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Understanding Society – a geographical profile of respondents

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Non-technical Summary

Understanding Society is a new UK household survey. Since 2009 individuals from nearly 40,000 households have taken part in yearly interviews. The study collects data on a wide range of health, social and economic indicators as well as covering aspects of identity and attitudes. Studies like this are very important for understanding the impact of changes to policies over a number of years, e.g. changes to pension age or the length of the maternity leave.

The sample was created by selecting addresses from all regions of the UK in a way that ensured that households in each region had the same chance of being selected whether located in a city, a town or in the countryside. The sampling was specifically designed to ensure proper representation of people from a range of areas taking into account the socio-economic status and ethnic composition of neighbourhoods.

The survey also contains a boost sample of ethnic minorities, which was based on a clustered, equal probability sample of addresses from selected areas with a high proportion of people from ethnic minorities. Interviewers would visit the households, but only go on to carry out an interview if someone from the household belonged to an ethnic minority group.

This paper looks at whether the individuals that were approached and agreed to take part are representative of the UK in terms of the neighbourhoods they live in – across regions and the country as a whole. We use data from the 2001 Census to create profiles of the general population of the UK.

Two different ways of grouping neighbourhoods across the country are used. The first method is to divide the UK into five bands according to the level of area deprivation and the second to divide the country into seven different neighbourhood types as classified by the Census Output Area classification.

Both methods show that the respondents were representative of the different regions of UK in terms of the types of neighbourhoods they live in.

Understanding Society – a geographical profile of respondents

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Abstract

Understanding Society was designed to be representative of the UK population using a stratified, clustered, equal probability sampling design. This paper uses Census 2001 data to analyse whether Wave 1 respondents are representative of the different regions of the UK in terms of the types of neighbourhoods individuals live in. Neighbourhoods are classified using Townsend Material Deprivation quintiles and the Census Output Area Classification. We find that the respondent members of the general population sample of *Understanding Society* closely resemble the Census 2001 population at the neighbourhood level - nationally and regionally.

Key words: neighbourhood classifications, area deprivation, geographical identifiers

JEL classifications: C83, N30

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1. Introduction

Understanding Society – also known as the UK Household Longitudinal Survey (UKHLS) – is a new UK household panel survey designed to be representative of the general population as well as the populations in the UK Regions (Lynn 2009). The so-called general population sample (GPS) was created by selecting addresses from all regions of the UK in a way that ensured that all households had the same chance of being selected whether located in a city, a town or in the countryside. A stratified, clustered, equal probability sampling design was used to ensure proper representation of people from a range of areas taking into account the socio-economic status and ethnic composition of neighbourhoods.

Understanding Society also contains a boost sample of ethnic minorities, which was based on a stratified, clustered, equal probability sample of addresses from selected areas with a high proportion of people from ethnic minorities (Berthoud *et al.* 2009). Interviewers would visit the households, but only go on to carry out an interview if someone from the household belonged to an ethnic minority group.

This paper looks at how representative the UKHLS respondents from the first wave, 2009-2010, are in terms of the neighbourhoods they live in. This is done by comparing the respondents from the *Understanding Society* general population and ethnic minority samples to the Census 2001 population according to a measure of area deprivation, the Townsend Material Deprivation Score, and a neighbourhood classification, the Census 2001 Output Area Classification (OAC). These two measures are widely used in health, social and economic research and present a simple way of analysing whether the sample is representative of a broad spectrum of localities.

The *Understanding Society* composition of respondents is a function of both survey design (sampling) and the socio-demographic patterning in response rates. Lynn et al. (2012) found that 58% of households and 82% of adults responded at Wave 1, and there were some area characteristics associated with low response rates, such as high proportions of single-person households, full-time employment, higher managerial and professional occupation as well as a high burglary rate and a low proportion of people

driving to work.[1] Inner and Outer London were the regions with the lowest response rates overall (Lynn et al. 2012).

We do not aim to distinguish the extent to which any discrepancies between the composition of respondents from *Understanding Society*'s general population sample and the Census 2001 population is caused by the sampling design or non-response respectively. Rather, we want to establish whether respondents in the UK and in UK regions are comparable to the Census 2001 in terms of neighbourhood characteristics.

We find that when considering neighbourhood characteristics, respondents from the Wave 1 general population sample are largely consistent with the Census 2001 population, both in terms of neighbourhood deprivation and Output Area Classification. This also holds when comparing the sample at regional level. Respondents from the ethnic minority boost sample on the other hand are more concentrated in multicultural, deprived neighbourhoods than the Census 2001 population as a whole. The results will be of interest to analysts wishing to analyse *Understanding Society* data at the regional level or planning linkage to small area indicators.

2. Data and method

UKHLS sample populations

We use data from the first wave of *Understanding Society*. In the study, a two-stage stratified, clustered, equal probability sampling design was used to select the general population sample in England, Wales and Scotland. At the first stage, postcode sectors were stratified and selected at random according to UK Region (n=12), proportion of manual labour occupation (tertiles, n=3), household density (tertiles, n=3), and non-white ethnicity (halves, n=2). Due to differences in the postal geography, Northern Ireland was treated as a single 'postcode sector' and was over-sampled. For the ethnic minority sample the overall aim was to reach a minimum of 1,000 adult interviews from each target ethnic group (Indian, Pakistani, Bangladeshi, Caribbean, African). Postcode sectors were ranked according to representation of the five target ethnic groups based on data from Census 2001 and the Annual Population Survey 2007. Addresses were subsequently selected at random from a subset of postcode sectors with high

[1] The area characteristics were measured at the level of Middle Layer Super Ouput Area which have around 7,000 inhabitants on average.

representation. Finally, interviewers visited and screened household with at least one person from one of the target ethnic groups or who had parents or grandparents who were from those ethnic groups (for a more detailed description, see Berthoud *et al.* 2009).

From the Wave 1 *Understanding Society* data set we select all responding adults (aged 16 or older), giving us a sample size of 43,674 individuals in the general population sample and 7,320 in the ethnic minority sample. Note that the British Household Panel Survey sample has been incorporated into *Understanding Society* at Wave 2 and is therefore not included in our sample.

Unweighted analyses were used for a 'face value' comparison between the Wave 1 respondents and the Census 2001 population. It should be noted that each wave of *Understanding Society* is released with a number of survey weights that can be used to correct for unequal selection probabilities, differential nonresponse/attrition and potential sampling error (McFall 2012).

2001 Census

The other sample we look at is the entire UK population as recorded in the 2001 Census. Here we select all individuals aged 16 and higher to make the sample comparable to the *Understanding Society* samples. The 2001 Census was collected 8-9 years earlier than Wave 1 *Understanding Society* data, and residential mobility will have taken place in this time-period which could confound comparisons of the two data sets. The neighbourhood classification that we use depends on variables that are quite resilient against residential mobility, however, as characteristics such as predominant housing tenure and types of industry will not be affected by it in the short to medium term.

Neighbourhood classification

To the *Understanding Society* and 2001 Census data we merge the Census 2001 Output Area Classification (OAC) at Output Area level. The OAC is constructed on the principle of clustering neighbourhoods according to proximity in attribute space rather than in the geographical plane (Harris et al. 2005). It is built from forty-one Census variables ranging from age group to ethnicity, tenure, education, occupation, transportat and health (Vickers and Birkin 2007). At the top level of the classification the UK Output Areas are divided into seven Supergroups: 1 Blue Collar Communities, 2 City Living, 3 Countryside, 4 Prospering Suburbs, 5 Constrained by Circumstances, 6 Typical Traits, 7 Multicultural.

More details on the most common characteristics of the different Supergroups are given in the next section.

Area deprivation

Area deprivation is measured using the Townsend Material Deprivation score method (Townsend 1987). The Townsend score is a simple index based on four indicators: unemployment, car ownership, home ownership and overcrowding. The advantage of the Townsend score is that it is based on data that are available for all four countries within the UK, whereas the alternative Index of Multiple Deprivation (IMD) is not designed for UK-wide analyses (ONS 2010). A disadvantage of the Townsend score, on the other hand, is that it is based on the decennial censuses and hence less timely than the IMDs, which are based on updateable administrative data sources (Department for Communities and Local Government 2010). As a construct of material deprivation Townsend score is also more simplistic and a factor such as lack of car ownership is likely to be a better indicator of deprivation in rural areas compared to inner city areas. The Townsend score has nonetheless been found to be highly correlated with the IMD; even in London (Norman et al. 2011).

We construct the Townsend score at the Output Area level, as it is only publicly available at Ward level and we want to allow for scale-free comparison with the Census 2001 Output Area Classification. Census 2001 data were obtained at the Output Area level through Casweb (Census Dissemination Unit, University of Manchester) for the following four domains; a) proportion of unemployment among economically active 16-74 year olds; b) proportion of households without a car; c) proportion of households not owner-occupied; d) proportion of households with more than one person per room[2]. The data for unemployment and overcrowding were transformed using the natural logarithm before z-standardisation. The z-standardised scores for the four variables were summed up for each Output Area to create the Townsend score and rank. The rank is used to create quintiles of deprivation.

[2] Census output and digitalised boundary data are Crown copyright and are reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland (ONS 2001ab, GROS 2001ab, NISRA 2001ab).

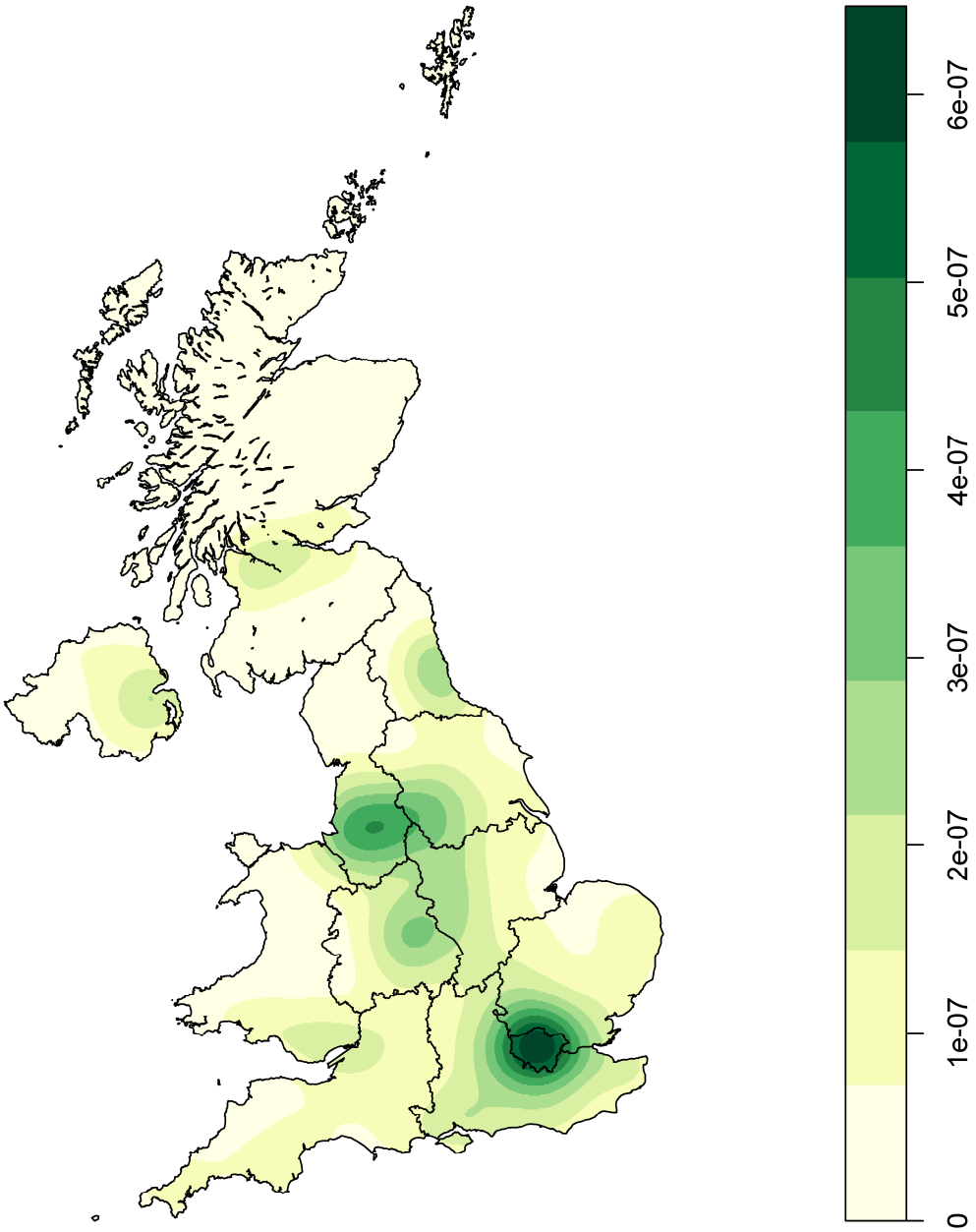
3. Sample description

Geographical distribution of the samples

Figure 1 shows the distribution of respondents from the *Understanding Society* general population sample across the UK as a population density map. The responding adults were assigned the grid references of the centroid of their postcode of residence using the National Statistics Postcode Directory (NSPD). The geographical distribution of the main sampling clusters was mapped as a point pattern smoothed with a kernel function in order to obscure the exact location of any single household (Baddeley & Turner 2005, Bivand & Rundel 2012, Bivand et al. 2008, Lewin-Koh et al. 2011, Neuwirth 2011, R Development Core Team 2011; R code is available upon request). The figure shows that the general population sample was selected from across the UK Regions, with more respondents drawn from areas with high population density.

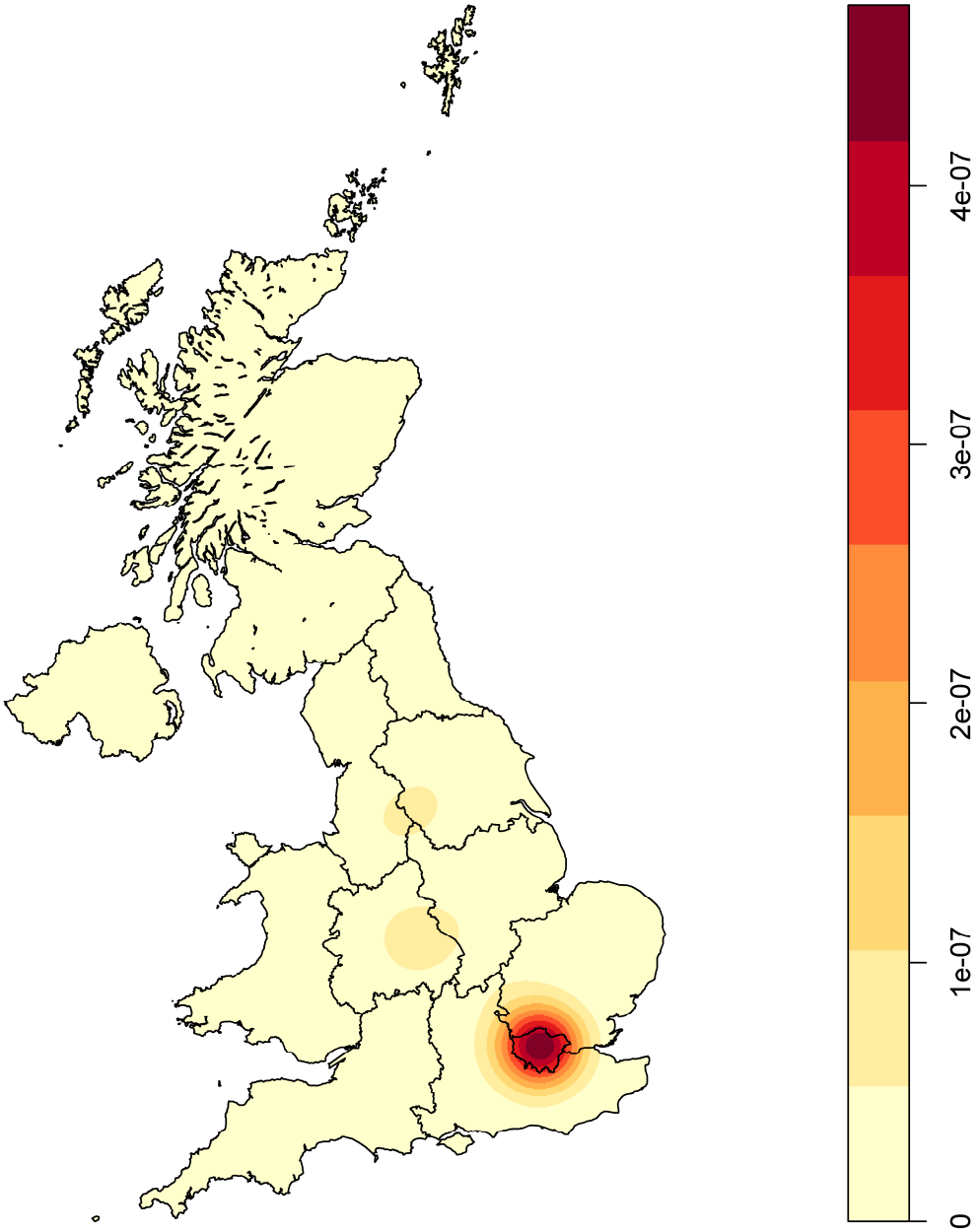
Figure 2 shows the population density map for the respondents from the ethnic minority boost sample. As is expected from the sampling design, the sample in this case is concentrated in the major English conurbations Greater London, West Midlands and Greater Manchester.

Figure 1 Density of *Understanding Society* general population sample responding adults



Notes: *Understanding Society* Wave 1 data. Population per square metre. Boundary data are Crown copyright**.**

Figure 2 Density of Ethnic Minority Sample of responding adults



Notes: *Understanding Society* Wave 1 data. Population per square metre. Boundary data are Crown copyright**.**

Table 1 gives more information on the distribution of responding adults from the general population sample. It shows, for geographical units at different levels of aggregation, how many units are represented in *Understanding Society* response data, how many units there are in the UK in total, as well as the median number of responding adults per sampled unit and the corresponding inter-quartile range. For example we can see that all of the 12 Regions of the UK are represented, and there is a median responding population of just under 4,000 adults in each region with an inter-quartile range between roughly 3 and 4 thousand adults. Most Local Authorities and Travel-To-Work-Areas are also represented, but only around two thirds of MSOAs (Middle Layer Super Output Areas), a third of LSOAs (Lower Layer Super Output Areas) and a tenth of Output Areas are represented. The average number of respondents which counted several thousand at the regional level diminishes to hundreds or tens at the sub-regional level.

Table 1: Median number and inter-quartile range of responding adults from the *Understanding Society* general population sample per geographical unit (n=43,674)

Geography	Number of sample units	Number of units UK	Pop median (IQR)
OA	23,339	223,019	2 (1;2)
LSOA	11,861	34,379	3 (2;4)
MSOA	4,423	7,195	7 (4;12)
TTWA	228	243	112 (50;240)
LAD	217	219	133 (81;187)
Region	12	12	3,778 (2,876;4104)

Notes: *Understanding Society* Wave 1 data. Output Area (OA), Lower/Middle Layer Super Output Area (LSOA/MSOA), Travel-To-Work-Area (TTWA), Local Authority District (LAD), UK Region (Wales, Scotland, Northern Ireland and 9 regions of England, formerly Government Office Regions).

Neighbourhood classification and deprivation

Table 2 shows the number of general population sample respondents residing in each of the OAC Supergroups together with a description of the most common Census neighbourhood traits defining each Supergroup. The OAC City Living is, for instance, characterised by higher educational qualifications, single non-pensioner person households, born abroad, apartment blocks and private renting. We see that the Supergroups Prospering Suburbs, Typical Traits and Blue Collar Communities have the highest representation in the general population sample, whereas City Living is the smallest group with just over 2,000 respondents. Table 2 also shows the mean

Townsend score in the Output Area Classification Supergroup. A negative value indicates below average deprivation whereas a positive value indicates above average deprivation. Output Areas that are characterised as Multicultural and Constrained by Circumstances are the most deprived according to the Townsend deprivation score. Prospering Suburbs and Countryside Output Areas are the least deprived according to the Townsend score.

Table 2: OAC Supergroup profile of respondents from the *Understanding Society* general population sample.

OAC Super Group	Typical Census attributes	N	Mean Townsend score
1.Blue Collar Communities	Terraced housing, renting publicly	7,521	1.53
2.City Living	Higher education qualifications, single person household (not pensioner), born abroad, renting privately, all flats	2,338	1.90
3.Countryside	2+ cars per household, working from home, agriculture/fishing employment, detached housing	6,043	-2.37
4.Prospering Suburbs	2+ cars per household, detached housing	10,066	-3.53
5.Constrained by circumstances	All flats, renting publicly	4,965	3.53
6.Typical Traits	Terraced housing	8,525	-1.35
7.Multicultural	Renting privately or publicly, commuting to work on public transport, all flats, born abroad, South Asian or Black ethnic background	4,216	3.47
Total		43,674	-0.30

Notes: *Understanding Society* Wave 1 and Census 2001 data.

4. Results

UK-wide analysis

We now turn to the comparison of the respondents from the general population and ethnic minority samples of *Understanding Society* to the 2001 Census population in terms of neighbourhood characteristics. First we look at the distribution of the responding sample populations by Output Area Classification Supergroups across the UK. This is shown in Figure 3. We can see that the profile of the general population sample respondents is similar to the 2001 Census. The proportion of the populations in the Prospering Suburbs and Typical Traits groups are virtually identical, whereas the responding general population sample of *Understanding Society* has slightly higher representation of Blue Collar Communities, Countryside and Constrained by Circumstances and slightly lower representation of City Living and Multicultural than the 2001 Census. Overall the discrepancies between the responding *Understanding Society* general population sample and the 2001 Census are not large.

The responding EM sample is, as expected from its design, very different from the profile of the general population sample and 2001 Census, and is skewed towards the Multicultural neighbourhood type from the OAC classification. This is a neighbourhood type predominantly found in Inner London boroughs, characterised by apartment block tenancy, public transport commuting, people born abroad and a high representation of people with South Asian or Black ethnic background. Ethnic minority households were selected in *Understanding Society* on a criterion of having residents of either Indian, Pakistani, Bangladeshi, African or Caribbean ethnic background and only from neighbourhoods with a high representation of those ethnic groups (Berthoud *et al.* 2009), so it is not surprising to find more than 70% of the respondents are living in the Multicultural neighbourhood Supergroup.[3]

[3] There is a tendency for these minorities to be more clustered, so less evenly distributed, than the White ethnic group (Simpson 2007) and this type of locality is therefore more likely to be clustered together in the OAC classification.

Figure 3: OAC Supergroup profile of respondents from the *Understanding Society* general population and ethnic minority samples versus Census 2001.

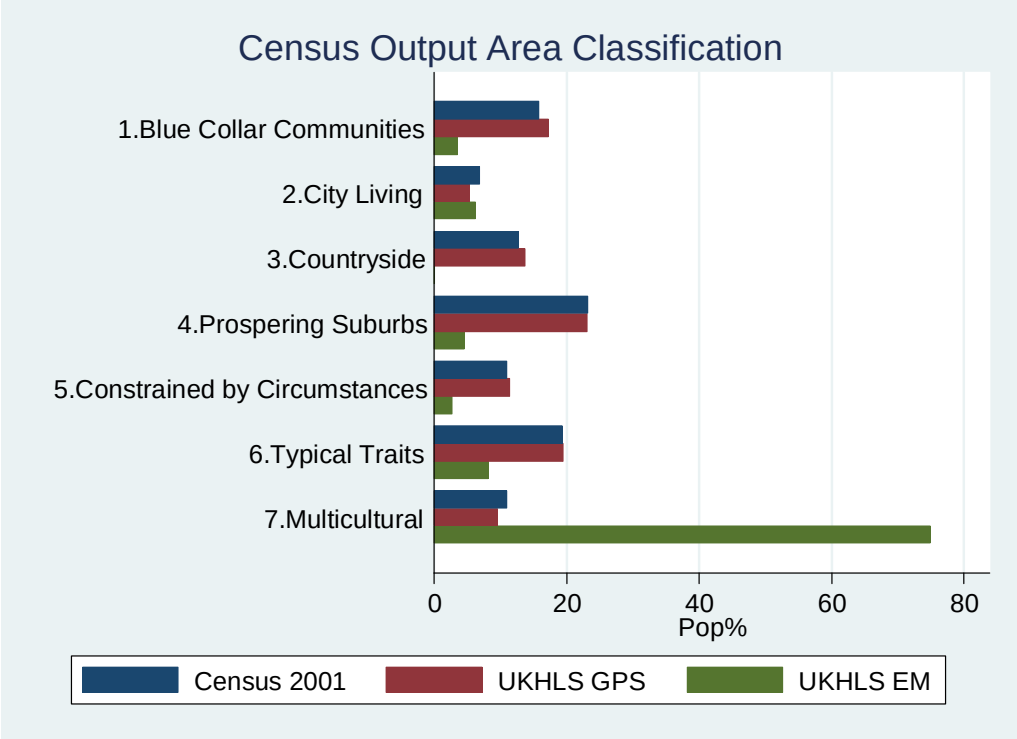
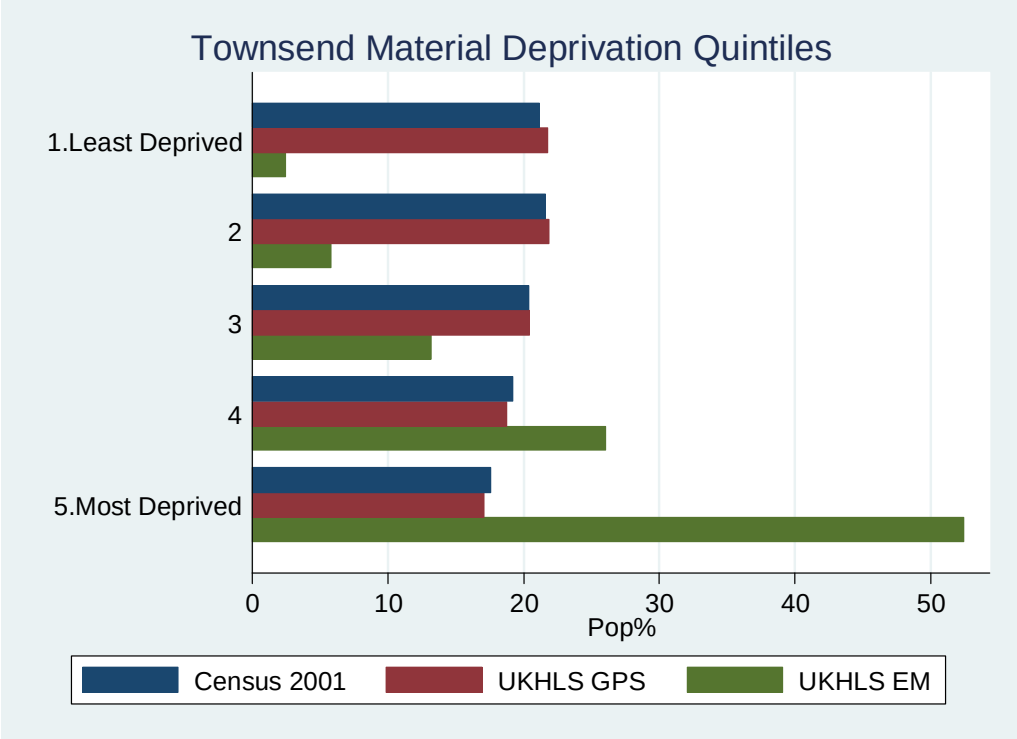


Figure 4 compares *Understanding Society*'s general population and ethnic minority sample respondents with the 2001 Census according to Townsend material deprivation quintiles of the Output Area of residence. We can see that the responding general population sample is very close to the 2001 Census, with a slightly higher representation in least deprived and slightly lower representation in the most deprived neighbourhoods. The Townsend profile shows that the 20% most deprived areas (most deprived quintile) contain less than 20% of the population. This is because the more deprived Output Areas tend to have smaller population sizes than the less deprived Output Areas. For example, the 20% least deprived neighbourhoods have an average population size of just under 300, and the 20% most deprived ones of about 250.

The responding ethnic minority sample again has a markedly different distribution across the range of deprivation than the 2001 Census, as can be seen in Figure 4. More than 50% of respondents live in the 20% most deprived Output Areas, and about 80% of respondents live in the 40% most deprived neighbourhoods.

Figure 4: Townsend material deprivation quintile profile of respondents from the *Understanding Society* general population and ethnic minority samples versus Census 2001.



Regional analysis

Next we look at and compare the characteristics of neighbourhoods separately by UK region. These comprise the nine regions of England plus Wales, Scotland and Northern Ireland. In this section we focus on a comparison of the responding *Understanding Society* general population sample with the 2001 Census adult population because the ethnic minority boost sample was not drawn evenly from all the UK regions.

Figure 5 shows the proportion of individuals from the 2001 Census and the *Understanding Society* general population respondents that live in the 20% most deprived areas as defined by the Townsend deprivation score. The profiles of the two groups are remarkably similar, with only a few percentage points difference in some of the regions. The differences between the responding general population sample and the 2001 Census are slightly larger when looking at the distribution of individuals living in the least deprived area quintiles (Figure 6). No clear pattern emerges across the regions, however, as in some regions the proportion of individuals in the least deprives areas is higher for the 2001 Census population (North East, North West, Yorkshire and the Humber, East of England and Wales) and in other regions the proportion is lower among

the Census population than among *Understanding Society* general population sample respondents (East and West Midlands, London, South East, South West, Scotland and Northern Ireland).

Figure 5: Regional profile of population residing in the most deprived Townsend quintile: Census 2001 and responding *Understanding Society* general population sample

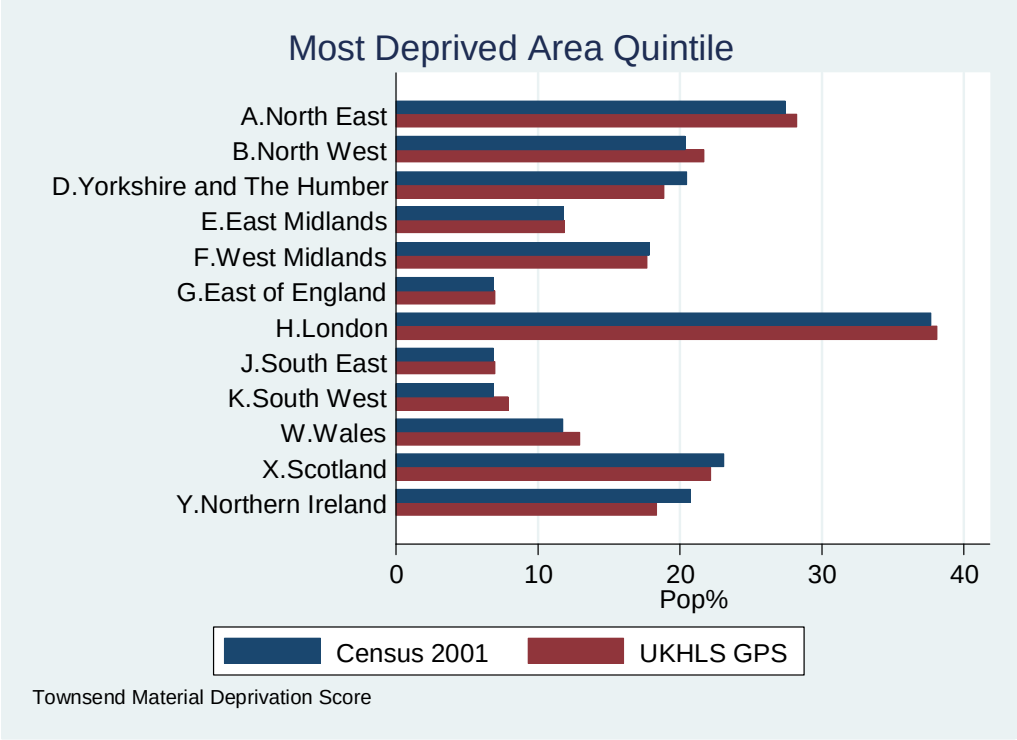
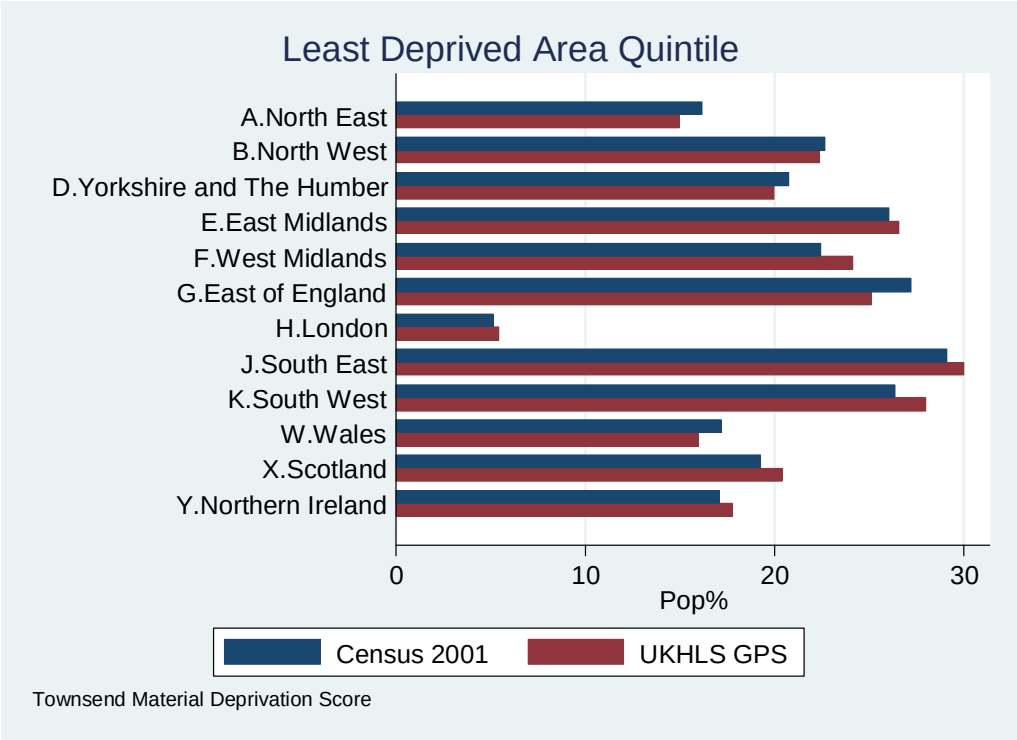


Figure 6: Regional profile of population residing in the least deprived Townsend quintile: Census 2001 and responding *Understanding Society* general population sample.



Figures 7-13 display the comparison of the responding *Understanding Society* general population sample with the 2001 Census population for each OAC Supergroup, separately by UK region. By and large the figures show a close resemblance of the two groups according to the Output Area Classification. Some of the more notable differences are that the responding *Understanding Society* general population sample has a higher representation of the Blue Collar Communities group in both the North East and in Wales, and of the Constrained by Circumstances group in the East of England, whereas the 2001 Census population has a higher representation of Prospering Suburbs in Wales and of City Living in London. Regarding City Living in London, nearly 20% of the Census 2001 adult population resided in this type of neighbourhood, whereas the same proportion for Wave 1 respondents of *Understanding Society* was 16% (Figure 9). The characteristics of the City Living neighbourhood type overlaps with many of the factors of low response rates found by Lynn *et al.* (2012).

Figure 7: Regional profile of population residing in OAC Blue Collar Communities: Census 2001 and responding *Understanding Society* general population sample.

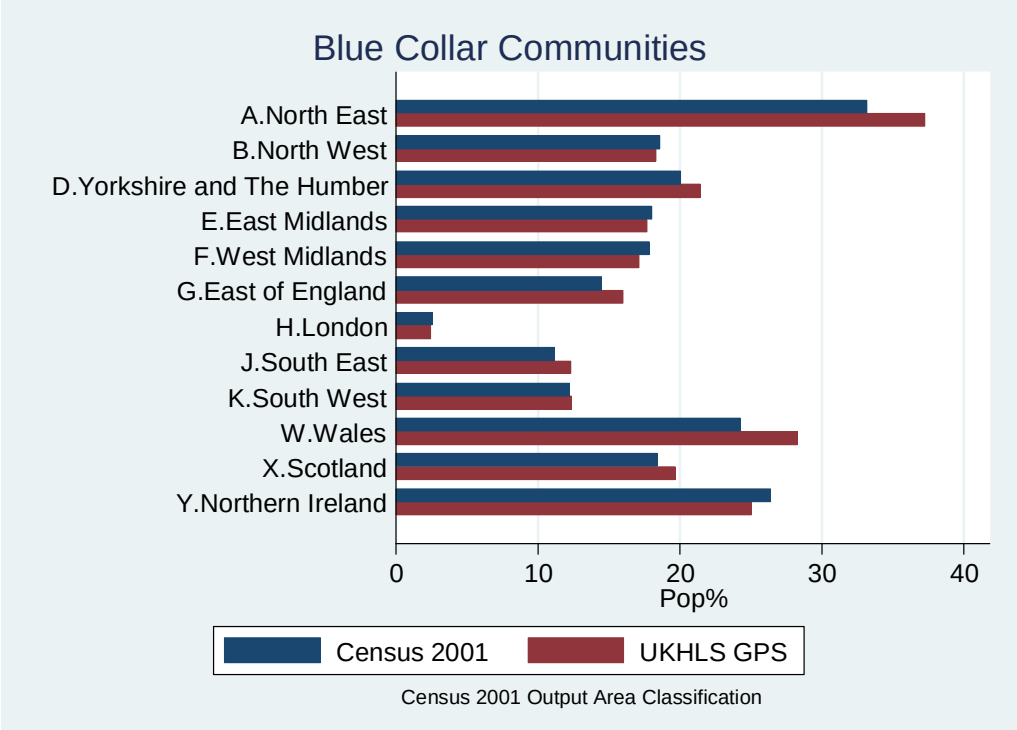


Figure 8: Regional profile of population residing in OAC City Living: Census 2001 and responding *Understanding Society* general population sample.

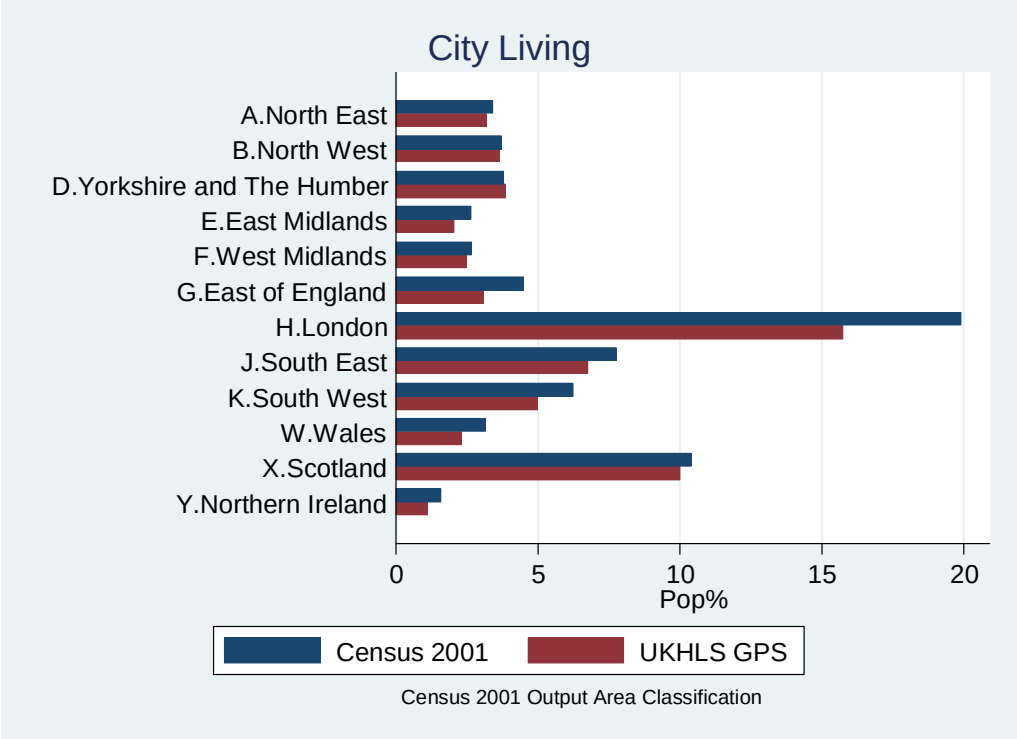


Figure 9: Regional profile of population residing in OAC Countryside: Census 2001 and responding *Understanding Society* general population sample.

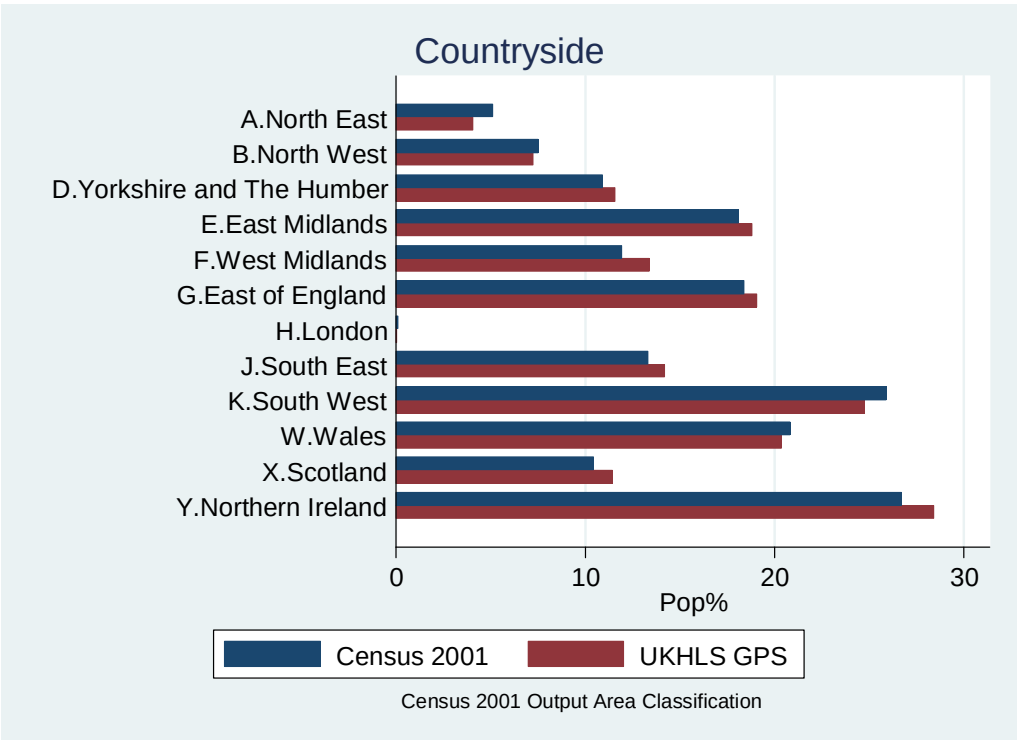


Figure 10: Regional profile of population residing in OAC Prospering Suburbs: Census and responding *Understanding Society* general population sample.

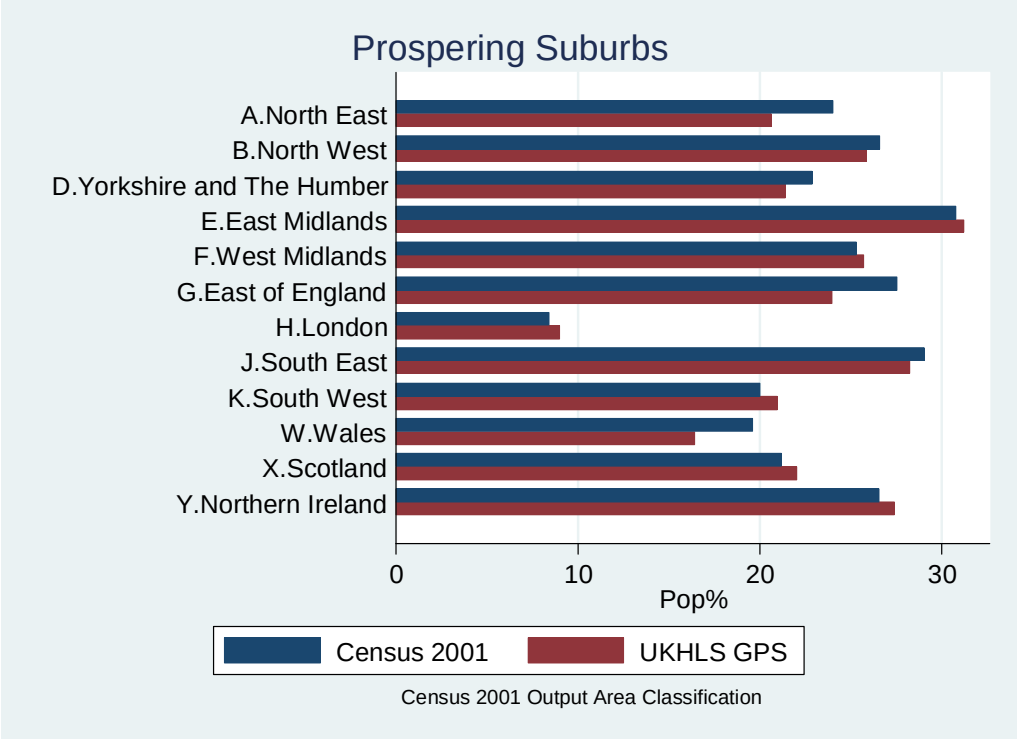


Figure 11: Regional profile of population residing in OAC Constrained by Circumstances: Census 2001 and responding *Understanding Society* general population sample.

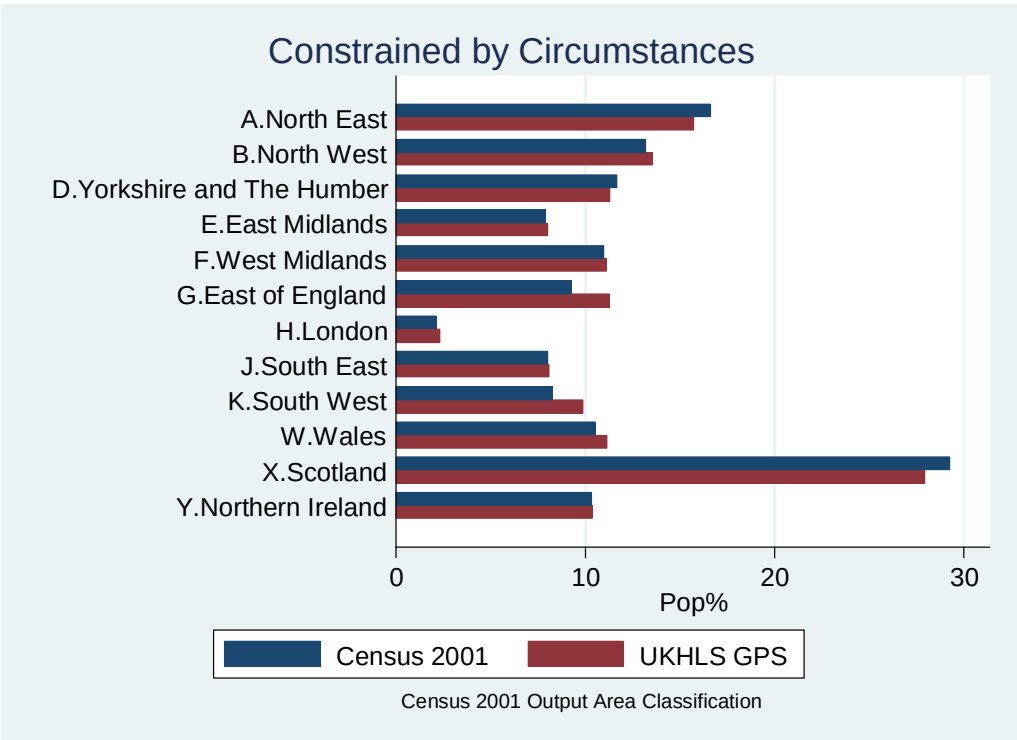


Figure 12: Regional profile of population residing in OAC Typical Traits: Census 2001 and responding *Understanding Society* general population sample.

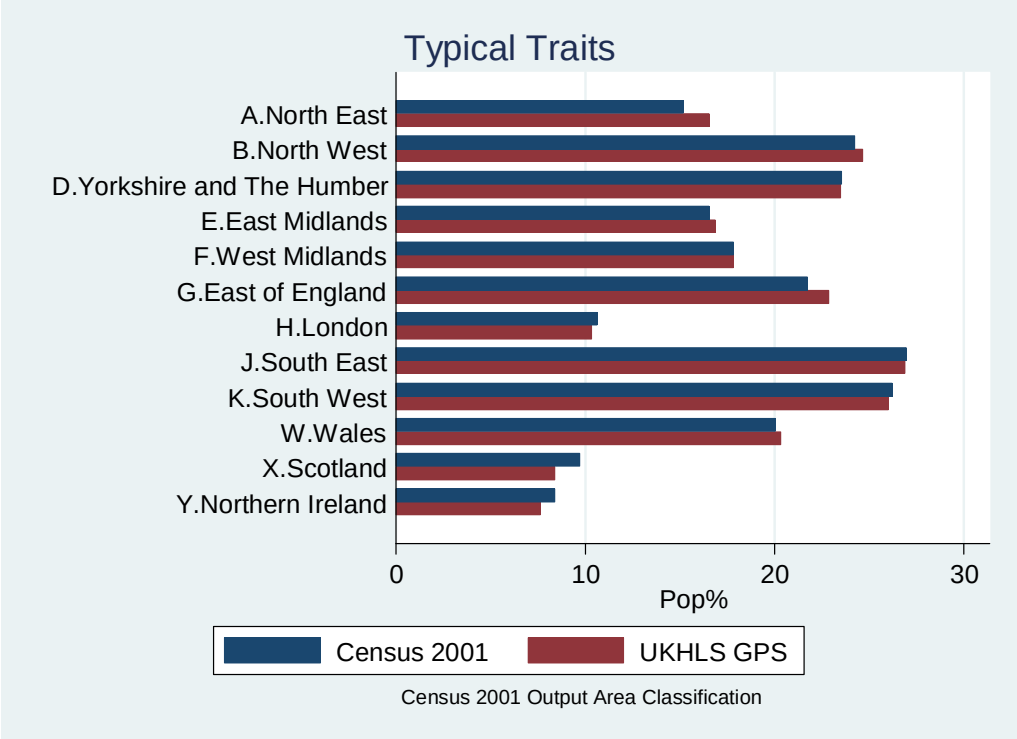
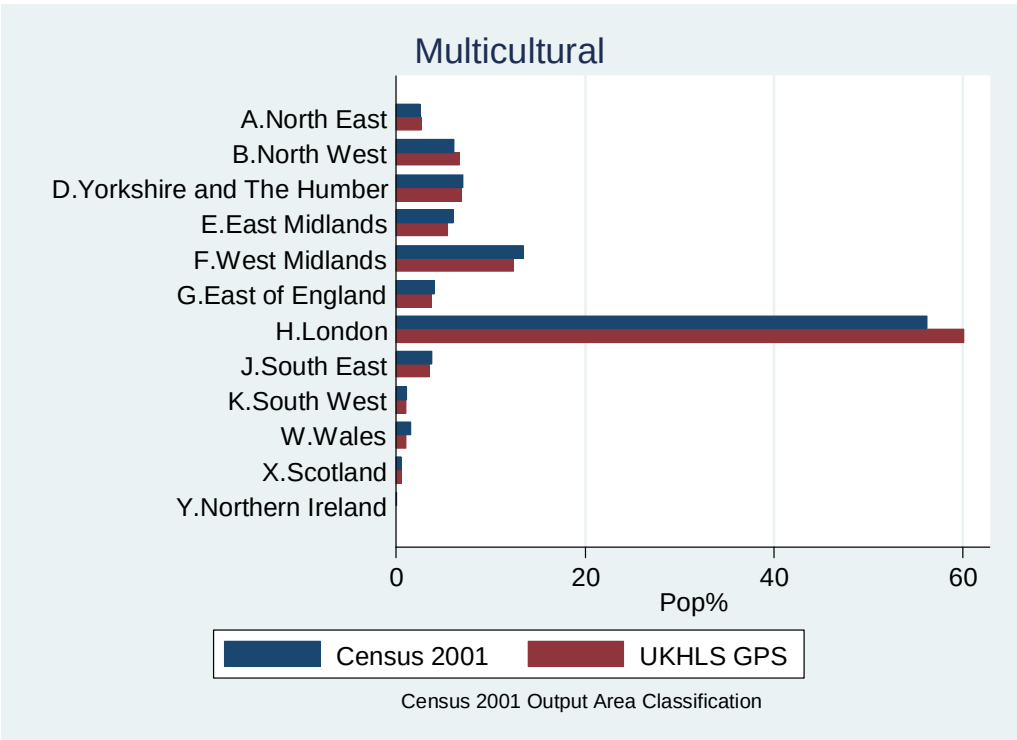


Figure 13: Regional profile of population residing in OAC Multicultural: Census 2001 and responding *Understanding Society* general population sample.



5. Conclusion

This paper compares the general population and ethnic minority samples of Wave 1 responding adults of *Understanding Society* with the adult Census 2001 population in terms of the neighbourhoods they live in. We characterise neighbourhoods (Output Areas) using the Townsend deprivation score and the Output Area Classification. Discrepancies between *Understanding Society* respondents and the Census population can be caused by the sampling designed used to select respondents, or they could reflect the socio-demographic patterning in response rates. We do not distinguish between the two in this paper.

As expected from the sampling design, the neighbourhoods in which respondents from the *Understanding Society* ethnic minority sample reside are not representative of the UK as a whole. Three quarters of the EM sample respondents were found to be living in OAC Multicultural neighbourhoods, and about 80% of ethnic minority respondents live in the 40% most deprived neighbourhoods of the UK, whereas this is the case for less than 40% of the Census population.

Overall the profiles for *Understanding Society* general population respondents and the 2001 Census population were found to be comparable with regards to both the neighbourhood classification and levels of area deprivation. This was the case when comparing neighbourhoods across the UK as a whole and also when doing this at the regional level. It is anticipated that most users will analyse *Understanding Society* data at the national level, but the results from this analysis show that even without sample weighting the respondents in the UK regions are comparable to the Census 2001 in terms of neighbourhood characteristics. Our data description shows that the sub-regional geographies each have a relatively smaller number of *Understanding Society* respondents and would hence more suitably be used for external linkage of contextual information than as units of analysis in themselves.

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