Scales of ethnic segregation in England and Wales, 1991-2011

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1. Introduction and context

'Segregation' is an emotive term with many alternative definitions, meanings and interpretations. Most studies which aim to measure segregation make use of Massey and Denton's (1988) seminal identification of the five dimensions of segregation, namely evenness, exposure, concentration, centralisation and clustering. Recognising the shortcomings of standard global measures of segregation, this paper considers a spatial measure of unevenness to explore how segregation varies across geography. Spatially-sensitive approaches provide more meaningful measures of segregation, which are better suited to exploring changes in segregation through time and which may be used to assess connections between neighbourhoods and segregation, speaking more effectively to policy.

In Britain, in the context of diversifying immigration streams, debates about the failure of multiculturalism, and amid accusations of minority populations living 'parallel lives' from the majority population, the geographical concentration of minority populations is of particular media and policy interest (Catney *et al* 2011, Phillips, 2007). Yet, surprisingly little is known about the spatial distribution of ethnic groups within Britain, with many published measures providing only global summaries of population unevenness and isolation/exposure.

Important work do date has shown that Britain does not have ghettoes (Peach, 1996), that segregation has decreased at district level between 1991 and 2001 (Simpson, 2007), and that deconcentration from metropolitan areas has been a feature for most groups in that period (Rees and Butt, 2004). Analyses of migration with an ethnic group dimension have demonstrated how Britain is not 'sleepwalking to segregation', but rather greater dispersal (Catney and Simpson, 2010; Finney and Simpson, 2009). However, as with other countries where immigration and population clustering are of interest, studies of segregation in Britain have fallen short by ignoring the important spatial variation in more and less diverse areas. This paper begins to address these shortcomings by making use of measures of segregation which account for this geographical diversity in ethnic distributions. After the presentation of a standard global measure of unevenness, a spatial Index of Dissimilarity (*D* hereafter) is presented and discussed. Following this, Moran's *I*, a measure of clustering, is utilised.

2. Data

An ethnic group question has been asked in the England and Wales Census since 1991, and 2011 will mark the third time point at which it is possible to explore the geographies of ethnic group distributions. 2011 Census data relevant for this study will be released by the time of GISRUK 2013, and the presentation will focus on these most up-to-date outputs to provide the latest picture of ethnic geographies in England and Wales. Given that these data are not yet available, the results presented here focus on 2001 (and partly on 1991), which will then be updated with 2011 data by the time of the conference.

Sections 3.1 and 4 compare the situation between 1991 and 2001 for England and Wales, while Section 3.2 focuses on 2001 outputs. Between 1991 and 2001 ethnic group definitions changed, and this paper makes use of Simpson and Akinwale's (2007) classification which identifies the most temporally consistent ethnic group categories into seven groups, namely White, Indian, Pakistani, Bangladeshi, Black African, Black Caribbean and Chinese. While the residual Other category (which comprises different groups for 1991 and 2001) is not consistent over time, results for this group are included for context but italicised as a reminder that the results for this group should, when considering change over time, be approached with caution.

3. Population unevenness

3.1 Segregation over time

Table 1 shows *D* values for England and Wales, at ward level for 1991 and at ward and district level for 2001. The mean population for wards at 2001 is *c*. 4,800 (*n*=8,850) and *c*. 113,000 for districts (*n*=376).

Table 1. *D*, England and Wales, 1991 wards and 2001 wards and districts.

	Ethnic group							
Year (Geography)	White	Indian	Pakistani	Bangladeshi	Caribbean	African	Chinese	*Other*
1991 (Ward)	0.614	0.653	0.751	0.742	0.689	0.711	0.422	*0.486*
2001 (Ward)	0.588	0.621	0.717	0.716	0.670	0.706	0.413	*0.428*
2001 (District)	0.521	0.565	0.615	0.614	0.628	0.679	0.320	*0.389*

Source: 1991 and 2001 Censuses of England & Wales, SAS06 & KS006. Author's own calculations.

It is immediately clear that segregation, as measured here by *D* and thus expressed as unevenness, decreased for all groups between 1991 and 2001. The differing values of *D* for the same time point, but for two different geographies, demonstrate that *D* is highly sensitive to spatial scale.

3.2 Spatially-sensitive segregation

One way to account for change in *D* values between geographical levels is to use a spatial bandwidth in which geographical weights are used to compute segregation – an alternative to pre-imposed geographical boundaries. Table 2 shows 2001 *D* values for a variety of bandwidths, ranging from 1,000 to 10,000 metres, for England and Wales.

Table 2. *D* at varying spatial bandwidths England and Wales, 2001.

BW (m)	White	Indian	Pakistani	Bangladeshi	Caribbean	African	Chinese	Other
1,000	0.573	0.609	0.693	0.685	0.662	0.697	0.382	0.418
2,000	0.545	0.590	0.654	0.641	0.645	0.683	0.348	0.401
3,000	0.526	0.572	0.622	0.615	0.632	0.676	0.330	0.389
4,000	0.514	0.555	0.596	0.598	0.621	0.674	0.317	0.379
5,000	0.503	0.542	0.571	0.586	0.611	0.675	0.307	0.371
6,000	0.494	0.530	0.549	0.576	0.602	0.677	0.297	0.364
7,000	0.486	0.519	0.530	0.567	0.594	0.679	0.289	0.358
8,000	0.479	0.509	0.514	0.559	0.588	0.681	0.282	0.353
9,000	0.473	0.501	0.500	0.550	0.583	0.683	0.276	0.349
10,000	0.469	0.494	0.488	0.542	0.580	0.683	0.271	0.345

Notes: BW (m) is bandwidth in metres.
Source: 2001 Census of England & Wales, KS006. Author's own calculations.

Unsurprisingly, *D* decreases as the bandwidth increases. That is, unevenness for a given ethnic group is lower over larger spatial scales. The only group for which this is an exception is the African group. For this group, *D* values remain fairly constant across all spatial scales. This group was shown in Table 1 to be one of the more clustered groups. Where members of the African group reside, there is consistently a moderate to high level of unevenness, likely a result of this group's more recent immigration history to Britain. While Pakistani and Bangladeshi unevenness remains the highest of all groups (Table 1), *D* is higher for smaller areas, and lower over large areas. That is, the population concentrations of these groups are highly localised. The Chinese and Other groups retain the lowest levels of unevenness over all spatial scales. The White and Indian groups have similar levels of unevenness over multiple spatial scales.

4. Population clustering: Moran's I

The global Moran's *I* spatial autocorrelation coefficient is a measure of clustering and has been computed for 1991 and 2001, for England only, using both Queen's contiguity (first order nearest neighbours) and a 20 kilometre bandwidth; the results are shown in Table 3.

Table 3. Moran's *I*, 1991 and 2001, England.

	1991		2001		Ratios of difference			
	QC	20km	QC	20km	91km:QC	01km:QC	01:91 QC	01:91 20km
White	0.78	0.39	0.80	0.44	0.50	0.54	1.03	1.12
Caribbean	0.81	0.36	0.84	0.40	0.44	0.48	1.03	1.11
African	0.82	0.44	0.84	0.48	0.54	0.57	1.02	1.08
Indian	0.70	0.18	0.72	0.21	0.25	0.29	1.03	1.19
Pakistani	0.45	0.11	0.49	0.13	0.24	0.27	1.09	1.21
Bangladeshi	0.63	0.06	0.66	0.09	0.10	0.13	1.05	1.34
Chinese	0.59	0.36	0.55	0.28	0.61	0.50	0.93	0.77
Other	0.82	0.57	0.86	0.61	0.69	0.70	1.04	1.06

Notes: QC is Queen's Contiguity; km is kilometres.
Source: 1991 and 2001 Census of England & Wales, SAS06 & KS006. Author's own calculations.

As would be expected, Moran's I is larger using a nearest neighbour contiguity matrix, than for a 20km bandwidth – a larger geography, for most places, particularly in urban areas. This finding mirrors the results for spatial D in that greater segregation is associated with smaller areas. For both time points, the Pakistani and Chinese group show low levels of both local (QC) clustering and of clustering over larger areas (20km bandwidth). The White, Caribbean, African, Indian and Other groups have high levels of clustering over both small and larger areas. The Bangladeshi group show high levels of local clustering, but little evidence of clustering over wider areas. Ratios of the difference between QC and 20km bandwidths show how, for all but the Chinese group, residential clustering in both local and wider areas has increased. However, clusters have become less localised between 1991 and 2001; that is, there is clustering over larger areas. Residential clustering of the Chinese group has decreased using both measures.

5. Conclusions and future work

The variation in aspatial D and I over different geographies, and the differing messages of decreasing unevenness and increasing clustering over time, demonstrate the need to account for spatial variation in ethnic group population distributions. Spatial D reduces the reliance on specific geographies and it allows for assessment of segregation at multiple spatial scales, as well as providing a robust measure for analyses of change through time, usually hampered by changing zonal systems.

This paper focuses on one aspect of a wider project, *Geographies of ethnic and social segregation in England and Wales, 1991-2011*, a Leverhulme Trust Early Career Fellowship which aims to examine segregation at a low-level geography, account for the spatial neighbourhood of each zone, and consider the nature of segregation for a particular group (ethnic and socio-economic) in a given locality; it is the first study to deconstruct the characteristics of segregation locally in England and Wales.

This paper has necessarily focussed on 2001, however the imminent release of data from the 2011 Census will provide the opportunity to update this work to the most recent timeframe possible.

6. Acknowledgments

References

Catney G, Finney N and Twigg L (2011) Diversity and the complexities of ethnic integration in the UK: Guest editors' introduction *Journal of Intercultural Studies* **32(2)** pp 107–114.
Catney G and Simpson L (2010) Settlement area migration in England and Wales: assessing evidence for a social gradient *Transactions of the Institute of British Geographers* **35(4)** pp 571–584.
Finney N and Simpson L (2009). *'Sleepwalking to segregation'? Challenging Myths about Race and Migration*. The Policy Press, Bristol.

Massey D and Denton N (1988) The dimensions of residential segregation *Social Forces* **67** pp 281–315.

Peach C (1996) Does Britain have ghettoes? *Transactions of the Institute of British Geographers* **22(1)** pp 216–235.

Phillips D (2007) Ethnic and racial segregation: a critical perspective *Geography Compass* **1(5)** pp 1138–1159.

Rees P and Butt F (2004) Ethnic change and diversity in England, 1981–2001, *Area* **36(2)** pp 174–186.

Simpson L (2007) Ghettos of the mind: the empirical behaviour of indices of segregation and diversity. *Journal of the Royal Statistical Society series A* **170(2)** 405–424.

Simpson L and Akinwale B (2007) Quantifying stability and change in ethnic group. *Journal of Official Statistics* **23(2)** pp 185–208.

Biography

Gemma Catney is a Leverhulme Trust Early Career Research Fellow engaged in her project 'Geographies of ethnic and social segregation in England and Wales, 1991-2011'. She is a Population Geographer by background, and in addition to segregation by ethnic group in Britain and religion in Northern Ireland, she has research interests in internal migration with an ethnic group dimension.