Development Report, which is a ratio between the richest 20% of the population and the poorest 20% (United Nations, 2015). Our 20:20 Index is therefore conceptually connected to previous approaches and identifies what proportion of areas within each TTWA are within the 20% most or least deprived nationally. Thus, the 20:20 Index is a nationally-calibrated, locally contextualised income inequality indicator.

4.2 Computing the 20:20 Index

In order to understand more about the extent to which local areas across England are imbalanced with respect to income, this Chapter presents a simple new metric. As discussed in Chapter 2, it is based on the proportion of households in each Lower-Layer Super Output Areas (LSOA) who are classified as income deprived, based on the English Indices of Deprivation, the latest edition of which were published in September 2019. Further details of this indicator are provided in the accompanying Technical Report.

The underlying variables for this dataset are from 2015 and include the following non-overlapping indicators, including new data on Universal Credit:

- Adults and children in Income Support families
- Adults and children in income-based Jobseeker's Allowance families

- Adults and children in income-based Employment and Support Allowance families
- Adults and children in Pension Credit (Guarantee) families
- Adults and children in Working Tax Credit and Child Tax Credit families not already counted, and whose equivalised income (excluding housing benefit) is below 60 per cent of the median before housing costs
- Asylum seekers in England in receipt of subsistence support, accommodation support, or both
- Adults and children in Universal Credit families where no adult is classed within the 'Working - no requirements' conditionality regime

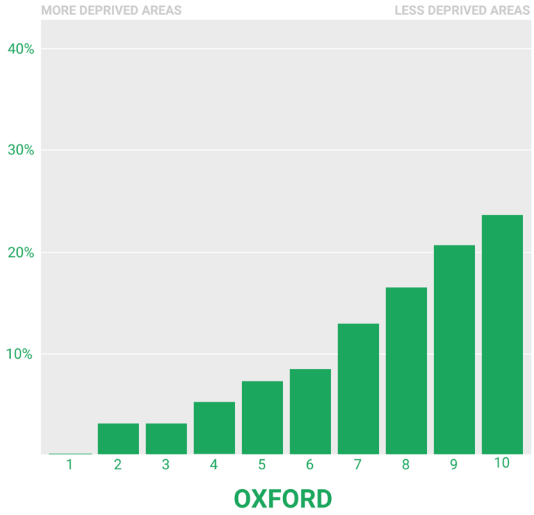
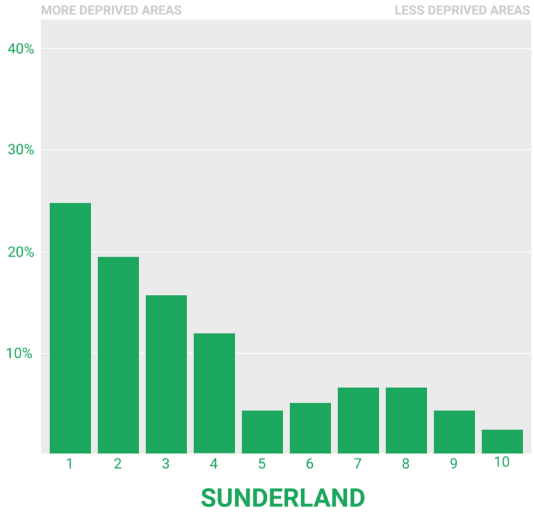
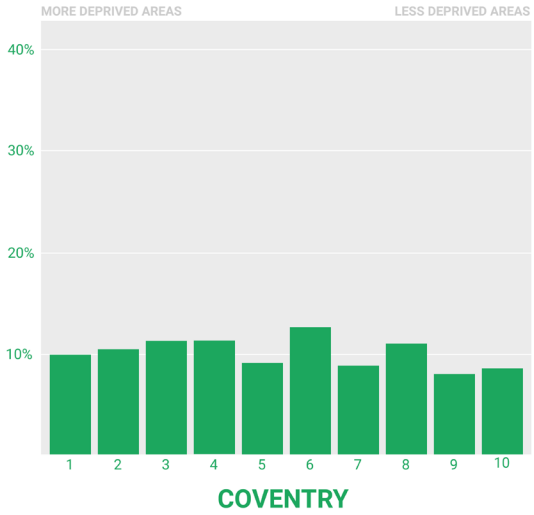
These data are then converted into a single score for each area and this is then ranked, so that England's 32,844 LSOAs can be positioned relative to each other. This constitutes the income domain of the 2019 Indices of Deprivation. We are then able to calculate the proportion of LSOAs in each travel to work area that fall within the most or least deprived 20% of all areas nationally and compute a ratio between the two. Before we do this, and in order to shed more light on the nature of the overall distribution of more and less deprived areas within individual TTWAs, the next section takes a closer look at the different kinds of distribution that currently exist.

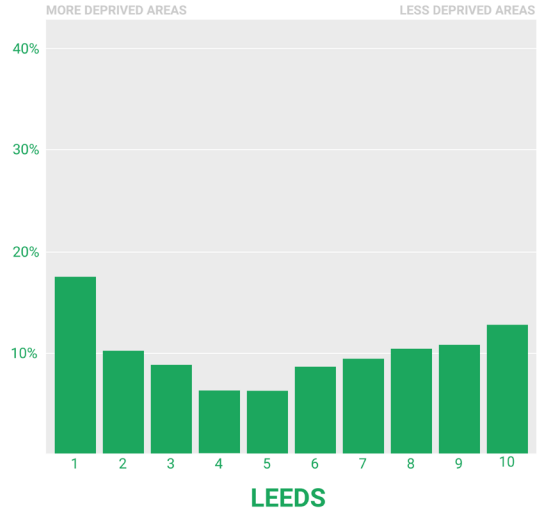
4.3 Comparing distributions within TTWAs

In the course of calculating the 20:20 Index for each TTWA, we first looked at the full distribution of areas in each TTWA in relation to which national decile of the income domain they were in. In doing so, it was obvious that even at this larger spatial scale there is a significant degree of variation in the level of economic imbalance within areas. Upon closer inspection of the distributions, it became clear that it is actually possible to categorise area-based income distributions into one of six types.

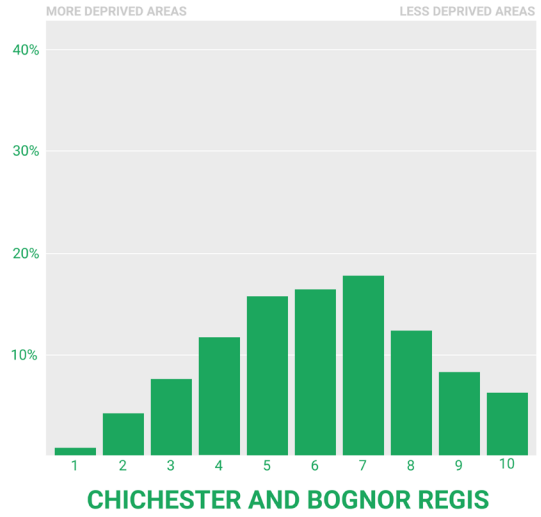
For example, in some areas the proportion of LSOAs in each national income decile is similar, resulting in a fairly flat distribution. In other areas there are a very high proportion of areas in the least deprived decile, and far fewer in others. 'Least deprived' in this context is not necessarily the same as 'affluent', but there is considerable overlap between the two. Conversely, in some TTWAs there are many more LSOAs in the most deprived decile than any other. Examples of these distributions are provided in Figure 4.1 below, with an illustrative description of each type of distribution.

FIGURE 4.1: area-based income distributions relating to the Indices of Deprivation 2019

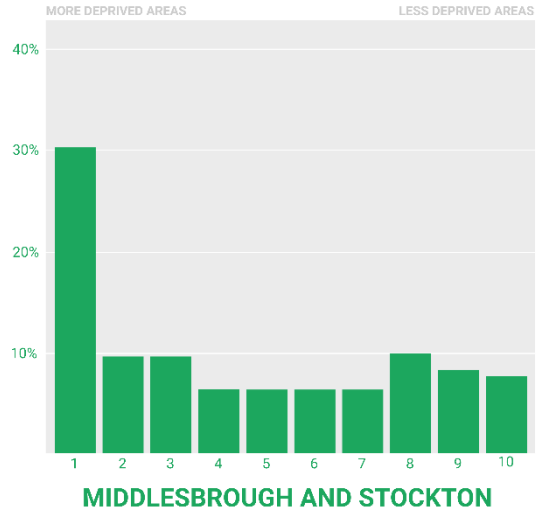
Distribution	Description
	**'Stacked right'** These charts show the percentage of LSOAs in a TTWA that are in each national income deprivation decile, with the most deprived areas to the left. Oxford's TTWA has an increasing proportion of LSOAs in each deprivation decile as we move further to the right of the chart (i.e. the less deprived side). In this case there are a far greater proportion of less income deprived areas.
	**'Stacked left'** In the opposite case of the above, Sunderland's TTWA has far more areas in the most deprived decile and an increasingly lower proportion as we move to the right of the chart. With the exception of some of the middle deciles, this is almost the exact inverse of the Oxford case.
	**'Flat'** In Coventry's TTWA, each income deprivation decile has between 8 and 13% of the area's LSOAs in it, giving the TTWA a roughly equal profile in this respect. There will of course be some internal variation within LSOAs in terms of income but, overall, Coventry is one of the more equal TTWAs by this measure.



'U-shaped'
Leeds' TTWA exhibits a subtle 'U-shaped' distribution, with the most and least deprived deciles having the highest proportion of LSOAs in them and the middle deciles relatively fewer, so that the chart dips in the middle. The proportion of areas in the most deprived decile is highest here. This distribution is the least common across all TTWAs in England.



'Bulging middle'
Reminiscent of the 'normal', or 'bell curve' distribution, Chichester and Bognor Regis' TTWA has many more areas in the middle deciles of the income deprivation distribution than any other. There are very few LSOAs in the least and most deprived deciles and 60% are within the middle four deciles.



'L-shaped'
In Middlesbrough and Stockton's TTWA we see a different kind of distribution altogether. The proportion of LSOAs in deciles 2 to 10 are relatively equal, but in the most deprived decile (1), on the left of the chart, we can see that it contains over 30% of all LSOAs, giving the distribution a distinctive 'L' shape. A small number of LSOAs in England are 'L-shaped'.

Source: English Indices of Deprivation, 2019

These distributions, as mundane as they may seem, have important real-world implications but they also play a part in influencing the final figure derived in Gini coefficient calculations. In the previous Chapter, we found that Sunderland was one of the top 20 'least

unequal' TTWAs in England using the Gini measure, yet we can see from the chart that in terms of income deprivation it is highly skewed towards the more deprived deciles. There are some more complex underlying methodological explanations for this, mainly relating to the fact that the majority of LSOAs in Sunderland contain households with lower incomes, but at this stage it is worth noting in order to highlight the fact that different measures of inequality can often produce different, even contradictory, results.

4.4 The most and least unequal areas on the 20:20 Index

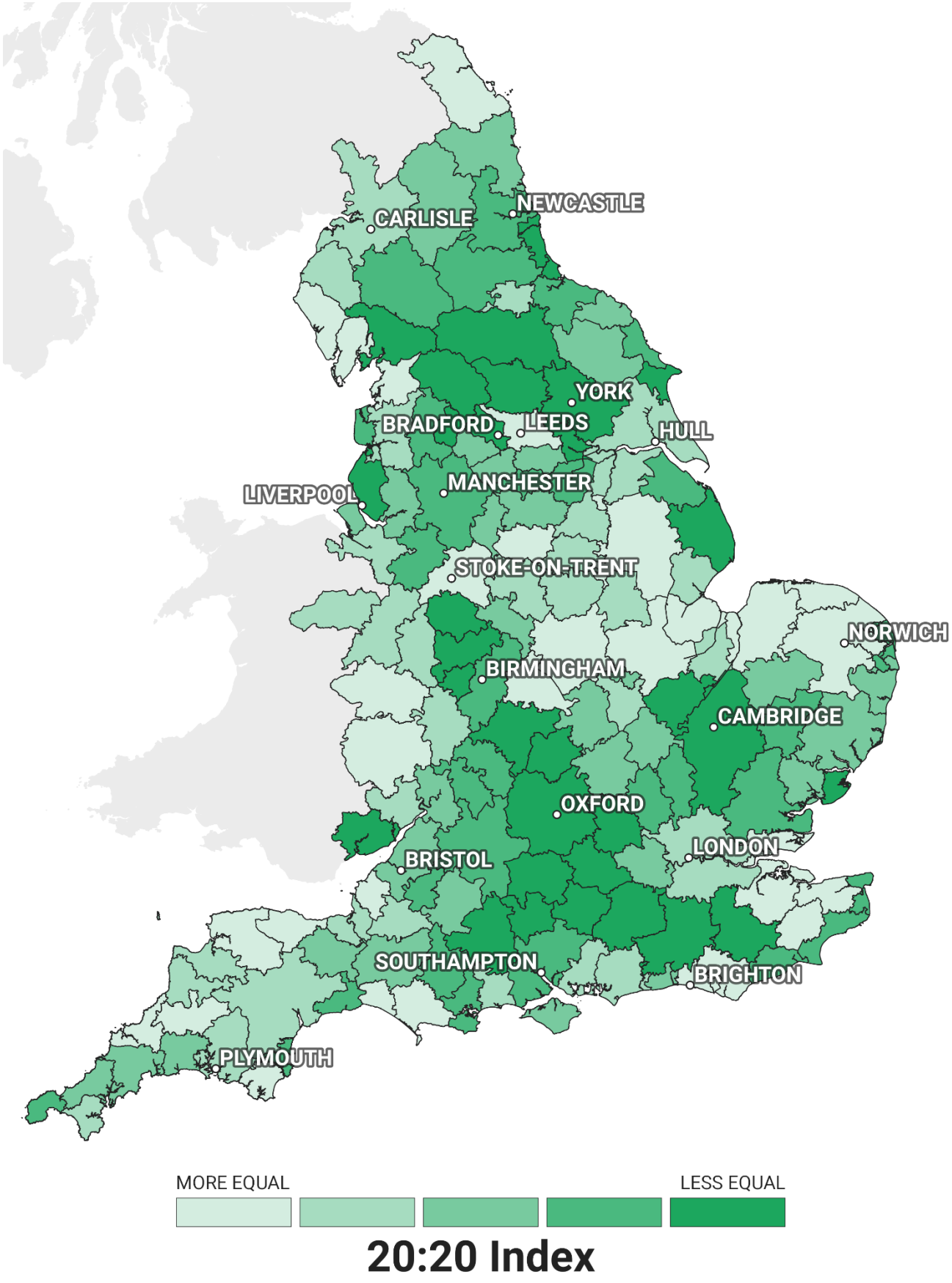
The 20:20 Index is a simple ratio between the proportion of LSOAs in each TTWA that fall within the most or least deprived decile nationally on the income domain of the 2019 Indices of Deprivation. In some cases, such as in Basingstoke or Bridlington, there are no areas within the TTWA that fall within the least or most deprived 20% nationally. Therefore, in order to produce a nationally comparable ranking based on the ratio between the top and bottom 20% we have used the absolute difference between a count of the most/least deprived figures and then standardised this figure using the total number of LSOAs in each TTWA. Therefore, an area with 30% of its areas in the least deprived quintile nationally, but none in the most deprived quintile, would be 'highly unequal' on this measure. A national map of the 20:20 Index for England is shown in Figure 4.2. The 20 most and least unequal English TTWAs on this measure are then shown in Tables 4.1 and 4.2, with the full table presented in Appendix 3.

In the list of 20 most unequal TTWAs (Table 4.1) we can see that in some locations the high inequality score is because there are far more areas in the least deprived 20%. This is true for the first four TTWAs on the list: Basingstoke, Guildford and Aldershot, Kendal, and High Wycombe and Aylesbury. In Hartlepool (5th), Bridlington (12th), Liverpool (16th) and Sunderland (19th) the opposite is true, and far more areas in these TTWAs are among the 20% most deprived nationally.

These differences serve as a useful reminder of two key points with respect to inequality. The first relates to the question of methodology and the fact that the results we arrive at depend upon the methods we use. In this case, our inequality measure highlights inequality relating to area-based income imbalance within labour market areas, rather than the income distribution as a whole. The second point is that significant inequality can arise as a result of 'bunching' at either end of the socio-economic spectrum. Thus, Basingstoke can be said to be highly imbalanced in relation to this measure since there are no areas among England's most deprived 20% with the TTWA. The opposite is true in Bridlington.

It is important to remember, as we mention above, that the Indices of Deprivation measure areas rather than individual people, so we return to this point in Chapter 8 with reference to household-level income data in order to shed more light on the extent to which area-based measures might actually mask underlying variation.

FIGURE 4.2: The 20:20 Index for all TTWAs in England



Source: English Indices of Deprivation, 2019

Table 4.1: the 20 most unequal English TTWAs (20:20 Index)

Rank	TTWA	In most deprived 20%	In least deprived 20%	Difference	Difference as % of all LSOAs
1	Basingstoke	0	84	84	54.9
2	Guildford and Aldershot	8	212	204	50.2
3	Kendal	0	22	22	50.0
4	High Wycombe and Aylesbury	3	128	125	49.8
5	Hartlepool	34	4	30	48.4
6	Andover	0	23	23	47.9
7	Harrogate	2	51	49	47.1
8	Northallerton	0	31	31	45.6
9	Reading	12	169	157	45.4
10	Crawley	4	164	160	42.7
11	Newbury	1	34	33	41.8
12	Bridlington	12	0	12	41.4
13	York	9	91	82	41.2
14	Oxford	10	148	138	41.2
15	Cambridge	3	171	168	40.4
16	Liverpool	303	46	257	39.7
17	Leamington Spa	1	60	59	39.1
18	Tunbridge Wells	2	71	69	38.5
19	Sunderland	116	17	99	37.6
20	Huntingdon	1	38	37	36.3

Source: English Indices of Deprivation, 2019

In the list of the 20 least unequal TTWAs shown in Table 4.2 we once again observe a significant number of coastal areas, from Minehead (1st) to Weston-super-Mare (6th) and Medway (18th). On closer inspection, we can see that in some areas there are very few LSOAs in either the most or least deprived 20%, and in Minehead there are no LSOAs in this category. There are greater numbers in the top and bottom 20% in areas like Peterborough (8th), Southend (12th), Coventry (16th) and Leeds (20th).

When we look at the location of the most and least unequal TTWAs on a map (Figure 4.3), some spatial patterns are notable. For example, six of the least unequal areas on this measure are in the south west of England, and very few of the least unequal areas are in the north of England. Several of the least equal areas appear in an arc to the west and south of London, in addition to Cambridge and Huntingdon to the north. On a smaller scale, a cluster of unequal TTWAs appears to the north and west of Leeds in the north of England, and it is notable that Liverpool features among the 20 most unequal, since none of the other major English cities outside London do.

It is important to remember that this analysis is based on TTWAs rather than local authority boundaries. In theory, using this wider geographic boundary, based as it is on an area's

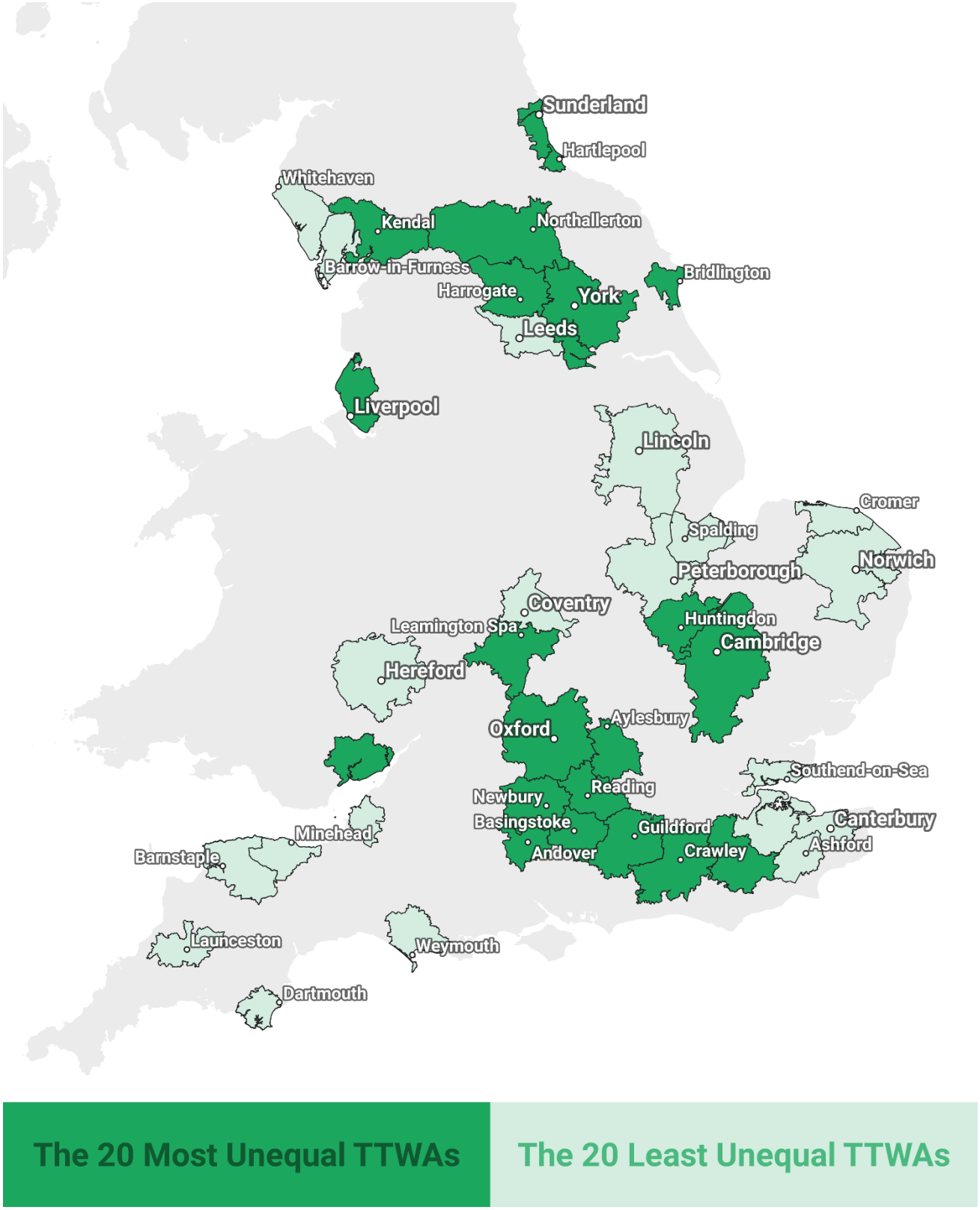
underlying functional economic geography, ought to have the effect of levelling out the extremes of income distributions. This is because local authority boundaries (Manchester being the classic case) are often very 'underbounded' in the sense that they do not encompass the entire functional urban area and instead often enclose a much poorer part of it. By contrast, some areas are 'overbounded' (Leeds being a good example) so that their local authority boundaries stretches well beyond the continuous urban fabric to include functionally separate locations (such as Wetherby in 'Leeds'). This is part of the reason for using the functional TTWA geography in the Atlas, yet even at this more appropriate spatial scale we see significant imbalances in some areas.

Table 4.2: the 20 least unequal English TTWAs (20:20 Index)

Rank	TTWA	In most deprived 20%	In least deprived 20%	Difference	Difference as % of all LSOAs
1	Minehead	0	0	0	0.0
2	Launceston	1	1	0	0.0
3	Kingsbridge and Dartmouth	1	1	0	0.0
4	Dorchester and Weymouth	7	7	0	0.0
5	Barrow-in-Furness	15	15	0	0.0
6	Weston-super-Mare	16	17	1	1.0
7	Ashford	9	8	1	1.3
8	Peterborough	37	34	3	1.4
9	Barnstaple	7	6	1	1.7
10	Spalding	1	2	1	2.0
11	Whitehaven	7	8	1	2.0
12	Southend	63	72	9	2.5
13	Canterbury	15	18	3	2.6
14	Hereford	6	9	3	3.0
15	Cromer and Sheringham	0	1	1	3.3
16	Coventry	74	60	14	3.8
17	Lincoln	35	27	8	3.9
18	Medway	57	72	15	4.1
19	Norwich	35	47	12	4.1
20	Leeds	139	118	21	4.2

Source: English Indices of Deprivation, 2019

FIGURE 4.3: The 20 most and least unequal TTWAs in England (20:20 Index)



Source: English Indices of Deprivation, 2019

4.6 What does this tell us?

The idea behind the 20:20 Index was to consider the extent to which economic imbalances were present within individual areas across England, but in a way that could not be picked up using the Gini coefficient alone. We may expect a relatively high level of economic imbalance within somewhat arbitrarily-drawn local authority boundaries but within larger functional areas like TTWAs the expectation is that this would be less of an issue.

However, recent research by Hincks et al. (2018) has demonstrated that functional geographies actually vary considerably by socio-economic group and for high earners in particular geographic employment horizons are much wider. What this means in practice is that high earners often commute well beyond TTWA boundaries owing to higher income opportunities elsewhere. For those on low incomes, travel horizons are much closer to home.

There is also a potentially important gender aspect here since the studies of the 'gender commute gap' have shown that women with children often work closer to home than their male counterparts (e.g. Clark and Wang, 2005). One artefact of this can be seen in Figure 4.3, in the arc of inequality across TTWAs that fall within the wider London commuter belt, including places like Aylesbury, Reading, Guildford and Crawley. This is also evident, to a lesser extent, in the cluster of the most unequal areas in the north of England, around York, Harrogate, Northallerton and Kendal (mostly quite rural TTWAs).

The geography of inequality for England that we see here is not the same as patterns observed when we simply map deprivation, or income across England. The 20-20 Index helps identify those areas where the proportion of people living in more deprived areas is either most similar to, or different from, the proportion living in less deprived areas and in this sense it provides a simple mapping of the extent to which Plato's 'city of the poor, city of the rich' statement is true of labour market areas in England.

Yet what we cannot see from this measure, or the Gini coefficient measure, is the extent to which neighbourhoods within TTWAs are spatially clustered to any significant degree. The maps at the end of Chapter 3 point to this being the case, but in order to provide a more formal assessment of the extent to which poverty and wealth might be dispersed or concentrated, a more sophisticated measure is needed, and this is what we develop in the next Chapter using a spatial statistical approach.

5. LOCAL INEQUALITY: 'CHEEK-BY-JOWL'?

5.1 'Dwellers in different zones': the geography of inequality

The two measures of inequality presented above offer important insights into the extent of the issue across England. Yet despite their usefulness, they do not explicitly tell us anything about the geography of inequality, so in this Chapter we employ a spatial statistical approach that does. Here we use the income domain from the 2019 Indices Deprivation to derive figures for each TTWA on the extent to which more or less deprived areas are spatially clustered. Previous work on this subject (e.g. Rae, 2012) has shown that deprivation in England is highly spatially concentrated and that these concentrations are persistent through time, but in studies of inequality the spatial component is often neglected. This Chapter is therefore an attempt to bring geography more explicitly into the discussion of local inequality.

Earlier, we cited Plato and his famous statement that 'any city, however small, is in fact divided into two'. Contemporary scholars of inequality also often cite from Benjamin Disraeli's novel 'Sybil, or The Two Nations' in which the characters discuss societal divisions in relation to 'dwellers in different zones', simply framed as 'the rich and the poor' (extract below).

> *'Two nations; between whom there is no intercourse and no sympathy; who are as ignorant of each other's habits, thoughts, and feelings, as if they were dwellers in different zones, or inhabitants of different planets; who are formed by a different breeding, are fed by a different food, are ordered by different manners, and are not governed by the same laws.'*
>
> *'You speak of—' said Egremont, hesitatingly.*
>
> *'THE RICH AND THE POOR.'*
>
> Disraeli, 1845

The key point here is that in both these references the underlying spatial character of inequality is evident, either in relation to cities being 'divided into two' or in the hyperbole of *Sybil*, of being 'inhabitants of different planets'. The extent to which such claims hold true today can be tested empirically using a spatial statistical approach, and this is what we present in Chapter 5.

Our approach helps quantify the extent to which, within individual TTWAs, more or less deprived neighbourhoods are clustered together or, conversely, arranged in a more random, dispersed pattern.

5.2 The importance of geography

In the academic literature on cities, neighbourhoods and poverty there is a long-running debate about the extent to which 'area' or 'neighbourhood' effects are important. Proponents argue that the geographic context within which individuals live can have a significant effect on the health, opinions or behaviours of individuals, above and beyond any individual characteristics (e.g. Atkinson and Kintrea, 2001, van Ham, et al., 2012).

Critics argue that such effects are exaggerated, incorrectly specified, or just plain wrong (Slater, 2013). Yet the balance of evidence suggests that where we live, even taking into account individual circumstances and other non-areas-based characteristics, can be an important contributing factor in determining peoples' life chances (e.g. Musterd, et al., 2019). For this reason we believe it is important to include an inherently spatial metric in the measurement of inequality.

Beyond such seemingly prosaic academic debates, there are important policy reasons for looking at the topic of spatial clustering of more deprived areas, and the geography of inequality more generally. This relates to the crucial question of whether social policy should be spatially blind (e.g. take an individual-level approach to welfare provision, *regardless* of where people live), or whether there should be some area-based component that recognises the potentially unique challenges faced by individuals living in certain areas. An example of this could be in a highly deprived labour market area where areas of concentrated poverty are far from employment opportunities, transport is poor and wages are low, resulting in higher than average levels of labour market exclusion. Another example might be in areas of low housing affordability, where even relatively wealthy residents barely earn enough to cover the cost of living, and workers have to endure long commutes as a result. The regional dimensions of these issues, in relation to labour market mobility, have been explored recently in a series of reports by the Resolution Foundation (e.g. Clarke, 2017; Judge, 2019) and over many years by Beatty and Fothergill (e.g. 1996).

Our view is that geography is an absolutely fundamental component of understanding inequality, even if it is not the only one. Therefore, we have calculated a measure of spatial autocorrelation for every TTWA in England using Moran's I, one of the most common methods for understanding geographic segregation. Conceptually, this metric works quite like the more well-known correlation coefficient, which also ranges from a maximum value of 1.0 to a minimum value of -1.0.

Further details of the method are provided in our accompanying Technical Report but, put simply, Moran's I tends toward its maximum value of 1.0 where all similar areas are clustered together spatially. Moran's I tends towards it minimum value of -1.0 when dissimilar areas are located adjacent to each other. A perfect example of this would be a chess board, where every neighbouring square is a different. When Moran's I is equal to zero, this indicates a high degree of spatial randomness, where there is no discernible pattern. As a rule, a Moran's I value of above 0.3 or below -0.3 is usually considered to be indicative of significant spatial clustering.

5.3 A 'Cheek-by-Jowl' Index with Moran's I

The somewhat abstract concept of spatial autocorrelation, and particularly indicators like Moran's I, can often cause confusion, so it is useful to think of it as a kind of 'cheek-by-jowl' index in that it helps identify locations where 'the rich' and 'the poor' are either living in neighbourhoods right next to each other, or whether poorer areas and richer areas tend to cluster with their own types. It is important to point out here that the Indices of Deprivation is an area-based measure rather than an individual measure, a topic which we discuss further in Chapter 8. The key point here is that across England we are much more likely to see geographic concentrations of areas in the top and bottom 20% of the income domain of the 2019 Indices of Deprivation than we are to see such areas neighbouring each other. This is why the term 'birds of a feather flock together' sometimes appears in the academic literature on this topic (e.g. Sohn, 2004).

But of course this Atlas is about understanding local inequalities, so we have calculated the level of spatial clustering *within* all of England's TTWAs. The top 20 areas in England with the highest degree of spatial clustering are shown in Table 5.1. In these areas, the high Moran's I values can be seen as a kind of empirical confirmation of Plato and Disraeli in that the tendency here is for areas of high or low deprivation to be clustered together spatially.

Particularly notable is the extent to which several of England's major urban labour market areas exhibit high degrees of geographic inequality on this measure, including Hull (1st), Liverpool (3rd), Birmingham (4th), Leeds (6th), Bradford (10th) and Manchester (19th). Once again, we also see some coastal areas high on the list, including Great Yarmouth (7th), Blackpool (9th), Grimsby (15th) and Weston-super-Mare (16th).

The areas with the lowest level of spatial concentration on this measure are shown in Table 5.2, for reference, since this measure is about understanding the extent to which localities exhibit high levels of spatial inequality. Many of the areas that feature in Table 5.2 are smaller, rural or do not contain many areas at either end of the income deprivation spectrum. Nonetheless, we are able to say that in these areas the spatial patterning of deprivation is close to random, at least at the scale of individual LSOAs. The full list of TTWAs on this measure is provided in Appendix 4.

What is more useful in this instance is to look at the underlying spatial patterns which have an impact upon the derivation of Moran's I in the first place. Therefore, in Figures 5.1 to 5.10 we have presented individual maps for a selection of TTWAs in the top 20, including Hull, Liverpool, Birmingham and London. In order to highlight the spatial dislocation between the most and least deprived areas in each TTWA, only the top and bottom 20% of LSOAs on the income domain are shown, in addition to the Moran's I value for each area. However, to be clear, all LSOAs within each TTWA were included in the calculation of Moran's I.

Table 5.1: the 20 TTWAs with the highest level of spatial clustering (Moran's I)

Rank	TTWA	Moran's I
1	Hull	0.65
2	Birkenhead	0.63
3	Liverpool	0.63
4	Birmingham	0.61
5	Derby	0.60
6	Leeds	0.60
7	Great Yarmouth	0.59
8	Barrow-in-Furness	0.58
9	Blackpool	0.58
10	Bradford	0.58
11	Wolverhampton and Walsall	0.56
12	Portsmouth	0.56
13	Middlesbrough and Stockton	0.56
14	Sheffield	0.56
15	Grimsby	0.56
16	Weston-super-Mare	0.55
17	Bristol	0.55
18	Leicester	0.52
19	Manchester	0.52
20	London	0.52

Source: English Indices of Deprivation, 2019

Table 5.2: the 20 TTWAs with the lowest level of spatial clustering (Moran's I)

Rank	TTWA	Moran's I
1	Kingsbridge and Dartmouth	-0.07
2	Hexham	-0.06
3	Bude	-0.04
4	Bideford	-0.02
5	Bridport	-0.02
6	Cinderford and Ross-on-Wye	-0.01
7	Sidmouth	-0.01
8	Blandford Forum and Gillingham	0.00
9	Boston	0.01
10	Oswestry	0.04
11	Wadebridge	0.05
12	Wisbech	0.07
13	Malton	0.07
14	Salisbury	0.08
15	Kendal	0.09
16	Skipton	0.09
17	Ludlow	0.10
18	Trowbridge	0.11
19	Cromer and Sheringham	0.11
20	Shrewsbury	0.12

Source: English Indices of Deprivation, 2019

FIGURE 5.1: Spatial clustering of LSOAs in Hull (Moran's I)

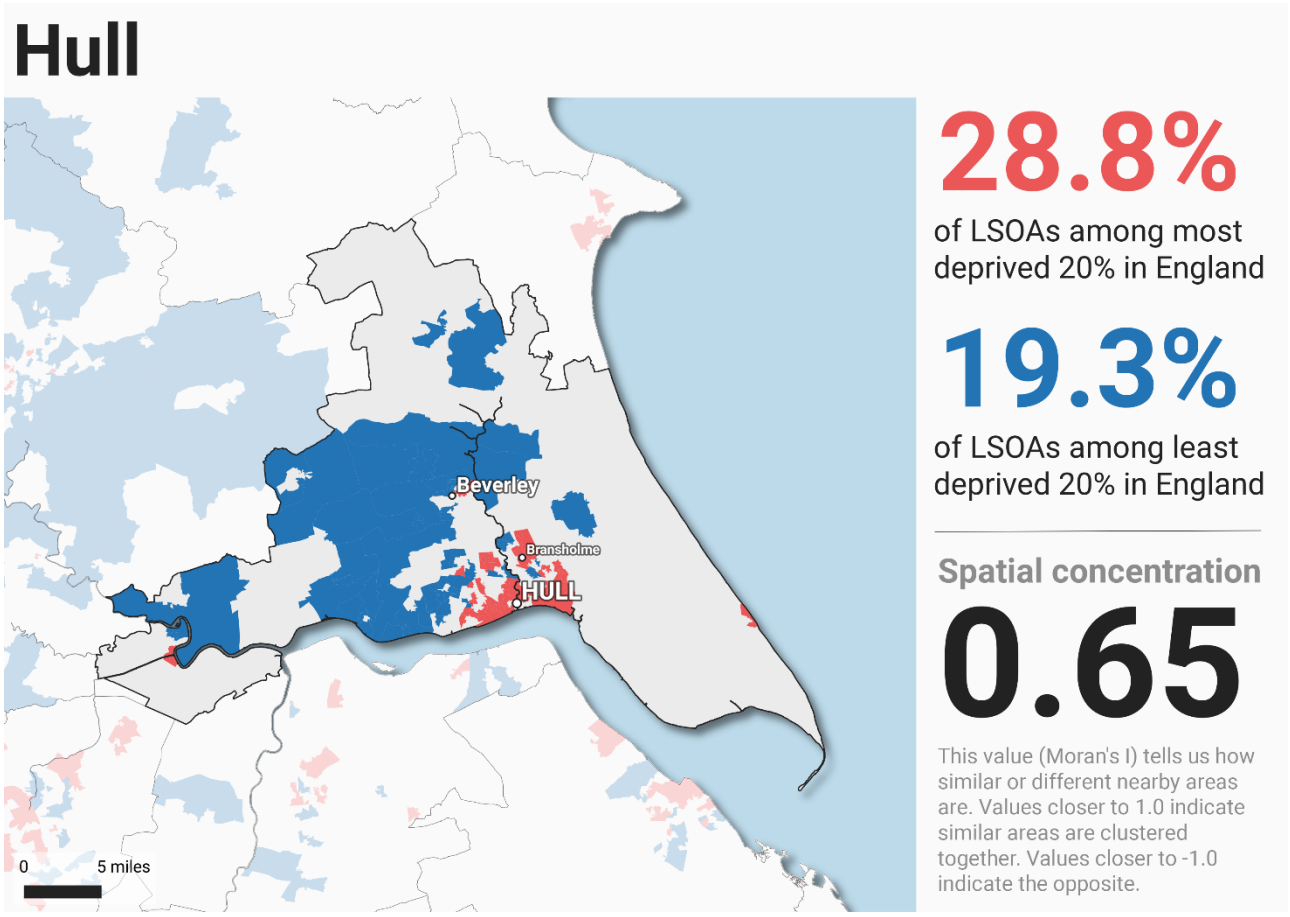


FIGURE 5.2: Spatial clustering of LSOAs in Liverpool (Moran's I)

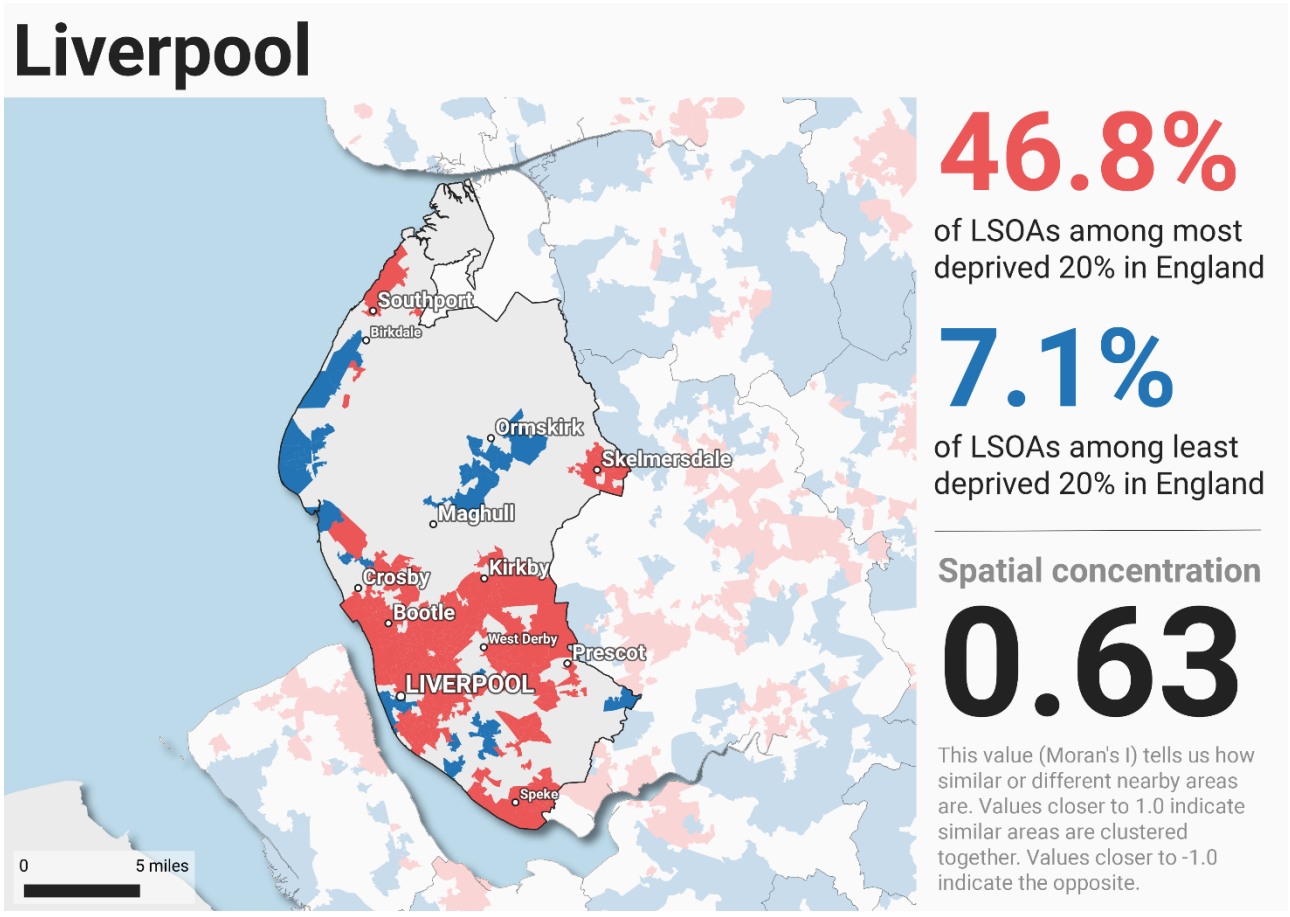


FIGURE 5.3: Spatial clustering of LSOAs in Birmingham (Moran's I)

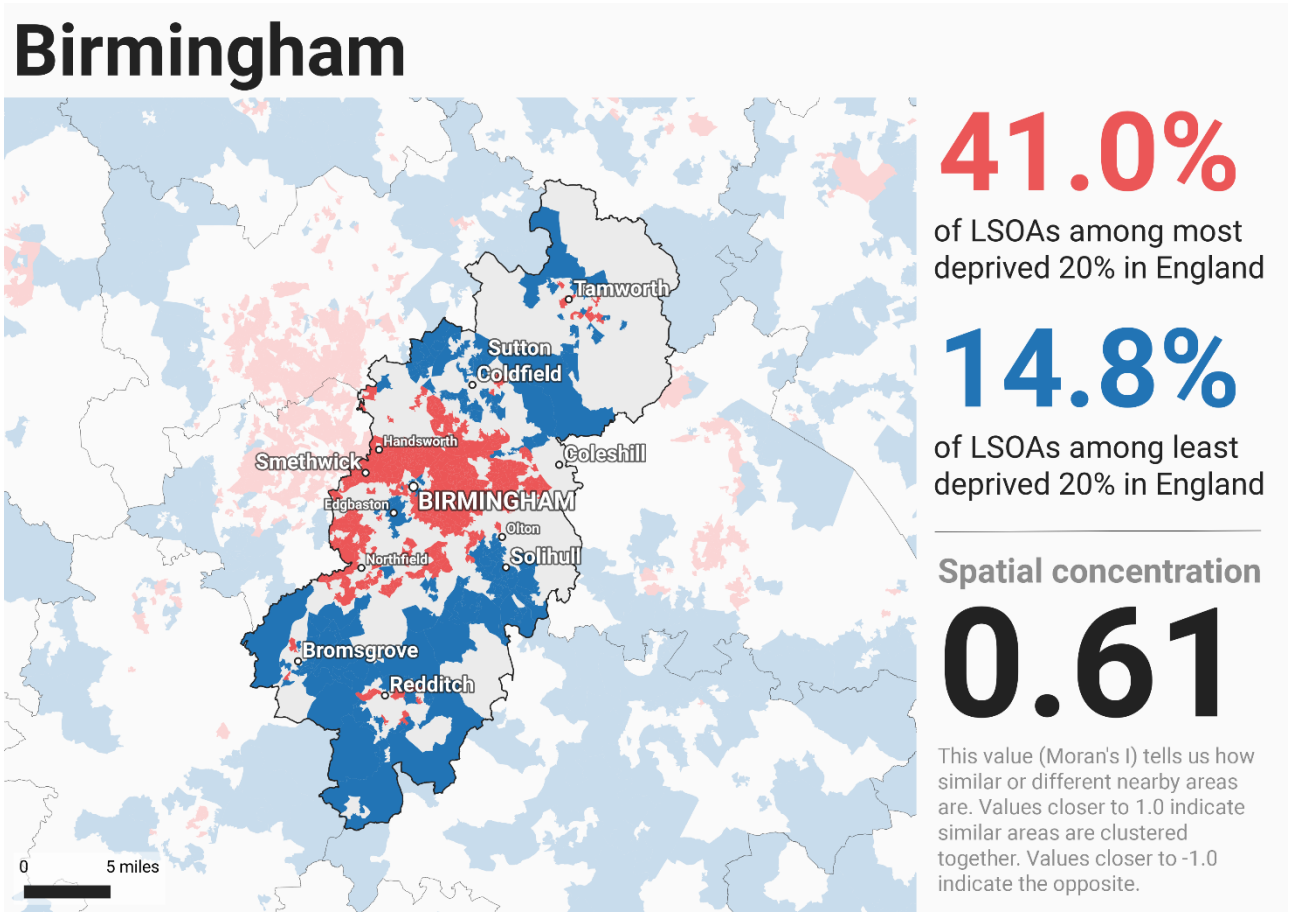


FIGURE 5.4: Spatial clustering of LSOAs in Leeds (Moran's I)

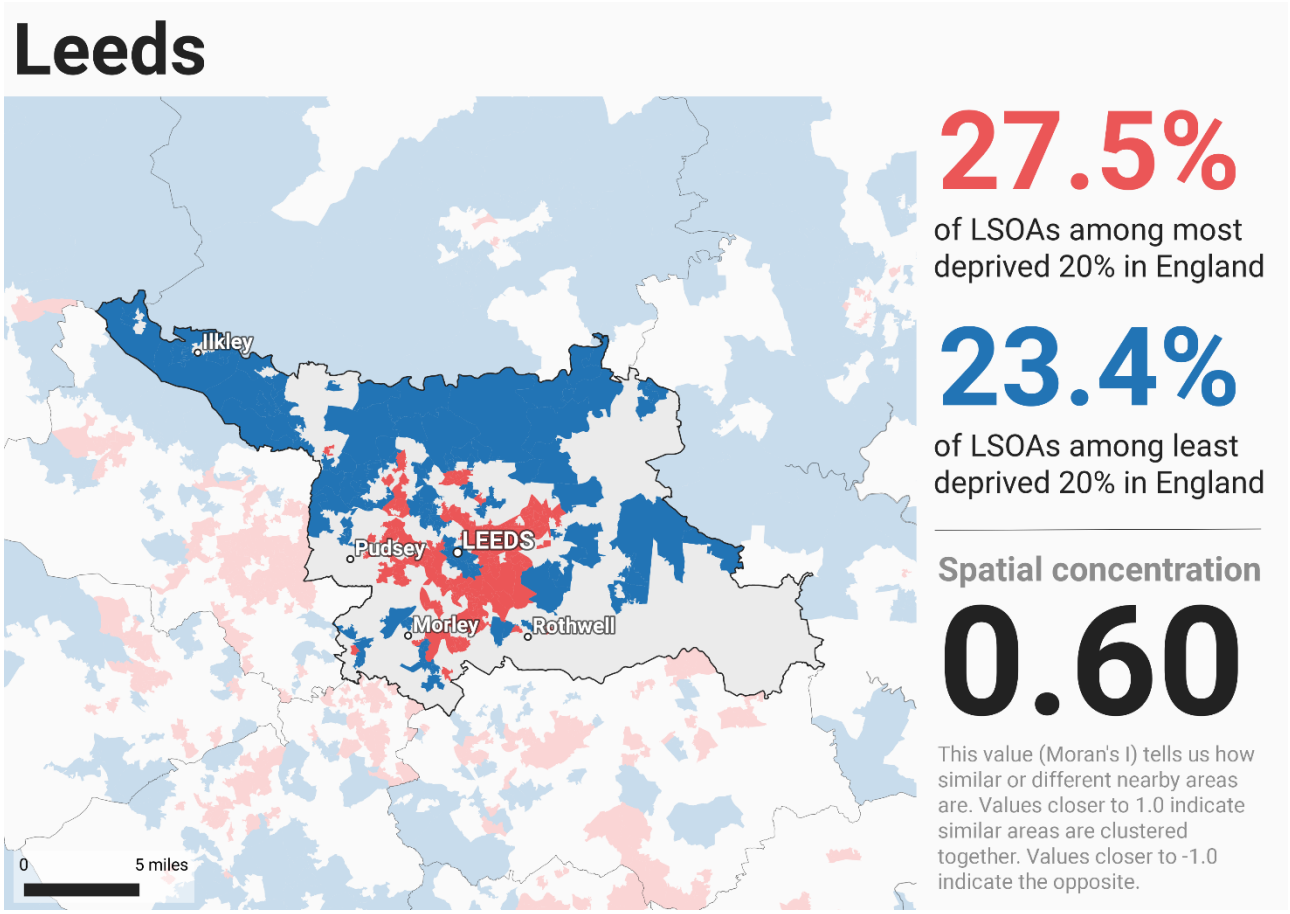


FIGURE 5.5: Spatial clustering of LSOAs in Great Yarmouth (Moran's I)

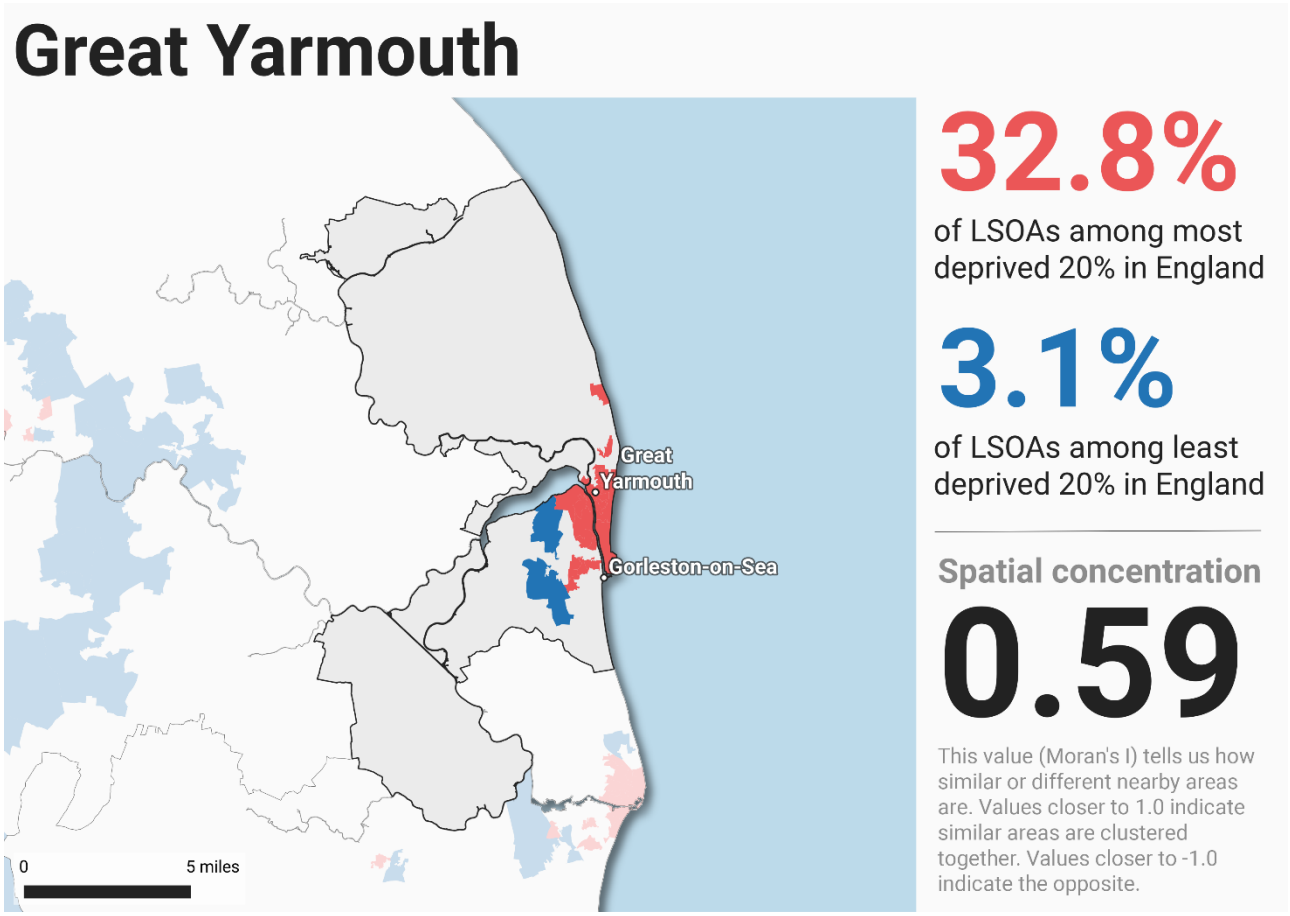


FIGURE 5.6: Spatial clustering of LSOAs in Blackpool (Moran's I)

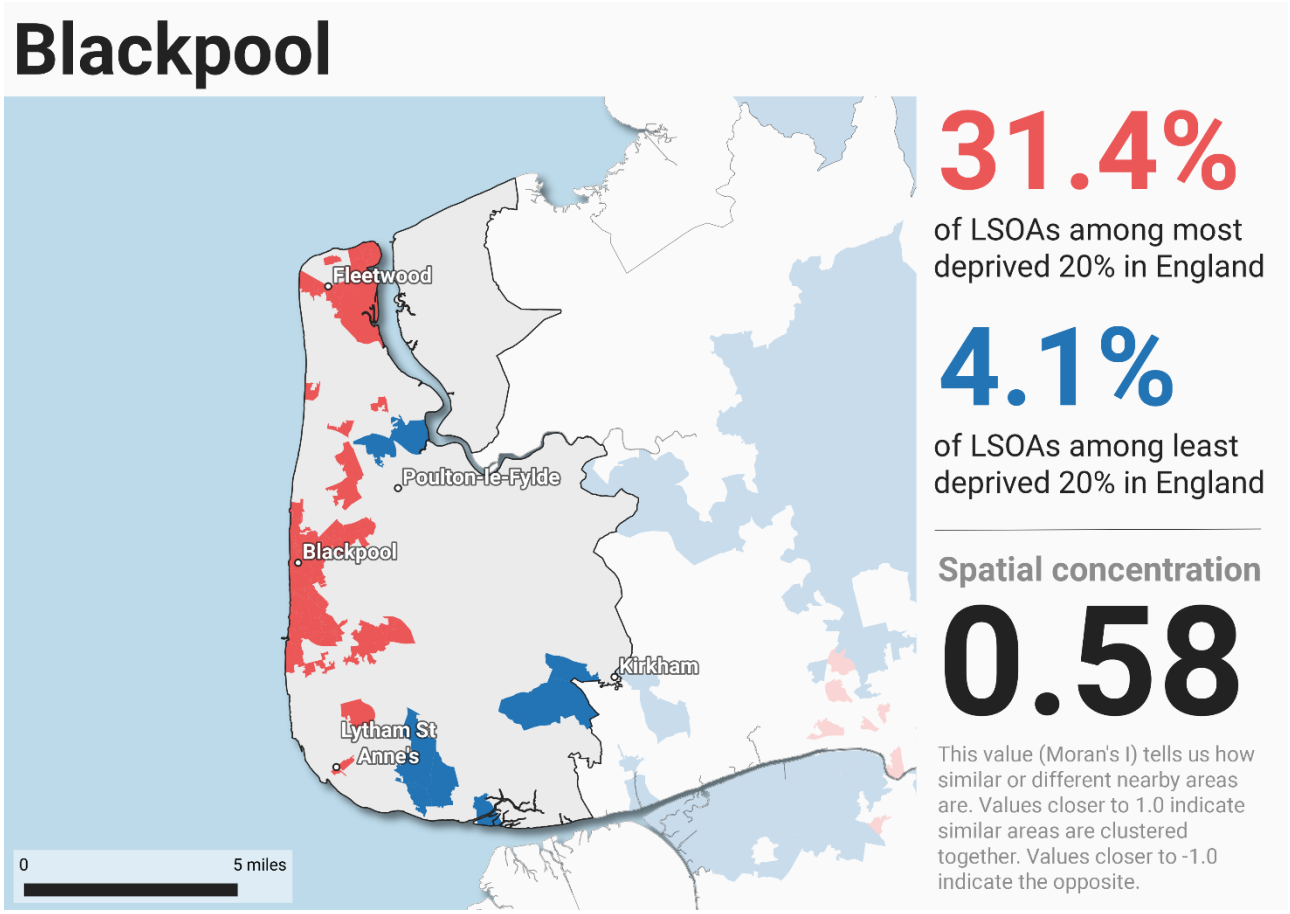


FIGURE 5.7: Spatial clustering of LSOAs in Sheffield (Moran's I)

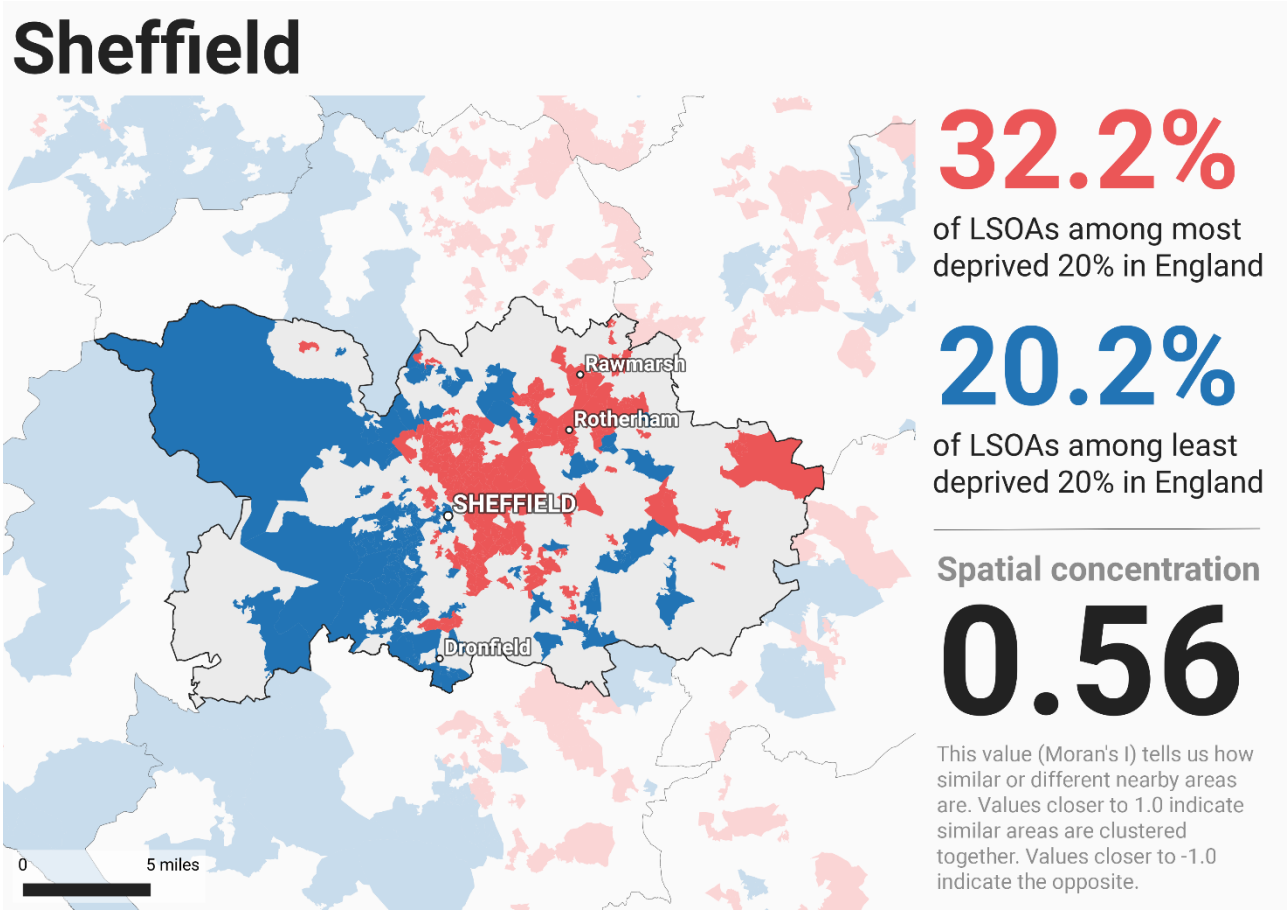


FIGURE 5.8: Spatial clustering of LSOAs in Middlesbrough and Stockton (Moran's I)

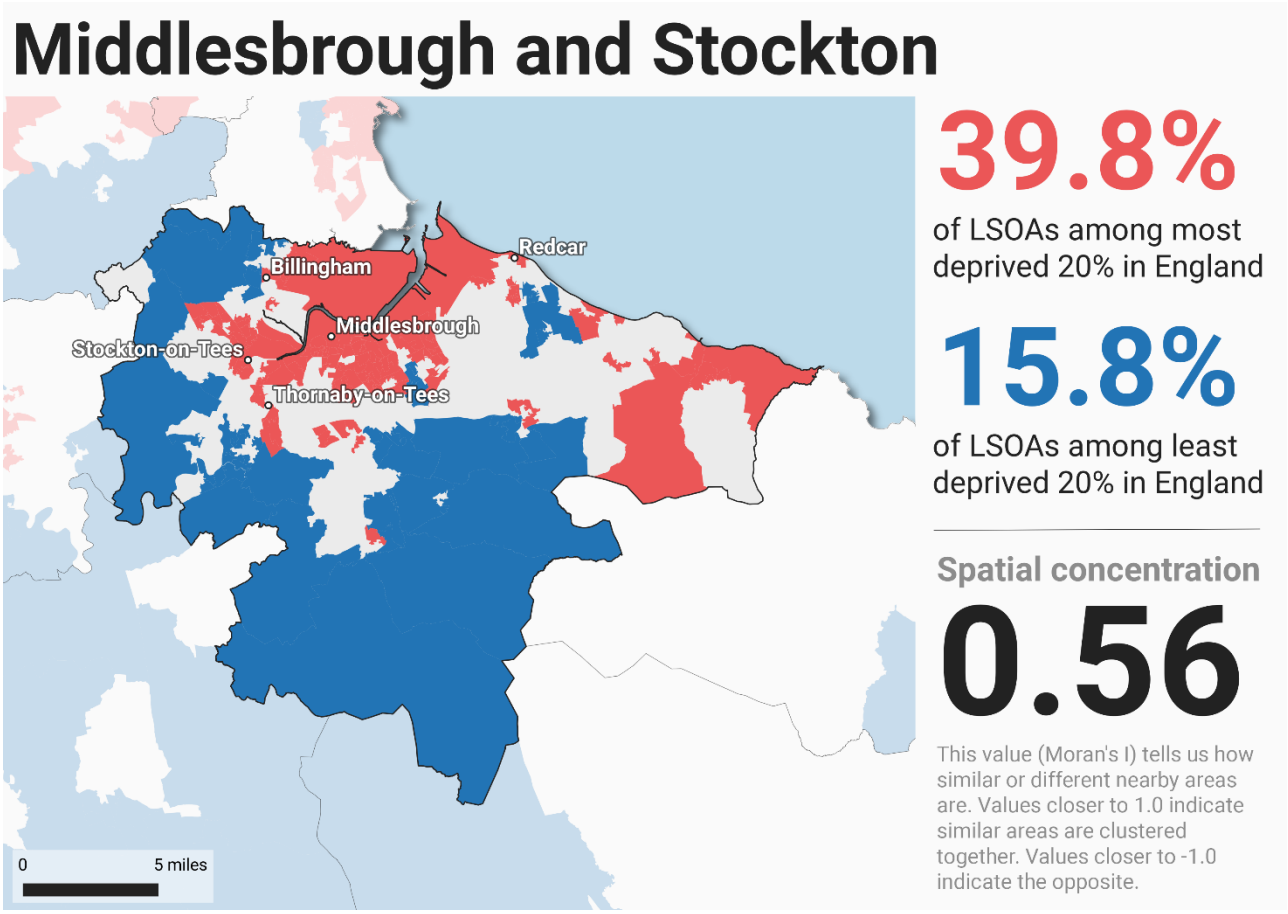


FIGURE 5.9: Spatial clustering of LSOAs in Manchester (Moran's I)

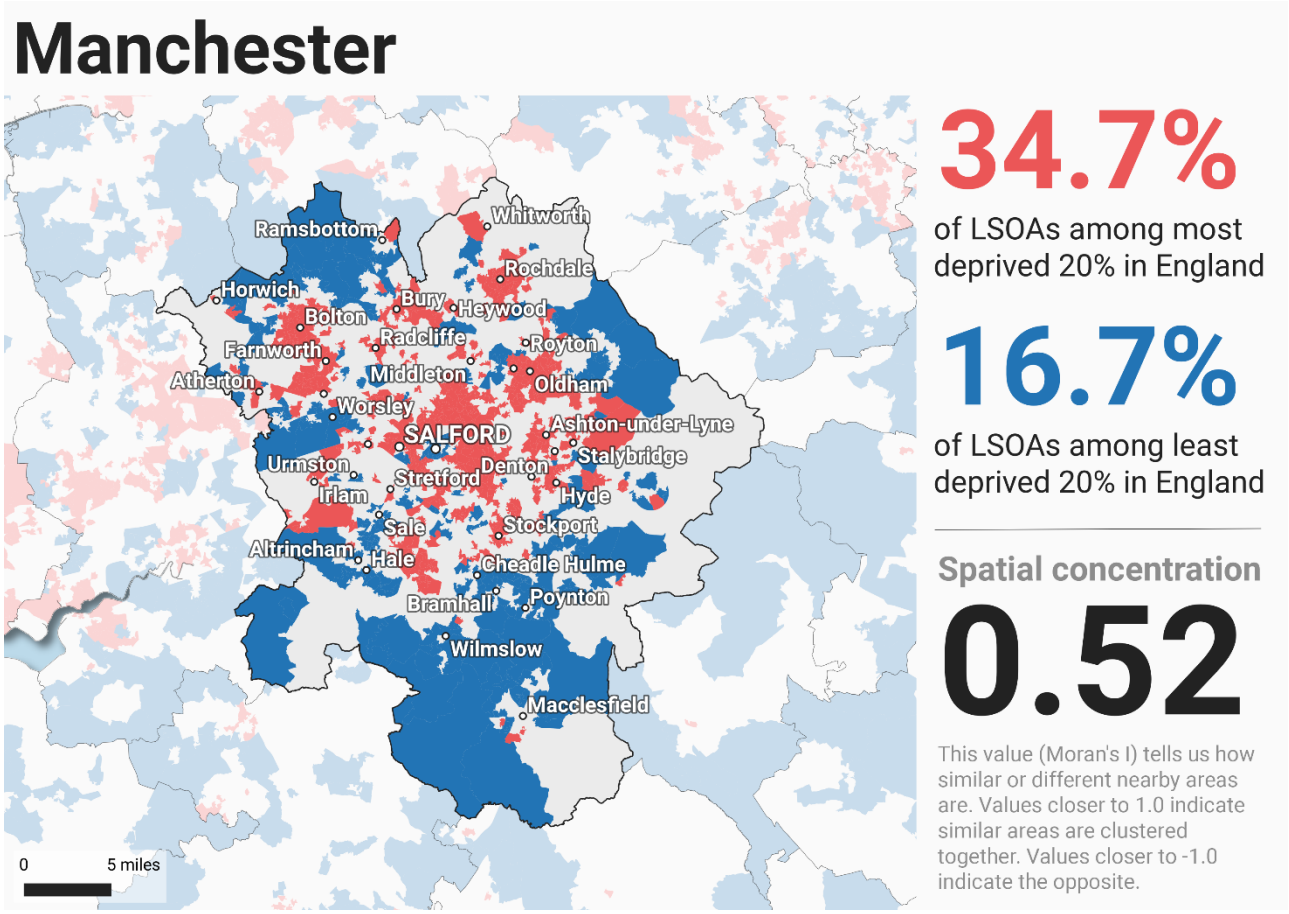
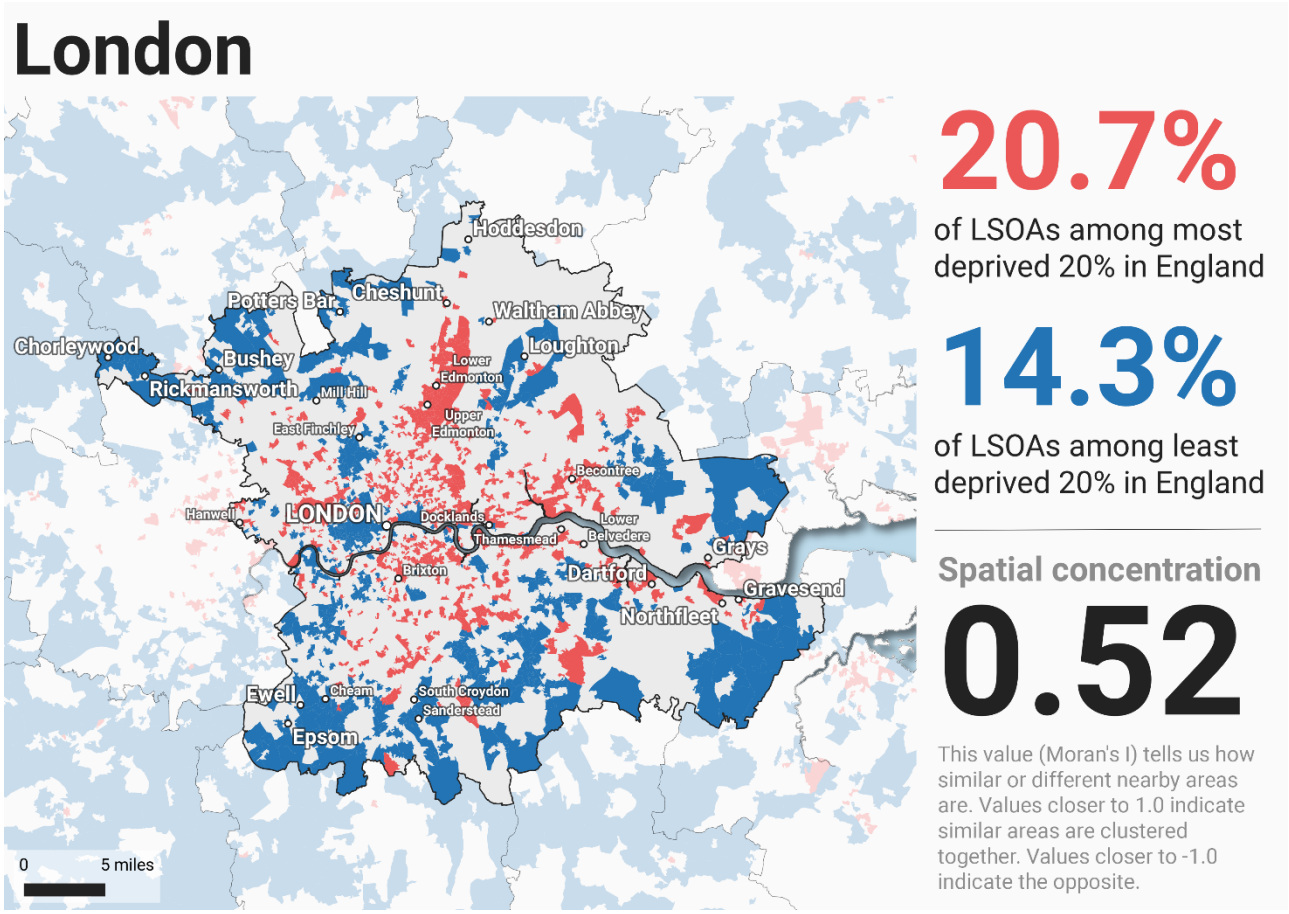


FIGURE 5.10: Spatial clustering of LSOAs in London (Moran's I)



5.4 What does this tell us?

The finding that deprivation, or income deprivation, is spatially clustered is of course in itself hardly new (e.g. Sofianopoulou et al., 2006). However, what we have provided here is an up-to-date, functional spatial assessment of the extent to which areas of high or low deprivation are located near each other across English TTWAs. Or, to put it another way, this helps shed light on the extent to which rich and poor areas are clustered with similar areas or whether they neighbour different kinds of areas.

For England as a whole, the pattern is one of spatial concentration, as is well known, but at the level of the TTWA, this analysis provides new evidence on the precise nature of the phenomenon and how individual areas compare with each other. Thus, where the Gini coefficient tells us about the distribution of income more generally, and the 20:20 Index sheds light on the extent of income imbalance by area, the use of Moran's I provides a complementary metric that helps us evaluate the spatial characteristics of the income divide. In effect, it allows us to say something precise and meaningful about the extent to which residents of each TTWA are in fact 'dwellers in different zones'.

We can see the stark nature of these spatial divides by looking at some of the maps above. For example, in Liverpool not only are 47% of LSOAs in the TTWA among England's 20% most income deprived, but these areas are also significantly geographically clustered. Besides the large concentration of income deprivation within the City of Liverpool, we also see concentrations in Southport and the 1960s new town of Skelmersdale, in addition to areas of low income deprivation in and around Birkdale, Ormskirk and Maghull. In Hull, the patterns appear less extreme, with just under 30% of LSOAs being among the most deprived 20% in England and just under 20% among the least deprived 20%. This is more akin to what we might expect in larger labour market areas, in terms of mirroring the national average.

In the map for Middlesbrough and Stockton TTWA (Figure 5.8) we see an example of a spatially and socio-economically uneven labour market area. Almost 40% of LSOAs here are among the most deprived quintile in England, and they are significantly spatially clustered. Areas among the least deprived 20% in England account for only 16% of the LSOAs here, and are also spatially clustered at the edges of the TTWA.

What a 'cheek-by-jowl' metric like Moran's I does, then, is tell us simultaneously about the *extent* and *geography* of income deprivation within an area. This can help us understand more fully which areas are most unequal, as we attempt to do in the next Chapter.

6. WHICH AREAS ARE MOST UNEQUAL?

6.1 Conceptualising inequality

The key question of which areas in England are most unequal depends upon our underlying concepts of 'area' and 'inequality'. This reflects some of the methodological complexities mentioned in Chapter 2, but it is of course not a particularly helpful proposition. So, as discussed previously, we have been clear in this Atlas that the focus is on income inequality and the corresponding unit of analysis is based on a consistent functional economic geography (the TTWA). From a conceptual point of view we consider income inequality to be multifaceted and that is the reason why we use three different measures to make an assessment of local inequalities in England. One of our measures (Gini) is about the overall income *distributions* within areas, one is about income *imbalance* by area (20:20 Index) and the other is *geographical* (Moran's I). Taken together, we believe this approach sheds new light on an old problem at the sub-national scale and can help both national and local governments gain a better understanding of the nature of inequality as it exists today.

6.2 England's most unequal areas

In Chapters 3, 4 and 5 we presented tables with a list of the most unequal TTWAs on three different measures. These have been combined in Table 6.1, with areas that feature as most unequal on more than one measure shown in **bold** text. One conclusion to draw from these differing lists is that it simply confirms that the methods we use to understand inequality can have a significant bearing upon the result. But it is also clear that geography matters.

For example, using the Gini coefficient, London is England's most unequal TTWA. Yet owing to its underlying functional economic geography, it is much more equal with respect to the proportion of areas that fall within the top or bottom 20% most income deprived. On this measure London is much more balanced, with 21% of its LSOAs among the 20% most deprived (so very similar to England overall) and 14% in the least deprived 20%. However, when we look at the geographical location of income deprivation across London from a spatial perspective (using the Moran's I measure) it is clear that London is quite unequal, in terms of the clustering of more and less deprived areas.

Another notable feature of Table 6.1 is the extent to which some of these areas are considerably more affluent than others, with several TTWAs in the wider London commuter belt featuring prominently. This may seem counter-intuitive in some ways because travel to work areas are themselves defined by commuting self-containment, but for high-earners travel-to-work horizons extend much further than for the working population at large and this is particularly true of London (see Hincks et al., 2018). It is likely that in many of the more prosperous areas in Table 6.1, inequality is in part driven by the availability of high wages within commuting distance for the highly skilled, in contrast to less mobile, lower skilled residents living and working locally. Unpicking these connections is not part of this Atlas project, but recent work published by the Joseph Rowntree Foundation on the extent

of labour market disconnection and deprivation in more deprived areas would appear to support this view (Crisp, et al., 2018).

Many of the areas in Table 6.1 are more economically buoyant, southern labour market areas, with the notable exception of Harrogate. Yet some of England's most deprived TTWAs also feature here, including Bridlington, Liverpool, Sunderland, and Grimsby. These areas have always featured quite prominently in national lists of the 'most deprived' locations but it also apparent that they are also rather unequal. Datasets like the 2019 Indices of Deprivation are particularly useful tools from a policy perspective in relation to identifying need at the local level. Our hope is that the evidence presented here can provide useful new evidence whilst at the same time demonstrating the value of using a selection of different inequality metrics.

Table 6.1: England's most unequal TTWAs using three different measures

Gini Rank	TTWA	20:20 Rank	TTWA	Moran's I Rank	TTWA
1	**London**	1	Basingstoke	1	Hull
2	**Tunbridge Wells**	**2**	**Guildford and Aldershot**	2	Birkenhead
3	**High Wycombe and Aylesbury**	3	Kendal	**3**	**Liverpool**
4	Slough and Heathrow	**4**	**High Wycombe and Aylesbury**	4	Birmingham
5	**Guildford and Aldershot**	5	Hartlepool	5	Derby
6	Luton	6	Andover	6	Leeds
7	Brighton	**7**	**Harrogate**	7	Great Yarmouth
8	Kingsbridge and Dartmouth	8	Northallerton	8	Barrow-in-Furness
9	**Leamington Spa**	**9**	**Reading**	9	Blackpool
10	Chelmsford	**10**	**Crawley**	10	Bradford
11	**Newbury**	**11**	**Newbury**	11	Wolverhampton and Walsall
12	**Reading**	12	Bridlington	12	Portsmouth
13	**Crawley**	13	York	13	Middlesbrough and Stockton
14	**Cambridge**	14	Oxford	14	Sheffield
15	Bath	**15**	**Cambridge**	15	Grimsby
16	Canterbury	**16**	**Liverpool**	16	Weston-super-Mare
17	Bedford	**17**	**Leamington Spa**	17	Bristol
18	Cheltenham	**18**	**Tunbridge Wells**	18	Leicester
19	**Harrogate**	19	Sunderland	19	Manchester
20	Colchester	20	Huntingdon	**20**	**London**

*Bold text indicates an area appears in more than one column (no TTWAs appear in all three lists)

6.3 How unequal is England?

In Chapter 1, we asked 'How unequal are localities across England and what impact does this have on the lives of local people?'. We have attempted to answer the first part of this question in the preceding Chapters and we explore the second part of the question in Chapter 7. Put simply, the answer to the question of how unequal localities across are is that some areas are moderately or highly unequal, regardless of whether you look at income distributions, area-based income imbalance or geography.

Yet it is also the case that many areas of England are much less unequal, although many of these are relatively deprived coastal or smaller ex-industrial towns which can perhaps best be characterised as 'relatively equal, but poor'. In this sense, then, England is 'unequally unequal', regardless of which metrics we use. But in the places where England *is* more equal, there are often significant concentrations of deprivation.

In order to answer our over-arching question of how unequal England is at a local level, we posed three further questions. We answer the first two of these below, and provide some insight on the third before going into more depth on it in the next Chapter.

1. **How is inequality best measured?** Our view is that income inequality is best measured by using more than one metric. For all its strengths, the Gini coefficient masks several important potential features of inequality, including the precise nature of the income distribution, and its underlying geography. That is why we have adopted a multi-faceted approach here.

2. **Which areas of England are most unequal?** From an income distribution point of view, the most unequal parts of England are in the south, particularly concentrated around Greater London. From the perspective of the level of imbalance in relation to the proportion of income deprived areas, the most deprived areas appear in an arc around the south and east of London, in the north of England around York and Harrogate, but also in some more deprived TTWAs like Bridlington, Hartlepool and Liverpool. When we look at the issue from the perspective of geographical inequality, the major towns and cities dominate, with Hull at the top of the list.

3. **Do more equal areas have better overall outcomes?** The answer to this question is 'only sometimes', and we have explored it in relation to income poverty, education and mortality in the next Chapter. We believe that the current focus on inequality as a serious social problem is correct but we also believe there is a need to be cautious about the extent to which greater equality is seen as a policy goal in isolation from tackling poverty and persistent multiple deprivation.

7. DO EQUAL AREAS HAVE BETTER OUTCOMES?

7.1 Exploring inequality and outcomes

If we believe that inequality is a problem worth talking and writing about and that it is relevant from a policy perspective, it is important to understand the connections, if any, between inequality and outcomes for people living in different areas. In this Chapter, we explore the relationship between the inequality in individual TTWAs and indicators relating to poverty, education and mortality. This is also in part intended as a contribution to a wider body of research on the links between inequality and poverty (e.g. McKnight, 2019).

Our approach involves taking the inequality measures we developed above and then making comparisons between these metrics and outcomes in individual TTWAs relating to a small set of indicators. These are described below, with additional details provided in our accompanying Technical Report. There are many potential indicators one could look at when attempting to understand the impacts of inequality, but we have chosen the three below because they relate to particularly important aspects of day-to-day life.

Age-standardised mortality rate (ASMR): we have calculated an age-adjusted standardised mortality rate per 10,000 population for each TTWA using the latest ONS mortality data (2016). Using the age-adjusted mortality rate is particularly useful, given the spatial-demographic population distribution within England, where there are far higher proportions of people aged 65 or older living in coastal areas. Using the ASMR measure we are able to assess the extent to which within-area inequality is associated with lower or higher mortality rates and identify, for example, areas with high inequality low mortality rates. It is also important to note that there can be significant differences in mortality rates, and life expectancies, within areas but this measure does not allow us to identify such trends.

Unadjusted means-tested benefits rate (UMBR): this indicator was developed by Alex Fenton (2012) at the LSE and is a proxy measure of income poverty for small geographic areas in England. It is based on the average number of claimants of means-tested benefits in an area in a given year. It is useful for making statements about relative poverty rates in larger geographic areas and is derived from household-level data.

Entry to higher education: this is an indicator published as part of the newly-released English Indices of Deprivation 2019. It measures the proportion of people under 21 not entering higher education. Shrinkage has been applied to this indicator (this process is used to improve the reliability of small area data), so we do not have individual rates for LSOAs but we are able to calculate a relative score for each TTWA which then allows us to make comparisons to this score and the level of inequality in an area. Note that a higher score on this measure indicates lower levels of entry to higher education.

In the sections below, we compare the data for each of these indicators to the level of inequality in each area in order to arrive at a better understanding of the relationship between the two, since it is not always straightforward or intuitive.

7.2 Local Gini coefficients and outcomes

When we examined the relationship between the local Gini coefficient and the three outcome measures above, it became clear that lower levels of inequality were often associated with poorer outcomes. We can see this in the upper left quadrant of Figure 7.1 where many of the areas with lower levels of income inequality have the highest age-standardised mortality rates. A notable feature here is the fact that many of these TTWAs are in coastal areas. By contrast, the areas in the lower right quadrant of Figure 7.1 have relatively high levels of income inequality but relatively low mortality rates. These areas are mostly in and around Greater London.

The same pattern can be seen in Figure 7.2 (Gini vs means-tested benefits rate) where more equal areas have poorer outcomes on this proxy poverty measure. At one end of the scale, Tunbridge Wells in Kent has among the highest Gini coefficient of any TTWA in England yet it also has much better outcomes on this measure. Areas with much poorer outcomes here are generally less unequal and include Liverpool, Hartlepool, Sunderland and Bridlington. In relation to entry to higher education (Figure 7.3), London's TTWA is notable for having the best outcomes on this measure, with many of the more equal TTWAs having much poorer outcomes. Again, many of these areas are coastal towns. The only deviation from this general pattern is in areas like Brighton and Southend, which have relatively high levels of inequality but also poorer levels of progression to higher education.

Figure 7.1: Gini coefficient vs mortality rate

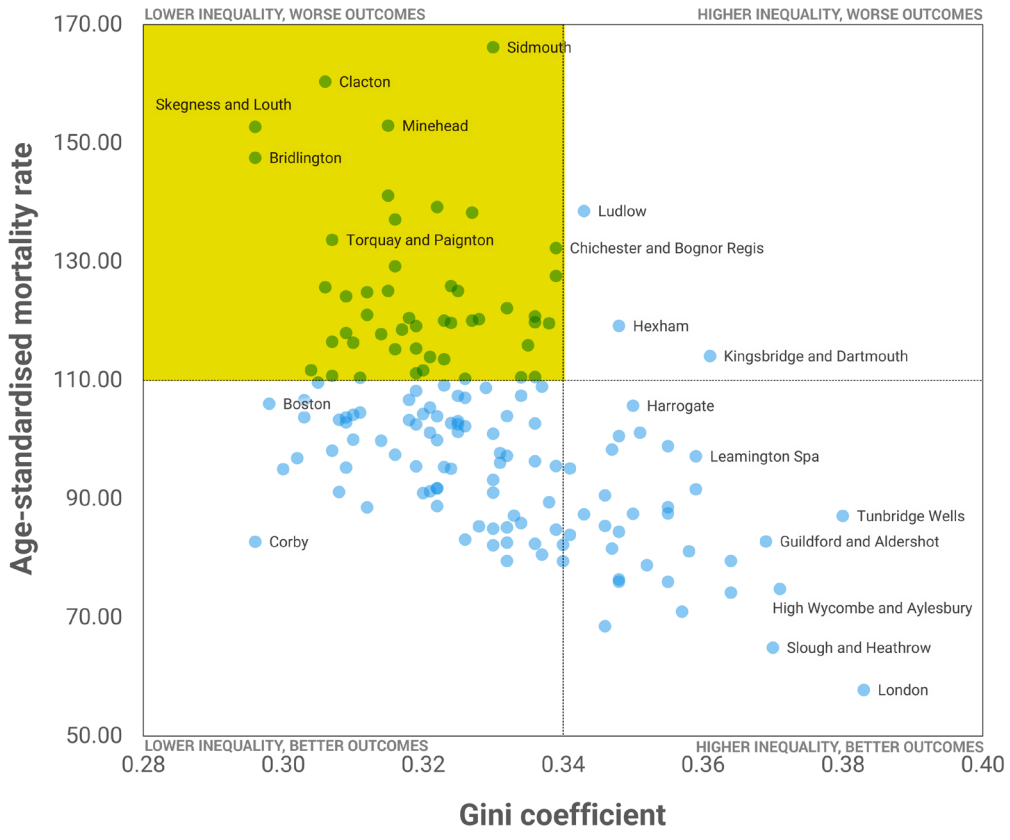


Figure 7.2: Gini coefficient vs means-tested benefits rate

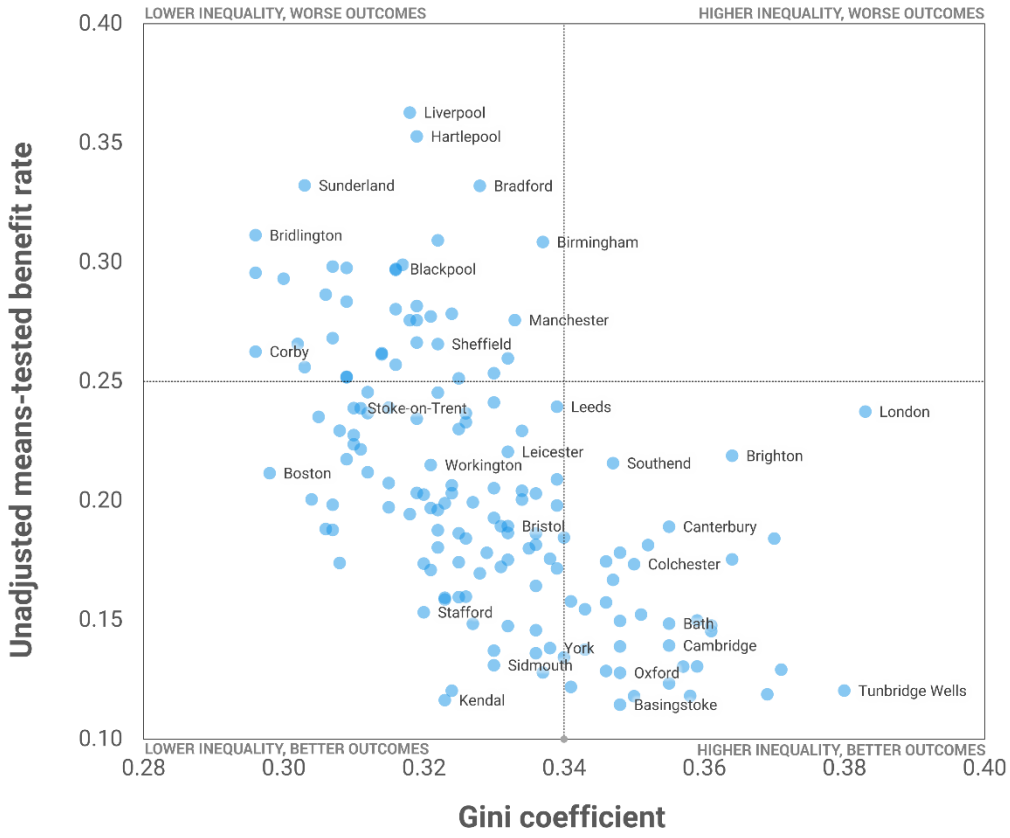
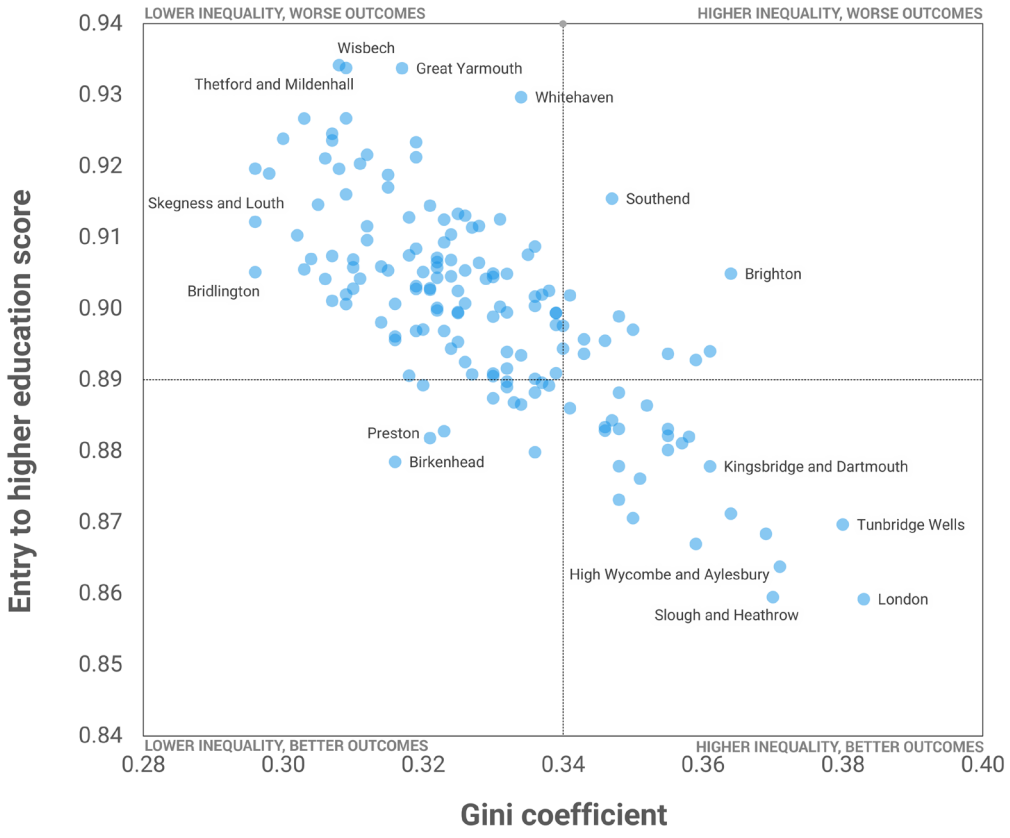


Figure 7.3: Gini coefficient vs progression to higher education



7.3 The 20:20 Index and outcomes

When we take a different measure of income inequality and compare it to the same indicators we may expect different results, and this is the case here. Overall, the relationship between the 20:20 Index (i.e. the ratio of 'rich' to 'poor' areas in a TTWA) and mortality, poverty and progression to higher education is weaker, yet there are many important individual observations. For example, several of the most unequal areas on this measure have among the highest levels of mortality, including Clacton, Skegness and Louth, and Bridlington, as seen in the upper right quadrant of Figure 7.4.

The relationship between the 20:20 Index and the means-tested benefits rate is more complex (Figure 7.5). Several areas with higher levels of inequality have lower poverty rates (bottom right quadrant), yet there are several TTWAs in the top right quadrant, indicating a high level of inequality *and* a high level of poverty. It appears that where the unadjusted means-tested benefits rate exceeds 25% (y-axis) the 20:20 Index is positively correlated with this indicator. Where it is below 25% there appears to be a negative relationship, where *higher* levels of inequality are associated with *better* outcomes within TTWAs. The relationship between the 20:20 Index and progression to higher education (Figure 7.6) is less clear, but once again we see a similar grouping of areas in the top right quadrant (e.g. Clacton, Skegness and Louth, Bridlington). It is notable that in both Figure 7.4 and 7.6, London is in the 'lower inequality, better outcomes' quadrant to the bottom left.

Figure 7.4: 20:20 index vs mortality rate

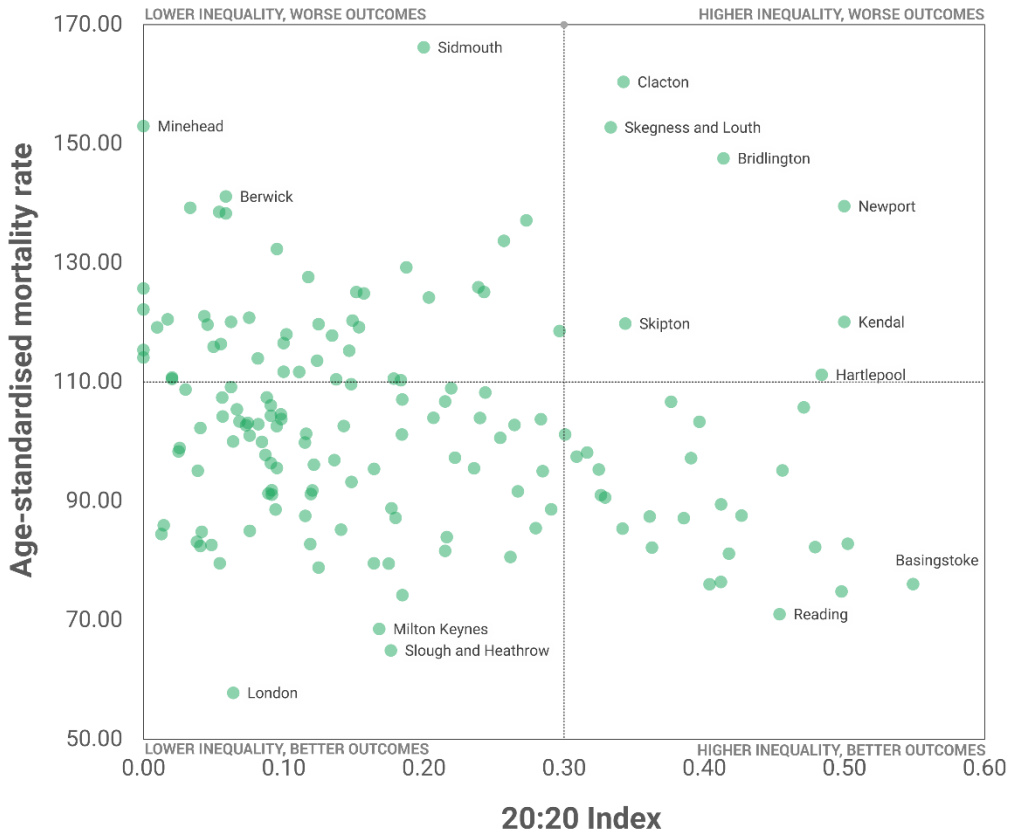


Figure 7.5: 20:20 index vs means-tested benefits rate

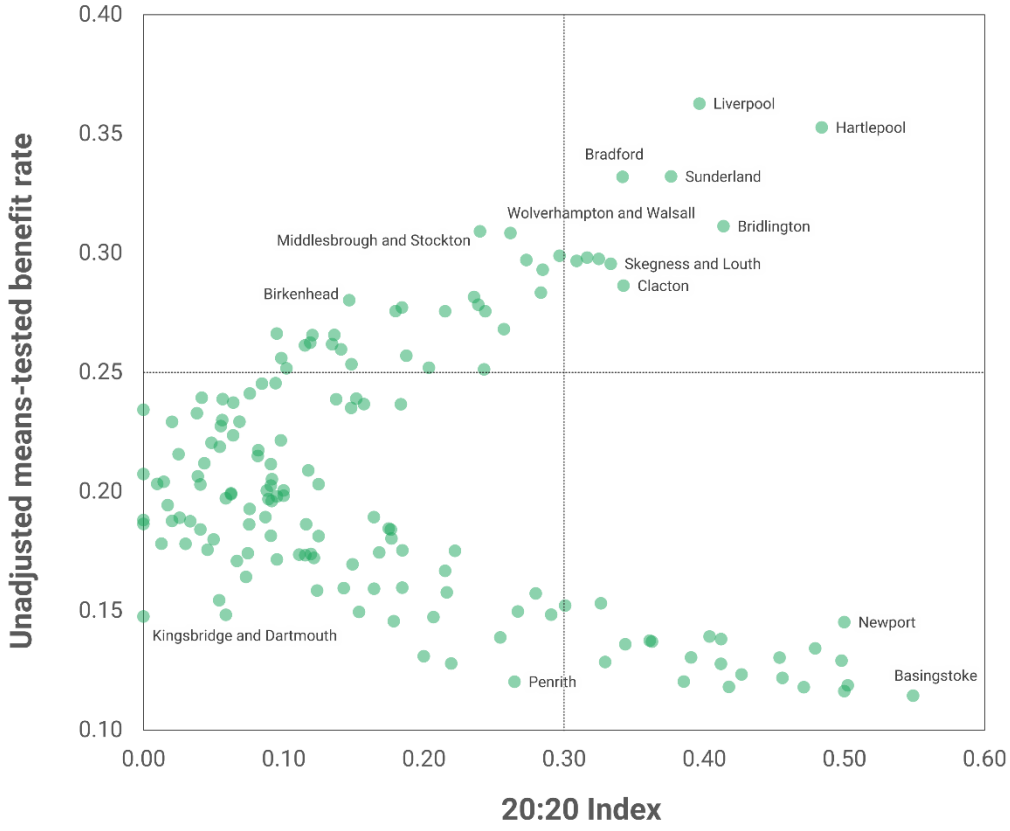
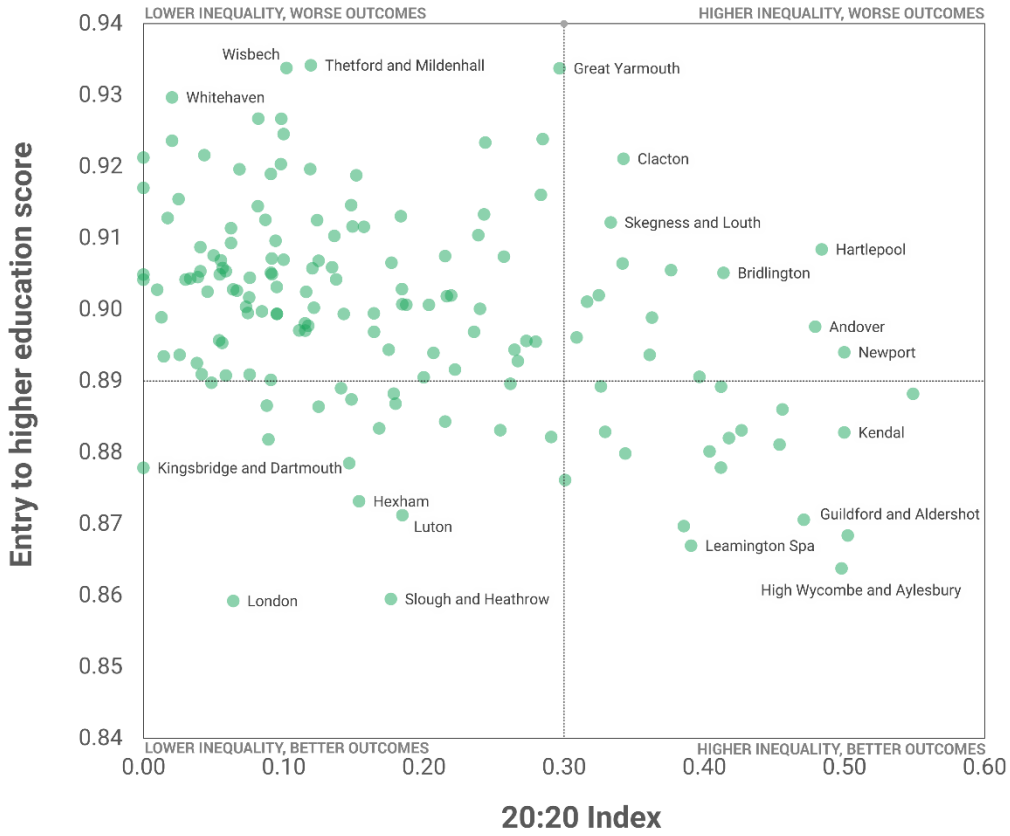


Figure 7.6: 20:20 index vs progression to higher education



7.4 Geographic clustering and outcomes

Using the measure of income inequality based on the spatial clustering of similar areas (Moran's I), we also see a different kind of relationship, but with some familiar messages. In Figure 7.7, for example, we once again find that several coastal areas with high inequality also have among the highest levels of age-standardised mortality. These include the TTWAs of Clacton, Blackpool, Margate and Ramsgate, and Bridlington. Several areas with greater spatial inequality have lower levels of mortality. These include London, larger cities such as Birmingham and Hull but also mid-sized towns and cities such as Milton Keynes.

The relationship between Moran's I and the benefits rate is shown in Figure 7.8, and in general inequality is positively correlated with this indicator, so that TTWAs with higher levels of inequality also have higher levels of poverty as defined using this measure. The areas in the top right quadrant ('higher inequality, worse outcomes') include Liverpool, Hartlepool, Bradford, Middlesbrough and Stockton, Birmingham and Hull. Finally, in Figure 7.9 we can see the relationship between inequality and progression to higher education. The more deprived, coastal TTWAs once again feature prominently as having poorer outcomes, including Great Yarmouth, Grimsby and Barrow-in-Furness. London, High Wycombe and Aylesbury, and Slough and Heathrow all exhibit among the highest levels of spatial inequality yet have among the highest higher education progression rates in the country.

Figure 7.7: Moran's I vs mortality rate

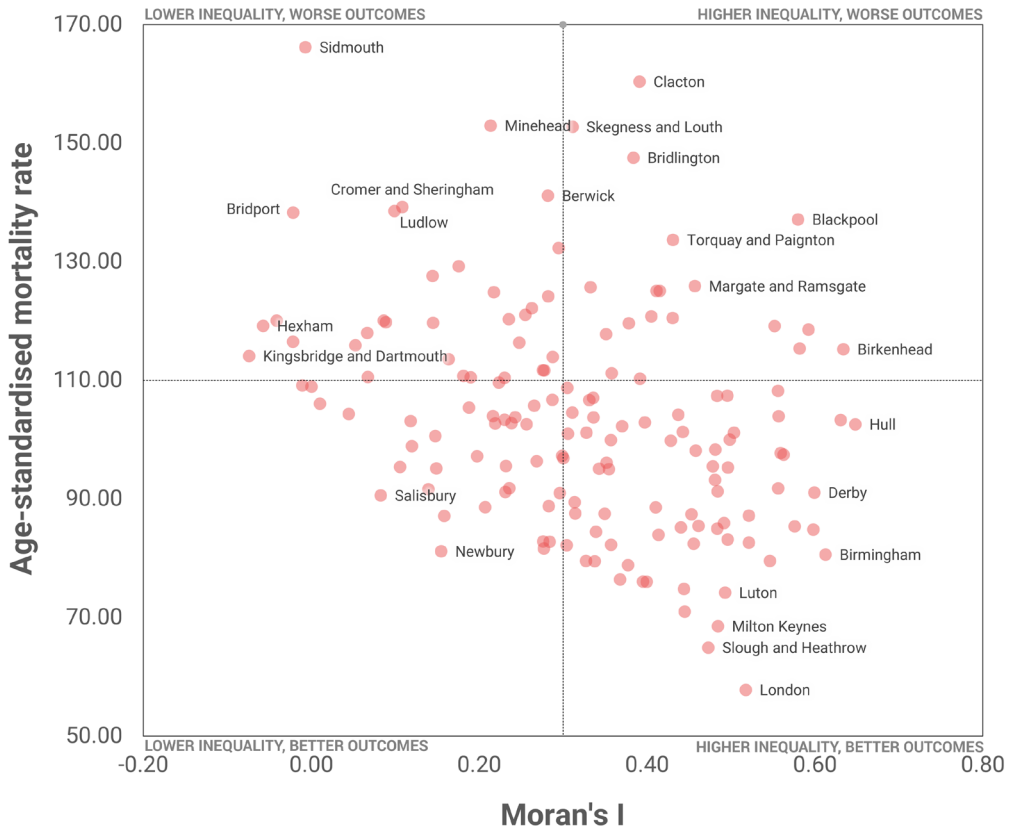


Figure 7.8: Moran's I vs means-tested benefits rate

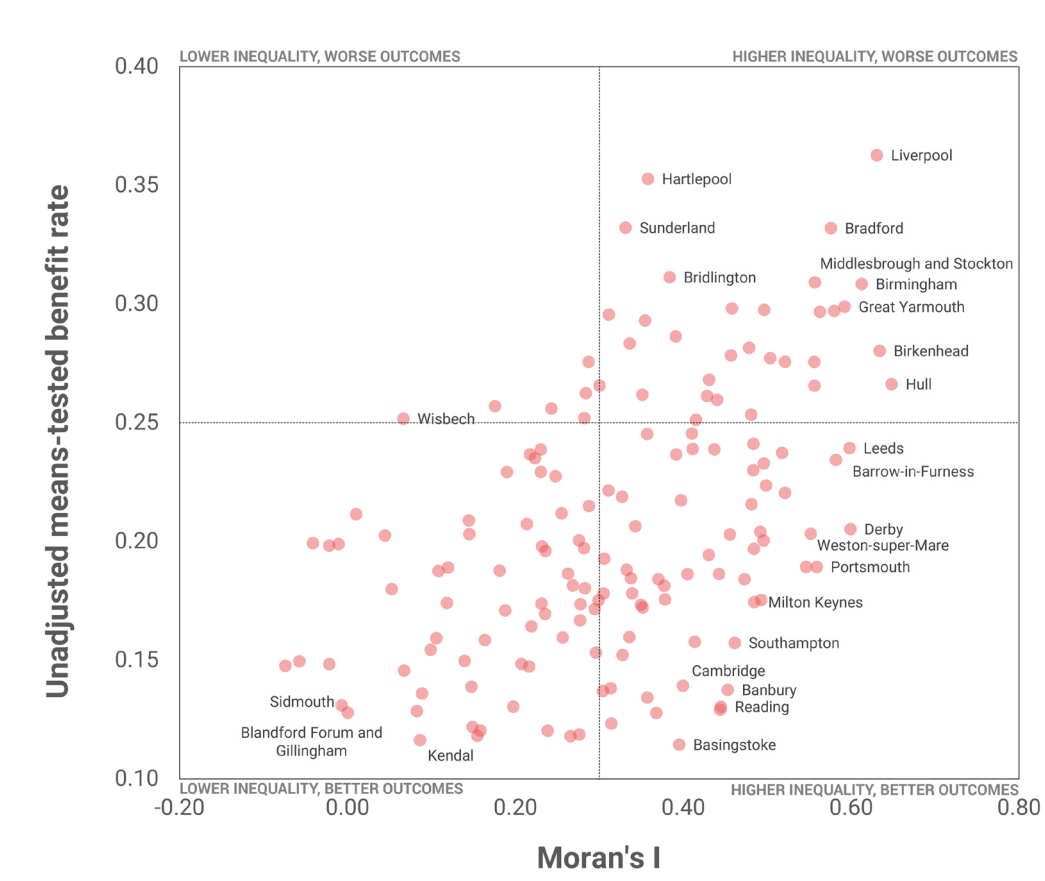
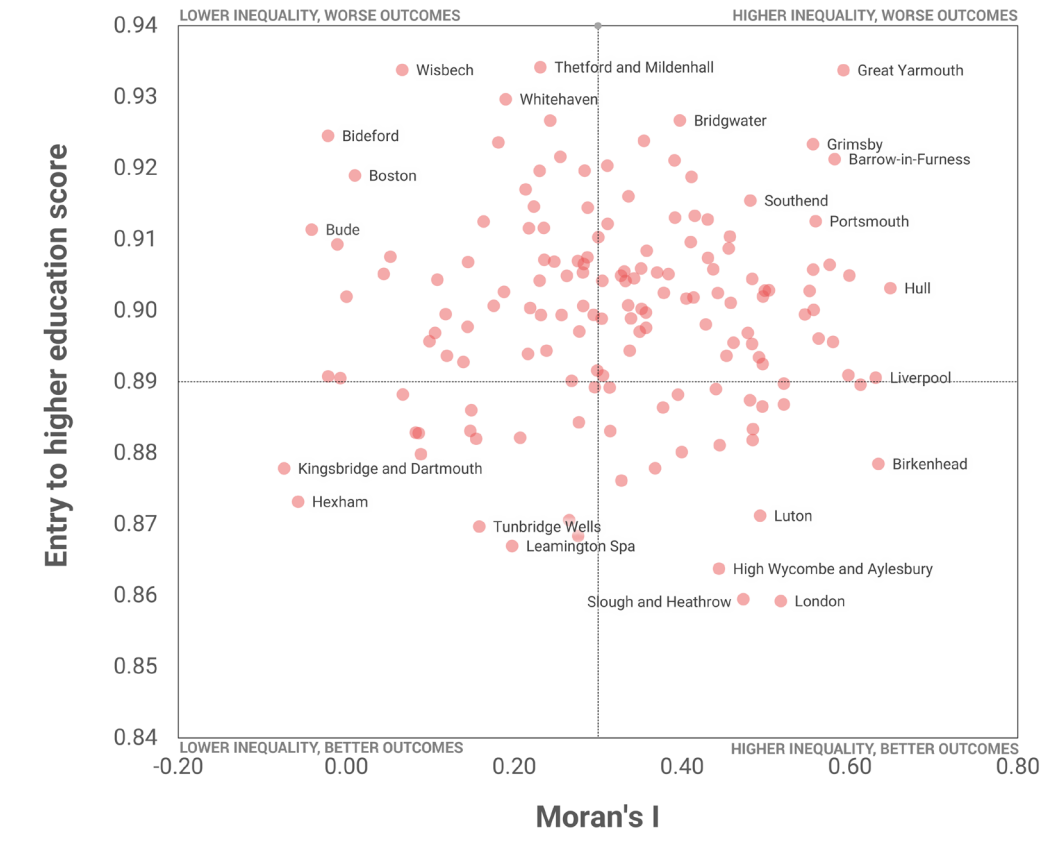


Figure 7.9: Moran's I vs progression to higher education



7.5 Summary: new insights into an old problem?

When looking at the scatterplots above, the intention was not to make causal inferences between inequality and outcomes, but rather to present new evidence on the relationships between different kinds of income inequality at the local level and some important socio-economic indicators. On the one hand, we have simply confirmed that the results we get depend upon how we conceptualise inequality in the first place, the methodological approach we take and the indicators we use. In this sense, we are mindful of the early work of the IFS Deaton Review, and particularly the following statement from its introduction (Joyce and Xu, 2019, p. 2):

> *'Too often the debate takes place in silos, focusing on just one type of inequality, a specific alleged cause or a specific proposed solution. We need to step back and ask: how are different kinds of inequality related and which matter most? What are the underlying forces that come together to create them? And crucially, what is the right mix of policies to tackle inequalities?'*

We consider the policy question in Chapter 9, but in line with the ongoing Review we have attempted to subvert convention slightly by looking beyond Gini and exploring the characteristics of local inequalities from the perspective of *distribution*, *imbalance* and *geography*. In doing so, we have demonstrated that higher Gini coefficients at the local level are sometimes associated with better outcomes in mortality, poverty and progression to higher education for young people. The purpose here is not to unpick the mechanisms underlying these relationships, yet at the same time it is useful to consider what they might be, so that they could be investigated in future work.

Why might we sometimes see more favourable outcomes in areas of higher inequality? One initial explanation might be a kind of positive externality/'neighbourhood' effect related to employment agglomeration in certain sectors within larger, more dynamic labour markets. That is, in cities like London, which tend to attract a significantly larger proportion of highly skilled workers, this might then also have additional positive impacts upon improving education and health outcomes for poorer residents. There are parallels here with earlier work by Rueda and Stegmueller (2015, p. 476) in their work on 'the externalities of inequality' and what they refer to as: 'the spillover from one domain to another (e.g., education and health investments that affect human capital and work effort)'. Ultimately, the nature of this relationship requires further investigation but we believe it is one worth exploring further.

Noting that higher levels of inequality in some local labour market areas is of course not the same as saying inequality is 'good' or 'preferable' in relation to certain outcomes, since the relationship between the two is far from perfectly linear and in many areas, particularly coastal towns, lower levels of inequality are much more likely to indicate that places are 'equal but poor'. An example of this can be seen in the local authority area of Blackpool,

within which 23% of LSOAs are within the 1% most deprived nationally and no LSOAs are ranked above the 65th percentile nationally in terms of overall deprivation.

The relationship between inequality and outcomes is more mixed in relation to the 20:20 Index, though the greatest number of TTWAs are to be found in the 'lower inequality, better outcomes' quadrant with respect to mortality and the means-tested benefits rate. For progression to higher education, areas with the greatest imbalance between the proportion of more and less deprived areas in England have lower rates of progression to higher education and several areas exhibiting higher inequality on this measure have better outcomes.

When we use an inequality measure that is explicitly spatial, as we have done with Moran's I, we find that that the areas with the lowest levels of mortality are often those with higher levels of spatial inequality, including London and Birmingham. It is only when we look at the means-tested benefits rate that we see a more intuitive relationship between inequality and poverty since in this case as Moran's I increases (indicating greater spatial clustering) the benefit rate does too. For progression to higher education, once again London and the nearby TTWAs of Slough and Heathrow, and High Wycombe and Aylesbury, demonstrate that higher levels of inequality can coexist with better outcomes.

Understanding the precise nature and direction of the relationship between local inequalities and local outcomes is beyond the remit of this Atlas. Our intention instead is to help shift the focus towards different ways of looking at inequality, particularly in relation to geography. We believe this can offer policymakers, scholars and anyone with an interest in social policy important new insights into an old problem and as such we reflect upon the implications of what we have found, and offer some policy lessons in the penultimate Chapter of this Atlas. Before we do so, Chapter 8 reflects on some important potential complications that need to be borne in mind when interpreting our research.

8. POTENTIAL COMPLICATIONS

8.1 Some reflections on interpretation and methodology

In Chapter 2 we commented on the fact that the study of inequality is sometimes quite contentious, particularly in relation to the key question of whether it is getting worse over time. In this Atlas we do not focus on the temporal dimension but instead on spatial aspects of local income inequalities across England. Having said this, the underlying rationale for this work is the premise that income inequality is relatively high, both in relation to the past three decades and in relation to comparator OECD countries. Indeed, Philip McCann's extensive treatment of the topic in his 2016 book emphasises the scale of the problem and it is for this reason that we have tried to shed more light on the topic here.

Yet the study of inequality is often characterised by methodological complexity, and debate about which approach is most appropriate, so we think it is important to be aware of potential complications as they relate to interpretation and policy lessons. We discuss two main issues here, although we do not believe they undermine any of our analyses, or the conclusions that follow. The first relates to the longstanding question of understanding areas vs understanding people or, to put it another way, the idea that 'not all poor people live in poor areas'. This issue is often raised when analysis is conducted using small spatial units rather than individual-level data. The second issue relates to the geographic scale question more generally and the fact that the boundaries we use will always be imperfect. We have attempted to counter that here by using TTWAs, which we see as being the least imperfect of the possible options. We end by reflecting on a number of other potential complications or issues that should be taken into account when interpreting our results.

8.2 'Not all poor people live in poor areas'

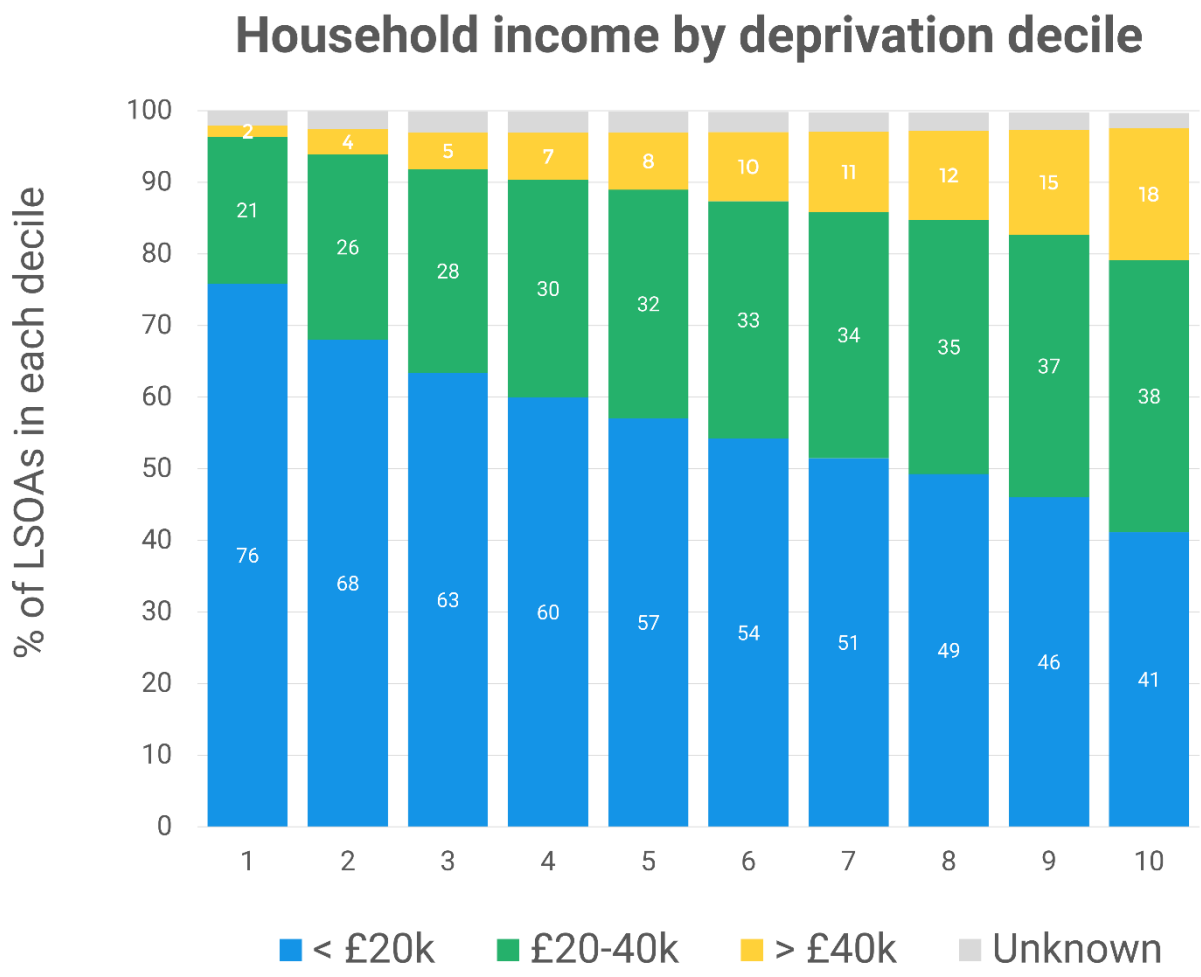
The long-running academic and policy debate about the importance of place in formulating policy is premised on opposing ideas of intervention. On the one hand, critics of area-effects and place-focused policies argue that we should help poor people, regardless of where they live and that the current focus on 'left behind places' should instead be on 'left behind people'. On the other hand, proponents of place-based policies argue that the underlying economic geography of England is one of hard-wired spatial inequality and that some kind of regional or local place-based policy is essential. We support the latter view, but have some sympathy for the former. Yet of course the spatial policy pendulum has swung back and forth over the years, depending upon the economic philosophies of those in power. Since 2010 we have, it seems, been in a 'policy off' phase with regard to place-based policies in England, but we think it is important to provide up-to-date evidence on the nature of the wide spatial-economic imbalances that exist in England, and also to examine the approaches we take to understanding people and places in the first instance.

For this reason we have attempted to shed a little more light on a longstanding assertion that 'the majority of deprived individuals and families did not live in the most deprived areas' (Smith, et al., 2004). This was also the main critique levelled at earlier area-based

interventions by Barnes and Lucas (1975) in their study of positive discrimination in education.

It is often impossible to get to the bottom of this issue owing to lack of data. In order to understand whether most 'poor people' live in 'poor areas' and whether interventions are right to focus on these locations, small area household income data would be required, in addition to some kind of measure of local socio-economic conditions. In an attempt to answer this question, in Figure 8.1 we have presented a stacked bar chart showing the proportion of LSOAs in each deprivation decile (using the overall 2019 Index of Multiple Deprivation rather than just income) in relation to the proportion of households within each decile at different income bands using the new ONS small area household income dataset. This is experimental data, and it does not include income from self-employment and investments taxed via Self-Assessment yet it provides a useful initial insight into the claim that 'not all poor people live in poor areas'. We can see that in the most deprived decile average household income is above £40,000 for a small proportion of households (2%) but below £20,000 in 76% of LSOAs.

Figure 8.1: Household income by deprivation decile (where decile 1 represents most deprived)



Source: ONS Research Outputs: Income from Pay as You Earn (PAYE) and benefits for tax year ending 2016 and English Indices of Deprivation, 2019.

This low-income figure decreases consistently for each decile, so that in the least deprived decile to the right of the chart the figure is 41% (here the percentage figure may be disproportionally inflated because the data source excludes income from investments, for example). Even taking into account the relevant data disclaimers, this would point to the fact that there may very well be a significant minority of households in 'rich' areas that are in fact 'poor' in relation to household income. At an overall level, the chart also appears to indicate that there may be some truth to claims that the *majority* of poor households are not located in 'poor areas'. Even if it is the case that in the most deprived decile most households can be classified as deprived, it is also the case the relationship appears slightly more complex than it is often assumed to be.

At the other end of the scale, in the most deprived deciles, there are a small proportion of households with average incomes above £40,000. For reference, median household income in the UK in 2019, £29,400. What might the implications of such anomalies be? One example may be that richer residents of more deprived areas could actually benefit from living in areas of higher deprivation if, as a result, they can access services and opportunities targeted towards 'deprived' neighbourhoods only. Conversely, low-income households in wealthier neighbourhoods may in effect be penalised for the opposite reason. An approach to welfare policy which takes both area *and* the location of all deprived households/individuals into account may therefore be worth exploring further.

Overall, even with this experimental research output data, which may underestimate overall incomes, the most deprived areas have the highest proportion of poor households. We cannot say from this whether 'most poor people live in poor areas' yet it does seem reasonable to infer that 'poor areas have the highest proportion of poor households'. We emphasise this point here because we believe an area-based approach to welfare policy remains important and justifiable, even if it should not be the only approach.

8.3 Bounded spaces are always imperfect

As discussed at the outset of this Atlas, we adopted the travel to work area (TTWA) as the main geographic unit for sub-national analysis of inequalities. This is because we are concerned with income inequalities, and incomes are principally associated with employment, or lack of it. As such, we wished to use a functional economic geography that was consistent across the country but also one that aligned conceptually with the phenomenon we were attempting to investigate.

Yet even TTWAs are imperfect, since the geography of employment is also strongly correlated with the differing socio-economic characteristics of individuals, as recent work by Hincks et al. (2018) has demonstrated. The travel horizons of single high earners, for example, are far greater than those on low incomes, those with limited employment opportunities, those with caring responsibilities or those with disabilities. This is particularly true for those living in more deprived neighbourhoods, as Crisp et al. (2018) demonstrated

in their recent study of transport-related barriers to employment in low-income neighbourhoods.

The implications of this are that for some individuals the TTWA geography may be too big and for others it may be too small. Yet, on average, because of the way TTWAs are constructed, we know that they are highly self-contained and that at least two thirds of an area's resident population work within the same TTWA. Therefore, the TTWA is used in this Atlas as the least imperfect spatial unit within which we can explore localised inequalities.

In a sense, this mirrors the famous George Box aphorism that 'all models are wrong, but some are useful', in that we could say 'all geographies are wrong, but some are useful'. The TTWA is certainly useful with regard to understanding sub-national income inequalities and we reflect on the lessons learned, and the implications of our work in the final Chapter below.

The online material associated with this project reports results for all TTWAs, local authorities and parliamentary constituencies in England, and this provides useful evidence on the extent to which boundaries matter. TTWAs are much larger than local authorities (of which there are 317 in England) and also significantly larger than constituencies (of which there are 533). In general, when we look at smaller geographic units we would expect to see less variation in terms of socio-economic composition but the way this relates to inequalities is slightly more complex.

With the Gini coefficient, for example, what we see are higher values at the top end and lower values at the bottom end. The most unequal TTWA in England is London, with a Gini coefficient of 0.38 but at the local authority level it is the London Borough of Kensington and Chelsea, with a Gini coefficient of 0.43. The parliamentary constituency of Kensington also has the highest Gini coefficient in England, at 0.43.

When we look at different indicators, other differences emerge. Thus, we observe that 90% of LSOAs in Birmingham's Hodge Hill constituency are within the 20% most deprived in England, followed by 84% in Liverpool Walton, 82% in Nottingham North and 76% in Manchester's Blackley and Broughton. At the opposite end of the income scale, 78% of LSOAs in the constituency of North East Hampshire are among the 20% least deprived in England, followed by 70% in Sheffield Hallam, 69% in Wokingham and 66% in South Cambridgeshire.

8.4 Other potential complications

The idea behind this Atlas was to shed light on local income inequalities across England in a conceptually simple way. We have computed some new metrics, updated others and attempted to identify the most and least unequal areas of England based on a functional economic geography. Whilst we believe this has shed new light in an important issue, the following points are worth bearing in relation to what we have found.

- The income data we have used in our research relates to income before housing costs (BHC) rather than after housing costs (AHC). Since there is significant variation in housing costs across England, this must be borne in mind when interpreting the raw values shown, for example in Chapter 3. The extent to which variation in housing costs contributes to levels of local income inequality is not the focus of this Atlas but it is perhaps significant that the TTWA with the highest housing costs is also the most unequal (London).

- Our analysis is very much a 'snapshot' one since we look at data for fixed time periods. A key question for future research on this topic would be the extent to which the local inequalities we have identified might change over time.

- The size of the areas we look at is also worth bearing in mind, both in relation to population and geographic area. High levels of inequality in smaller labour market areas are no doubt important, but it is important to remember here that the levels of inequality we see in the major TTWAs (e.g. London, Manchester, Birmingham and Liverpool) constitute, in absolute terms, a much higher proportion of the population.

9. FINDINGS AND RECOMMENDATIONS

9.1 Four key findings, four recommendations

As discussed at the outset of the Atlas, the big question guiding our research was 'How unequal are localities across England, and what impact does this have on the lives of local people'? The answers, it would seem, are 'quite unequal' and 'a potentially significant impact'. Yet we recognise that this lacks specificity and when it comes to improving social well-being through research, and making a contribution to improving welfare and life chances, more specific statements are needed. Therefore, in this Chapter we highlight four findings, and four associated recommendations arising from our work. These relate to the following themes, with recommendations flowing from each.

1. **Many areas are relatively equal, but poor:** inequality across England, no matter how we measure it, is often quite stark. However, many locations are relatively equal yet remain among the poorest in England. This is particularly true when looking through the lens of the Gini coefficient, where many of the most equal areas have among the worst outcomes in England on the indicators we looked at.

2. **For inequality, location matters:** when we look at the maps of the most and least unequal places in England, we can see some clear spatial patterns. On the one hand this may relate to a cluster of high inequality areas in and around London, and on the other it may relate to the relative geographical dislocation of many of England's large seaside and ex-industrial towns. Yet whichever way we look at it, there is a clear geography of inequality in England.

3. **Not all poor people live in poor places:** although we believe the preceding point to be true, it is also likely the case that many of the poorest individuals and households do not live in the poorest locations, and we believe there is a need to examine this in more detail. Without understanding this critical methodological question in more depth, policies which seek to remedy poverty and inequality may miss their targets.

4. **Spatial segregation is important:** of the three inequality measures we present in this Atlas, it is the one relating to spatial inequality where the most unequal areas also have the worst outcomes. This may point to the fact that spatial dimensions of inequality have, to date, been under emphasised. Or, it may point to the fact that there actually are some compounding effects associated with areas of concentrated poverty.

9.2 Many areas are relatively equal, but poor

When we looked at inequality from the perspective of the Gini coefficient, it was clear that many of the most equal areas were also among the poorest in England, with the opposite also being true. London's TTWA has the highest Gini coefficient, and all but one of the top 20 most unequal areas on this measure are in the south of the country. The areas with the

lowest levels of income inequality as defined by the Gini coefficient were in places like Clacton, Sidmouth, Minehead, Bridlington and Skegness and Louth. These places have come to be defined in terms of the 'left behind' narrative that has recently gained currency, yet it is clear that on the most commonly used inequality measure they are also relatively equal. Despite this, they often have very poor outcomes for mortality, poverty and progression to higher education. We highlight this issue first because we think it is important, during a time of rising interest in inequality, to remember that greater equality must also be accompanied by opportunity and greater prosperity if it is to positively impact the lives of individuals.

Recommendation 1 Our first recommendation is that when considering questions of inequality from a policy perspective, *we should take into account the fact that many of the poorest local economies in the country are also the most equal*. This is more of a conceptual than a practical recommendation but from an applied policy point of view it suggests that the objective of decreasing income inequality, as measured by the Gini coefficient, would only be effective if it is accompanied by targets for increased prosperity in the most deprived locations.

9.3 For inequality, location matters

The issue of geographic dislocation has also emerged quite clearly from the results presented in this Atlas. The places with the poorest outcome indicators most often tended to be places furthest from London and the major cities, and often ex-industrial or coastal towns with relatively poor transport connectivity. It is difficult to determine the extent to which this relationship is causal, and this is not the objective here anyway, but it seems clear that there is a persistent 'remoteness' factor embedded in the geography of inequality in England. It is the case that in those TTWAs close to London, where the Gini coefficient returns the highest values, inequality may also be transport-related where high income employment is facilitated by fast and relatively easy access to central London. More detailed work would be necessary to unpick these relationships but the geography of inequality here is potentially quite revealing.

Recommendation 2 Our second recommendation is for *increased policy focus on the links between geographic dislocation, deprivation and inequality*. Previous work by Crisp, et al. (2018) has highlighted the importance of these links at the neighbourhood level but we believe it is also important to consider wider questions of regional and sub-national connectivity and links to the drivers of inequality. Therefore, there are important connections to be made between transport policy and welfare policy and as such an inter-departmental approach to tackling geographic dislocation is likely to be necessary.

9.4 Not all poor people live in poor areas

As we discussed above, the 'people versus places' debate is a longstanding one. The question of whether welfare policy should focus on people, no matter where they are, rather than places, is often ideologically driven. Yet at the same time, the experimental ONS income dataset we used in this Atlas provides a useful insight into the question of whether England's poorest areas are actually home to its poorest residents. Figure 8.1 suggests that the most deprived areas in England have the highest proportion of low-income households, as we would expect, but it also points to a more revealing finding. That is, there appear to be a significant number of low-income households living in areas that appear, as far as the data tell us, to be more prosperous. Recent research by Fransham (2018) also suggests that 'low-income individuals are less likely to be living in the highest poverty areas'. The exact extent of this phenomenon remains difficult to quantify, since our income data includes only benefits and earnings data, and excludes income from investments and self-employment, but the overarching statement that 'not all poor people live in poor areas' does seem to have considerable merit.

Recommendation 3 Our third recommendation is for *a thorough review of the evidence relating to the issue of whether the 'majority of deprived individuals and families did not live in the most deprived areas'* (Smith et al., 2001; Barnes and Lucas, 1975). Rather than viewing this issue as an arcane methodological question, we believe that finding a definitive answer to it should be a policy priority if we are serious about tackling poverty and inequality in England. When it comes to tackling persistent poverty through policy intervention, it may be right to focus on the most deprived locations if they contain the highest proportions of poor households and residents, yet doing this in isolation may lead to reduced effectiveness if poorer residents living elsewhere are overlooked. This is a fairly obvious point, yet there appears to be something of a gap in the academic and policy literature in relation to finding definitive answers to the question of the proportion of 'poor people' who do or don't live in 'poor areas'.

9.5 Spatial segregation is important

When we conceptualise inequality from a spatial perspective, as we do with the Moran's I measure, it became clear that geographic patterns of income deprivation are often more closely associated with poorer outcomes than the other measures we use. Or, more accurately, this is the measure where poorer area outcomes are most likely to be positively correlated with higher levels of inequality, although the relationship is once again far from linear. Nonetheless, it does appear that in relation to key outcomes such as our poverty proxy measure (UMBR) and progression to higher education individual TTWAs are more likely to be located in the top right quadrant of the scatterplots in Chapter 7. Regardless of the potential mechanisms underpinning these relationships, it is also clear that this measure of inequality, which considers both the characteristics of areas *and* where they are located relative to other areas, provides a useful alternative perspective on the nature of inequality. Used in isolation, or in conjunction with the other inequality measures presented here, it offers potentially useful new insights into the drivers of inequality at the sub-national

scale. It also allows us to say something meaningful, and empirically robust, about Disraeli's notion of 'dwellers in different zones'.

Recommendation 4 Our final recommendation is not related directly to the specific geographic measure we adopt here, since there are several different ways to calculate spatial inequalities. Instead, *we simply recommend that any approaches which seek to understand the true nature of inequalities should incorporate an explicit measure of spatial disparity*. Put another way, it seems clear from our analysis in this Atlas that the story of inequality in England is an inherently spatial one and as such we believe it should also be measured as one, in addition to indicators such as the Gini coefficient. This point is threaded through the literature on urban and regional inequalities (e.g. Beatty and Fothergill, 1996; Bell et al., 2018), which often highlights quite striking spatial imbalances at the regional level. Therefore, if geography is an important part of the inequality equation, we believe it is necessary to include a robust spatial-empirical approach in order to understand it better.

10. CONCLUSION

In late 2019, as the nation continues to experience political uncertainty and the machinations of the Brexit process roll on, it seems there is little room in the policy arena for taking action on persistent poverty, deprivation or the level of inequality in England. In fact, it seems like there is little room to even discuss the topic. However, as hard as it may be to envision a return to 'normal' politics, it is surely the case that at some point in the future attention will once again turn to the question of inequality, and the growing consensus that something needs to be done about it. Indeed, only two years ago it was one of the few topics where there was an element of consensus across the political spectrum.

For example, in their 2017 party political manifestos, all the major parties in England highlighted inequality as a policy challenge that needed to be tackled. The Conservative manifesto stated that 'we abhor social division, injustice, unfairness and inequality' (Conservative Party, 2017, p. 9), the Labour manifesto highlighted the ways in which 'inequality has ballooned' and is holding the economy back (Labour Party, 2017, p. 13), and the Liberal Democrat manifesto talked of breaking down the barriers that hold people back, and 'reducing inequality' (Liberal Democrats, 2017, p. 69).

Little detail was associated with these proclamations, as one might expect in public-facing documents intended for a wide audience, but the message that inequality was problematic and needed to be tackled was a powerful one. This message may have been put on hold for the past two years, as the UK attempts to navigate a path to leave the European Union, but regardless of the outcome of this process there is a need for greater understanding of the nature, geography and intensity of inequality across the country, and particularly in England.

Therefore, we present this English Atlas of Inequality as a first step towards greater understanding of the topic, and one that attempts to shed light on the geographical element in particular. We have tried to demonstrate that looking at inequality from different perspectives may yield different results, but in relation to outcomes it is often the same group of places that head the list.

Yet, at the same time, there are some confounding features of inequality in that some of England's most unequal places have some of the best outcomes on key measures. This is at once a reminder that a policy focus on inequality ought also to be linked to a focus on poverty alleviation and equality of opportunity, but also that how we understand inequality is inextricably linked to how we measure it in the first place. Our hope is that this Atlas can make a small contribution to the debate and help shed light on a topic of critical importance.

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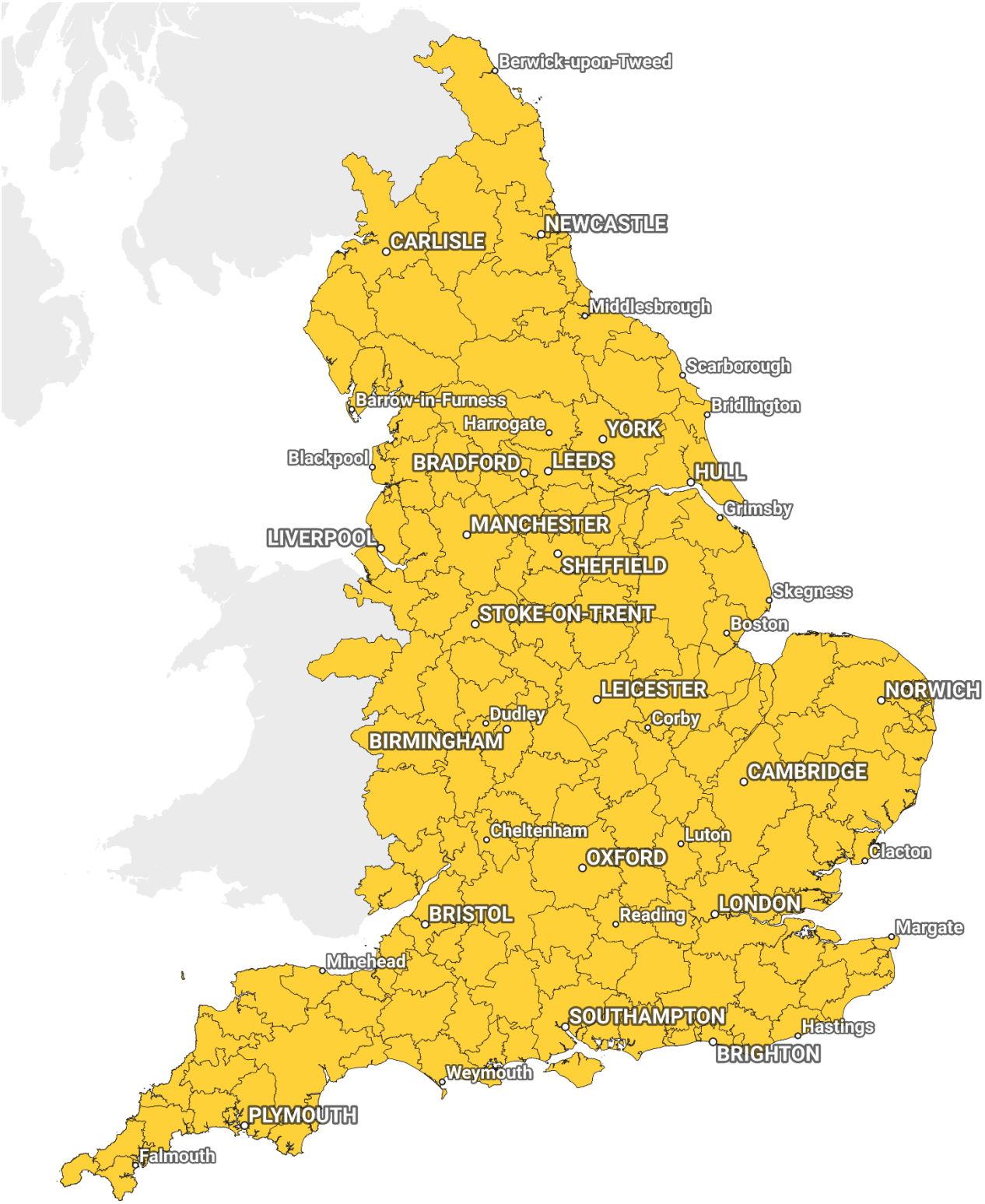
APPENDIX 1 – TTWA POPULATIONS

A map of all English TTWAs is shown below. This includes the six TTWAs that straddle the border between England and Scotland or England and Wales. This is followed by a table showing the population of each TTWA. In the case of cross-border TTWAs the population count is for those residents within the TTWA living in England.



Rank	TTWA	Population (mid-2017)
1	London	8,655,062
2	Manchester	2,727,654
3	Birmingham	1,786,898
4	Slough and Heathrow	1,695,794
5	Newcastle	1,070,123
6	Liverpool	1,013,719
7	Leicester	987,418
8	Sheffield	867,647
9	Bristol	861,991
10	Nottingham	840,916
11	Leeds	821,848
12	Warrington and Wigan	820,018
13	Wolverhampton and Walsall	780,315
14	Luton	750,495
15	Cambridge	722,901
16	Southampton	703,476
17	Guildford and Aldershot	663,936
18	Coventry	649,422
19	Medway	644,049
20	Crawley	640,717
21	Southend	593,564
22	Portsmouth	569,468
23	Reading	569,402
24	Oxford	569,042
25	Dudley	557,678
26	Stoke-on-Trent	543,065
27	Bradford	542,209
28	Hull	518,682
29	Chelmsford	492,482
30	Middlesbrough and Stockton	489,486
31	Norwich	484,867
32	Exeter	441,812
33	Derby	441,567
34	Preston	426,601
35	High Wycombe and Aylesbury	422,039
36	Sunderland	391,612
37	Swindon	390,283
38	Stevenage and Welwyn Garden City	389,871
39	Huddersfield	385,274
40	Milton Keynes	384,477
41	Ipswich	382,189
42	Lincoln	363,764
43	Peterborough	358,196
44	Bournemouth	357,947
45	Plymouth	356,595

46	Brighton	349,242
47	Wakefield and Castleford	348,148
48	York	346,673
49	Northampton	345,984
50	Birkenhead	342,647
51	Blackburn	336,507
52	Worcester and Kidderminster	319,675
53	Doncaster	308,940
54	Mansfield	307,651
55	Crewe	307,057
56	Tunbridge Wells	304,169
57	Blackpool	293,245
58	Gloucester	266,395
59	Barnsley	264,633
60	Durham and Bishop Auckland	261,735
61	Trowbridge	255,603
62	Eastbourne	254,070
63	Basingstoke	251,958
64	Kettering and Wellingborough	251,634
65	Chichester and Bognor Regis	250,464
66	Leamington Spa	248,595
67	Bedford	242,450
68	Colchester	230,741
69	Chesterfield	227,172
70	Telford	225,132
71	Halifax	209,454
72	Poole	209,064
73	Canterbury	206,898
74	Chester (only partly in England)	194,714
75	Burton upon Trent	193,657
76	Margate and Ramsgate	190,253
77	Grimsby	187,777
78	Worthing	186,705
79	Cheltenham	185,651
80	Yeovil	183,952
81	Hastings	180,438
82	Bath	180,146
83	Burnley	178,401
84	Huntingdon	175,216
85	Blyth and Ashington	173,215
86	Scunthorpe	172,538
87	Folkestone and Dover	165,955
88	Hereford	165,030
89	Weston-super-Mare	161,806
90	Stafford	161,691
91	Shrewsbury	161,179
92	Torquay and Paignton	160,972

93	King's Lynn	159,796
94	Harrogate	158,620
95	Salisbury	150,282
96	Lancaster and Morecambe	142,487
97	Bury St Edmunds	141,773
98	Isle of Wight	140,984
99	St Austell and Newquay	139,847
100	Redruth and Truro	135,301
101	Newbury	131,852
102	Lowestoft	128,391
103	Carlisle (only partly in England)	127,949
104	Taunton	127,607
105	Ashford	127,527
106	Dorchester and Weymouth	125,074
107	Thetford and Mildenhall	123,421
108	Worksop and Retford	120,857
109	Clacton	119,358
110	Banbury	116,948
111	Darlington	115,306
112	Northallerton	112,700
113	Bridgwater	105,153
114	Great Yarmouth	104,018
115	Skegness and Louth	101,750
116	Hartlepool	97,844
117	Barnstaple	95,440
118	Spalding	93,295
119	Evesham	92,736
120	Barrow-in-Furness	91,705
121	Wisbech	89,595
122	Andover	87,894
123	Boston	84,878
124	Scarborough	83,839
125	Cinderford and Ross-on-Wye (only partly in England)	80,368
126	Grantham	79,917
127	Kendal	79,715
128	Workington	79,351
129	Blandford Forum and Gillingham	77,955
130	Falmouth	75,878
131	Street and Wells	73,995
132	Corby	71,519
133	Whitehaven	68,689
134	Ludlow	58,680
135	Skipton	56,604
136	Penzance	54,943
137	Bideford	54,671
138	Liskeard	53,646
139	Cromer and Sheringham	52,287

140	Sidmouth	50,971
141	Malton	50,834
142	Oswestry (only partly in England)	50,329
143	Penrith	48,944
144	Bridlington	44,466
145	Buxton	43,674
146	Hexham	42,043
147	Wadebridge	33,737
148	Kingsbridge and Dartmouth	33,308
149	Bude	31,735
150	Minehead	30,730
151	Bridport	28,925
152	Launceston	28,081
153	Berwick (only partly in England)	27,068
154	Whitby	24,531
155	Newport (only partly in England)	5,806

APPENDIX 2 – LOCAL GINI COEFFICIENTS

This is the complete table referred to in Chapter 3, on local Gini coefficients for England's 149 travel to work areas, plus 6 that straddle the England-Scotland or England-Wales border. A rank of 1 here means most unequal.

Rank	TTWA	Gini Coefficient
1	London	0.383
2	Tunbridge Wells	0.380
3	High Wycombe and Aylesbury	0.371
4	Slough and Heathrow	0.370
5	Guildford and Aldershot	0.369
6	Luton	0.364
7	Brighton	0.364
8	Newport	0.361
9	Kingsbridge and Dartmouth	0.361
10	Leamington Spa	0.359
11	Chelmsford	0.359
12	Newbury	0.358
13	Reading	0.357
14	Crawley	0.355
15	Canterbury	0.355
16	Cambridge	0.355
17	Bath	0.355
18	Bedford	0.352
19	Cheltenham	0.351
20	Harrogate	0.350
21	Colchester	0.350
22	Oxford	0.348
23	Evesham	0.348
24	Basingstoke	0.348
25	Ashford	0.348
26	Hexham	0.348
27	Stevenage and Welwyn Garden City	0.347
28	Southend	0.347
29	Southampton	0.346
30	Salisbury	0.346
31	Milton Keynes	0.346
32	Ludlow	0.343
33	Banbury	0.343
34	Swindon	0.341
35	Northallerton	0.341
36	Northampton	0.340
37	Andover	0.340
38	Leeds	0.339
39	Chichester and Bognor Regis	0.339
40	Whitby	0.339

41	Falmouth	0.339
42	York	0.338
43	Eastbourne	0.338
44	Blandford Forum and Gillingham	0.337
45	Birmingham	0.337
46	Street and Wells	0.336
47	Medway	0.336
48	Malton	0.336
49	Bournemouth	0.336
50	Grantham	0.336
51	Skipton	0.336
52	Wadebridge	0.335
53	Chester	0.334
54	Whitehaven	0.334
55	Peterborough	0.334
56	Manchester	0.333
57	Leicester	0.332
58	Launceston	0.332
59	Huddersfield	0.332
60	Crewe	0.332
61	Bury St Edmunds	0.332
62	Bristol	0.332
63	Portsmouth	0.331
64	Ipswich	0.331
65	Worcester and Kidderminster	0.330
66	Sidmouth	0.330
67	Nottingham	0.330
68	Huntingdon	0.330
69	Derby	0.330
70	Halifax	0.330
71	Hereford	0.329
72	Worthing	0.328
73	Bradford	0.328
74	Bude	0.327
75	Bridport	0.327
76	Norwich	0.326
77	Folkestone and Dover	0.326
78	Coventry	0.326
79	Poole	0.326
80	Shrewsbury	0.325
81	Gloucester	0.325
82	Buxton	0.325
83	Lancaster and Morecambe	0.325
84	Hastings	0.325
85	Margate and Ramsgate	0.324
86	Liskeard	0.324
87	Lincoln	0.324

88	Penrith	0.324
89	Cinderford and Ross-on-Wye	0.323
90	Yeovil	0.323
91	Trowbridge	0.323
92	Kendal	0.323
93	Sheffield	0.322
94	Kettering and Wellingborough	0.322
95	Darlington	0.322
96	Cromer and Sheringham	0.322
97	Burton upon Trent	0.322
98	Middlesbrough and Stockton	0.322
99	Workington	0.321
100	Preston	0.321
101	Newcastle	0.321
102	Exeter	0.321
103	Oswestry	0.320
104	Taunton	0.320
105	Stafford	0.320
106	Weston-super-Mare	0.319
107	Hull	0.319
108	Hartlepool	0.319
109	Grimsby	0.319
110	Blackburn	0.319
111	Barrow-in-Furness	0.319
112	Liverpool	0.318
113	Durham and Bishop Auckland	0.318
114	Barnstaple	0.318
115	Great Yarmouth	0.317
116	Wolverhampton and Walsall	0.316
117	Penzance	0.316
118	Blackpool	0.316
119	Birkenhead	0.316
120	Berwick	0.315
121	Lowestoft	0.315
122	Minehead	0.315
123	Warrington and Wigan	0.314
124	Blyth and Ashington	0.314
125	Telford	0.312
126	King's Lynn	0.312
127	Isle of Wight	0.312
128	Scunthorpe	0.311
129	Redruth and Truro	0.311
130	Stoke-on-Trent	0.310
131	Plymouth	0.310
132	Chesterfield	0.310
133	Wisbech	0.309
134	Scarborough	0.309

135	Doncaster	0.309
136	Burnley	0.309
137	Bridgwater	0.309
138	Worksop and Retford	0.308
139	Thetford and Mildenhall	0.308
140	Torquay and Paignton	0.307
141	Dudley	0.307
142	Bideford	0.307
143	Spalding	0.307
144	Clacton	0.306
145	Dorchester and Weymouth	0.306
146	St Austell and Newquay	0.305
147	Carlisle	0.304
148	Sunderland	0.303
149	Mansfield	0.303
150	Wakefield and Castleford	0.302
151	Barnsley	0.300
152	Boston	0.298
153	Skegness and Louth	0.296
154	Corby	0.296
155	Bridlington	0.296

APPENDIX 3 – 20:20 Index

This is the complete table referred to in Chapter 4, on the 20:20 Index for England's 149 travel to work areas, plus 6 that straddle the England-Scotland or England-Wales border. A rank of 1 here means most unequal.

Rank	TTWA	LSOAs in most deprived 20%	LSOAs in least deprived 20%	Difference	Difference as % of all LSOAs
1	Basingstoke	0	84	84	54.9
2	Guildford and Aldershot	8	212	204	50.2
3	Kendal	0	22	22	50.0
4	Newport	0	2	2	50.0
5	High Wycombe and Aylesbury	3	128	125	49.8
6	Hartlepool	34	4	30	48.4
7	Andover	0	23	23	47.9
8	Harrogate	2	51	49	47.1
9	Northallerton	0	31	31	45.6
10	Reading	12	169	157	45.4
11	Crawley	4	164	160	42.7
12	Newbury	1	34	33	41.8
13	Bridlington	12	0	12	41.4
14	York	9	91	82	41.2
15	Oxford	10	148	138	41.2
16	Cambridge	3	171	168	40.4
17	Liverpool	303	46	257	39.7
18	Leamington Spa	1	60	59	39.1
19	Tunbridge Wells	2	71	69	38.5
20	Sunderland	116	17	99	37.6
21	Huntingdon	1	38	37	36.3
22	Banbury	4	30	26	36.1
23	Skipton	2	13	11	34.4
24	Clacton	25	0	25	34.2
25	Bradford	135	28	107	34.2
26	Skegness and Louth	20	0	20	33.3
27	Salisbury	2	30	28	32.9
28	Stafford	7	38	31	32.6
29	Burnley	48	10	38	32.5
30	Dudley	144	37	107	31.7
31	Wolverhampton and Walsall	188	44	144	30.9
32	Cheltenham	11	45	34	30.1
33	Great Yarmouth	21	2	19	29.7
34	Bath	5	37	32	29.1
35	Barnsley	54	9	45	28.5
36	Doncaster	68	13	55	28.4
37	Southampton	36	153	117	28.0

38	Blackpool	61	8	53	27.3
39	Chelmsford	9	87	78	26.7
40	Penrith	0	9	9	26.5
41	Birmingham	426	154	272	26.2
42	Torquay and Paignton	28	1	27	25.7
43	Evesham	0	14	14	25.5
44	Grimsby	42	12	30	24.4
45	Hastings	28	2	26	24.3
46	Middlesbrough and Stockton	121	48	73	24.0
47	Margate and Ramsgate	29	2	27	23.9
48	Blackburn	84	34	50	23.6
49	Crewe	17	59	42	22.2
50	Blandford Forum and Gillingham	0	9	9	22.0
51	Swindon	20	70	50	21.6
52	Stevenage and Welwyn Garden City	8	56	48	21.5
53	Durham and Bishop Auckland	55	21	34	21.5
54	Bury St Edmunds	0	18	18	20.7
55	Scarborough	13	2	11	20.4
56	Sidmouth	0	6	6	20.0
57	Penzance	7	1	6	18.8
58	Luton	46	126	80	18.5
59	Poole	8	32	24	18.5
60	Newcastle	227	104	123	18.4
61	Folkestone and Dover	25	7	18	18.4
62	Manchester	565	272	293	18.0
63	Malton	0	5	5	17.9
64	Burton upon Trent	13	33	20	17.7
65	Slough and Heathrow	58	225	167	17.7
66	Northampton	23	58	35	17.5
67	Milton Keynes	18	55	37	16.8
68	Trowbridge	7	32	25	16.4
69	Bristol	66	149	83	16.4
70	Isle of Wight	15	1	14	15.7
71	Hexham	1	5	4	15.4
72	Lowestoft	18	6	12	15.2
73	Worthing	7	24	17	14.9
74	Halifax	36	17	19	14.8
75	St Austell and Newquay	13	1	12	14.8
76	Birkenhead	65	33	32	14.7
77	Buxton	1	5	4	14.3
78	Huddersfield	67	35	32	14.1
79	Redruth and Truro	13	2	11	13.8
80	Wakefield and Castleford	58	29	29	13.6

81	Blyth and Ashington	35	21	14	13.5
82	Liskeard	4	0	4	12.5
83	Bedford	19	37	18	12.5
84	Yeovil	6	20	14	12.4
85	Ipswich	26	53	27	12.2
86	Sheffield	171	107	64	12.1
87	Thetford and Mildenhall	2	10	8	11.9
88	Corby	7	2	5	11.9
89	Whitby	3	1	2	11.8
90	Gloucester	19	37	18	11.6
91	Colchester	11	26	15	11.5
92	Warrington and Wigan	161	102	59	11.5
93	Taunton	5	13	8	11.1
94	Wisbech	5	0	5	10.2
95	Bideford	3	0	3	10.0
96	Carlisle	9	17	8	10.0
97	Mansfield	46	28	18	9.8
98	Scunthorpe	20	10	10	9.8
99	Falmouth	4	0	4	9.5
100	Chichester and Bognor Regis	7	21	14	9.5
101	Hull	94	63	31	9.5
102	Telford	29	16	13	9.4
103	Derby	48	72	24	9.2
104	Kettering and Wellingborough	16	29	13	9.2
105	Oswestry	3	0	3	9.1
106	Boston	6	2	4	9.1
107	Grantham	5	9	4	9.1
108	Preston	42	65	23	8.9
109	Chester	27	38	11	8.8
110	Portsmouth	45	75	30	8.7
111	Darlington	21	15	6	8.5
112	Bridgwater	12	7	5	8.2
113	Workington	9	13	4	8.2
114	Nottingham	127	89	38	7.6
115	Worcester and Kidderminster	25	40	15	7.6
116	Bournemouth	17	33	16	7.5
117	Shrewsbury	6	13	7	7.4
118	Street and Wells	1	4	3	7.3
119	Worksop and Retford	17	12	5	6.8
120	Exeter	13	30	17	6.7
121	London	987	681	306	6.4
122	Plymouth	45	31	14	6.4
123	Bude	1	0	1	6.3
124	Cinderford and Ross-on-Wye	6	3	3	6.3

125	Berwick	1	0	1	5.9
126	Bridport	0	1	1	5.9
127	Stoke-on-Trent	84	65	19	5.7
128	Lancaster and Morecambe	20	15	5	5.6
129	Chesterfield	33	25	8	5.5
130	Brighton	31	20	11	5.4
131	Ludlow	2	4	2	5.4
132	Wadebridge	1	0	1	5.0
133	Leicester	91	118	27	4.9
134	Eastbourne	16	23	7	4.6
135	King's Lynn	10	6	4	4.3
136	Leeds	139	118	21	4.2
137	Norwich	35	47	12	4.1
138	Medway	57	72	15	4.1
139	Lincoln	35	27	8	3.9
140	Coventry	74	60	14	3.8
141	Cromer and Sheringham	0	1	1	3.3
142	Hereford	6	9	3	3.0
143	Canterbury	15	18	3	2.6
144	Southend	63	72	9	2.5
145	Whitehaven	7	8	1	2.0
146	Spalding	1	2	1	2.0
147	Barnstaple	7	6	1	1.7
148	Peterborough	37	34	3	1.4
149	Ashford	9	8	1	1.3
150	Weston-super-Mare	16	17	1	1.0
151	Launceston	1	1	0	0.0
152	Kingsbridge and Dartmouth	1	1	0	0.0
153	Dorchester and Weymouth	7	7	0	0.0
154	Barrow-in-Furness	15	15	0	0.0
155	Minehead	0	0	0	0.0

APPENDIX 4 – MORAN'S I VALUE BY TTWA

This is the complete table of Moran's I values for all TTWAs, as presented in Chapter 5. Moran's I is a measure of spatial concentration or dispersion and ranges from a maximum of 1.0 to a minimum of -1.0. The higher the value, the greater the level of spatial clustering of areas with similar characteristics. A rank of 1 means most unequal.

Rank	TTWA	Moran's I
1	Hull	0.65
2	Birkenhead	0.63
3	Liverpool	0.63
4	Birmingham	0.61
5	Derby	0.60
6	Leeds	0.60
7	Great Yarmouth	0.59
8	Barrow-in-Furness	0.58
9	Blackpool	0.58
10	Bradford	0.58
11	Wolverhampton and Walsall	0.56
12	Portsmouth	0.56
13	Middlesbrough and Stockton	0.56
14	Sheffield	0.56
15	Grimsby	0.56
16	Weston-super-Mare	0.55
17	Bristol	0.55
18	Leicester	0.52
19	Manchester	0.52
20	London	0.52
21	Newcastle	0.50
22	Plymouth	0.50
23	Burnley	0.50
24	Coventry	0.50
25	Chester	0.50
26	Luton	0.49
27	Peterborough	0.49
28	Milton Keynes	0.48
29	Preston	0.48
30	Nottingham	0.48
31	Lancaster and Morecambe	0.48
32	Southend	0.48
33	Halifax	0.48
34	Blackburn	0.48
35	Slough and Heathrow	0.47
36	Southampton	0.46
37	Dudley	0.46
38	Margate and Ramsgate	0.46

39	Medway	0.46
40	Banbury	0.45
41	Reading	0.44
42	High Wycombe and Aylesbury	0.44
43	Gloucester	0.44
44	Huddersfield	0.44
45	Stoke-on-Trent	0.44
46	Torquay and Paignton	0.43
47	Barnstaple	0.43
48	Warrington and Wigan	0.43
49	Hastings	0.42
50	Swindon	0.41
51	Lowestoft	0.41
52	Telford	0.41
53	Bournemouth	0.41
54	Cambridge	0.40
55	Bridgwater	0.40
56	Basingstoke	0.40
57	Folkestone and Dover	0.39
58	Clacton	0.39
59	Bridlington	0.38
60	Eastbourne	0.38
61	Bedford	0.38
62	Norwich	0.37
63	Oxford	0.37
64	Hartlepool	0.36
65	Andover	0.36
66	Darlington	0.36
67	Barnsley	0.35
68	Ipswich	0.35
69	Blyth and Ashington	0.35
70	Colchester	0.35
71	Lincoln	0.34
72	Ashford	0.34
73	Northampton	0.34
74	Doncaster	0.34
75	Poole	0.34
76	Dorchester and Weymouth	0.33
77	Sunderland	0.33
78	Cheltenham	0.33
79	Brighton	0.33
80	Crawley	0.31
81	York	0.31
82	Skegness and Louth	0.31
83	Scunthorpe	0.31
84	Worcester and Kidderminster	0.31
85	Hereford	0.31

86	Huntingdon	0.30
87	Wakefield and Castleford	0.30
88	Crewe	0.30
89	Stafford	0.30
90	Chichester and Bognor Regis	0.29
91	Workington	0.29
92	Durham and Bishop Auckland	0.29
93	Corby	0.28
94	Burton upon Trent	0.28
95	Scarborough	0.28
96	Berwick	0.28
97	Taunton	0.28
98	Stevenage and Welwyn Garden City	0.28
99	Guildford and Aldershot	0.28
100	Carlisle	0.28
101	Grantham	0.27
102	Harrogate	0.27
103	Launceston	0.26
104	Buxton	0.26
105	King's Lynn	0.26
106	Chesterfield	0.25
107	Mansfield	0.24
108	Penrith	0.24
109	Kettering and Wellingborough	0.24
110	Worthing	0.24
111	Falmouth	0.23
112	Thetford and Mildenhall	0.23
113	Redruth and Truro	0.23
114	Worksop and Retford	0.23
115	St Austell and Newquay	0.22
116	Street and Wells	0.22
117	Isle of Wight	0.22
118	Bury St Edmunds	0.22
119	Minehead	0.21
120	Bath	0.21
121	Leamington Spa	0.20
122	Whitehaven	0.19
123	Exeter	0.19
124	Spalding	0.18
125	Penzance	0.18
126	Yeovil	0.16
127	Tunbridge Wells	0.16
128	Newbury	0.15
129	Northallerton	0.15
130	Evesham	0.15
131	Liskeard	0.15
132	Whitby	0.14

133	Chelmsford	0.14
134	Canterbury	0.12
135	Shrewsbury	0.12
136	Cromer and Sheringham	0.11
137	Trowbridge	0.11
138	Ludlow	0.10
139	Skipton	0.09
140	Kendal	0.09
141	Salisbury	0.08
142	Malton	0.07
143	Wisbech	0.07
144	Wadebridge	0.05
145	Oswestry	0.04
146	Boston	0.01
147	Blandford Forum and Gillingham	0.00
148	Sidmouth	-0.01
149	Cinderford and Ross-on-Wye	-0.01
150	Bridport	-0.02
151	Bideford	-0.02
152	Bude	-0.04
153	Hexham	-0.06
154	Kingsbridge and Dartmouth	-0.07
155	Newport	-0.47

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