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Social atlas of drugs misuse in London

Following the success of TV shows such as “Breaking Bad” or “Narcos”, there is an increasing interest in drugs as a social and cultural phenomenon. Based on the plot of these two programmes it seems that drug cartels bloom only in the western hemisphere, the United States and South America, specifically in Colombia, as a result of post-Escobar times. Nevertheless, in recent times Europe has been increasingly becoming more affected by the problem of drug misuse. In 2014, number of the most influential English newspapers have alarmed that London has the highest use of illegal drugs (such as cocaine, LSD or ecstasy) in Europe, even calling it “the cocaine capital of Europe” (The Independent, 2014). The problem of drug misuse in London is widespread, touching all social groups and layers (Pearson, 1996). However, less affluent and educated people are still seen as the only source of the problem.

This social atlas is designed to investigate the problem of drug misuse in London, by looking at the distribution of drug-related crimes in London and ambient socio-economic factors. The atlas interesting because it presents the problem of drug misuse in London as a common social phenomenon, rather than something which happens in the far reality. My analysis mainly focuses on the dataset which provides the distribution of people who were stopped and searched by the Metropolitan Police between June 2016 and December 2016. To compare this distribution of drug possession to socio-economic factors I have also used Census Data provided by Office for National Statistics, data at the level of Lower Layer Super Output Area (LSOA) on crime produced by Metropolitan Police Service and data on the English Indices of Deprivation 2015 created by Department for Communities and Local Government. To show the general pattern of drug use in London’s boroughs I have used data on deaths

related to drug misuse created by Office for National Statistics and data on drug misuse itself, provided by the Public Health England. All of datasets used in this project were not significantly changed; in a few cases I have renamed the headings and in other I have manually removed the unwanted columns.

Drug misuse in London

According to research undertaken by the government of the United Kingdom, the level of deaths related to drug misuse recorded its peaks after an increase over "the past 20 years, with a significant rise in the last three years" (GOV.UK, 2017). Figure 1 shows the rate of deaths related to drug misuse registered between 2014 and 2016, per 100,000 population.

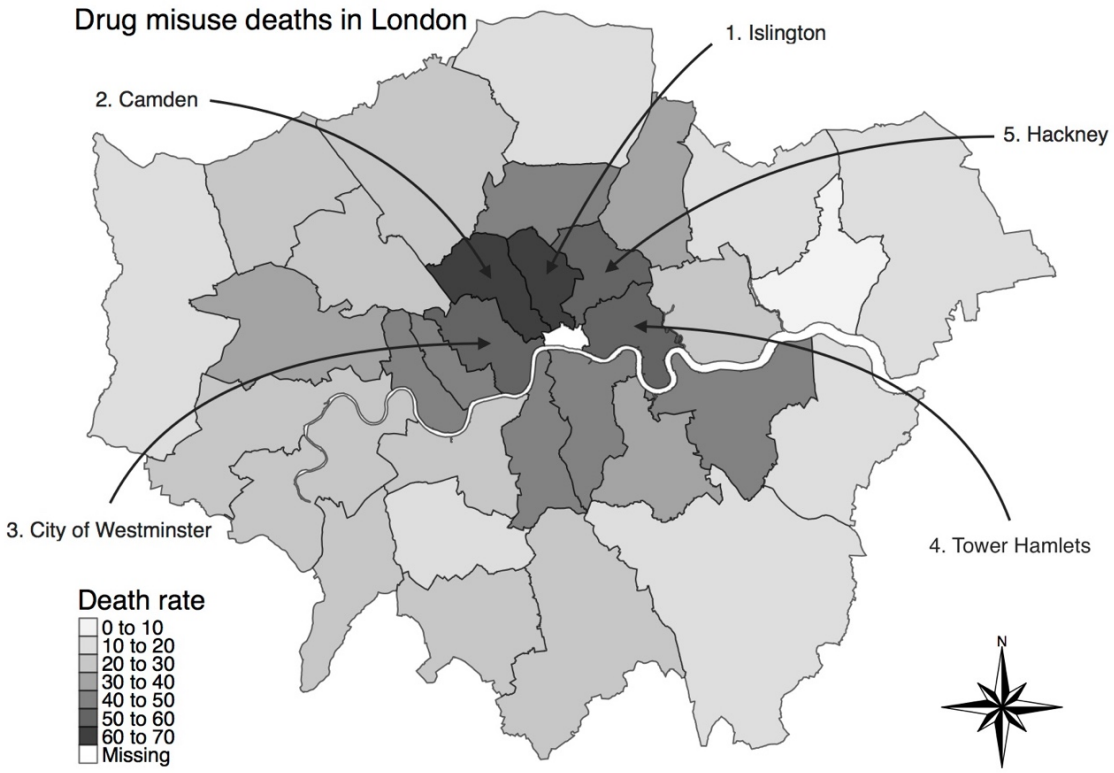

Figure 1. Map of age-standardised mortality rate per 100,000 population for deaths related to drug misuse reported between 2014 and 2016 in London.

Borough	Drug misuse death rate
Islington	66
Camden	62
Westminster	58
Tower Hamlets	56
Hackney	52

Table 1. The table of five London's boroughs with the highest rate of deaths related to drug misuse. The rate is calculated for 100,000 people.

Results [Figure 1 and Table 1] show that the highest rate of deaths related to drug misuse was observed in the borough of Islington, where there were 66 cases of deaths related to drug misuse, per 100,000 deaths. What one should bear in mind is the fact that the rate has not been calculated for the City of London, since a rate for less than 3 drug-related deaths might not be accurate and meaningful; only one person has died in the City of London because of the drug misuse. What can also be easily spotted is the cluster of the highest rates in the northern part of Inner London. Even though rates of boroughs within the Outer London are not that high, London has a higher level of people dying from cocaine and other drugs than the rest of the country (GOV.UK, 2017). However, the deaths rates do not show precisely the size of the phenomenon of drug misuse; since there is no evidence that some overdose of some illegal substances, such as cannabis, might lead to death, the problem of drug misuse can therefore be greatly under-represented (Iversen, 2001). To see the real problem of drug misuse, it is useful to look at the estimated rates of drug users [Figure 2]. The results show that the pattern of boroughs with the highest rates of drug misuse is the same as the pattern of drug-related death rates. What has changed is the order of boroughs with the highest rates; the borough with the highest rate of estimated drug misuse is Tower Hamlets, where almost 2% of population of the borough do drugs [Table 2].

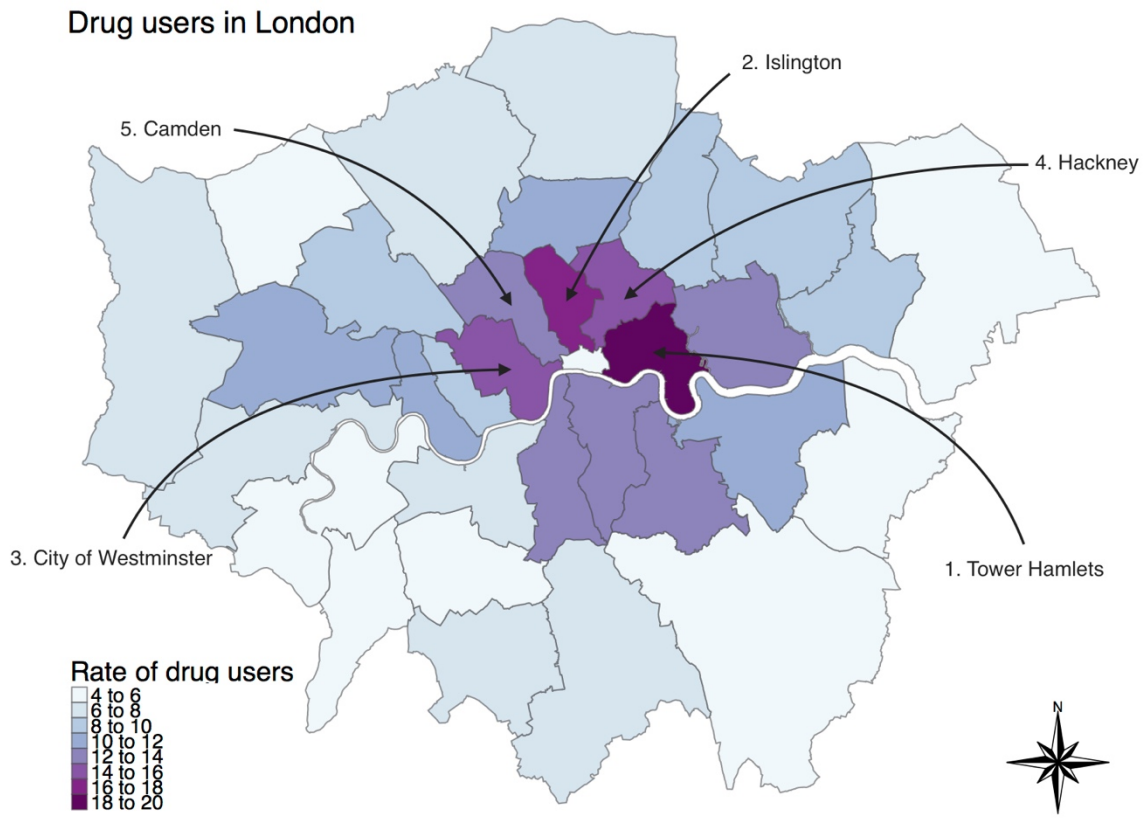

Figure 2. Map of the estimated crude rate of opiate and/or crack cocaine users. The rate is calculated per 1,000 people in the age between 16 and 54.

Borough	Drug misuse rate
Tower Hamlets	18.48
Islington	16.70
Westminster	15.57
Hackney	14.43
Camden	13.63

Table 2. The table of five London's boroughs with the highest estimated rate of opiate and/or crack cocaine users, calculated per 1,000 population aged 16-54.

Drug possession

To see how the use of drug possession is related to socio-economic factors, I have decided to look at the LSOA level. Because Tower Hamlets is facing the biggest problem of drug misuse

In London (almost 2% of its population drug) and has the fourth highest rate of deaths caused by drug misuse, I will narrow my analysis down to this borough. Since the early 1980s there has been a great concern that the highest concertation of drug-related problems is characteristic for areas with high rates of unemployment and proportion of ethnic minorities (Pearson and Patel, 1998). These two variables will be later compared with the hotspots of drug possession. To find such hotspots, I have used Kernel Density Estimate technique which obtains "a smooth surface estimate representing the density of the point distribution" by calculating number of points and their spatial distribution, with a chosen bandwidth size (Chainey, 2013: 9). Figure 3 shows the where are the 75%, 50%, 25% and 5% of top density of stop and searches in Tower Hamlets.

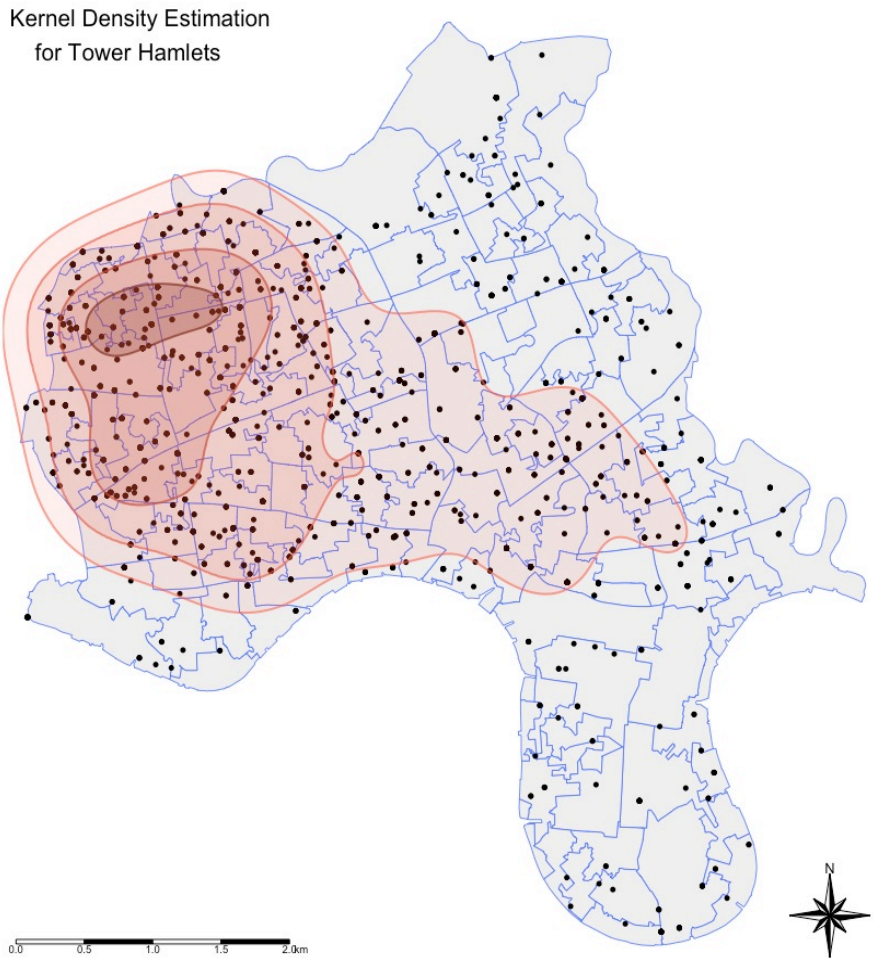

Figure 3. Kernel Density Estimation of drug possession in Tower Hamlets.

What can be clearly spotted, is the concertation of observations in the north-western part of the borough and a relatively low number of observations in the area of Isle of Dogs. This spatial pattern of drug possession clearly overlays with the Index of Multiple Deprivation [Figure 4]. The index calculates level of deprivation based on seven features, including the Crime Domain which "measures the risk of personal and material victimisation at local level" (Smith *et al*, 2015: 44). Since drug-related crime is not recognized as form of deprivation, drug possession or overdose was not taken as an indicator of the Crime Domain (Smith *et al,* 2015). However, the link between drug possession and deprivation is undisputed, which is also reflected by the map.

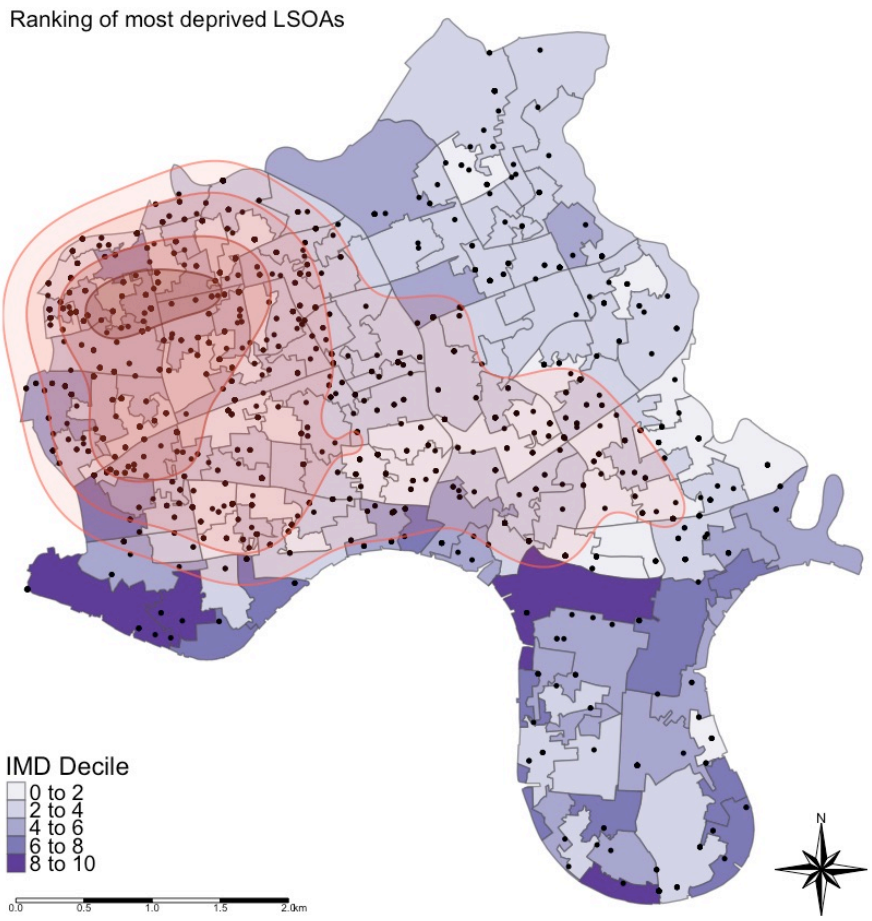

Figure 4. Ranking of the most deprived LSOAs in Tower Hamlets, where values of 1 and 10 indicates that the LSOA falls respectively within the most and the least deprived 10% of all LSOAs in the United Kingdom, compared to the Kernel Density Estimation of drug possession.

Drug possession in Tower Hamlets concentrates not only in the most deprived Tower Hamlets' LSOAs, but also the most deprived LSOAs nationally. Knowing that "the most serious concentrations of drug misuse are to be found in neighborhoods suffering from multiple deprivation", can we find a link between the density of drug possession with unemployment rate or ethnicity? (Pearson, 1995: 113).

When compared to the unemployment rate [Figure 5], one can see that the top densities cover LSOAs with both high and low unemployment rates.

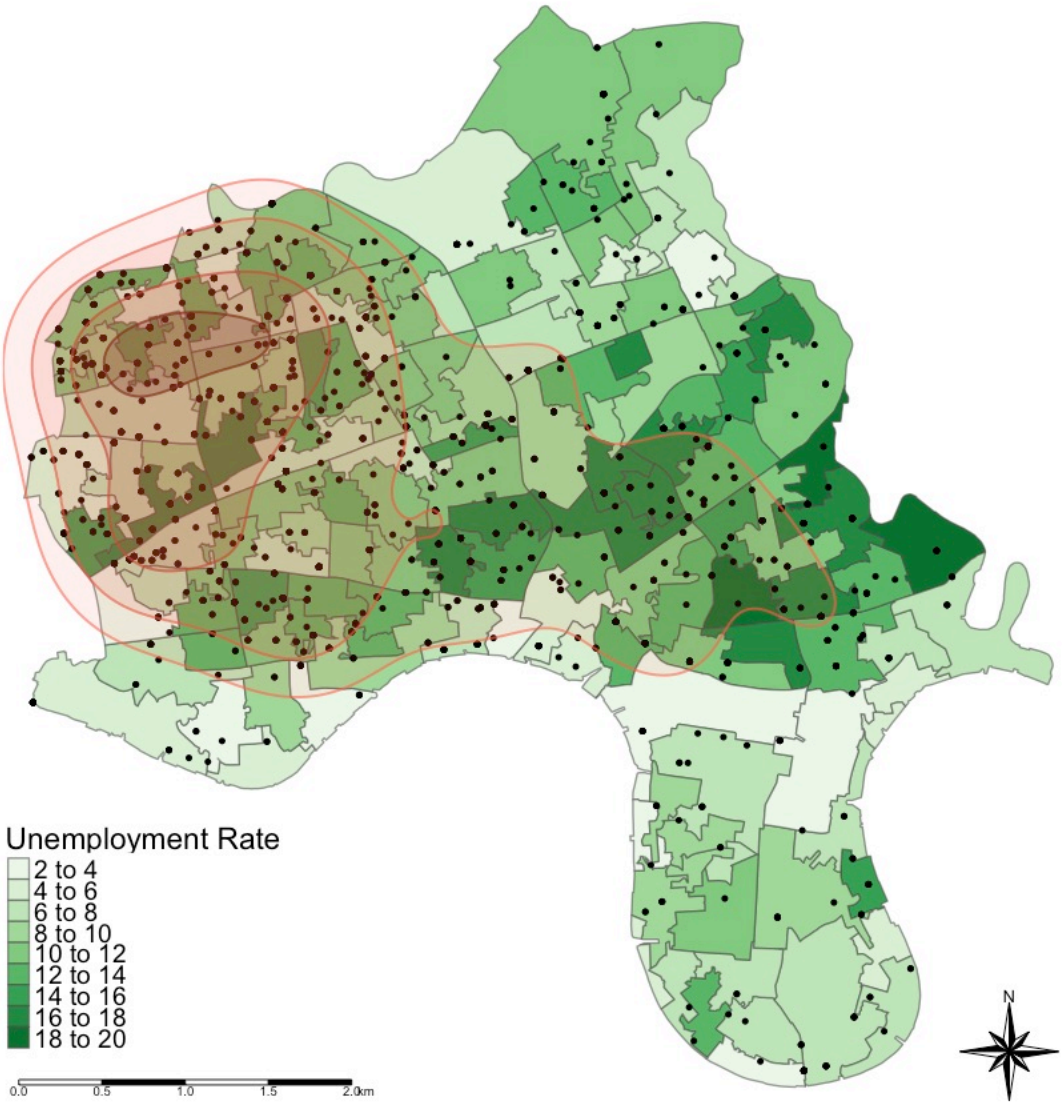

Figure 5. Kernel Density Estimation of drug possession and unemployment rate in Tower Hamlets.

Clearly, the map suggests that there might be no relationship between drug possession and unemployment; neither does the next map [Figure 6], which compares the distribution of drug possession with the percentage of black and minority ethnic population.

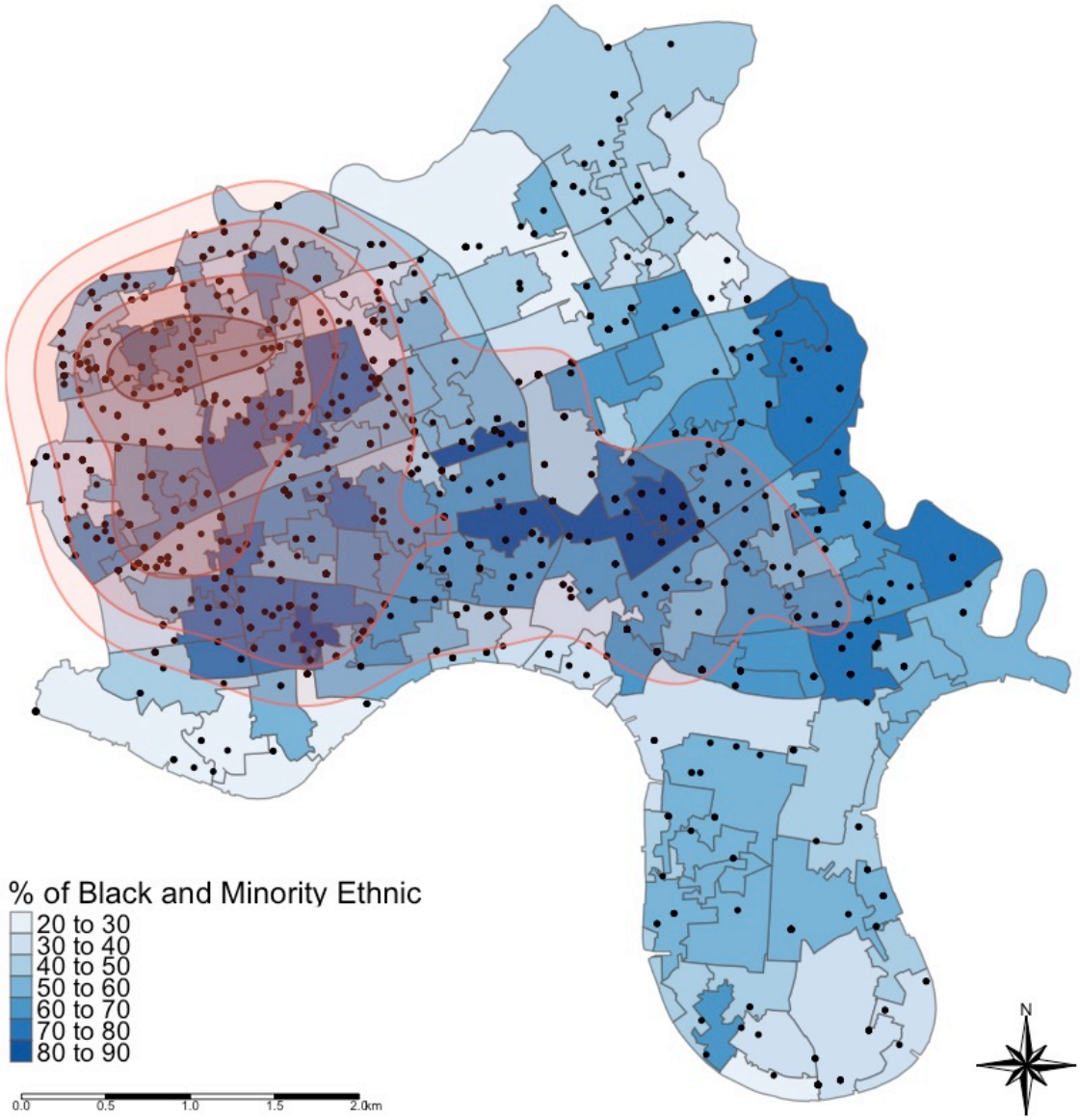

Figure 6. KDE of drug possession and percentage of black and minority ethnic population.

While the eye of human is not good at picking up spatial patterns, the statistics on the ethnicity of people searched by Metropolitan Police support the hypothesis of no relationship between ethnicity and drug misuse; both white and black ethnicities compose 39% of cases

of drug possession. However, there are no evident patterns of clustering of these two variables. Therefore, it could be useful to make a comparison of the density of drug possession with spatial clusters of unemployment rate and percentage of black and minority ethnic population. To look for spatial autocorrelation of these variables, I have used the Getis and Ord Gi* statistic, which identifies the degree to which low and high values cluster together. The statistic calculates the presence of spatial correlation around each location based on the style of weighting the association between adjoining locations; in this sense higher values of the statistic indicate the clustering of areas of higher values (Rogerson, 2015). Figures 7 and 8 compare the distribution of drug possession with the clustering patterns of unemployment rate and percentage of black and ethnic minority, respectively.

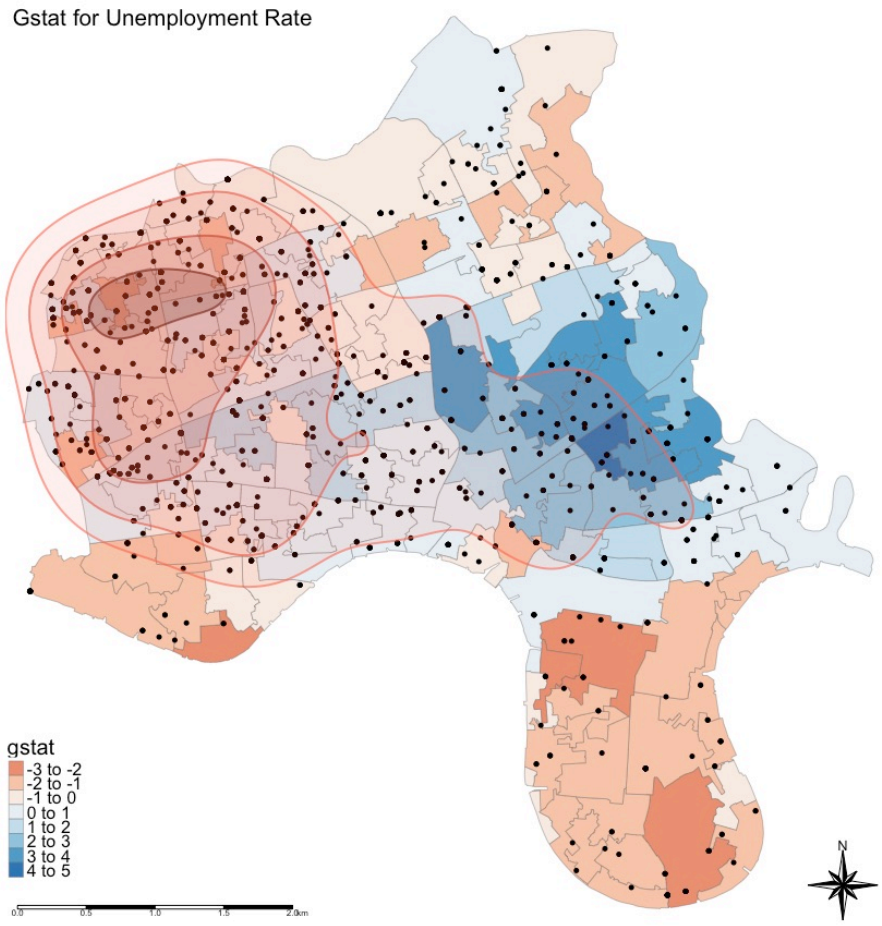

Figure 7. The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of unemployment rate.

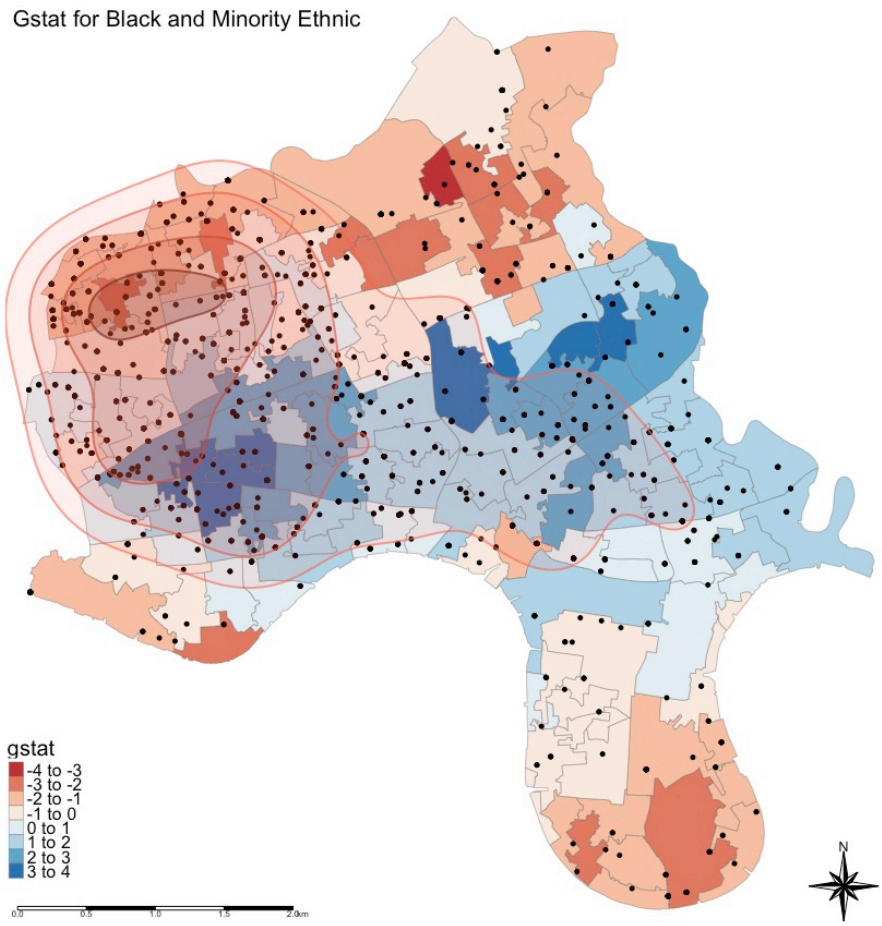

Figure 8. The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of percentage of black and minority ethnic population.

Maps expose that the top densities concentrate in areas with clusters of lower values of unemployment rate and percentage of black and minority ethnic population. In order to further investigate the influence of unemployment and ethnicity on the distribution of drug possession, I have decided to run a geographically weighted regression model.

Geographically weighted regression model

Geographically weighted regression model is a spatial regression model which works similarly to the general linear regression model but also allows coefficients to vary geographically; it is a powerful technique of spatial analysis as it accounts for the heterogeneity of the

phenomena across space (Xu and Lin, 2017). While choosing unemployment and ethnicity as independent variables does not need explanation, choice of the dependent variable needs more attention. The problem of drug misuse might be under-estimated by looking only on the cases of drug possession. Moreover, number of police interventions can be dependent on the infrastructure of the region. Figure 9 shows a disproportionate concentration of cases of drug possession in the western part of the borough, with over 120 cases of drug possession recorded.

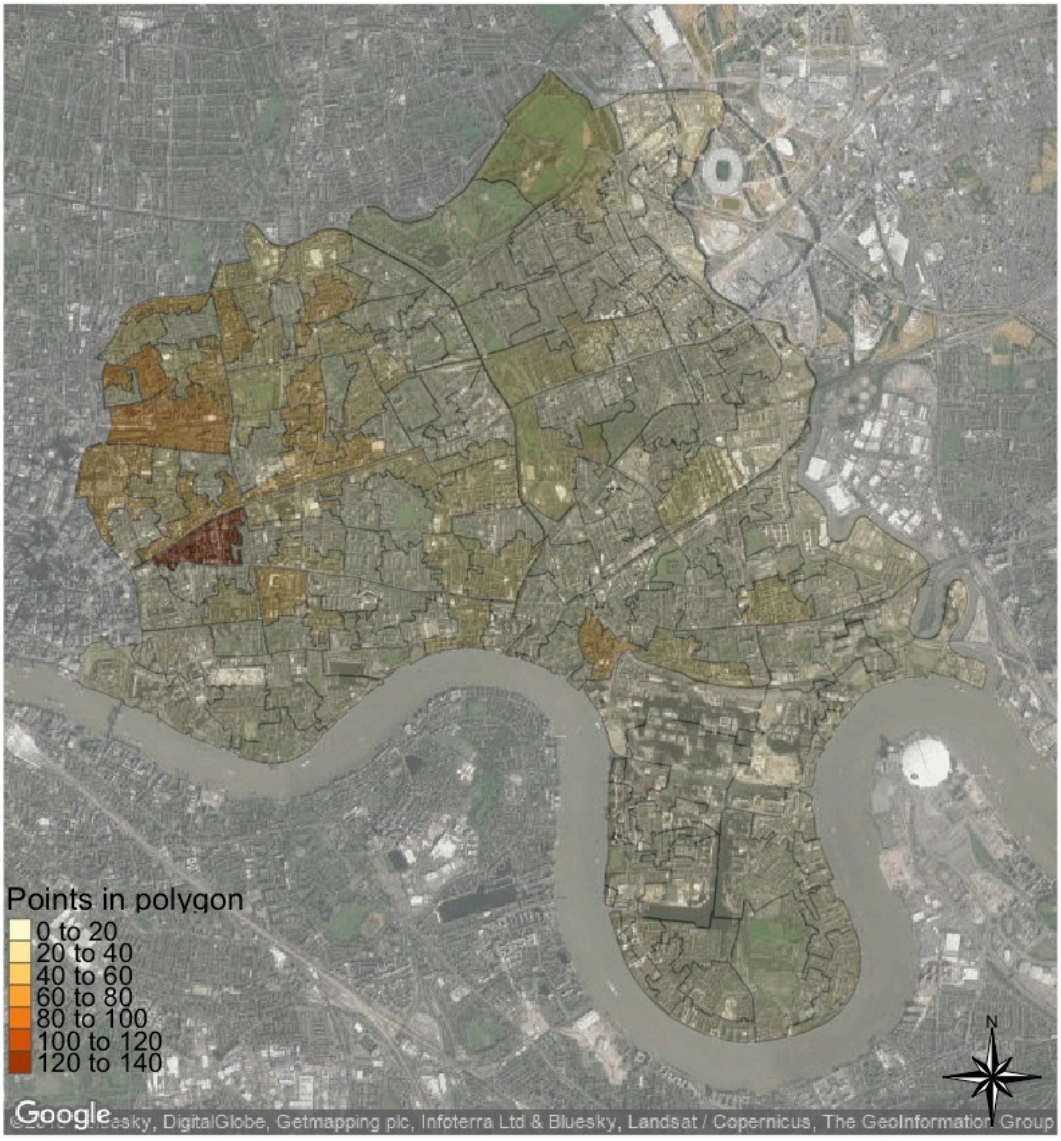

Figure 9. Number of cases of drug possession controlled by the Metropolitan Police in each Tower Hamlets' LSOAs.

This might be because of the character of the LSOA; it includes Altab Ali Park, which due to its connection to the infamous racist murder of Bangladeshi textile worker Altab Ali, can be still regarded as a focal point of local deprivation (BBC News, 2016); moreover, it is also articulated by local people, who describe the park as "full of drunks and homeless" (Foursquare, 2018). Such disproportionate distribution of cases of drug possession may also arise from the Modifiable Areal Unit Problem (MAUP), where the results of the analysis are dependent on size and shape of the polygon, in this case LSOA (Lloyd, 2014). Thus, to obtain more reliable results, instead of using number of cases of drug possession I have used the total number of drug-related crimes as my dependent variable.

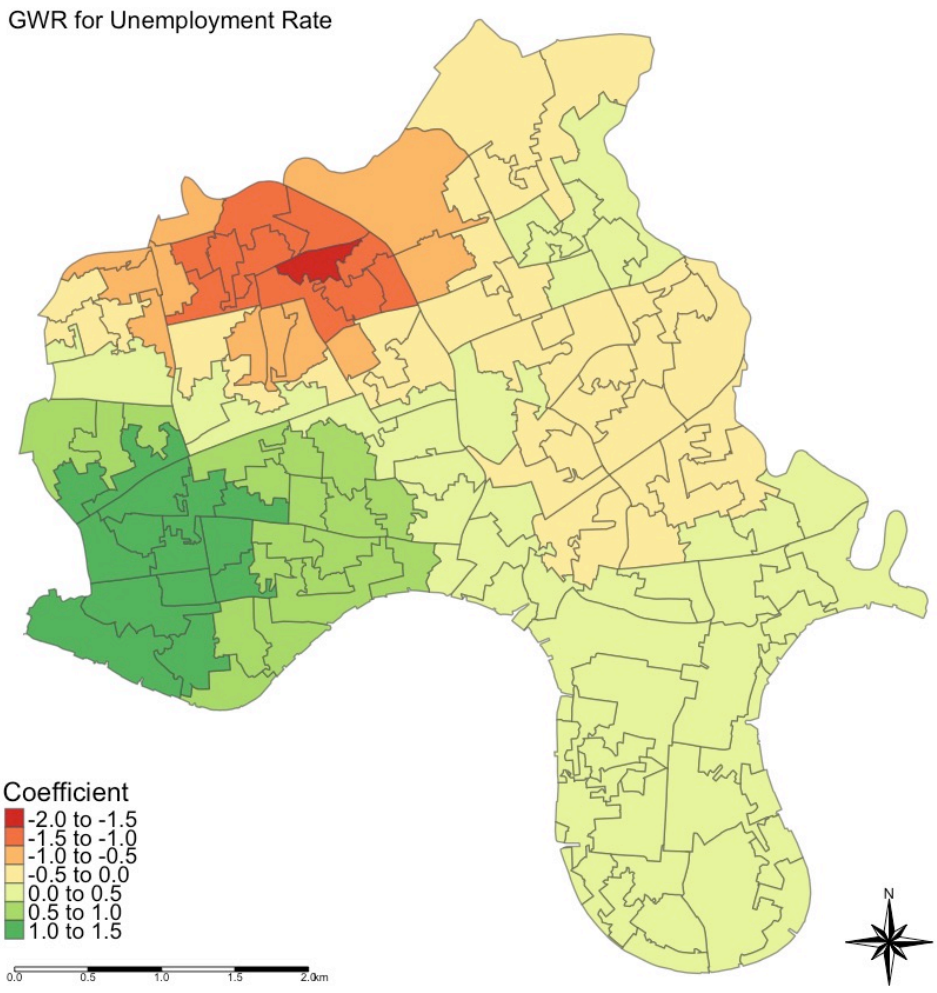

Figure 10. Differences in the coefficient of unemployment rate in the geographically weighted regression model.

Eventually, my geographically weighted regression model consists of unemployment rate and percentage of black and minority ethnic population as independent variables, and the total number of drug-related crimes as a dependent variable. What these two map show, is how the coefficients of explanatory variables vary depending on the location [Figure 10 and Figure 11].

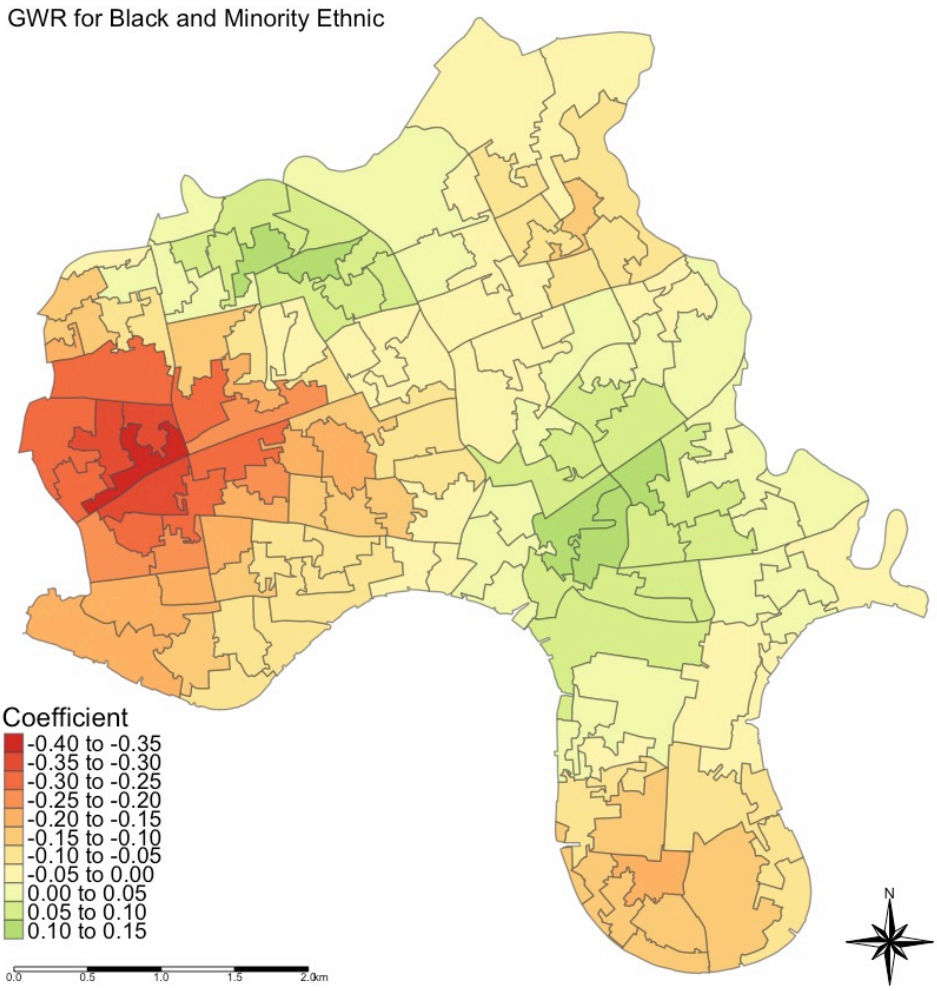

Figure 11. Differences in the coefficient of unemployment rate in the geographically weighted regression model.

The results indicate the influence of unemployment rate on drug-related crime varies mainly in west Tower Hamlets, while controlling for percentage of black and minority ethnic population; with the increase of one unit in unemployment rate there is an associated

increase of 1 to 1.5 unit in number of crime in south-west and a decrease of 1 to 2 units in north-west. However, the model also suggests that in the same part of the borough there is a negative relationship between percentage of black and minority ethnic people and drug-related crime when holding the variable on unemployment rate constant. Figure 12 presents the output of R-squared statistic, which examines how well the created geographically weighted regression model explains the variation in the dependent variable.

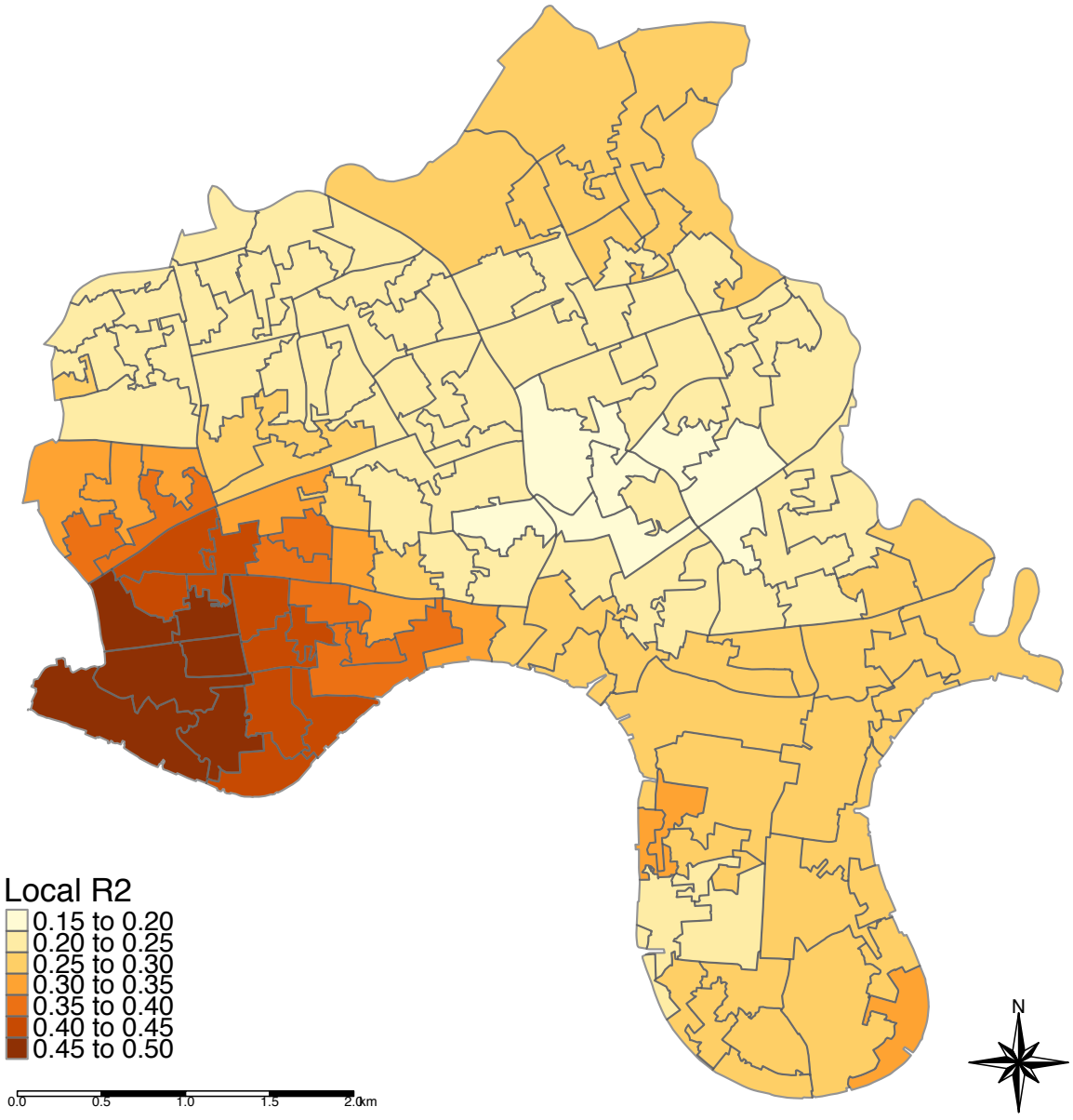

Figure 12. Output of the R-squared statistic for the geographically weighted regression model.

The map shows that the model explains up to a half of the variation in the total number of drug-related crime in south-west and only 15-20% of the variability in central Tower Hamlets. In spite of the fact that the model explains up to 50% of the variation in dependent variable, the influence of unemployment rate and ethnicity seems to be deluded. In most cases, the coefficients of both variables are very close to zero, which means that they might not necessarily have much explanatory power. Having this in mind, one should not assume positive relationship between drug-related crime and neither unemployment rate, nor the percentage of black and minority ethnic population.

Conclusion

The rationalities for this social atlas were to shed a light on the problem which still seems to be taboo in London. Furthermore, it tests the long-standing assumptions of employment and ethnicity being major factors of drug misuse. The history of the study on drugs tended to over-represent these variables, but this trend has recently shifted due to the increase of drug use among affluent people of different ethnicities (Buxton, 2006). The fact that such factors, along with "age, gender, nationality and income level are no longer significant determinants of drug use", calls for the greater attention from the authorities on the problem of drug misuse form and simultaneously gives space for future studies on this topic (Buxton, 2006: 81). Nevertheless, as long as drug possession is illegal in the United Kingom, the problem of drug misuse in London will be blurred and unexplained. This is said not to call national authorities to legalize substances which are now recognized as illegal, but to highlight that to tackle the problem of drug-related crime we need to better understand other factors than demographics which may have an impact on it.

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Appendix

Dataset	Source
drug.misuse .deaths	*'localauthoritiesregistrations201416final.xls'*, *sheet=3*; downloaded from: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/datasets/drugmisusedeathsbylocalauthority
Figures and Tables	
Figure 1 – Rate of drug misuse deaths in London; Table 1 – Boroughs with the highest rates of drug-related deaths.	

Dataset	Source
drug.misuse	*'drug-misuse-borough.xls'*, *sheet=3*; downloaded from: https://data.london.gov.uk/dataset/estimated-problem-drug-users-borough
Figures and Tables	
Figure 2 – Rate of drug misuse in London; Table 2 – Boroughs with the highest estimated rates of drug misuse.	

Dataset	Source
stop_and_search	Bounded following datasets: *'2016-06-metropolitan-stop-and-search.csv'*; *'2016-07-metropolitan-stop-and-search.csv'*; *'2016-08-metropolitan-stop-and-search.csv'*; *'2016-09-metropolitan-stop-and-search.csv'*; *'2016-10-metropolitan-stop-and-search.csv'*; *'2016-11-metropolitan-stop-and-search.csv'*; *'2016-12-metropolitan-stop-and-search.csv'*; downloaded from: https://data.police.uk

Figures
Figure 3 – Kernel Density Estimation of drug possession in Tower Hamlets; Figure 4 – Ranking of the most deprived LSOAs in Tower Hamlets, where values of 1 and 10 indicates that the LSOA falls respectively within the most and the least deprived 10% of all LSOAs in the United Kingdom, compared to the Kernel Density Estimation of drug possession; Figure 5 – Kernel Density Estimation of drug possession and unemployment rate in Tower Hamlets; Figure 6 – Kernel Density Estimation of drug possession and percentage of black and minority ethnic population; Figure 7 – The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of unemployment rate; Figure 8 – The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of black and minority ethnic population; Figure 9 – Number of cases of drug possession controlled by the Metropolitan Police in each Tower Hamlets' LSOAs.

Dataset	**Source**
d.index	'*ID_2015_for_London.xls*', *sheet=2;* downloaded from: https://data.london.gov.uk/dataset/indices-of-deprivation-2015
Figures	
Figure 4 – Ranking of the most deprived LSOAs in Tower Hamlets, where values of 1 and 10 indicates that the LSOA falls respectively within the most and the least deprived 10% of all LSOAs in the United Kingdom, compared to the Kernel Density Estimation of drug possession;	

Dataset	Source
census.data	Merged all (2) sheets of *'lsoa-data_2011.xls';* downloaded from: https://data.london.gov.uk/dataset/lsoa-atlas
Figures	
Figure 5 – Kernel Density Estimation of drug possession and unemployment rate in Tower Hamlets; Figure 6 – Kernel Density Estimation of drug possession and percentage of black and minority ethnic population; Figure 7 – The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of unemployment rate; Figure 8 – The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of black and minority ethnic population; Figure 10 – Differences in the coefficient of unemployment rate in the geographically weighted regression model; Figure 11 – Differences in the coefficient of unemployment rate in the geographically weighted regression model; Figure 12 – Output of the R-squared statistic for the geographically weighted regression model.	

Dataset	Source
crime	'*LSOA_Crime.csv';* downloaded from: https://data.london.gov.uk/dataset/recorded_crime_summary
Figures	
Figure 10 – Differences in the coefficient of unemployment rate in the geographically weighted regression model; Figure 11 – Differences in the coefficient of unemployment rate in the geographically weighted regression model; Figure 12 – Output of the R-squared statistic for the geographically weighted regression model.	

Shapefile	Source
boroughs.map	*'London_Borough_Excluding_MHW.shp';* downloaded from: https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
Maps	
Figure 1 – Rate of drug misuse deaths in London; Figure 2 – Rate of drug misuse in London.	

Shapefile	Source
Tower.Hamlets	'*Tower_Hamlets_lsoa11.shp';* downloaded from: https://data.cdrc.ac.uk/dataset/cdrc-2011-oac-geodata-pack-tower-hamlets-e09000030
Maps	
Figure 3 – Kernel Density Estimation of drug possession in Tower Hamlets; Figure 4 – Ranking of the most deprived LSOAs in Tower Hamlets, where values of 1 and 10 indicates that the LSOA falls respectively within the most and the least deprived 10% of all LSOAs in the United Kingdom, compared to the Kernel Density Estimation of drug possession; Figure 5 – Kernel Density Estimation of drug possession and unemployment rate in Tower Hamlets; Figure 6 – Kernel Density Estimation of drug possession and percentage of black and minority ethnic population; Figure 7 – The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of unemployment rate; Figure 8 – The comparison of drug possession density and Getis-Ord Gi* statistic of spatial autocorrelation of black and minority ethnic population; Figure 9 – Number of cases of drug possession controlled by the Metropolitan Police in each Tower Hamlets' LSOAs;	

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