

Geographical variation in GP drug prescribing for Schizophrenia and similar psychosis in England.

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Abstract

Visualising and analysing geographical patterns in mental illness can be a starting point for understanding and creating effective policy around inequalities and how to resolve them. This research note looks at geographical variations in GP prescribing for Schizophrenia and similar psychosis using open Presentation-level Data for England downloaded from NHS Digital. We found considerable geographical variation in both the level of prescribing per thousand population at Local Authority level and in the rate of change measured over five years. There is a statistically significant north-south divide in prescribing. We have used social marketing geodemographics to explore possible correlates with the geographical patterns. Highest positive correlations shows links to deprivation and less healthy lifestyle choices. Seeing the geographical variation is in itself informative and a potential eye-opener. In doing so, new questions can be asked of the data, practice and policy.

Keywords: Schizophrenia, psychosis, prescribing, geography, England

1. Introduction

Mental health has been rising up the UK political agenda with the Prime Minister announcing in January 2017 that her Government will transform the way it deals with mental health problems¹. Investigative journalism such as BBC's Panorama has portrayed a scene of deteriorating national funding for mental health care². Visualising and analysing geographical patterns in mental illness can be a starting point for understanding and creating effective policy around inequalities and how to resolve them. For example, Rowlinson *et al.* (2013) have used open source prescription dispensing data to look at geographical variations in spending per person on metformin and methylphenidate. This research note looks at GP prescribing for Schizophrenia but also similar psychosis as the medications prescribed can be used for a range of diagnoses. These illnesses were chosen because of the on-going debate on their causes in relation to a genetic predisposition, environmental factors such as stress, family dynamics and changes in lifestyle, the abuse of alcohol and drugs, or a combination of these (see, for example, Kirkbride *et al.*, 2010). We link local authority level mapping for England to a geodemographic and lifestyle classification to provide some initial insight into the patterns. We also identify a significant north-south divide. We believe that such maps of prescribing for Schizophrenia have not been produced before.

2. Methods

Monthly files on GP Practice Prescribing Presentation-level Data for England were downloaded from NHS Digital³ for the periods October to September 2010/11 and 2015/16. This resulted in two years of data, five years apart - a data set in the region of 240 million data records. The separately downloadable lists of chemical substances for each period were joined so as to include both discontinued and newly introduced substances. Those prescribed for Schizophrenia and similar psychosis were then identified (listed in Table 1) and used to extract numbers of prescriptions for them from the main data set. The separately downloadable lists of GP practices for each period were joined and georeferenced from the practice postcode to the Office of National Statistics (ONS) Local Authority code. The extracted prescriptions for each period could then be aggregated by the 326 local authorities in England. These data were matched with lifestyle classification P²

¹ <https://www.gov.uk/government/news/prime-minister-unveils-plans-to-transform-mental-health-support>

² <http://www.bbc.co.uk/programmes/b08f0htn>

³ <http://content.digital.nhs.uk/article/2021/Website-Search?q=GP+practice+prescribing&go=Go&area=both>

People & Places from Beacon Dodsworth Ltd⁴ for preliminary analysis of social segmentation using geodemographics (Abbas *et al.* 2009)

Table 1: Thirty-four prescribed chemical substances used to extract the underlying data for Schizophrenia and similar psychosis (data source: NHS Digital). Note: Aripiprazole and Paliperidone have two codes each.

CHEMSUB	NAME
0402010A0	Amisulpride
0402010AD	Aripiprazole
0402020AD	Aripiprazole
0402030R0	Asenapine
0402010B0	Benperidol
0402010D0	Chlorpromazine Hydrochloride
0402010F0	Chlorprothixene
0402010AH	Clotiapine
0402010C0	Clozapine
0402020G0	Flupentixol Decanoate
0402020L0	Fluphenazine Decanoate
0402020P0	Fluphenazine Enantate
0402020R0	Fluspirilene
0402010J0	Haloperidol
0402020T0	Haloperidol Decanoate
0402010L0	Levomepromazine Hydrochloride
0402010K0	Levomepromazine Maleate
0402010AI	Lurasidone
40201060	Olanzapine
0402020AC	Olanzapine Embonate
0402010AE	Paliperidone
0402020AB	Paliperidone
0402010P0	Pericyazine
0402010Q0	Perphenazine
0402020V0	Pipotiazine Palmitate
0406000T0	Prochlorperazine Maleate
0406000U0	Prochlorperazine Mesilate
0402010AB	Quetiapine
0402020AA	Risperidone
0402010U0	Sulpiride
0402010X0	Trifluoperazine
0402010AG	Ziprasidone Hydrochloride
0402010AC	Zotepine
0402020Z0	Zuclopenthixol Decanoate
0402010T0	Zuclopenthixol Hydrochloride

⁴ <http://www.p2peopleandplaces.co.uk/>

3. Results

Figure 1 shows the geographical variation in prescribing per thousand population by Local Authority for the year October 2015 to September 2016. The upper quintile of areas with highest prescribing encompasses both urban and rural areas, university cities and coastal towns. Labeled in Figure 1 are the areas that are statistically significant outliers at the 95% confidence interval at either end of the scale. There is a cluster of these in the Manchester/Liverpool area. Indeed, there is overall significantly higher prescribing in the regions that constitute the north of England (NE, NW, Yorkshire & Humberside; mean = 35.3) compared with the south (SW, SE, E, London; mean = 29.3): Welch Two Sample t-test, $t = 4.69$, $df = 57.03$, $p < 0.001$.

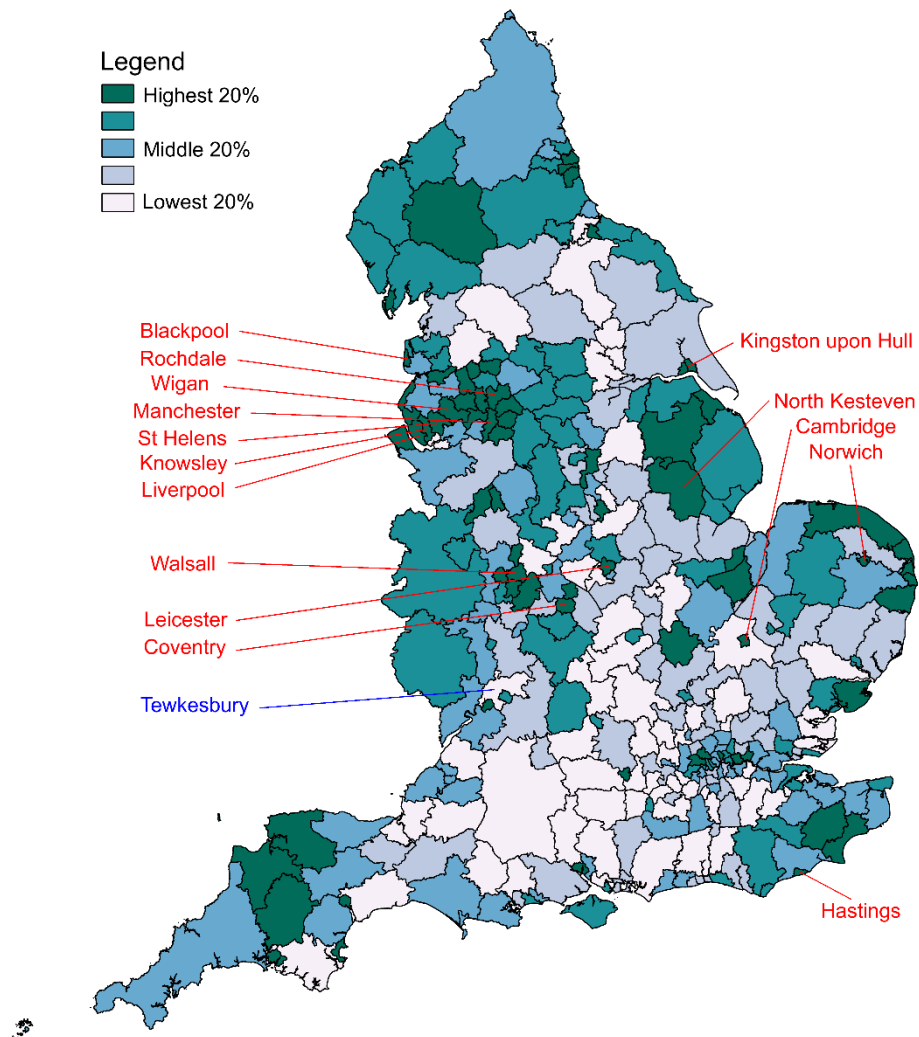


Figure 1: Quintiles of GP prescriptions per thousand population for Schizophrenia and similar psychotic illnesses by Local Authority/District in England, October 2015 – September 2016 (data source: NHS Digital). Named areas are high outliers (red) and low outlier (blue) at 95% confidence interval.

To gain a preliminary insight into the general social, economic and health characteristics of areas most associated or least associated with rates of prescribing, correlations were calculated for the 16 top level ‘Trees’ in the P² People & Places geodemographic classification. These are summarised in Table 2 along with pen portraits of each type. Links to deprivation and less healthy lifestyle choices are evident for the highest positive correlations whilst ethnicity is not as prominent as the literature would suggest. Wilkinson and Pickett (2010) have argued a significant association between income inequality and mental illness. They give a correlation of $r = 0.73$ between income inequality and percent population with any mental illness for 12

“rich, developed countries”, concluding that “more people suffer from mental illness in more unequal countries” (ibid. p67). Taking the income deprivation scores from the English Indices of Deprivation 2015⁵, we find a correlation of $r = 0.63$ with our rate of GP prescribing by Local Authority⁶.

Table 2: Geodemographic trees having highest correlation with rate of prescribing.

Correlation	Tree	Name	Summary description
+ 0.445	N	Disadvantaged Families (4.1% of population)	Deprived young urban dwellers, lone parents with young children, and couples with children. Immigration is below average. Housing rented in dense, overcrowded areas. Long-term unemployment is common. In very poor health, smokers and consumers of junk food. Typically ex-industrial areas.
+ 0.321	J	Working Families (20.3% of population)	Suburban working-age families with children. Poorly qualified manual, skilled and semi-skilled with few white-collar workers; commuting to working in manufacturing or service jobs. Mortgaged or rented terraces and semis in dense suburban areas. Eats little fresh food and has increased spending on takeaways with high levels of smoking. Below average health with long-term work related health issues.
+ 0.253	L	Struggling Singles (3.2% of population)	Deprived young urban singles and lone parent families with pre-school children. Much recent immigration. Small households mostly privately rented. Poor or no qualifications across all ages means low employment or part-time work doing routine jobs. Found to be in poor health, sometimes work-related illnesses. Likely to have poor diet and smoke. Coastal and market towns, some provincial cities.
- 0.4	C	Middle England (20.3% of population)	Older married households in predominantly white areas, with low migration and low population density. Spacious rural detached dwellings, mostly owner-occupied. Well-qualified managers and professionals and other white-collar workers. Average health - eats well and spends on health and fitness; doesn't smoke.

Figure 2 shows the annual percentage rate of change in GP prescriptions per thousand population for Schizophrenia and similar psychotic illnesses over the five years to September 2016. The average change in the rate of prescribing nationally is close to zero. The pattern of change has considerable geographical variation with clusters of above average increases for example in East Anglia and other rural areas. Labelled in Figure 2 are the areas that are statistically significant outliers at the 95% confidence interval at either end of the scale. These changes do not have a strong association with lifestyle types. The pattern on the one hand may be due to differences in evolving policies and practices in the way mental health services are commissioned across the country resulting in growth/decline in GP prescribing. On the other, the patterns may have started to reflect the introduction of new Housing Zones⁷ and also the Local Housing Allowance for those on Housing Benefit whereby allowances for private sector rentals are capped. Whereas the former is likely to lead to regional housing mobility, surveys (DWP, 2014) have shown that this is not happening as a result of the latter. However, data for London obtained by Shelter revealed that a quarter of homeless families were housed in a non-neighbouring borough and that ten percent were moved out of London⁸. If repeated across England in all areas with housing shortages and/or high rentals, then this may well act to redistribute those that are vulnerable to mental illness.

⁵ <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015>

⁶ The Index of Multiple Deprivation 2015 has a higher correlation at $r = 0.68$, but this overall index includes measures of health deprivation, hence our use of the income deprivation score only.

⁷ <https://www.gov.uk/government/news/areas-shortlisted-to-become-englands-first-housing-zones>

⁸ <https://www.localgov.co.uk/Councils-unlawfully-rehousing-families-outside-local-area-warns-charity/40914>

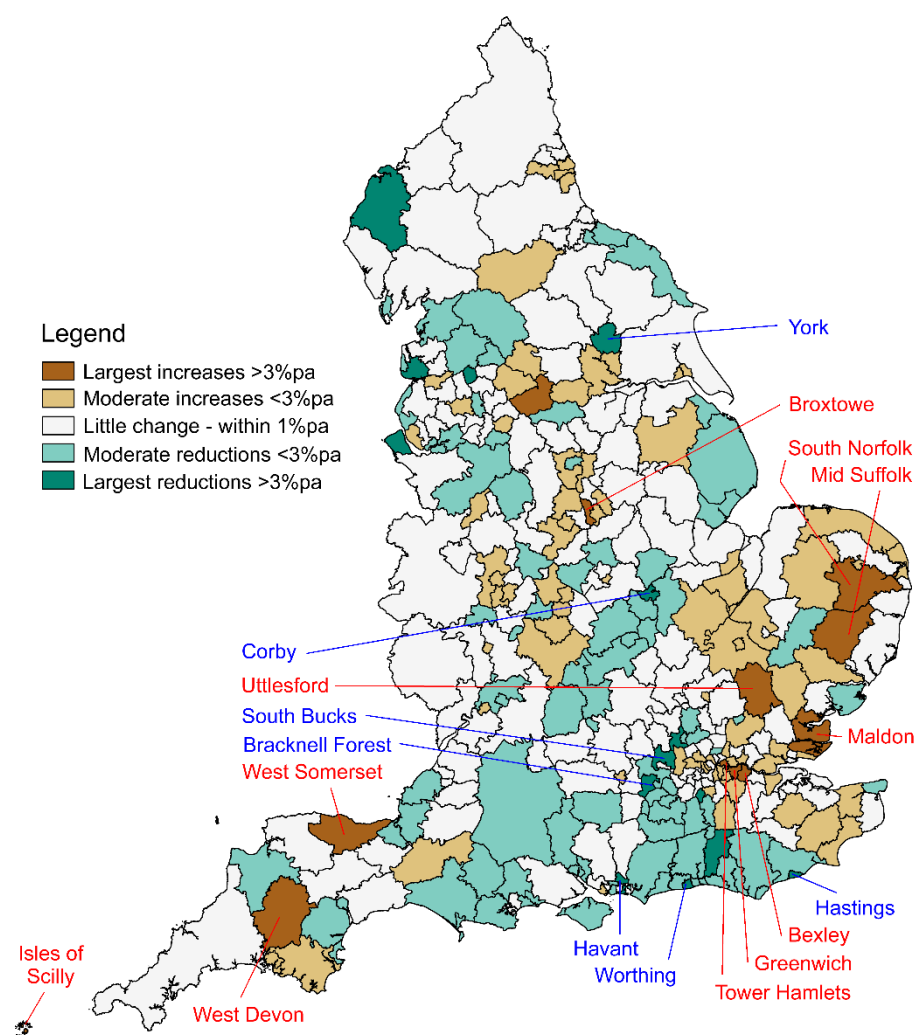


Figure 2: Percentage annual rate of change in GP prescriptions per thousand population for Schizophrenia and similar psychotic illnesses by Local Authority/District in England, calculated over five years to October 2015 – September 2016 (data source: NHS Digital). Named areas are positive outliers (red) and negative outliers (blue) at 95% confidence interval.

Having presented our results, we need to briefly discuss possible biases in the data. As already mentioned above, some of the substances listed in Table 1 are not confined to Schizophrenia and similar psychosis and can be used in diagnoses of other mental illnesses. However, without diagnostic codes alongside prescribing data the effect on the analysis is difficult to gauge. The list of substances in Table 1 are those used to treat Schizophrenia and similar psychosis. The other issue is the base population in calculating rates. The open GP prescribing data are by surgery and we have aggregated to Local Authority. We have used the Office of National Statistics (ONS) population figures. However, surgery catchment areas are not confined to Local Authority boundaries and so there may be net ingress or egress of patients changing the prescribing base population. One way round this would be to use GP registers for the base population. However, a technical note with data by the House of Commons Library⁹ shows that GP registers in England are inflated overall by 4% in relation to ONS figures and that geographically this ranges from +20% (Hammersmith & Fulham) to -12% (Richmondshire)¹⁰. We have analysed the distances from GP surgeries to the nearest Local Authority

⁹ <https://commonslibrary.parliament.uk/social-policy/health/population-estimates-gp-registers-why-the-difference/>

¹⁰ City of London is -14% but would be considered a special case due to its small area and low resident population.

boundary and from GP surgery to its nearest neighbour by urban/rural class¹¹ as given in Table 3. This shows that median distance from a surgery to a Local Authority Boundary is quite short, but further in rural areas. However, median mid-distances to a neighbouring surgery in urban areas is very small by comparison, suggesting small patient catchment areas that may by and large nestle within Local Authorities. However, where there are boundaries within large urban areas, net ingress or egress of patients is a possibility. In rural areas, particularly rural villages, GP catchment areas would seem much larger with greater possibility of crossing over Local Authority boundaries. The net effect though in relation to a base population remains unclear, but nevertheless to recognise that some inaccuracy in the base population for calculating rates may be present.

Table 3: Analysis of distances from GP surgeries to Local Authority boundaries and mid-distance to nearest neighbour surgery. Note: distances are calculated from GP surgery postcode using Euclidean distance.

Measure	URBAN			RURAL		
	Major conurbation	Minor conurbation	City & Town	Town & Fringe	Villages	Hamlets
Count of surgeries	4815	425	5043	1020	256	85
Median distance from surgery to Local Authority boundary (m)	1172	1825	1575	2195	2674	2394
Median mid-distance from surgery to nearest neighbour surgery (m)	70	118	85	1278	2568	1118

4. Conclusions

The purpose of these maps is to explore geographical variation across England. This visualisation of GP prescribing for Schizophrenia and similar psychosis has not been achieved before, so seeing the geographical variation is in itself informative and a potential eye-opener. In doing so, new questions can be asked of the data, practice and policy that are focused on explaining and, if necessary, ameliorating these geographical variations. We propose to continue our analysis using specific drugs at GP surgery scales and to repeat this analysis for other illnesses.

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¹¹

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