

## Show me the money – Income inequality and segregation in UK cities

Accepted for publication in *Area*. The information, practices and views in this article are those of the author(s) and do not necessarily reflect the opinion of the Royal Geographical Society (with IBG).

### Authors:

Jenni Cauvain (Corresponding author)

School of Social and Political Sciences, Nottingham Trent University, Nottingham, UK.

Email: [jenni.cauvain@ntu.ac.uk](mailto:jenni.cauvain@ntu.ac.uk)

Gavin Long

School of Geography, the University of Nottingham, Nottingham, UK

Timothy Whiteley

School of Mathematical Sciences, the University of Nottingham, Nottingham, UK

Etienne Farcot

School of Mathematical Sciences, the University of Nottingham, Nottingham, UK

**Article type:** Regular paper

**Abstract:** The social geography of cities is argued to be changing globally; rising economic inequality is associated with increasing segregation. Yet, income inequality has been predominantly mobilised through

national and regional imaginaries. In cities, a number of factors, such as the normative policy motivation to  
This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/AREA.12784](https://doi.org/10.1111/AREA.12784)

This article is protected by copyright. All rights reserved

Accepted Article

intervene in 'disadvantaged' neighbourhoods, have led to (concentrations of) poverty becoming prioritised in empirical studies of household income. This paper addresses a gap in understanding the relationship between local income inequality and the segregation of high income households at the urban and neighbourhood scales in England and Wales. The results highlight that wealthier cities and districts (Cambridge, Winchester, and Rushcliffe in the Nottingham conurbation) have higher income inequality (Gini), but are less segregated (Index of Dissimilarity). Lower average income cities tend to be more segregated, this is due to self-segregation of high income household into 'pockets of affluence'. These results confirm that high income households are the most segregated group in our sample, consistent with trends in global urban segregation patterns. The research also highlights just how prevalent low income is in urban neighbourhoods, making the case for high income as the designated minority population in segregation studies. In our detailed case study of Nottingham, income homogeneity is typical of areas with high deprivation. Neighbourhoods with a high Gini coefficient could be described as "mixed income": the Gini is raised by the presence of high income households in urban neighbourhoods. We argue that the Gini therefore offers potential as an indicator of social mix in urban studies. These results are based on an experimental household income dataset released by the Office of National Statistics, with analysis of all core cities in England and Wales, alongside Derby, Leicester, Cambridge, Southampton and Winchester, followed by a detailed case study of Nottingham (UK) and its extended suburban boundary.

**Acknowledgments:** We would like to thank the anonymous reviewers and Area editors for their very constructive engagement and positive feedback. Thank you also to colleagues at *Modelling and Analytics for a Sustainable Society* doctoral scholarship programme, and Sustaining Urban Habitats: An Interdisciplinary

Accepted Article  
Approach at the University of Nottingham, both funded by the Leverhulme Trust. This research would not have been possible without the funding and institutional support, nor without the informal but very necessary encouragement from our wider network of colleagues.

**Funding information:** Leverhulme Trust

**Data availability statement:** The data that support the findings of this study are available via the website of the Office of National Statistics, at ons.gov.uk. These data were derived from the following resources available in the public domain:  
<https://www.ons.gov.uk/census/censustransformationprogramme/administrativedatacensusproject/administrativedatacensusresearchoutputs/populationcharacteristics/researchoutputsincomefrompayasyouearnpayeandbenefitsfortaxyearending2016>

## 1 INTRODUCTION

Since at least the 1950s, researchers have been concerned about how income inequality and segregation intersect in urban space, but the field is marked with disagreement on both scientific methods of study and conclusions drawn (Sampson, 2008; Massey, 2012; Tammaru et al., 2020). This paper focuses on the unevenness of household income, what could be described as the “differential social organisation of the city, especially its neighbourhoods” (Sampson, 2008: 190), with special interest in the impact of high income households.

The study of income-based segregation is a dynamic sub-field of both geography and sociology, we contribute to the sub-field by offering new evidence of household incomes at LSOA level in UK cities. We aim to demonstrate how small shifts in methodology can broaden the focus from ‘pockets of deprivation’ towards *unevenness of household income*. This approach has potential to reveal previously undetected associations between place, quality of life, social justice and household income. For example, Darlington-Pollock et al. (2021) revealed that poverty and deprivation did not explain excess deaths in the UK in the period marked by austerity before the Covid-19 pandemic, instead, areas with higher losses of average household income were most affected. We should be curious about patterns of income beyond existing knowledge about the disadvantages associated with deprivation; self-segregation of high income households may also exacerbate social inequalities (Atkinson, 2006; Reardon & Bischoff, 2011).

Evidence of income-based inequality and segregation in cities comes overwhelmingly from the US (Reardon & Bischoff, 2011). International comparison of household incomes in urban areas is challenging due to different cultural norms and laws around privacy, that lead to variable data availability (OECD, 2018). However, a recent survey of large cities found that there is a global convergence of trends of rising inequalities and socio-economic segregation; whilst lower income countries experience higher levels of both inequality and segregation, high-income countries are experiencing faster rates of change (van Ham et al., 2021). This points to a changing social geography linked to urbanization. Within the literature on income inequality and segregation in cities, there is more emphasis on large cities and capitals, whereas our paper focuses on second and third tier cities in the UK, for the first time to our knowledge.

## 2 BACKGROUND: INCOME INEQUALITY AS A STORY OF NATIONS

Income inequality has over a century-long tradition among economists, it is linked to fiscal redistribution policy, thus traditionally considered central government business (Kakwani, 1980). Income inequality is affiliated with many social ills. Epidemiologists have associated it with increased mortality and poor health in international comparisons (Kondo et al., 2009), also within US metropolitan regions (Sanmartin et al., 2003). Since the global financial crisis of 2007/8, economic inequality as a topic was propelled into the mainstream by the success of Thomas Piketty's (2014) *Capital in the 21st century*. However, a recent systematic review of the geographies of income inequality research found that the number of publications focusing on the urban (including neighbourhood) scale had not risen since 2007/8 (Cavanaugh and Breau, 2018). By contrast, a substantial increase was found in regional and national accounts of income inequality. Consequently, there is intuitive knowledge about national contexts; countries tend to have reputations as low or high income inequality, the latter comes with recognised social burdens (Wilkinson and Pickett, 2009).

Within urban and regional research, recent publications on the relationship between income inequality and segregation consider the Gini as a *national characteristic*, it is used to frame particular urban or regional case selections within their macroeconomic context (Tammaru et al., 2020; Nieuwenhuis et al., 2020), sometimes due to unavailability of data to calculate the Gini at the urban level (van Ham et al., 2021). The usefulness of the national Gini for policy and research purposes is beyond dispute. Our proposition is simply that it could be under-represented in urban literature and therefore its meaning remains vague at local and neighbourhood scales. We fill this gap by offering Gini estimates for local authorities and LSOAs, and offer an interpretation of the Gini as an indicator of social mix.

### 2.1 Urban policy interventions

There is a long tradition in urban scholarship to study social mix and to plan interventions in communities, with historical links back to the late 19<sup>th</sup> century when concentrations of poverty were witnessed in the slums of industrialising cities (Atkinson, 2005). In de-industrialising Britain, scholars such as the late Brian Robson (*Those Inner Cities*, 1988) helped to foreground neighbourhood disadvantage in British urban policy. The progressive case for policy intervention is based on the injustices associated with concentrated poverty (Thurber et al., 2018). There is a notable sub-literature dealing with 'neighbourhood effects'

arising from segregation of poverty, and how income segregation intersects with racial segregation, especially in the US (Massey et al., 1991; Sampson, 2008). Against this backdrop, de-segregation of poverty became a policy fix, and mixed-income neighbourhoods were accepted as a sustainable urban form. However, there is a lack of consensus on what constitutes segregation and how it should be remedied (Bailey et al., 2006; Bolt et al., 2009). Brown-Saracino (2017) argues that anxieties about (growing) income inequality can explain urban researchers' disagreements about gentrification, and to an extent, the underlying sentiments are reflected in methodological choices too. Gentrification linked to mixed-income policy interventions has been associated with displacement, further segregation and social polarisation (Lees, 2008). The efficacy of 'social mix' policies (Livingston et al., 2013), their underlying values (Lupton & Tunstall, 2008) and impact on social wellbeing (Thurber et al., 2018) have been found wanting. Despite these shortcomings, researchers continue to be interested in patterns of poverty in cities in order to break cycles of disadvantage. We support this endeavour, but recognise its limitations, particularly the co-optation of the deprived neighbourhoods agenda by revanchist urban policies (Lawton, 2018).

## **2.2 The relationship between income inequality and segregation**

Existing literature shows that the presence of high earners is the most important driver of wage inequality in cities and neighbourhoods in Canada, US and the UK, indeed the polarisation of incomes associated with global economic restructuring is linked to urban segregation patterns (Chen et al., 2011; Glaeser et al., 2009; Lee et al., 2016; van Ham et al., 2021). Empirical evidence points to the rich being the most segregated group in cities worldwide, followed by the very low income groups, therefore income-based segregation follows a U-curve (Reardon & Bischoff 2011; OECD, 2018; Musterd et al., 2017). This matters because the self-segregation of the rich could threaten the socio-spatial contract between different socio-economic groups in cities (Atkinson, 2006). High income households may also secure unjust advantages through self-segregation (Reardon & Bischoff, 2011). The main body of research points to income inequality leading to income-based segregation, although there are often local complexities (Kawachi, 2002; OECD 2018; Reardon & Bischoff, 2011). Musterd et al. (2017) draw attention to a number of context-specific factors such as the type of welfare state, housing system, immigration and local/institutional context, noting that segregation can also be linked to individual or household preferences. Economic

segregation can be a result of social groups choosing to live in close proximity (Bailey & Minton, 2018; Chen et al. 2011).

Tammaru et al.'s (2020) work argues that national-level income inequality is associated with rising levels of socio-economic segregation in urban regions in Europe, but notably there was a time lag of approximately ten years between the increase in national Gini and the associated impact on segregation. Perhaps then counter-intuitively, given that the UK is characterized as a high inequality nation within Europe (Nieuwenhuis et al., 2020), Bailey and Minton (2018) found that poverty became more suburbanized, or less concentrated in inner cities, between 2004 and 2016. Bailey and Minton's research design followed the classic segregation framework "poor" vs "non-poor", using the Index of Multiple Deprivation (IMD) as a proxy for income. In part, this paradox may be explained by Reardon and Bischoff's findings in the North American context; in the largest 100 cities in US, "*income inequality appears to be much more strongly linked to the segregation of affluence than to the segregation of poverty*" (2011, p. 1131). The evidence consistently points to more significant segregation of high income groups. The question then arises, *what happened to high income households*; if poverty became less segregated in the UK, did high incomes segregate more? And what impact does *local* income inequality have on segregation in UK cities? We cannot address the temporal question in this paper due to unavailability of historical data, but we purposefully put forward a design that explores links between high-income segregation and local income inequality.

### **2.3 Research strategy and questions**

First we take a glance at basic descriptive statistics of high, medium and low income in all LSOAs. Next, analysis of a purposive selection of UK cities and districts (LA boundary), asks the question "*what is the relationship between local income inequality and segregation?*". The sample includes all core cities in England and Wales, additionally Derby and Leicester, and more affluent cities of Cambridge, Winchester and Southampton. London, a known outlier (Lee et al., 2016), is purposefully excluded. Second, a detailed case study of Nottingham (East Midlands) unpacks the dynamics at a more granular level and answers the questions: "*which group (high or low income) is more segregated?*" and "*what does Gini tell us about 'sustainable neighbourhoods'?*". The detailed case study of Nottingham focuses on the Principal Urban Area (PUA) that captures parts of the more affluent suburbs surrounding

the city, and the outlying districts of Broxtowe, Erewash, Gedling, Rushcliffe and Ashfield, each district has a presence in the PUA but extend beyond it (Figure 1).

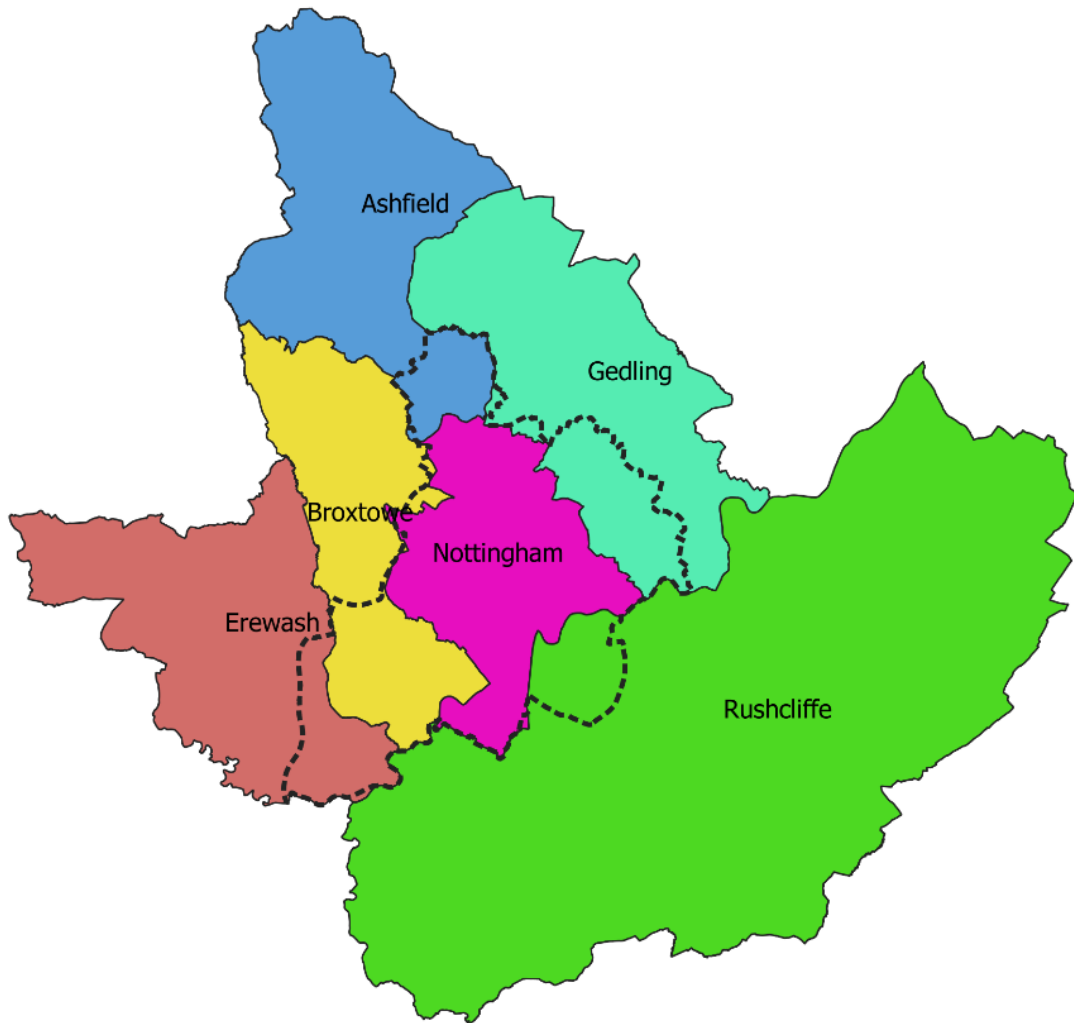


Figure 1: Nottingham city, Nottingham PUA (dotted line) and suburban district boundaries.

Contains National Statistics data © Crown copyright and database right 2012

### 3 DATA

We use an experimental dataset (ONS 2017), offering the highest level of spatial disaggregation for household income in the UK (excluding Scotland) currently. The outputs are modelled, based on PAYE tax records, pensions and social security payments. The data is provided at LSOA level, using annual income bands at £5-10k intervals, the highest category being £60k+. We use gross household income adjusted for household size and composition using the modified OECD equivalence scale (ONS, 2017). The data was aggregated into ‘low’ (less than £15k) ‘medium’ (£15-£40k) and ‘high’ (more than £40k). To

This article is protected by copyright. All rights reserved



justify these thresholds, we consulted the Households Below Average Income (HBAI) survey (DWP, 2017). It defines relative poverty as £15,400 pa, whereas £40,000 pa represents the top 20 per cent. The dataset we use is modelled differently to the HBAI, therefore our income thresholds are not an exact match with the official UK definitions. The ONS cautions that this data should not be used to estimate poverty or living standards in the UK.

### **3.1 Limitations**

The opaqueness of high incomes, the uncertainties relating to the accuracy of the experimental, modelled ONS income dataset, and the lack of historical data are our main constraints, alongside lack of data on household wealth. Other criticisms include the modifiable areal unit problem; also, geographic units can be arbitrary and incongruent with what communities identify as neighbourhoods (Bailey et al., 2017). Urban administrative boundaries in the UK are known to be inconsistent, “underbounding” affects many cities (Bailey & Minton, 2018). Despite these limitations, we hope to stimulate discussion about the utility of the Gini for urban research.

## **4 METHODS**

Following Massey and Denton (1988), we use measures of (un)evenness; Gini coefficient and Dissimilarity Index (D). Massey (2012, p. 40) defines (un)evenness as “the degree to which the percentage of minority group members within specific neighborhoods departs from the minority percentage in the entire urban area”. We conceptualise high incomes as the “minority” population and use this term in the discussion to refer to the high income group in our research design that compares high and low income. This is in contrast to ‘classic’ segregation studies of poor vs non-poor households, where poor households are the minority population.

### **4.1 Dissimilarity Index (D)**

Due to the “U-curve” in income-based segregation, the interaction between low and high income households is our main focus. D values were calculated using the Multi-Level Index of Dissimilarity (MLID) package in R (Harris and Owen, 2018), comparing high and low income populations as follows:

$$D = k \sum_i \left| \frac{n_{yi}}{n_y} - \frac{n_{xi}}{n_x} \right|$$

The MLID package's *impacts* function calculates the impact of each sub-division on the overall D value. This is used to identify locations that have a significant effect on the overall D; we report the results at LSOA level.

## 4.2 Gini coefficient

If the income of household  $i$  is  $x_i$ , then the equation of the Gini is given by:

$$G = \frac{\sum_{i=1}^n \sum_{j=1}^n |x_i - x_j|}{2n \sum_{i=1}^n x_j}$$

To estimate the Gini coefficient from the LSOA income dataset that uses income bands, it is assumed that within each income band the data is uniformly distributed. This requires an upper bound on incomes above £60,000 pa, which was set as £120,000 pa (see addendum for justification). Using the Uniform assumption, the Gini coefficient was estimated for each LSOA.

Aggregating data to the city level reveals how the Gini coefficient changes as the spatial unit increases, aggregated results are presented for Nottingham and all the comparator cities.

## 5 RESULTS

### 5.1 Income distribution in LSOAs

In all the 42,250 LSOAs in England and Wales, nine per cent of all households have an income of £40k or above; 49.8 per cent are medium income, and just under 40 per cent have less than £15k per annum. The majority of LSOAs (83 per cent) have medium income as the dominant category whereas only 1 per cent (ca 400 LSOAs) have high income households as the dominant category. In the majority of LSOAs (78 per cent), the number of low income households is more than 20 per cent higher than the number of high income households. The skew towards low incomes is a known characteristic of the UK income distribution (DWP, 2017), but the insight from the LSOA perspective is new.

## 5.2 City comparison: affluent cities are different

Figure 2 shows the values for Gini and D in our sample cities.

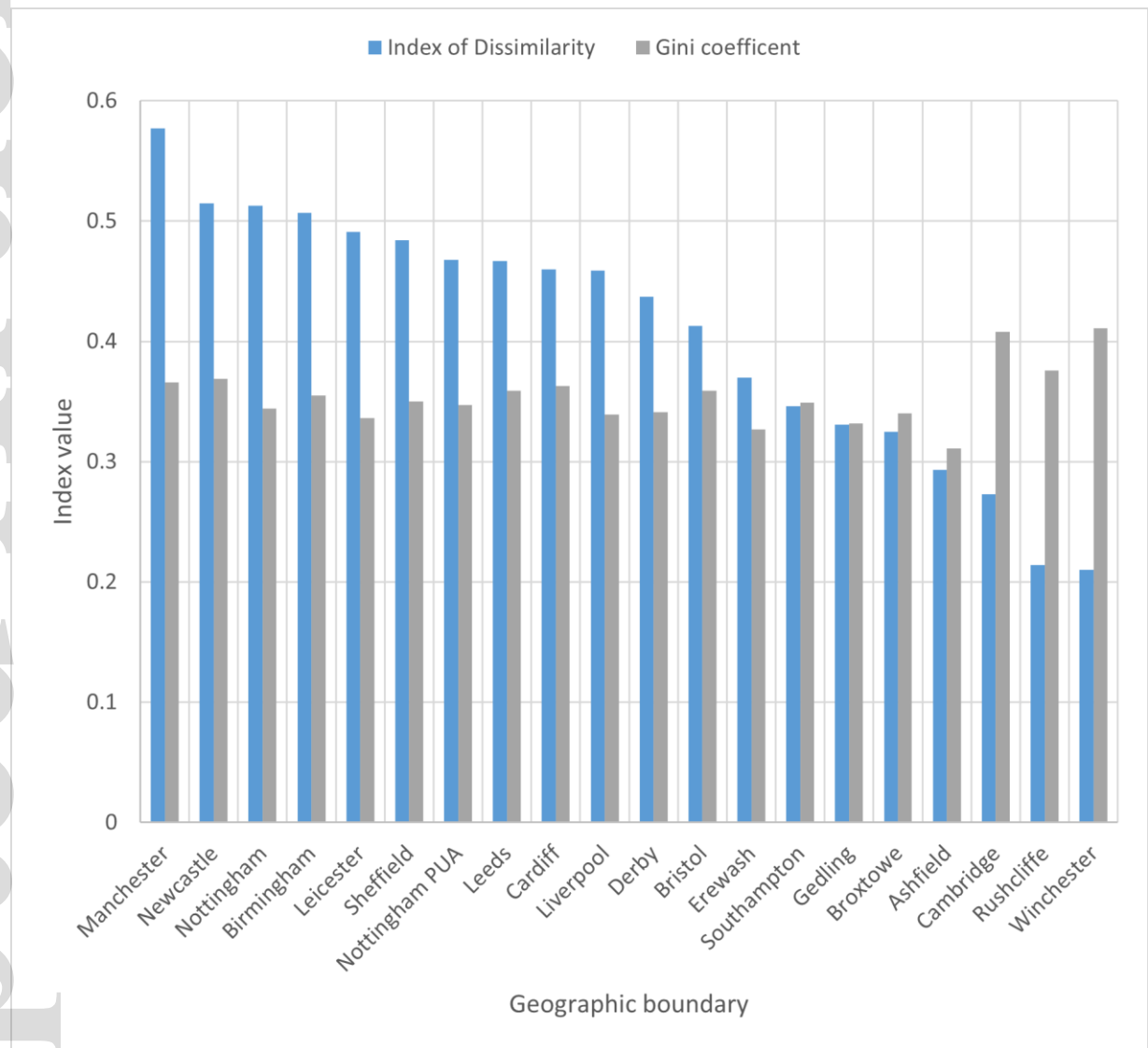


Figure 2: Gini coefficients and dissimilarity indices for case study areas of Nottingham and comparator UK cities (in descending order of D)

The notable trend in Figure 2 is the relationship between income, D scores and Gini; a cluster of higher income cities show lower segregation and higher Gini. Scatterplots (Figure 3) for D and Gini against mean household income in our sample cities suggest that both measures create a distinct response in wealthier cities. The results speak against the grain of inequality-segregation research where high inequality is typically associated with more segregation. The reversal of this inequality-segregation relationship could mean that previously published research has focussed predominantly on the segregation of poor vs non-poor households, as

opposed to comparing high with low income households. The “pockets of affluence” metaphor may help to interpret the result; in richer cities, high income households are more evenly spread. In lower income cities, high income households will segregate more, and there will be fewer of these affluent pockets, giving a higher D score.

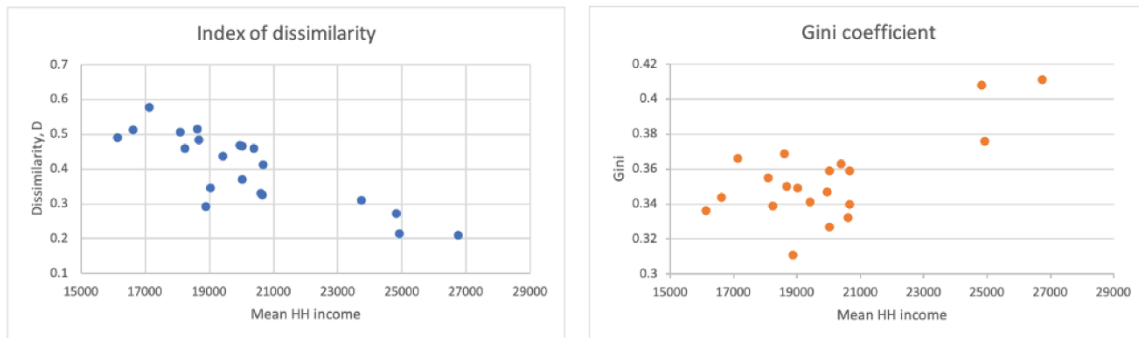
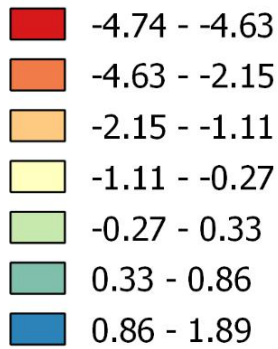


Figure 3 Scatterplots of D and Gini against mean household income in urban areas

### 5.3 Who is more segregated?

We calculated the scaled mean impact on the D by LSOA in our case study area of Nottingham, and for an instrumental selection of two similar urban cases (Manchester and Sheffield) and one extreme case (Cambridge)<sup>1</sup>. In Figure 4, the negative values depicting wealthy areas (highest score -4.74) have a greater magnitude than the positive values depicting low income areas (highest score 1.89) in Nottingham PUA. Manchester and Sheffield are very similar, the highest negative scores are -4.34 (Manchester) and -4.030 (Sheffield); the highest positive values are 1.22 and 1.64 respectively. The highest impact score in wealthier Cambridge is -2.19. In Cambridge, high income groups have a slightly higher impact on the overall D score, the most segregated low income neighbourhood in Cambridge scored 1.78.

#### PUA - Impacts by LSOA



OpenStreetMap

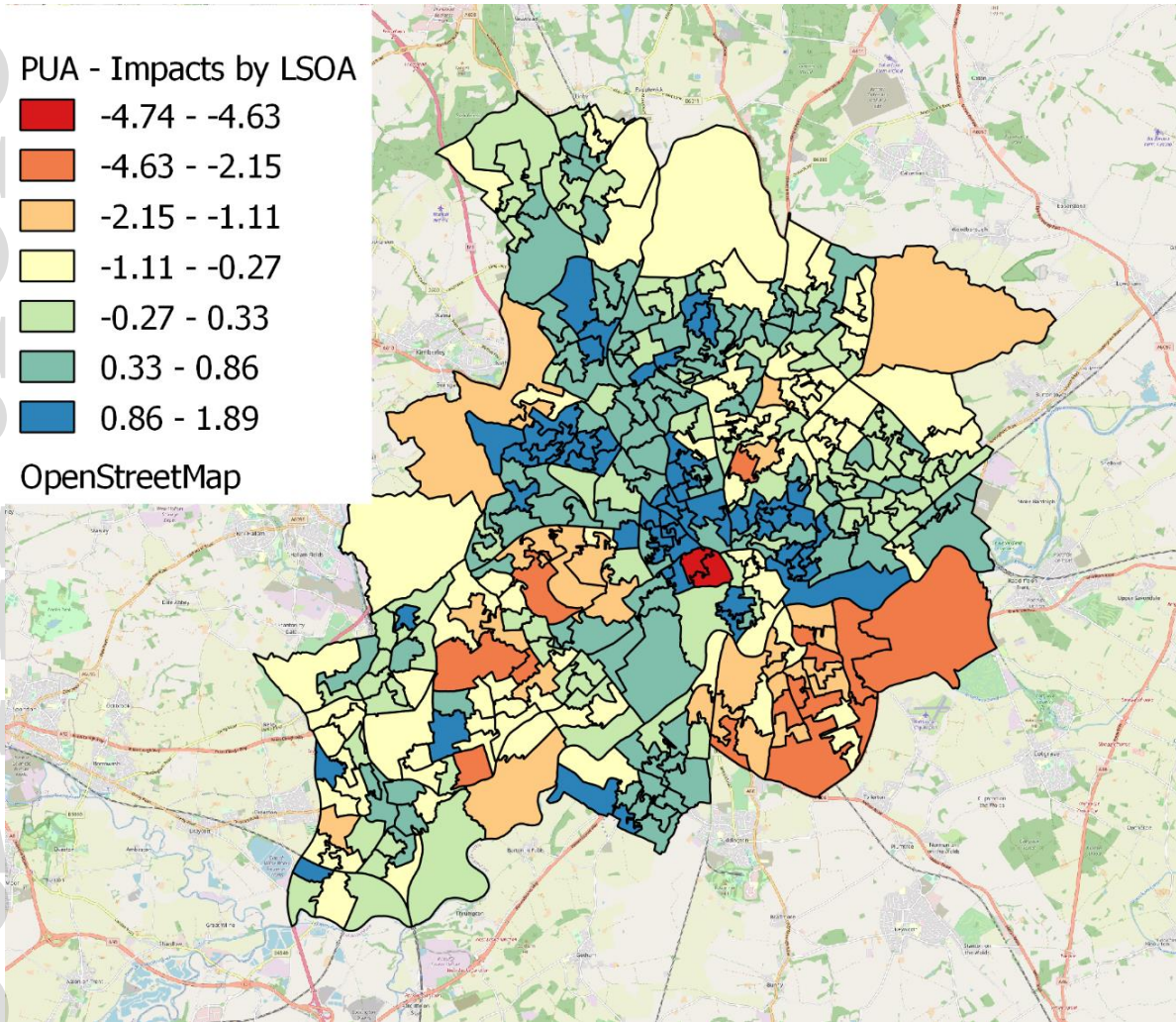


Figure 4: LSOA level impacts on the Dissimilarity index for Nottingham PUA. Contains National Statistics data © Crown copyright and database right 2012. Backdrop mapping © OpenStreetMap contributors

#### 5.4 The Gini and social mix

Our analysis shows that there are no uniformly rich LSOAs in Nottingham PUA that would show a low Gini (see Figure 5). The homogenous LSOAs concentrate in North Nottingham that is considered “deprived” by IMD. This homogeneity implies an absence of high incomes in poorer areas. The highest Gini values were initially found in student areas, explained by a concentration of £0-5,000 income households. Given that UK student housing is highly segregated (Smith & Hubbard, 2014), it is noteworthy that student areas were not highlighted in our segregation map (Figure 4); the Gini is therefore more sensitive than D. However, we wanted to understand social mix in non-student population, therefore ran the analysis

excluding £0-5,000 group. Now, the highest Gini values depict ‘mixed income’ LSOAs that are in desirable residential locations where the Gini is driven by the presence of high incomes.

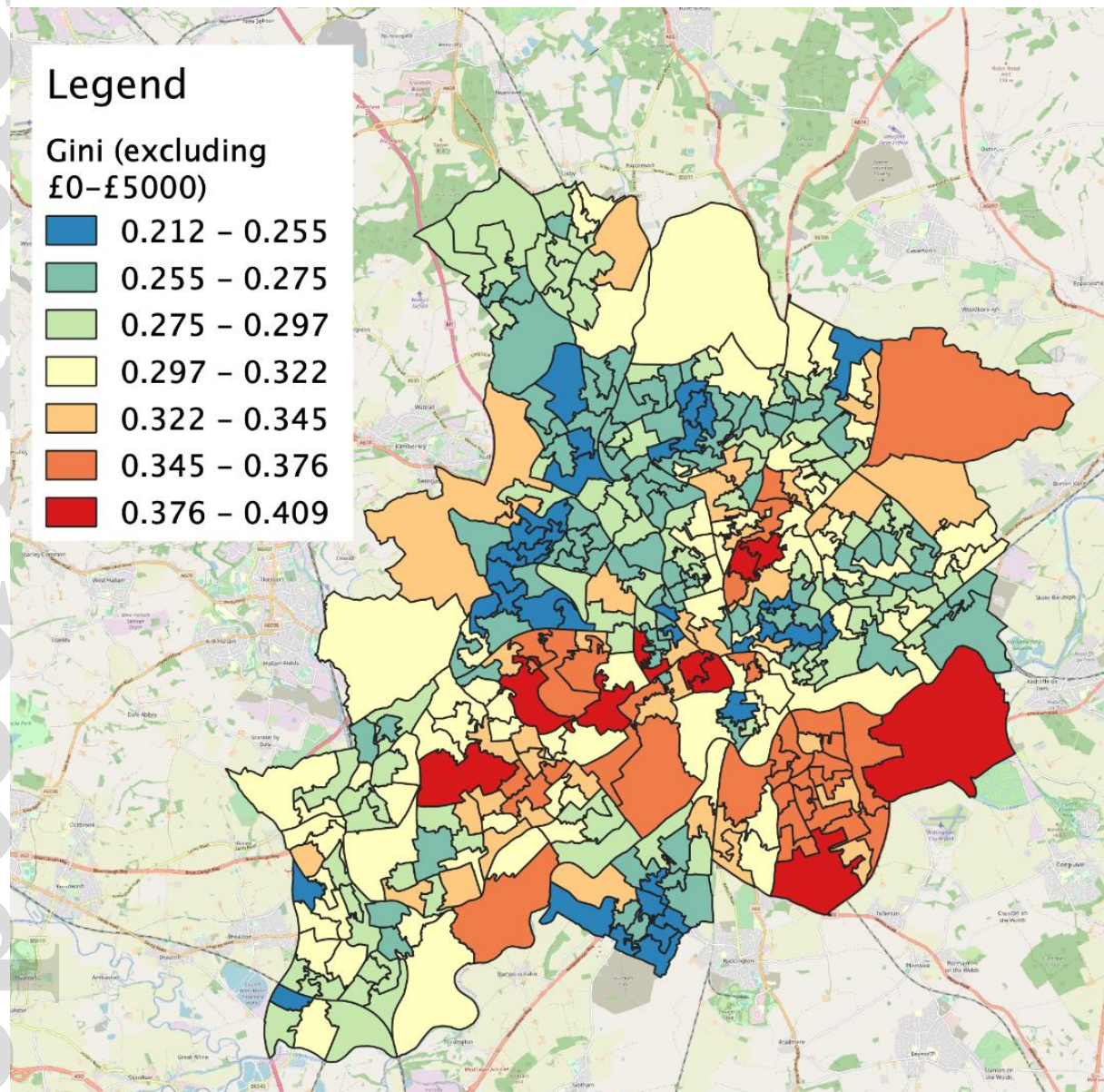


Figure 5: Gini coefficients by LSOA, Nottingham PUA. Contains National Statistics data © Crown copyright and database right 2012. Backdrop mapping © OpenStreetMap contributors

## 6 DISCUSSION

Income datasets rely on income bands where the highest incomes are incorporated in an open-ended category, such as £60,000/pa or above in our dataset. The opaqueness at the top end of income statistics is a shared problem internationally (OECD, 2018). Any measure of

inequality based on household income data is likely to underestimate it, including our own research. Because of this, the Gini at the local level may be better suited to describe the extent of income heterogeneity or “social mix”, rather than income inequality in a traditional sense. Our study also confirms that Gini results have a broader range at the LSOA level than when aggregated to city level. The same logic works when scaled further up, reportedly, national Gini figures are lower than those of major cities (Tammaru et al., 2020).

High/increasing Gini is often perceived as ‘bad news’ in national studies. In urban research, a high Gini is tentatively ‘good news’. In cities and neighbourhoods, it denotes income heterogeneity, or mixed incomes, often seen as a building block of sustainable neighbourhoods. Glaeser et al (2009) suggested that a degree of inequality could signal an inclusive urban economy – it is worth asking “inclusive of whom”? We found that a higher Gini implied the inclusion of *high incomes* in the social mix, both at metropolitan and neighbourhood level.

In our segregation research design, high incomes represent the ‘minority population’, informed by our findings that low incomes outnumber high incomes in 4 out of 5 LSOAs in England and Wales. Within Nottingham, conventional research design using ‘low income vs the rest’ resulted in  $D = 0.185$ , whereas ‘high vs low incomes’ resulted in  $D = 0.463$ . This suggests that high incomes are more segregated than low incomes – a finding supported by our D impact score maps. There are difficulties with using D to compare cities, particularly due to the variegated proportions of the minority population in each city (Cortese et al., 1978). We explored this by providing a scatterplot that considers the mean income in each city against their evenness scores. We consistently found that more affluent cities (with greater share of high income households) stood out from the rest. It may be that these distributional dynamics at the urban level have been overlooked in previous research.

The concentration of poverty in inner cities is slowly diluting in England (Bailey & Minton, 2018), but our research confirms that there is still a notable division between the typically poorer urban core and suburban wealth belts. We also found that high income groups are the most segregated, also within wealthier locations that were less segregated overall. Considering the ‘time lag’ between a rising national Gini and rising levels of urban segregation in Europe (Tammaru et al., 2020), an important question arises about the long-term trend of self-segregation by the wealthy in UK cities. We would need further data

releases to investigate this, and urge the ONS to continue with small-scale income data modelling. Further data releases would also allow gentrification to be explored.

## 7 CONCLUSIONS

The central motivation of this paper was to provide a framework for understanding the unevenness of household income in ordinary cities and towns in England and Wales, and to explore the role of high incomes in inequality and segregation patterns. Our urban comparison showed a recurring pattern. The cities and districts with a greater share of high income population (Cambridge, Winchester, and Rushcliffe in the Nottingham conurbation) have lower segregation, but higher income inequality. This evidence runs counter to the perception that higher inequality means more segregation which is globally the dominant trend, but the opposite appears to be the case in the named wealthy areas. This highlights the need for understanding local deviations from expected patterns, an issue also raised by van Ham et al (2021). Unlike in conventional segregation studies where the focus is often on poor vs non-poor households, we focused on high vs low incomes. We found that high income households were the most segregated group in our sample, a finding that supports international studies on urban segregation patterns. Regarding the role of Gini in urban studies, a higher value is a harbinger of 'social mix' in cities and neighbourhoods, whereas a low Gini implied uniformly low income. For the lower average income cities the pattern is less consistent - more research would be needed to confirm these trends and to expand the sample.

How the presence or absence of 'social mix', linked to self-segregation by the wealthy, affects quality of life and spatial justice remains a question for future research. Our research also raises a question about trends over time that cannot be explored with the current data. We would welcome a plurality of methods and intellectual traditions to make use of income inequality and income-based segregation in urban studies and we hope our paper stimulates this effort, complementing the long-standing interest in concentrations of poverty in urban studies.

## ENDNOTES

<sup>1</sup> see online supplement for additional impact maps



## REFERENCES

Atkinson, R. (2005). Occasional Paper 1: Neighbourhoods and the Impacts of Social Mix: Crime, Tenure Diversification, and Assisted Mobility. Available from <http://neighbourhoodchange.ca/wp-content/uploads/2011/06/Atkinson-2005-Nhoods-and-Impacts-of-Social-Mix.pdf> (accessed 29/4/2019).

Atkinson, R. (2006). Padding the Bunker: Strategies of Middle-class Disaffiliation and Colonisation in the City. *Urban Studies* 43(4), 819-832. <https://doi.org/10.1080/00420980600597806>

Bailey, N., Haworth, A., Manzi, T., Paranagamake, P. & Roberts, M. (2006). Creating and sustaining mixed income neighbourhoods. Joseph Rowntree Foundation. Available at <https://www.jrf.org.uk/sites/default/files/jrf/migrated/files/9781905018314.pdf>

Bailey, N, van Gent, W. & Musterd, S. (2017). Remaking Urban Segregation: Processes of Income Sorting and Neighbourhood Change. *Population, Space and Place* 23(3). <https://doi.org/10.1002/psp.2013>

Bailey, N. & Minton, J. (2018). The suburbanisation of poverty in British cities, 2004-16: extent, processes and nature. *Urban Geography* 39(6) 892-915. DOI: 10.1080/02723638.2017.1405689

Bolt, G., Phillips, D. & van Kempen R. (2010). Housing Policy, (De)segregation and social mixing: an international perspective. *Housing Studies* 25(2), 129-135. <https://doi.org/10.1080/02673030903564838>

Brown-Saracino, J. (2017). "Explicating Divided Approaches to Gentrification and Growing Income Inequality," *Annual Review of Sociology*, 43. <https://doi.org/10.1146/annurev-soc-060116-053427>

Cavanaugh, A. & Breau, S. (2018). Locating Geographies of Inequality: Publication Trends across OECD Countries. *Regional Studies* 52(9): 1225-1236. <https://doi.org/10.1080/00343404.2017.1371292>

Chen, W., Myles, J. & Picot, G. (2011). Why Have Poorer Neighbourhoods Stagnated Economically While the Richer Have Flourished? Neighbourhood Income Inequality in Canadian Cities. *Urban Studies* 49(4): 877–96. <https://doi.org/10.1177/0042098011408142>

Cortese, C., Falk F. & Cohen J. (1978). Understanding the Standardized Index of Dissimilarity: Reply to Massey. *American Sociological Review* 43(4): 590-592.

Darlington-Pollock, F., Green M and Simpson L. (2021). Why were there 231 707 more deaths than expected in England between 2010 and 2018? An ecological analysis of mortality records. *J Public Health (Oxf)*. [online advance publication]. DOI: 10.1093/pubmed/fdab023

Department for Work and Pensions (DWP) (2017). Households Below Average Income: An analysis of the UK income distribution: 1994/95 -2015/16. Available from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/600091/households-below-average-income-1994-1995-2015-2016.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/600091/households-below-average-income-1994-1995-2015-2016.pdf) (accessed 3/2/2019).

Glaeser, E., Resseger, M. & Tobio, K. (2009). Inequality in Cities. *Journal of Regional Science*, 49(4): 617–646. <https://doi.org/10.1111/j.1467-9787.2009.00627.x>

Harris, R. & Owen, D. (2018). Implementing a Multilevel Index of Dissimilarity in R with a case study of the changing scales of residential ethnic segregation in England and Wales. *Environment and Planning B*, 45(6), 1003–1021. <https://doi.org/10.1177/2399808317748328>

Kakwani, N. (1980) *Income inequality and poverty*. A World Bank research publication. Oxford University Press.

Kawachi, I. (2002). Income inequality and economic residential segregation. *Journal of Epidemiology & Community Health* 56:165-166. DOI: 10.1136/jech.56.3.165

Kondo, N., Sembajwe G., Kawachi I. & van Dam R. (2009). Income inequality, mortality, and self-rated health: meta-analysis of multilevel studies. *BMJ* 339: b4471. DOI: <https://doi.org/10.1136/bmj.b4471>

Lawton, P. (2018). Situating revanchism in the contemporary city, *City*, 22:5-6, 867-874, DOI: 10.1080/13604813.2018.1548821

Lee, N., Sissons P. & Jones K. (2016). The Geography of Wage Inequality in British Cities. *Regional Studies* 50(10), 1714-1727. <https://doi.org/10.1080/00343404.2015.1053859>

Lees, L. (2008). Gentrification and Social Mixing: Towards an Inclusive Urban Renaissance? *Urban Studies* 45(12), 2449-2470. DOI:10.1177/0042098008097099

Livingston, M., Kearns, A. & Bailey, N. (2013). Delivering Mixed Communities: The Relationship between Housing Tenure Mix and Social Mix in England's Neighbourhoods. *Housing Studies* 28(7), 1056–80. <https://doi.org/10.1080/02673037.2013.812723>

Massey, D. (2012) Reflections on the Dimensions of Segregation. *Social Forces* 91(1), 39-43. <https://doi.org/10.1093/sf/sos118>

Massey, D., & Denton, N. (1988). The dimensions of residential segregation. *Social Forces* 67(2), 281–315. DOI: 10.1093/sf/67.2.281

Massey, D., Gross, A. & Eggers, M. (1991). Segregation, the concentration of poverty, and the life chances of individuals. *Social Science Research* 20(4): 397-420. [https://doi.org/10.1016/0049-089X\(91\)90020-4](https://doi.org/10.1016/0049-089X(91)90020-4)

Musterd, S., Marcinczak, S., van Ham, M. & Tammaru, T. (2017). Socioeconomic segregation in European capital cities: Increasing separation between poor and rich. *Urban Geography* 38(7), 1062-83. <https://doi.org/10.1080/02723638.2016.1228371>

Nieuwenhuis J., Tammaru T., van Ham M., Hedman, L. & Manley, D. (2020). Does Segregation Reduce Socio-Spatial Mobility? Evidence from Four European Countries with Different Inequality and Segregation Contexts. *Urban Studies* 57(1), 176-197. <https://doi.org/10.1177/0042098018807628>

Office for National Statistics (2017). *Administrative data based research on PAYE and benefits income distributions in England and Wales*, available at <https://www.ons.gov.uk/census/censustransformationprogramme/administrativedatacensusproject/administrativedatacensusresearchoutputs/populationcharacteristics/researchoutputsincomefrompayasyouearnpayeandbenefitsfortaxyearending2016>; (accessed 3/2/2019).

Piketty, T. (2014). *Capital in the 21st century*. Cambridge: Harvard University Press. <https://doi.org/10.4159/9780674369542>

Reardon, S.F & Bischoff, K. (2011). Income Inequality and Income Segregation. *American Journal of Sociology* 116(4), 1092-1153.

Sampson, R. J. (2008). Moving to Inequality: Neighborhood Effects and Experiments Meet Social Structure, *American Journal of Sociology* 114(1), 189-231. DOI:10.1086/589843

Sanmartin, C., Ross, N.A., Tremblay, S., Wolfson, M., Dunn, J.R. & Lynch, J. (2003). Labour Market Income Inequality and Mortality in North American Metropolitan Areas. *Journal of Epidemiology and Community Health* 57(10), 792-797. DOI: 10.1136/jech.57.10.792

Sautkina E., Bond, L. & Kearns, A. (2012). Mixed Evidence on Mixed Tenure Effects: Findings from a Systematic Review of UK Studies, 1995–2009. *Housing Studies* 27(6), 748–82. <https://doi.org/10.1080/02673037.2012.714461>

Smith, D. & Hubbard, P. (2014). The segregation of educated youth and dynamic geographies of studentification. *Area* 46(1), 92-100. <https://doi.org/10.1111/area.12054>

Tammaru, T., Marcinczak S., Aunap, R., van Ham, M., & Janssen, H. (2020). Relationship between Income Inequality and Residential Segregation of Socioeconomic Groups. *Regional Studies* 54(4), 450-461. <https://doi.org/10.1080/00343404.2018.1540035>

Thurber, A., Bohmann, C. & Heflinger, C. (2018). Spatially integrated and socially segregated: The effects of mixed-income neighbourhoods on social well-being. *Urban Studies* 55(9), 1859-1874. <https://doi.org/10.1177/0042098017702840>

Van Ham, M., Tammaru, T., Ubarevičienė, R., Janssen, H. (eds) (2021) *Urban Socio-Economic Segregation and Income Inequality: A Global Perspective*. Springer Urban Book Series. DOI: 10.1007/978-3-030-64569-4

Wilkinson, R. & Pickett, K. (2009). *The Spirit Level*. London: Bloomsbury Press.