Inequality and Public Transport

The Case of East London

Background and Objective of the Study

- Evidences from the literature suggests that the there is a link between public transport accessibility and the wellbeing of the people (discussed in detail later.) (Gates et al, 2019) (Banister, 2018)
- Much of the research in the transport has focused on the length of the journey or physical access to the public transport, and a very limited number of them have explored socio-economic inequality and public transport (Gates et al, 2019, ITF RoundTable Report, 2017)
- There is still a wide knowledge gap as in how exactly the public transport accessibility affects the inequality/wellbeing of the people.

..Background and Objective of the Study Contd..

Gates et al (2019), argues there are 3 ways in which transport and inequality are linked

1) The way people are distributed geographically, and across social classes.

2) The way opportunities are distributed , including jobs and education.

3) How accessible the transport system is , in terms of cost, geographic accessibility and the time and reliability of different transport options.

- The objective of our research is to understand these intricate links between the public transport and inequality, understood in terms of wellbeing of the people in the select boroughs of East London.

Research Questions

- What are the ways in which accessibility to public transport affects the wellbeing of people?
- Are there any demographic factors that affect the patterns of mobility within social groups?

Inequality and Wellbeing?

- Inequality is often understood in terms of income and wealth distribution in a society.
- This often leaves out the multidimensionality of inequality, that may be structural and institutional.

Hence, we use wellbeing

- Key aspects :

1) focusses on the "potential"

2) takes account to non-market factors (ie. instead of resources and utility non-monetary constraints)

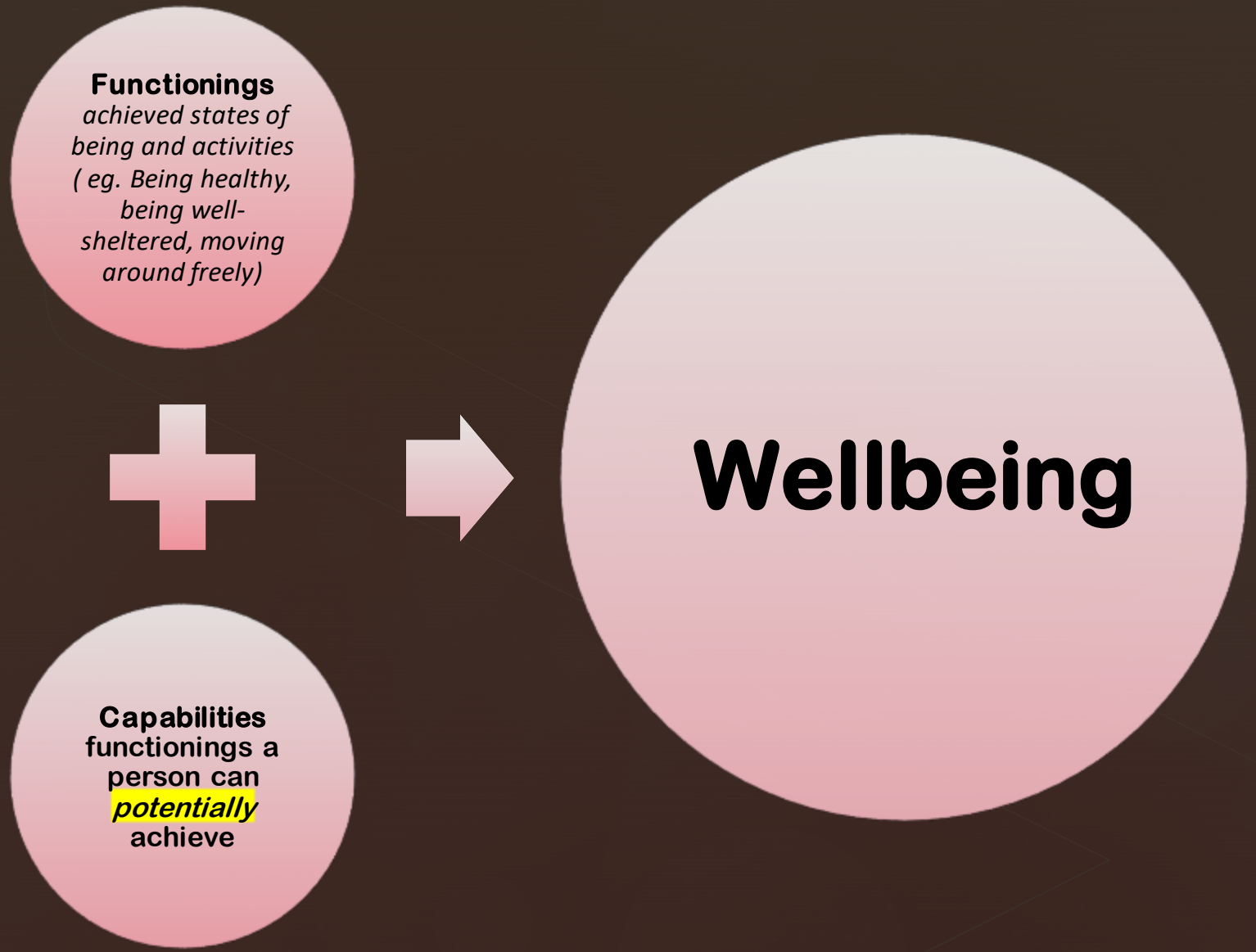
3) useful in distributive justice and welfare measures.

Theoretical Framework

- The Capability Approach conceives of measured wellbeing "as the freedom people have to enjoy valuable activities and states".
- This approach entails two normative claims:
- i) the freedom to achieve well-being is of primary moral importance and (*substantial freedom*)
- ii) that freedom to achieve well-being is to be understood in terms of people's capabilities. (Sen, 1999)(*positive freedom/capability*)

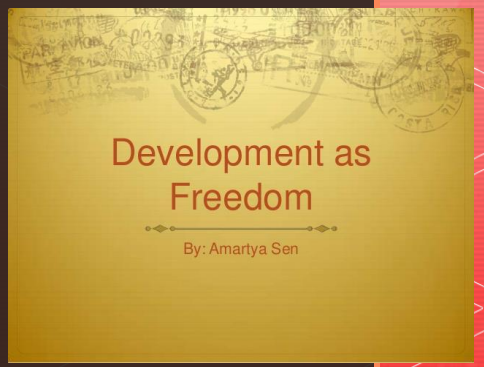
"well-being should be conceived directly in terms of functionings and capabilities instead of resources or utility. 'The central feature of well-being is the ability to achieve valuable functionings. The need for identification and valuation of the important functionings cannot be avoided by looking at something else, such as happiness, desire fulfilment, opulence, or command over primary goods' (Sen, 1985)"

Contd. Theoretical Framework



Key Concepts

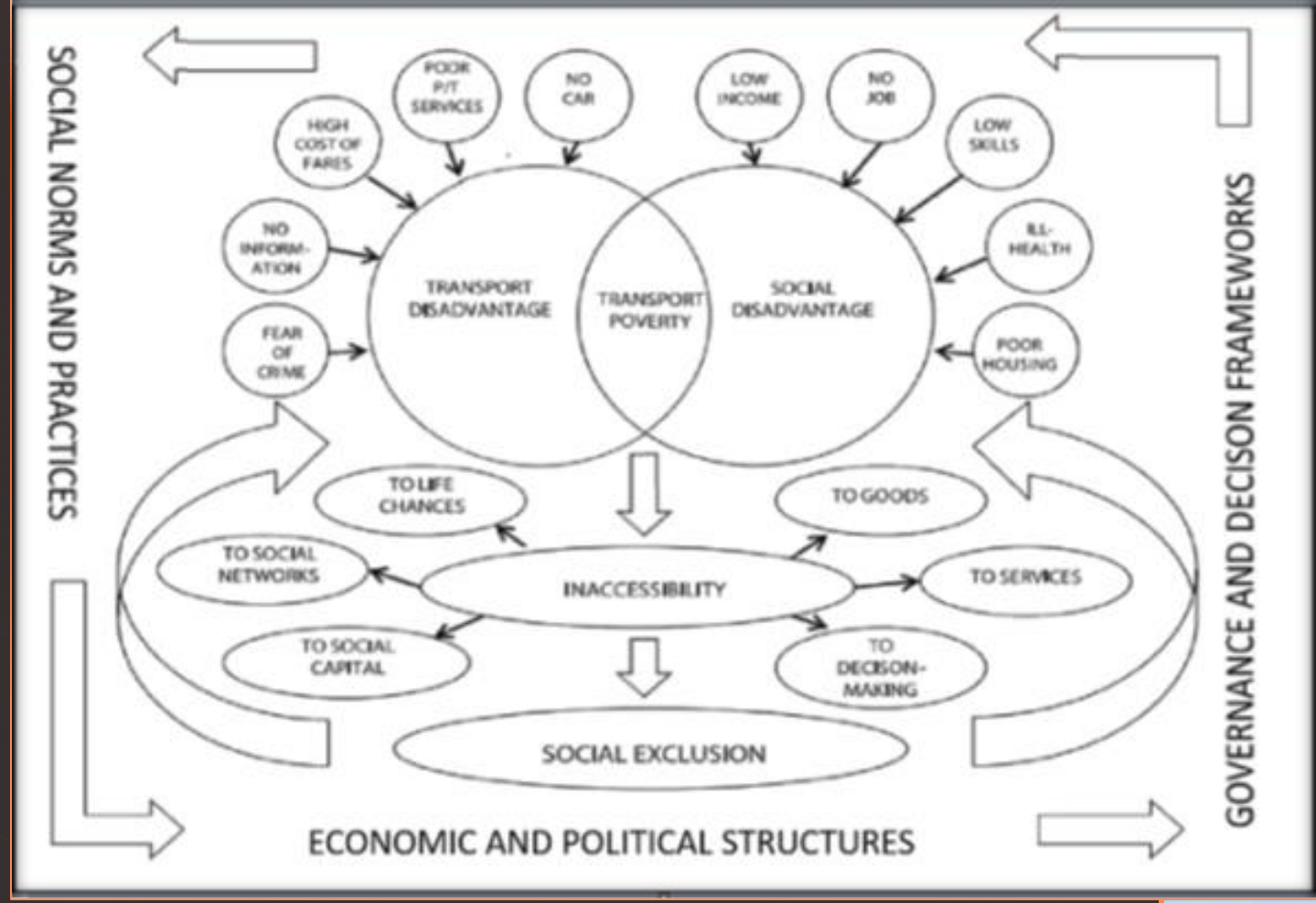
Mobility : individual's capacity to be able to go anywhere at any time and their freedom to do so(Flamm and Kaufmann, 2006) is (conceived as a basic freedom that will increase their social integration and wellbeing) (Banister, 2018)
Freedom to move around freely is "intrinsic as well as instrumental freedom"(Sen, 1999) .
(in other words, it can be conceived as a functioning and a capability)
“is not only the ultimate end of development; it is also a crucially effective means.” (Sen, 1999)



Public Transport Accessibility & Transport Poverty

Transport poverty
(Lucas et al., 2016):
An individual is transport poor if, at least one of the following conditions apply:

- There is literally no transport option available that is suited to the individual's physical condition and capabilities.



- The existing transport options do not reach destinations where the individual can fulfil his/her daily activity needs, in order to maintain a reasonable quality of life.
- The necessar[y] … amount spent on transport leaves the household with a [low] residual income … .
- The individual needs to spend an excessive amount of time travelling, leading to time poverty or social isolation.
- The prevailing travel conditions are dangerous, unsafe or unhealthy for the individual.

Our Method and Approach:

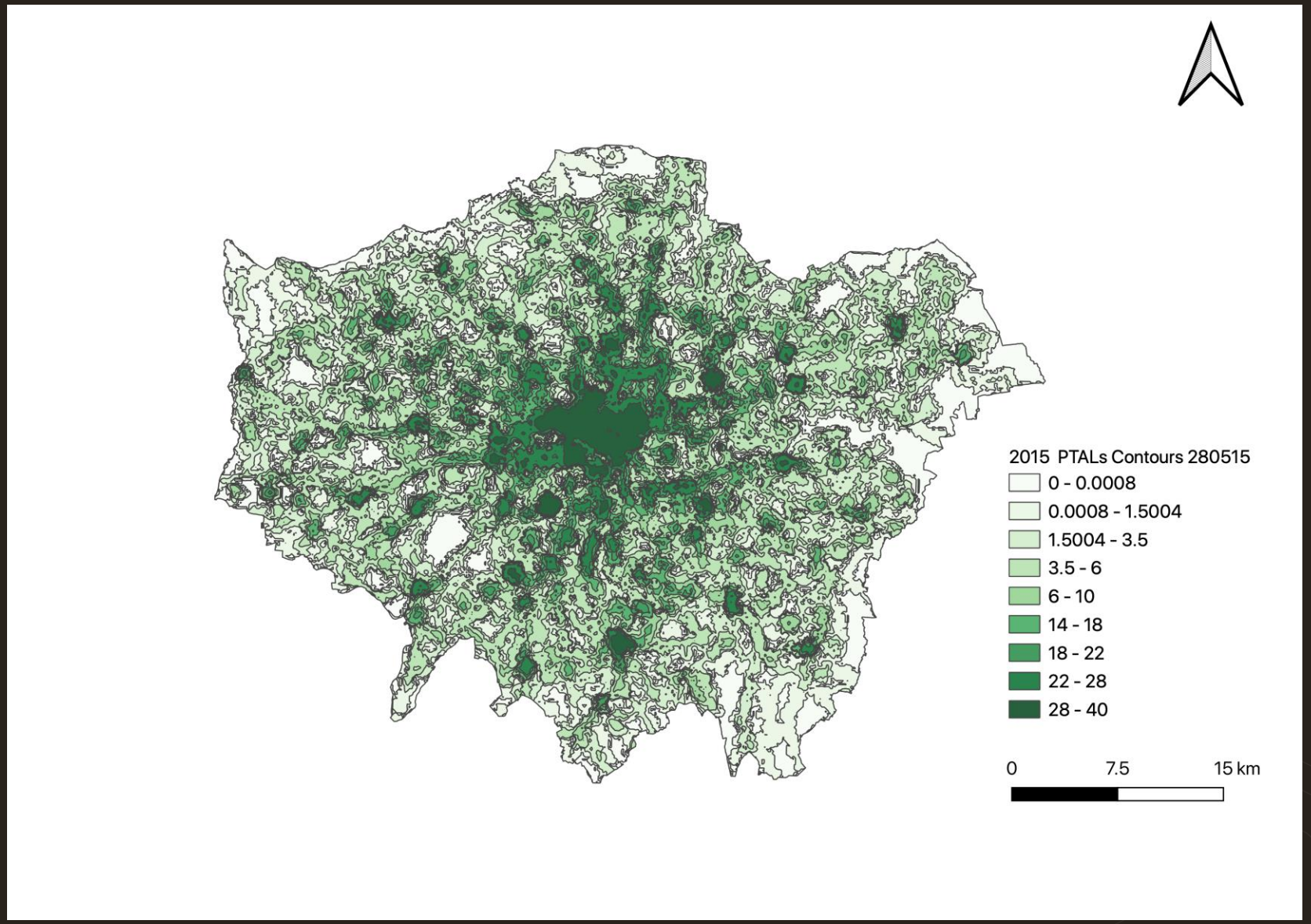
Although Sen's Capabilities appraoch is arguably useful to capture the multidimensional aspect of development and inequality , one limitation is to quantify/measure wellbeing that may be subjective at an individual level.

This is where we go by the normative claims of freedom and capabilities such as mobility, education, health, shelter as multiple indices of wellbeing.

- To assess mobility , we use LSOA-level accessibility scores, and deprivation indices for other indicators of wellbeing.

About our data

- Transport for London Public Transport Accessibility Levels
  - A metric developed by the Borough of Hammersmith and Fulham to determine allowed levels of parking, later expanded to all of London
  - Generates an Access Index summed across all modes, converted to the categoric index known as PTAL
  - How well connected is any 100m grid square in London?
    - We use data aggregated to Lower Super Output Levels - statistical areas with populations of 1500 on average
  - Data is the most recent version available, published in 2015
    - Some changes ahead, but none since 2015
- We are using the Access Index! (higher => more accessible)


2015 PTALs Contours 280515
0 - 0.0008
0.0008 - 1.5004
1.5004 - 3.5
3.5 - 6
6 - 10
14 - 18
18 - 22
22 - 28
28 - 40
0
7.5
15 km

About our data

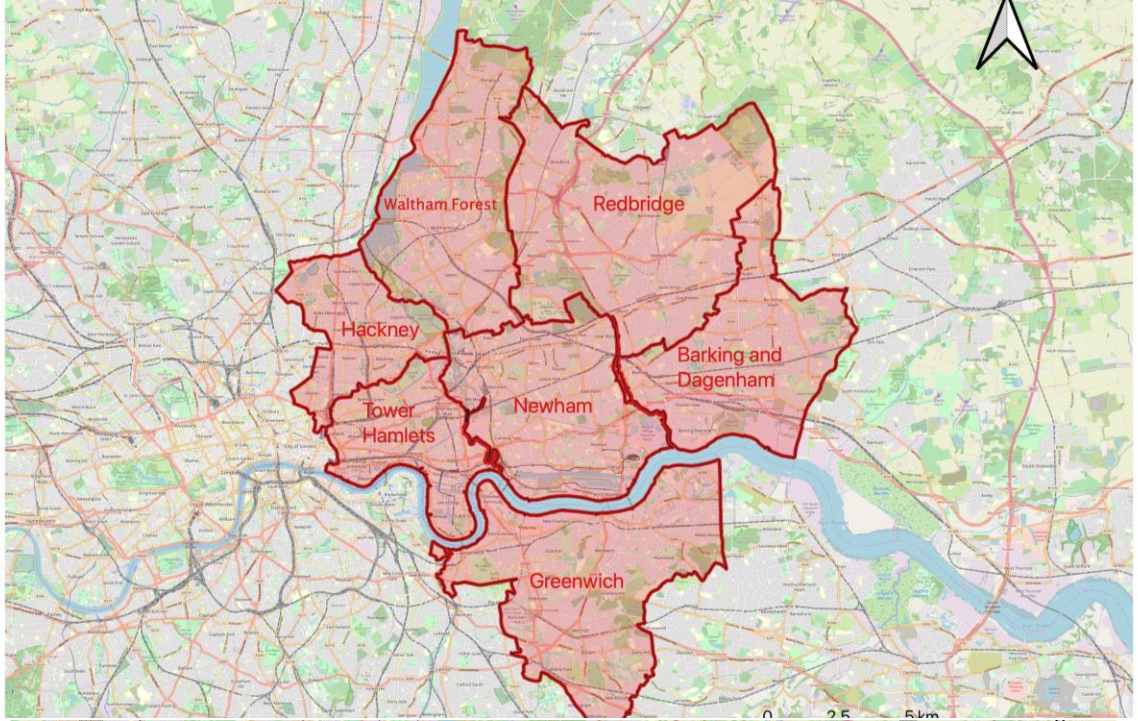
- Indices of Multiple Deprivation (2019)
  - England-wide indicators of deprivation (crime, health, education, access to public services etc.) are weighted to create a single score for deprivation
  - Ranking may be more useful for interpretations
- Household Income Estimates for Small Areas (2012/13)
  - Data on incomes in these areas is difficult to obtain outside of census data
  - Published by the Greater London Authority, less likely to be available elsewhere

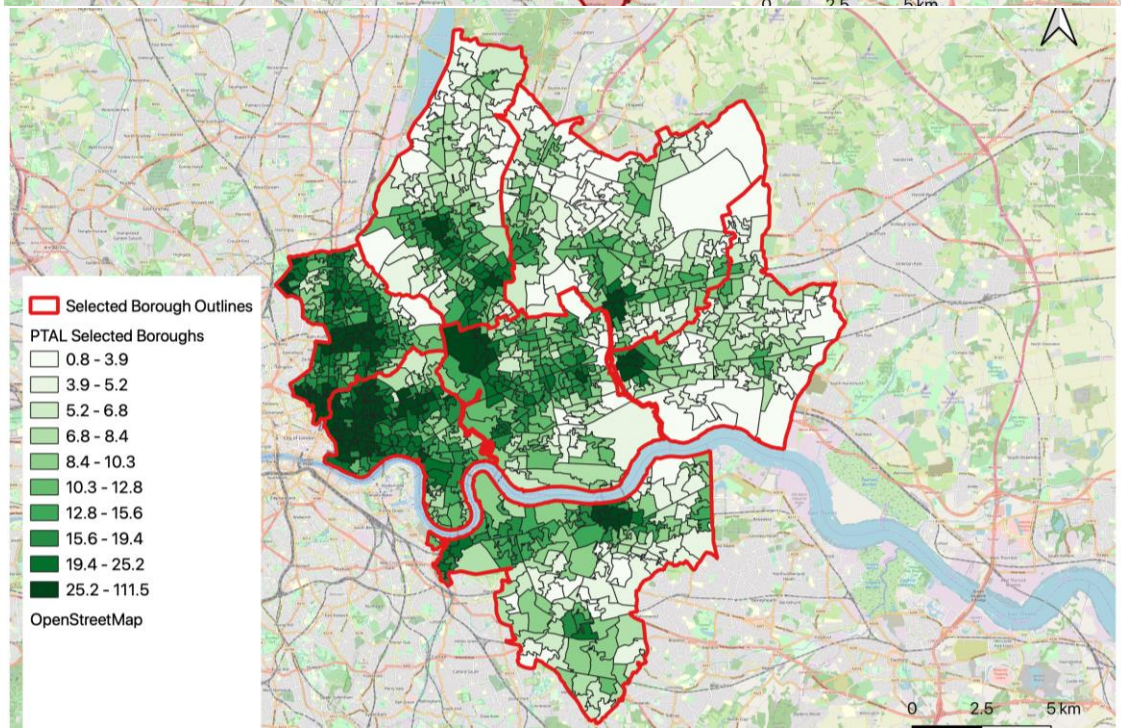
About our data

- LSOA Atlas (2014)
  - A wide range of demographic data for each LSOA, including but not limited to
    - Age structure
    - Ethnic origin
    - House prices
    - Education levels
    - Benefit claimants

Newham and surroundings

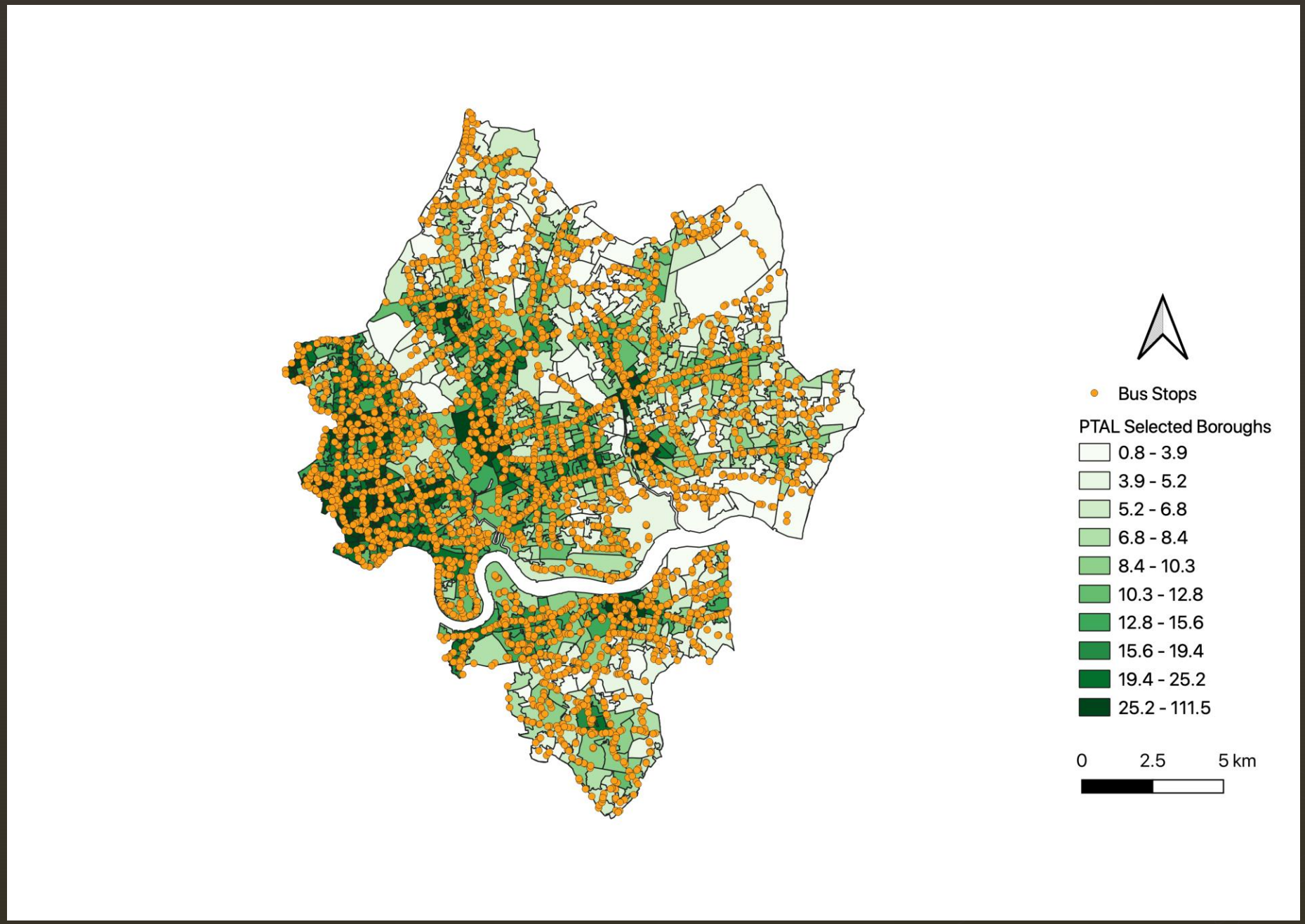
- Rapid investment in public transport as part of regeneration ahead of London 2012 Olympic Games
- New shopping centres and continued redevelopment of Stratford into a hub for East London
- Newham
  - London's 3rd most populated borough
  - 3rd highest in public transport modal share
  - 29 TfL stations





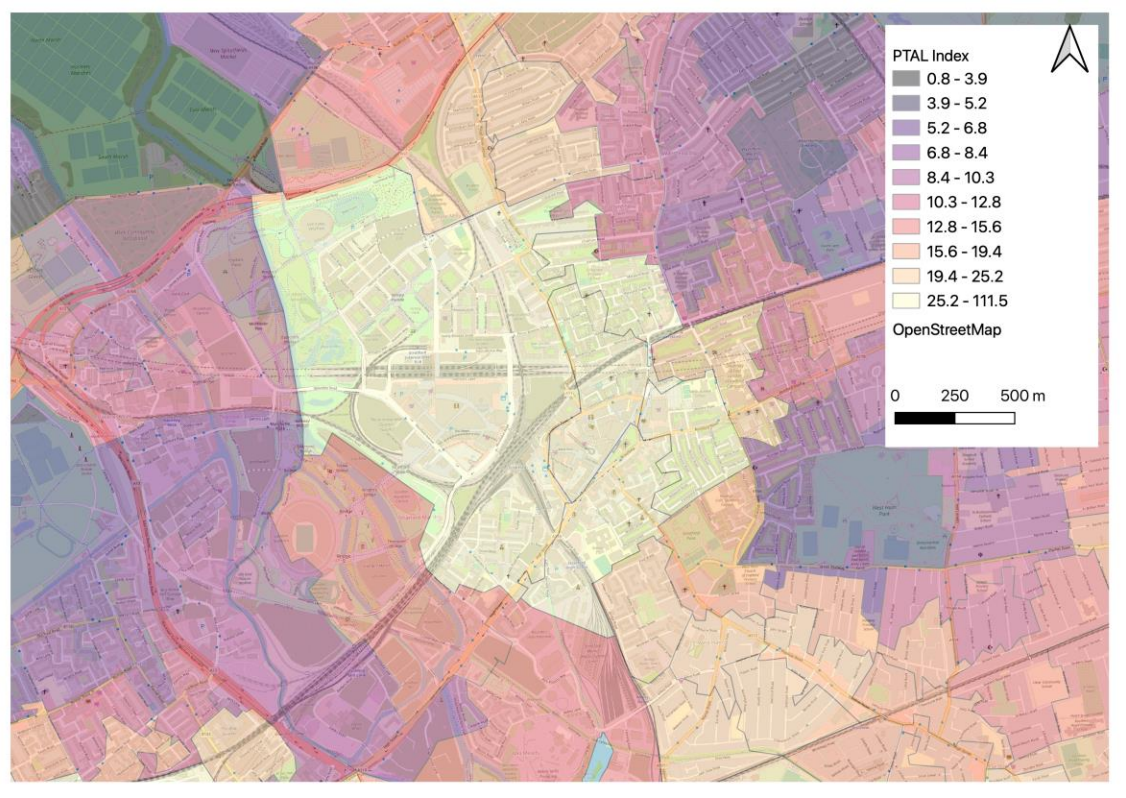
Initial Analysis

- Newham as a whole is too small for our analysis- so we also use its neighbours, stretching over 15km across
- Greenwich is on the other side of the river!
- Easy to identify local hubs here

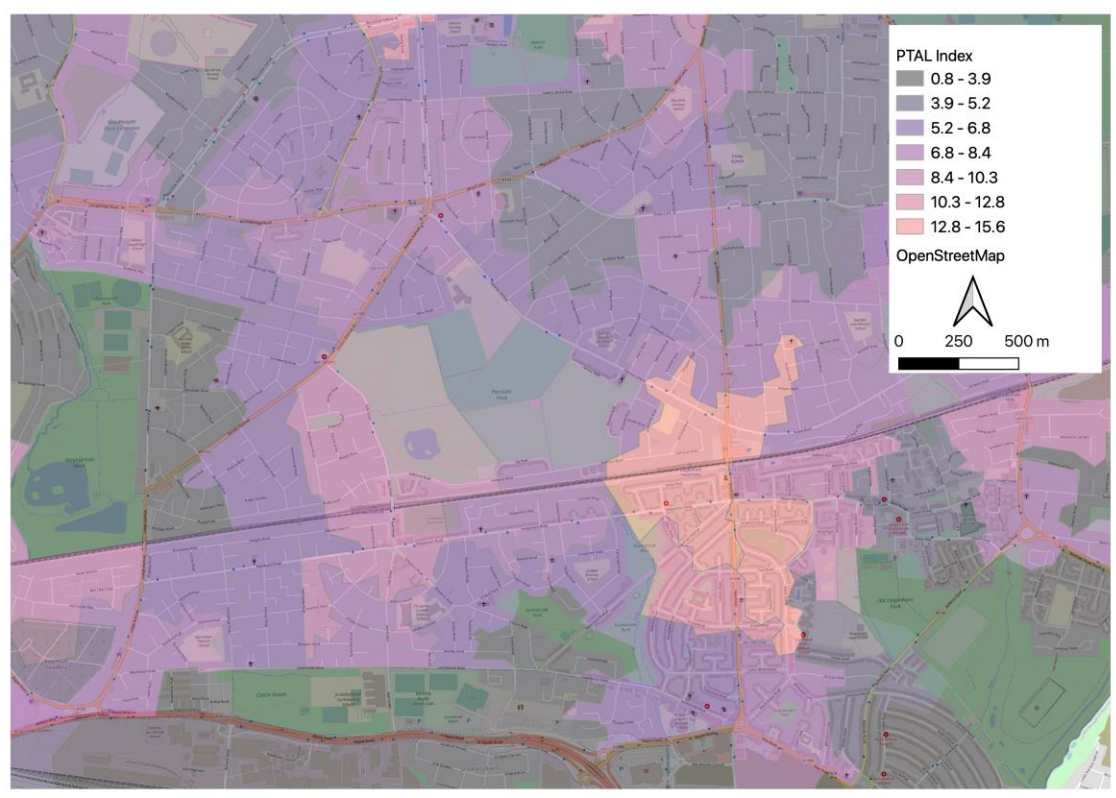

Bus Stops
PTAL Selected Boroughs
0.8 - 3.9
3.9 - 5.2
5.2 - 6.8
6.8 - 8.4
8.4 - 10.3
10.3 - 12.8
12.8 - 15.6
15.6 - 19.4
19.4 - 25.2
25.2 - 111.5
0
2.5
5 km

A closer look at two areas

Stratford

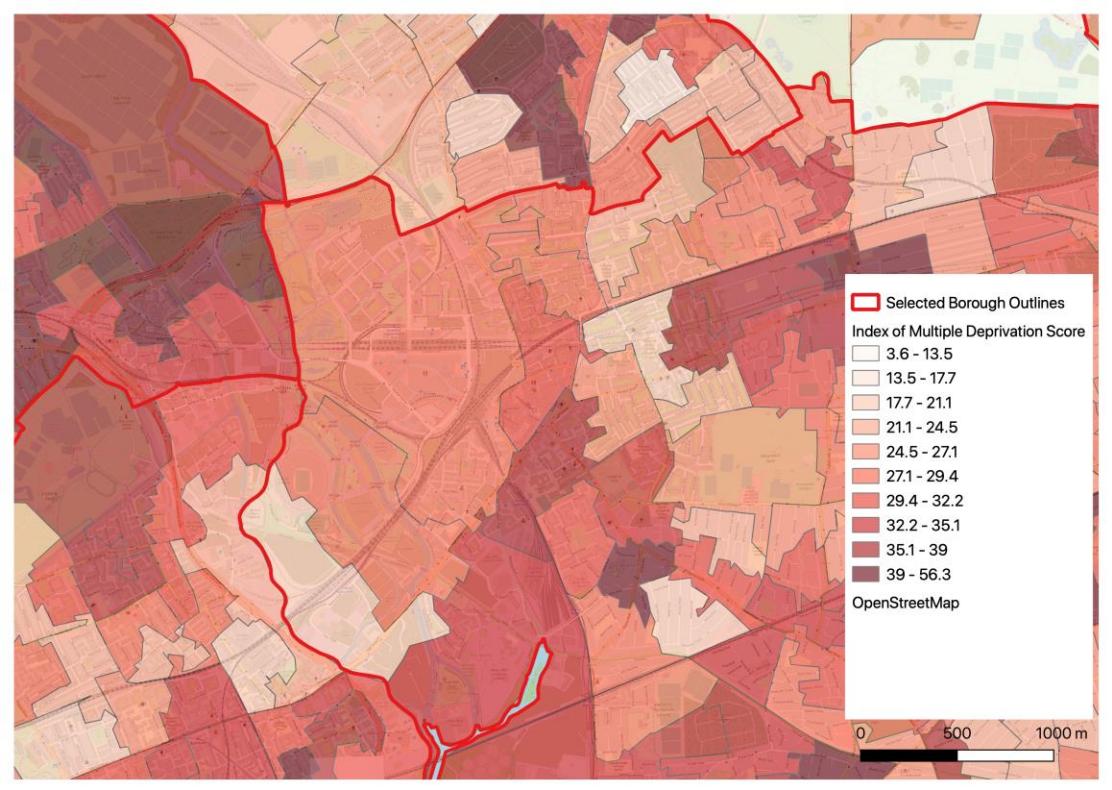


Dagenham and Becontree

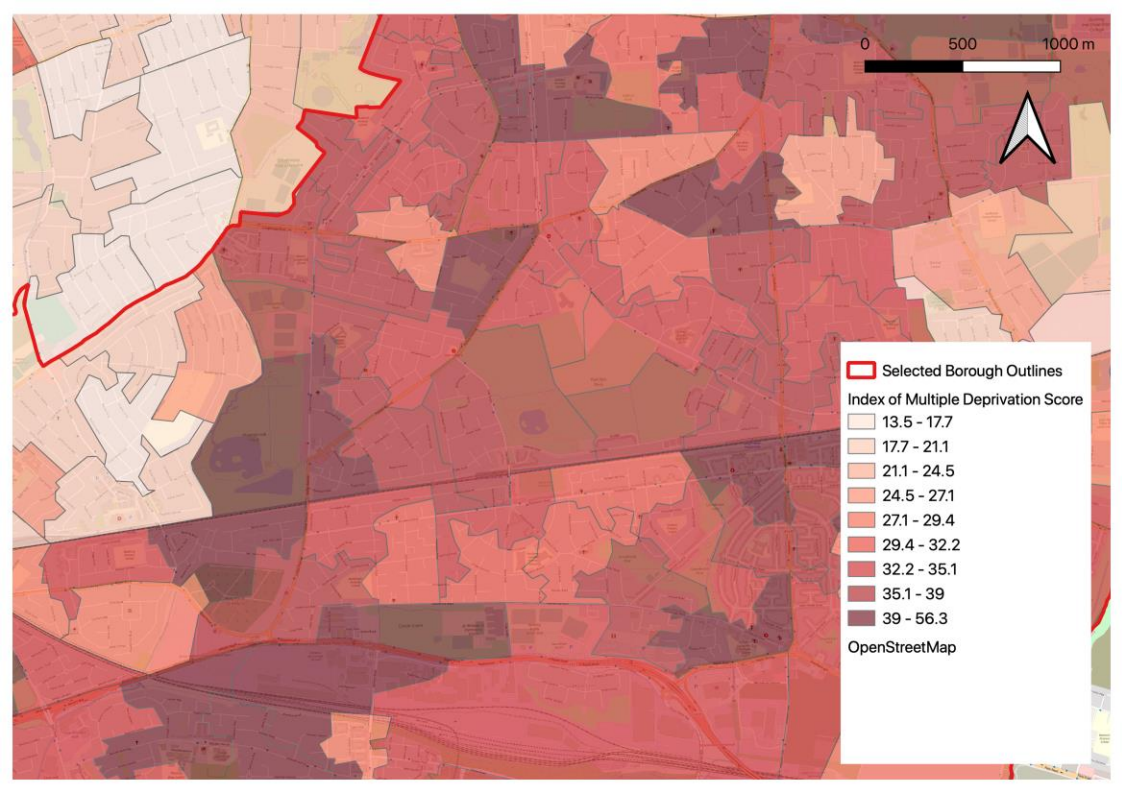


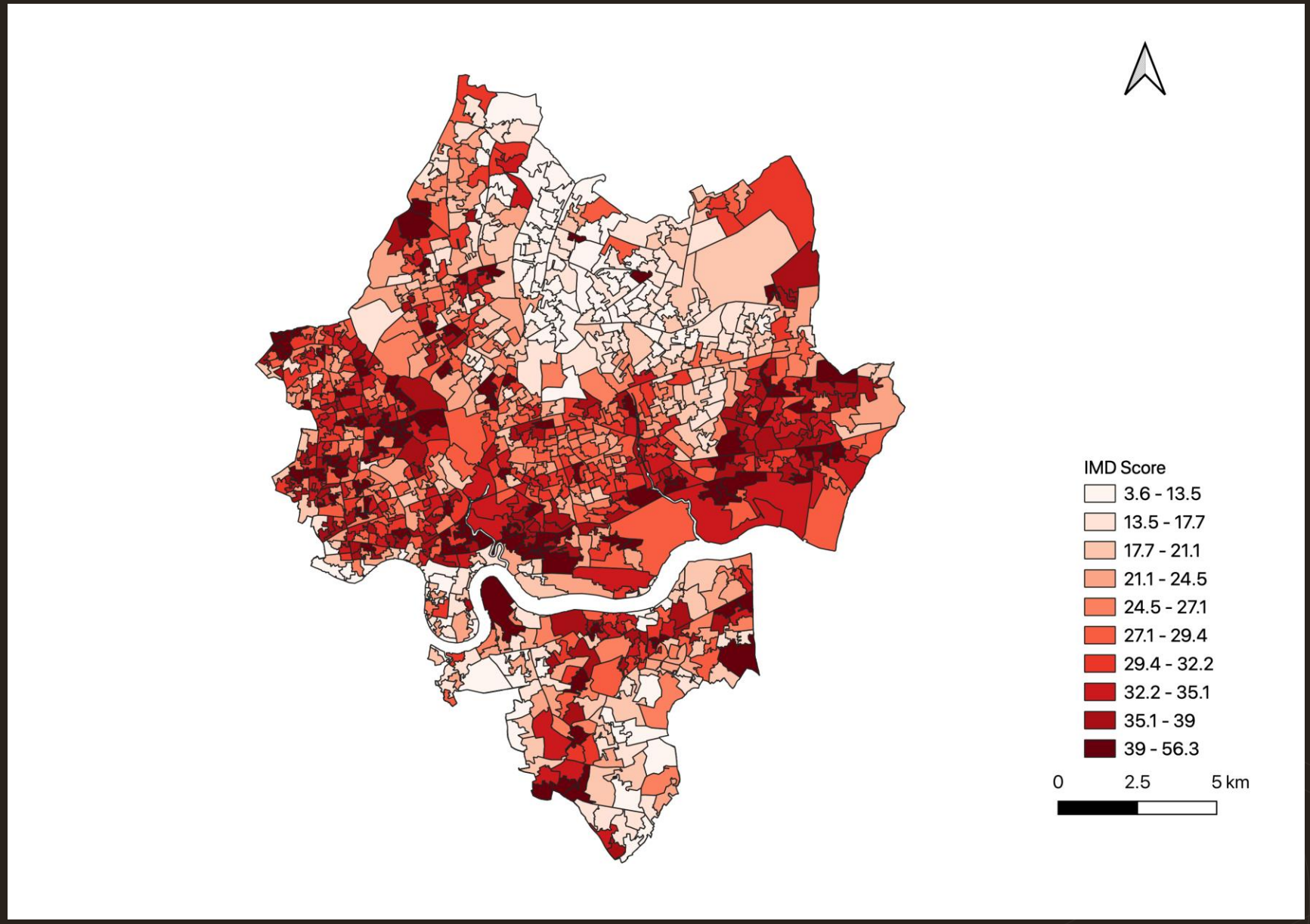
A closer look at two areas

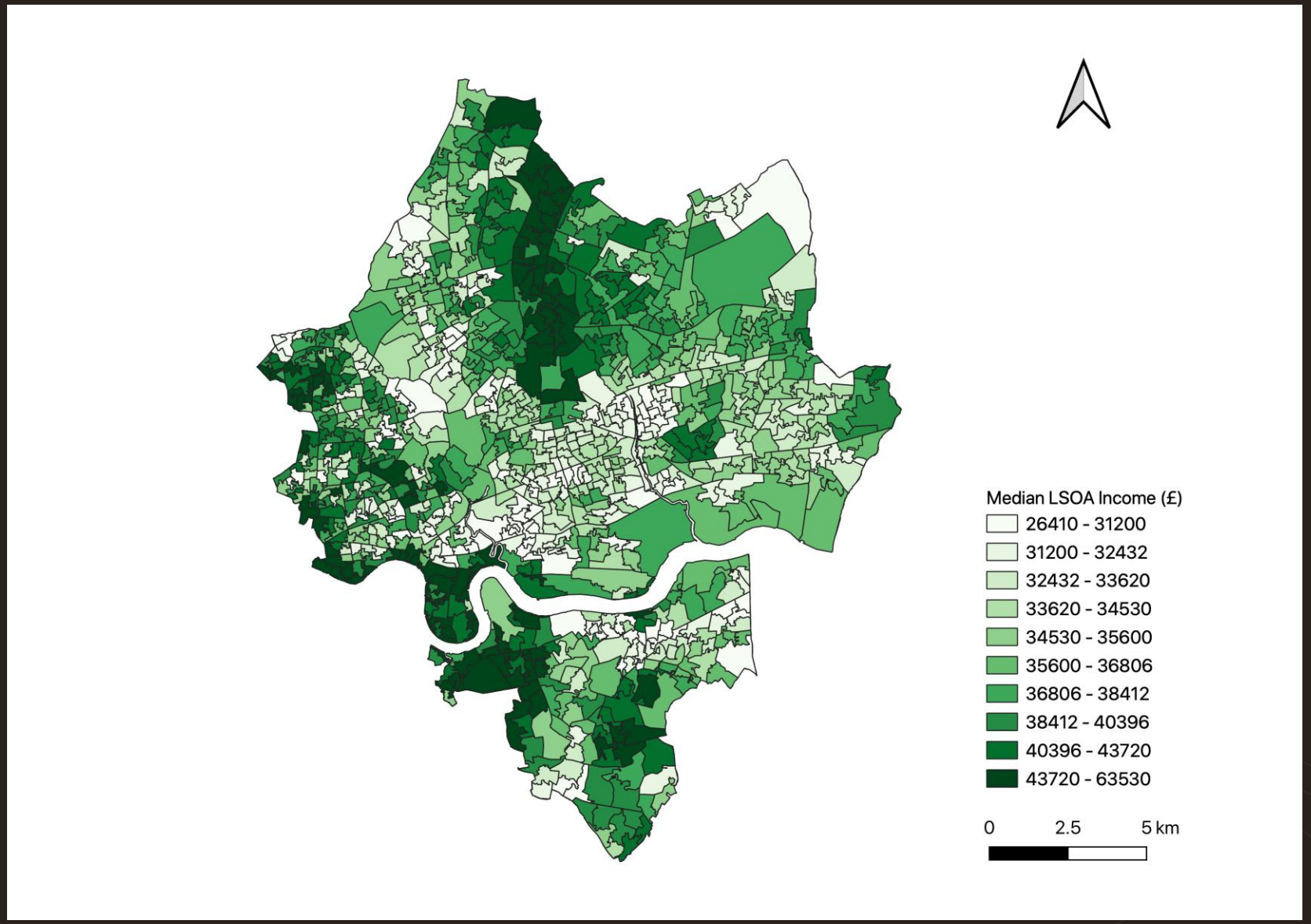
Stratford

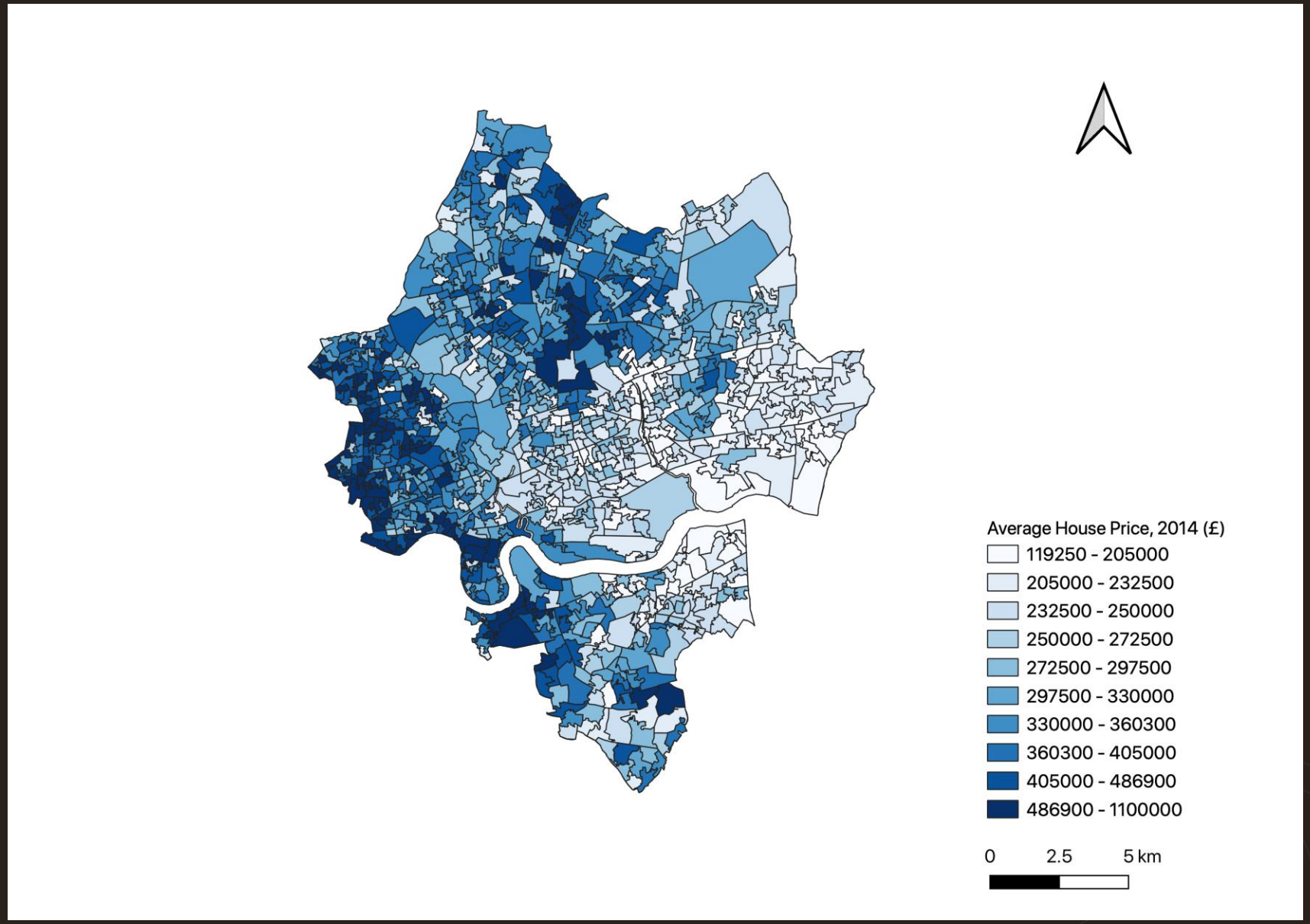


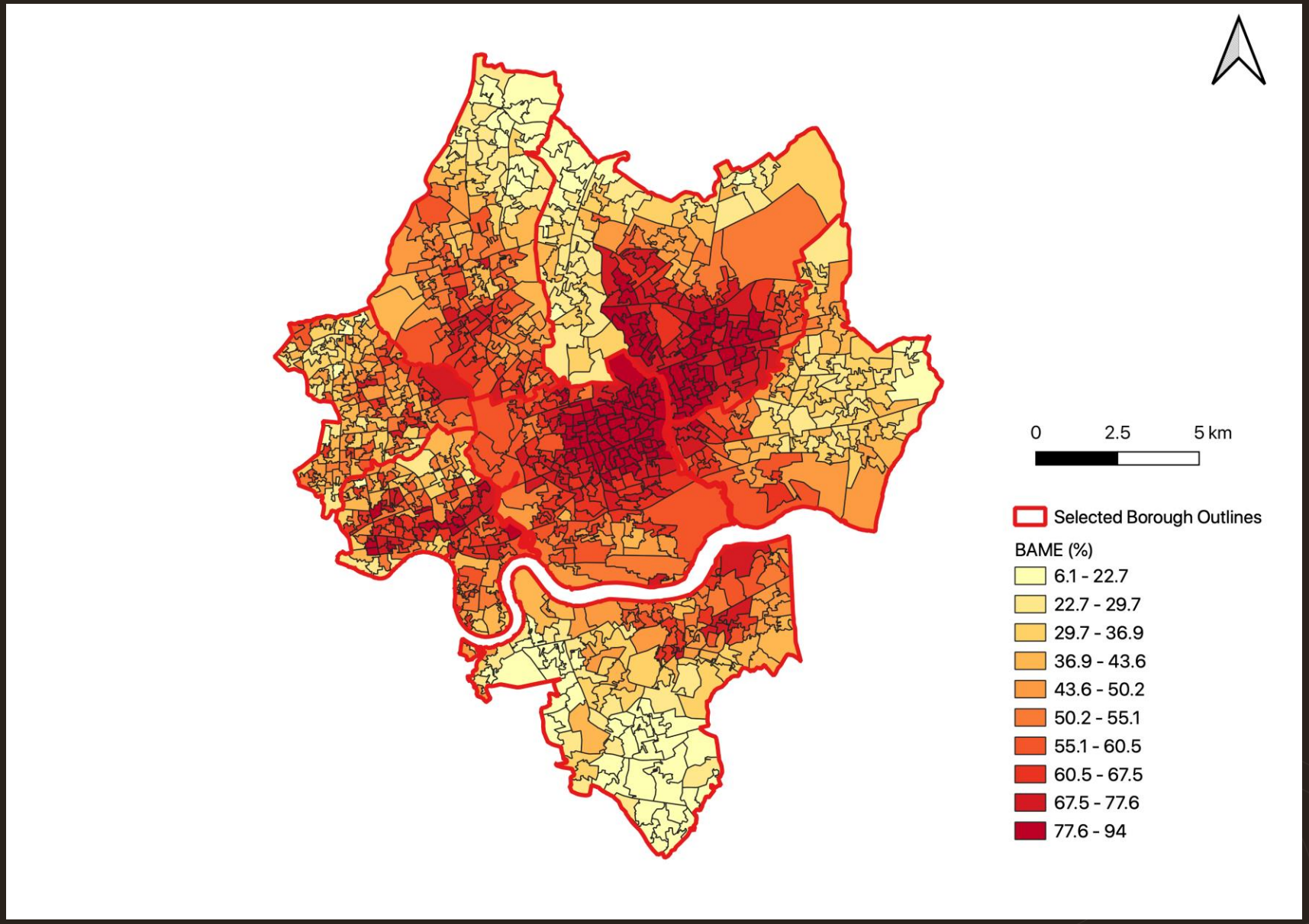
Dagenham and Becontree

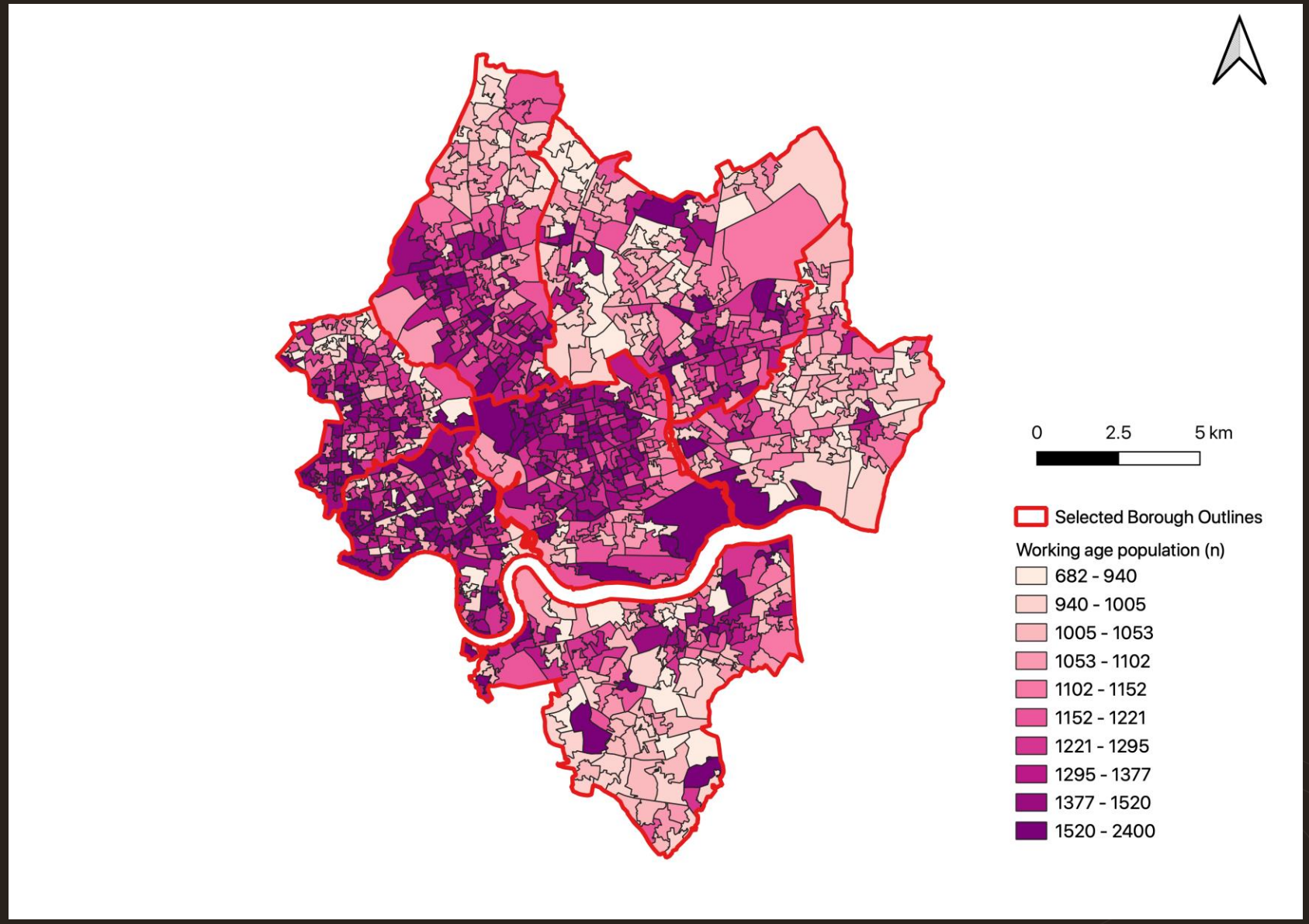



IMD Score
3.6 - 13.5
13.5 - 17.7
17.7 - 21.1
21.1 - 24.5
24.5 - 27.1
27.1 - 29.4
29.4 - 32.2
32.2 - 35.1
35.1 - 39
39 - 56.3
0
2.5
5 km


Median LSOA Income (£)
26410 - 31200
31200 - 32432
32432 - 33620
33620 - 34530
34530 - 35600
35600 - 36806
36806 - 38412
38412 - 40396
40396 - 43720
43720 - 63530
0
2.5
5 km

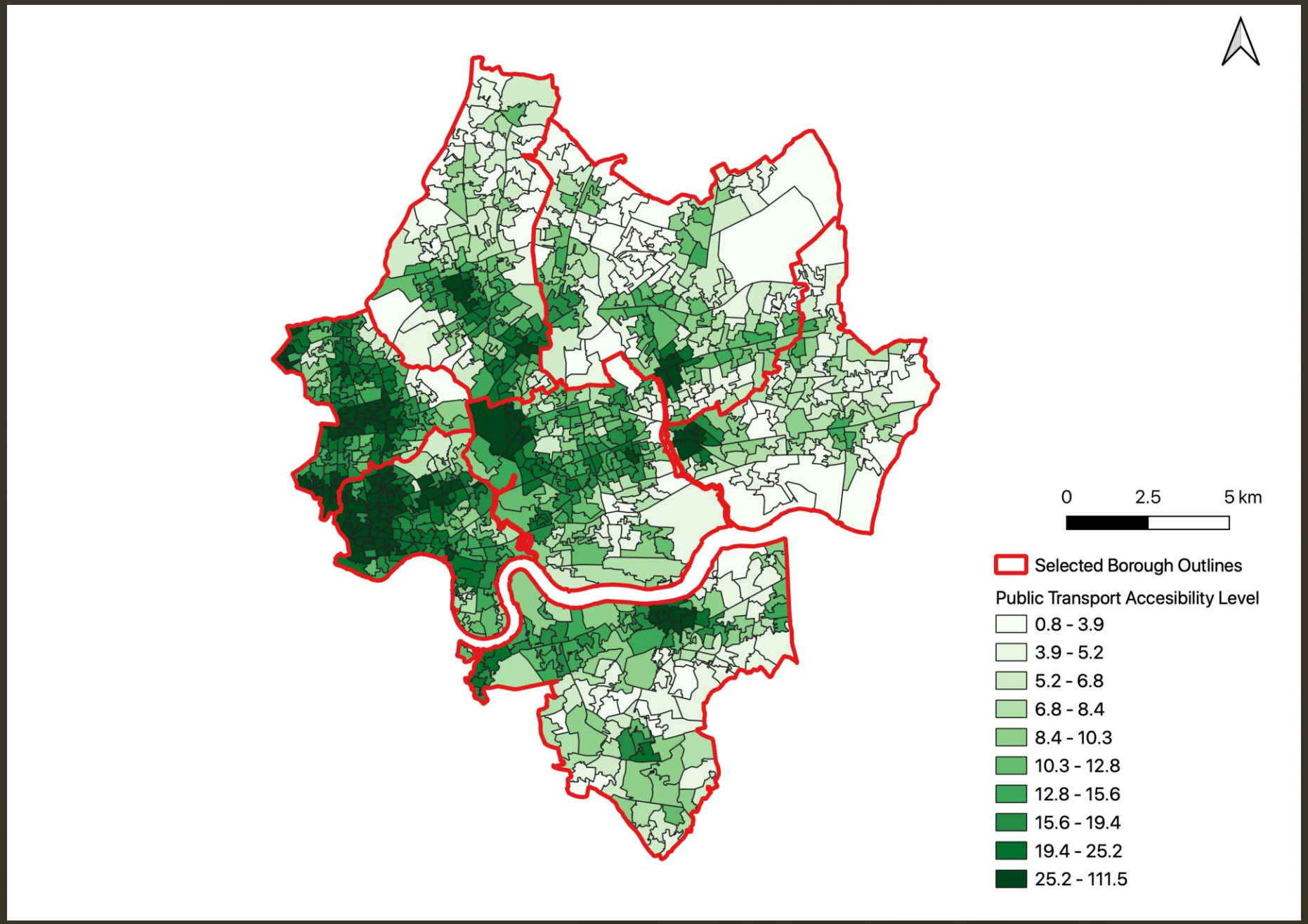

Average House Price, 2014 (£)
119250 - 205000
205000 - 232500
232500 - 250000
250000 - 272500
272500 - 297500
297500 - 330000
330000 - 360300
360300 - 405000
405000 - 486900
486900 - 1100000
0
2.5
5 km


0
2.5
5 km
Selected Borough Outlines
BAME (%)
6.1 - 22.7
22.7 - 29.7
29.7 - 36.9
36.9 - 43.6
43.6 - 50.2
50.2 - 55.1
55.1 - 60.5
60.5 - 67.5
67.5 - 77.6
77.6 - 94


0
2.5
5 km
Selected Borough Outlines
Working age population (n)
682 - 940
940 - 1005
1005 - 1053
1053 - 1102
1102 - 1152
1152 - 1221
1221 - 1295
1295 - 1377
1377 - 1520
1520 - 2400

Initial Analysis

- Inconclusive!
- Tower Hamlets may have the highest levels of accessibility and house prices, but also some of the lowest incomes, which contrasts with many of the other boroughs in the study
- The inclusion of Greenwich does not seem to have had any influence on the analysis
- Further statistical spatial analysis may well help
- There's no obvious patterns to identify here, apart from one


0
2.5
5 km
Selected Borough Outlines
Public Transport Accesibility Level
0.8 - 3.9
3.9 - 5.2
5.2 - 6.8
6.8 - 8.4
8.4 - 10.3
10.3 - 12.8
12.8 - 15.6
15.6 - 19.4
19.4 - 25.2
25.2 - 111.5

The Redbridge Problem

- Each one of our indicators shows one entire borough that simply isn't like the rest – Redbridge
  - Higher house prices, higher median incomes, lower levels of deprivation, especially in the Lea Valley
- Yet it appears to have similar levels of accessibility to those boroughs at similar distances from Central London
- More factors at work that we should be considering?
  - Who makes decisions on transport
  - Public spending
  - The self-reinforcing nature of deprivation
  - Rates of public transport use

Statistical Analysis

Well-Being

Statistical/Spatial Analysis- PTAL with deprivation (IMD)

Normal Stats

- Correlation: 0.1655

Stats with spatial component

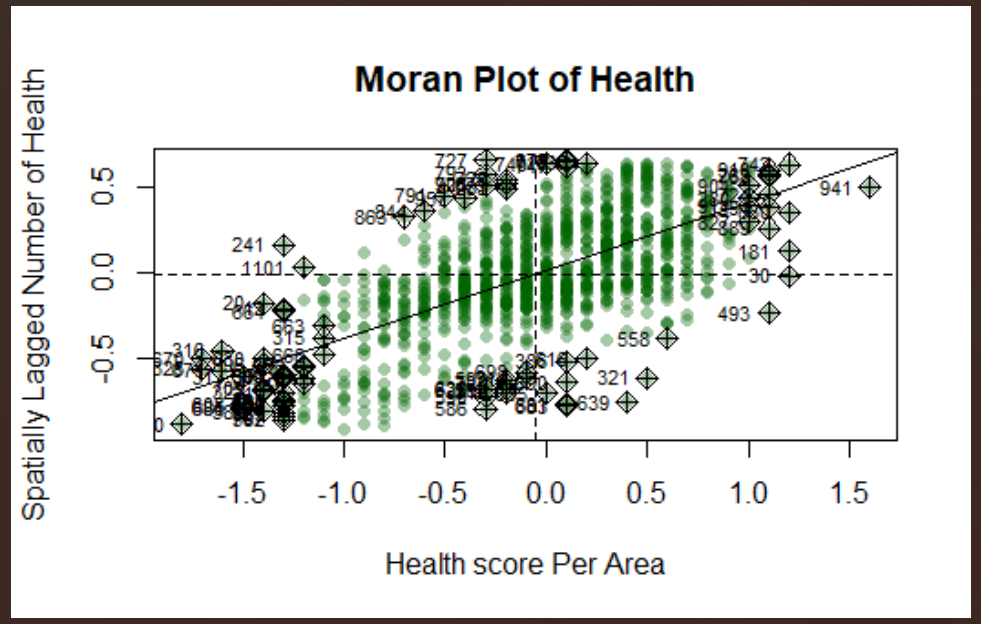
- Moran's I: 0.3083798102
- *Spatial Regression model*

IMD coefficient: 0.0285752

Statistical/Spatial Analysis- PTAL with health

Normal Stats

- Correlation: 0.2405

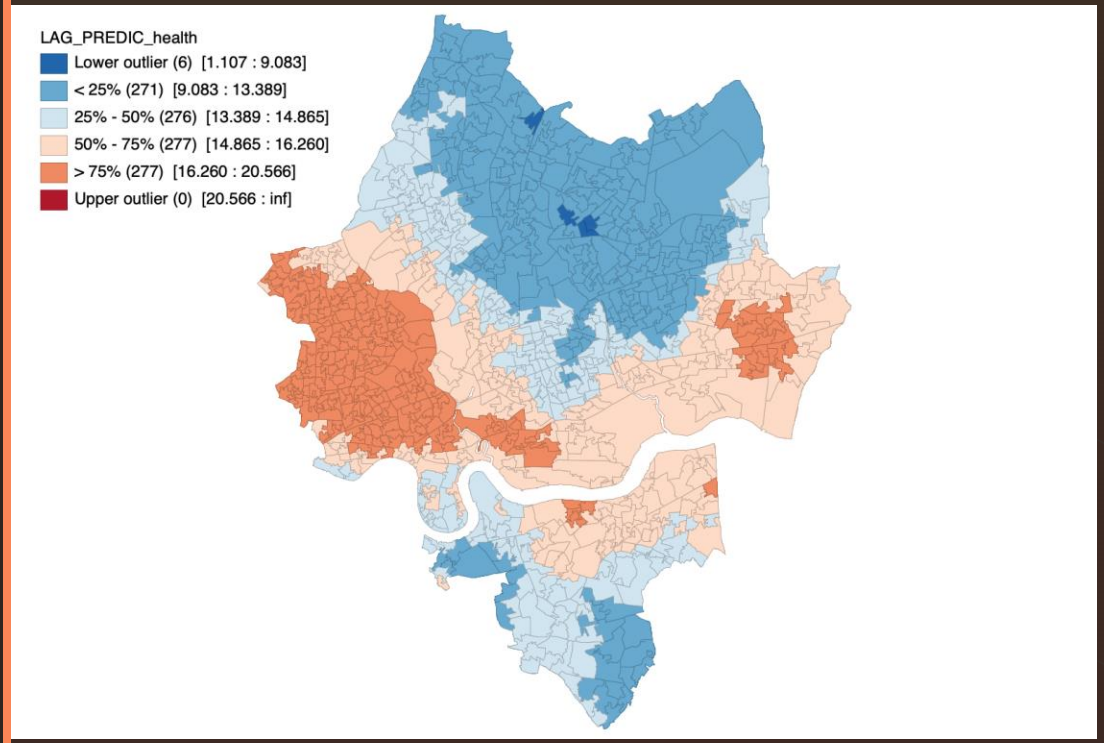


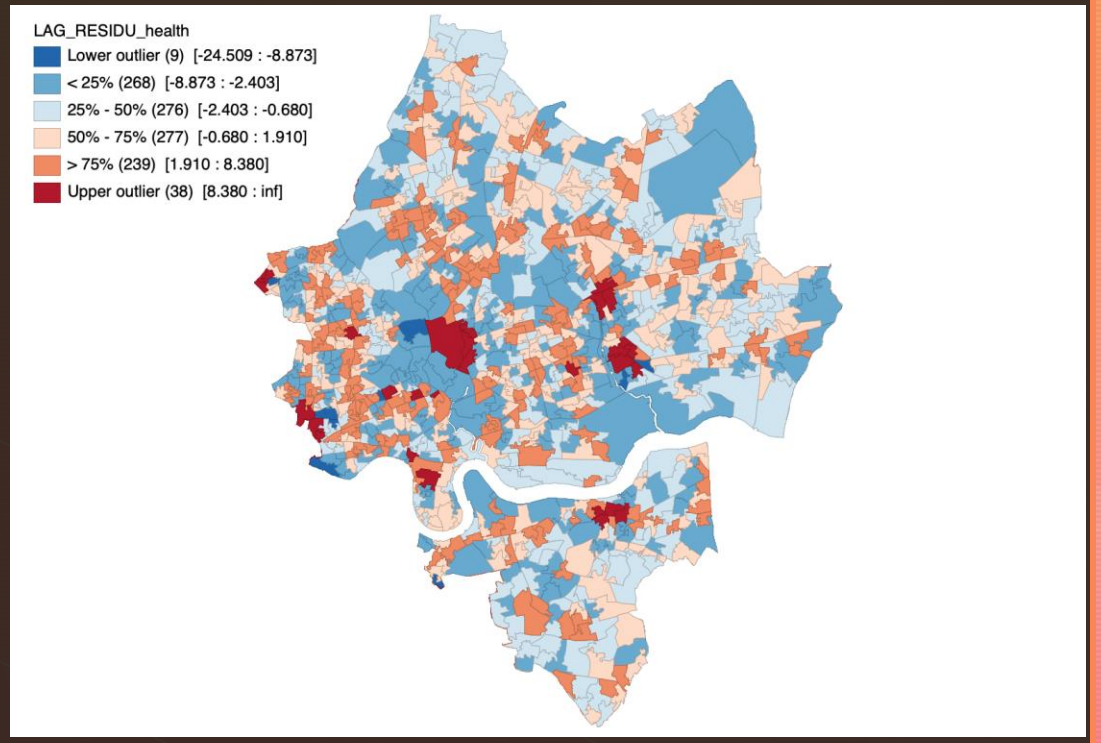
Stats with spatial component

- Moran's I: 4.032510e-1
- *Spatial Regression model*

Health coefficient: 0.514455

Closer look at health





Statistical/Spatial Analysis- PTAL with education, skills & training

Normal Stats

- Correlation: -0.1772

Stats with spatial component

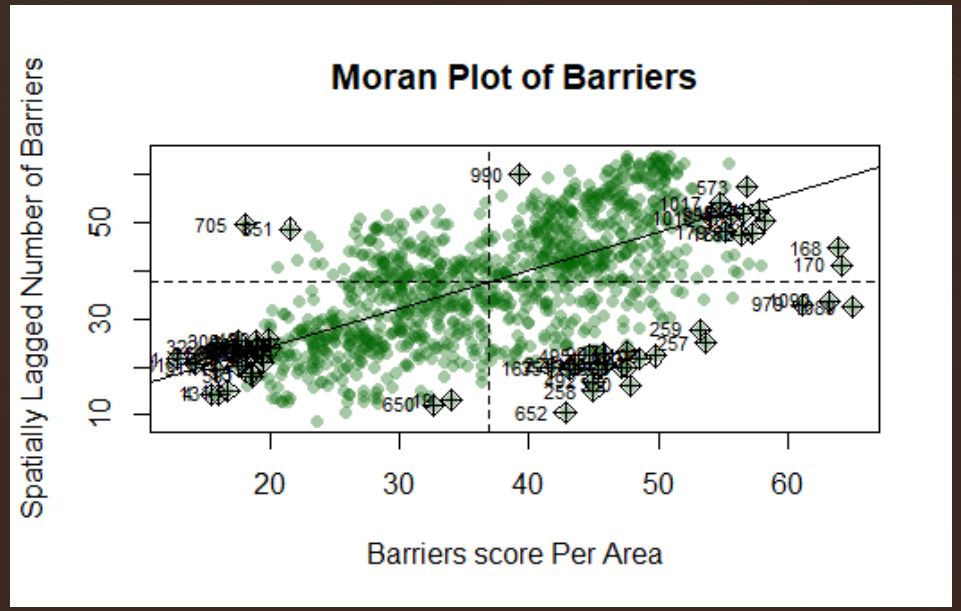
- Moran's I: 2.465767e-1
- *Spatial Regression model*

Edu, skills, & training coefficient: -0.0410766

Statistical/Spatial Analysis- PTAL with barriers to housing

Normal Stats

- Correlation: 0.6811

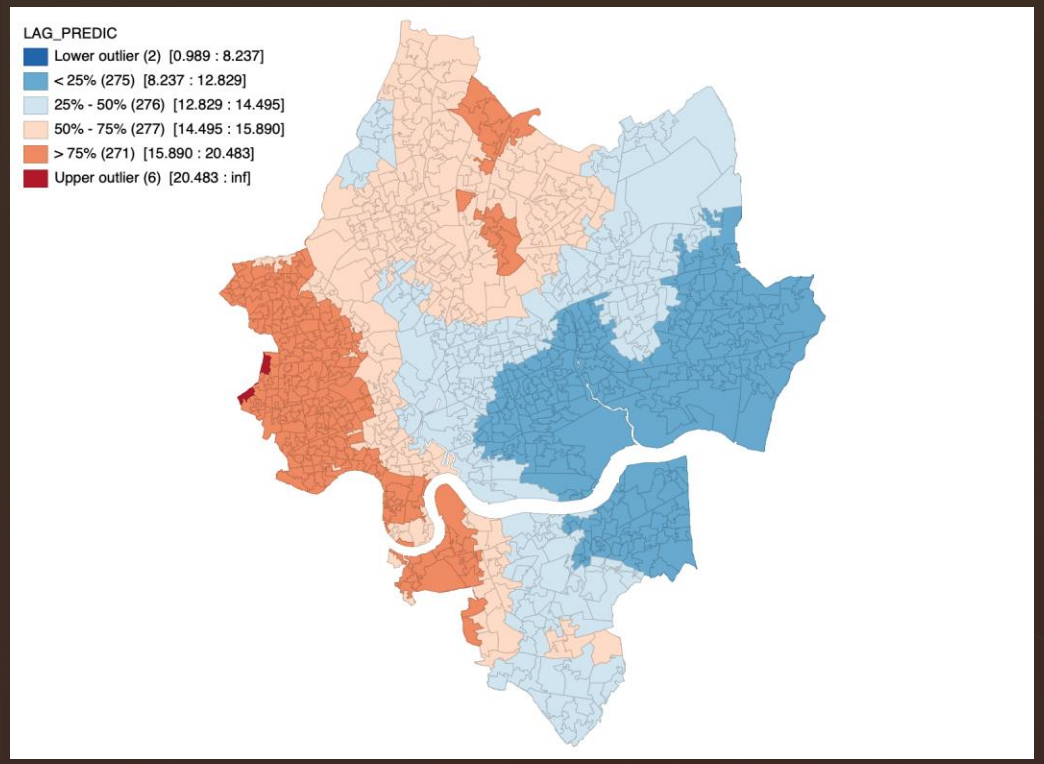


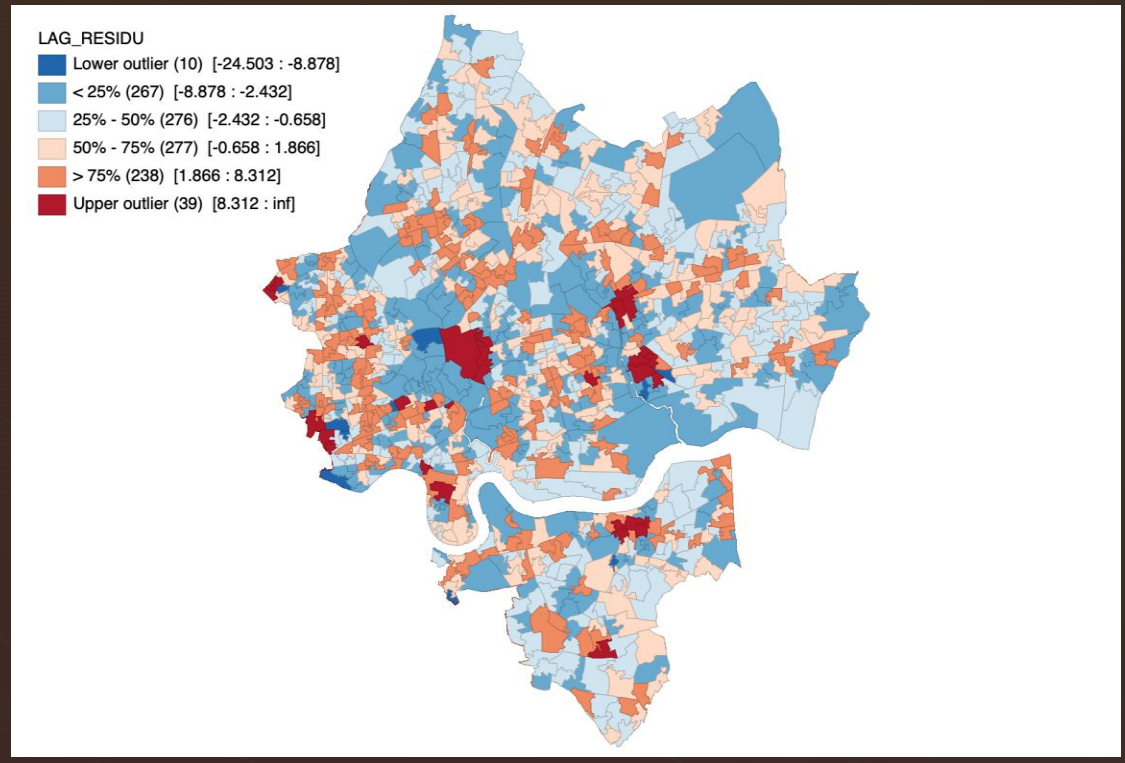
Stats with spatial component

- Moran's I: 5.283758e-1
- *Spatial Regression model*

Barriers to housing coefficient: 1.87415e-06

Closer look at barriers to housing





Statistical Analysis

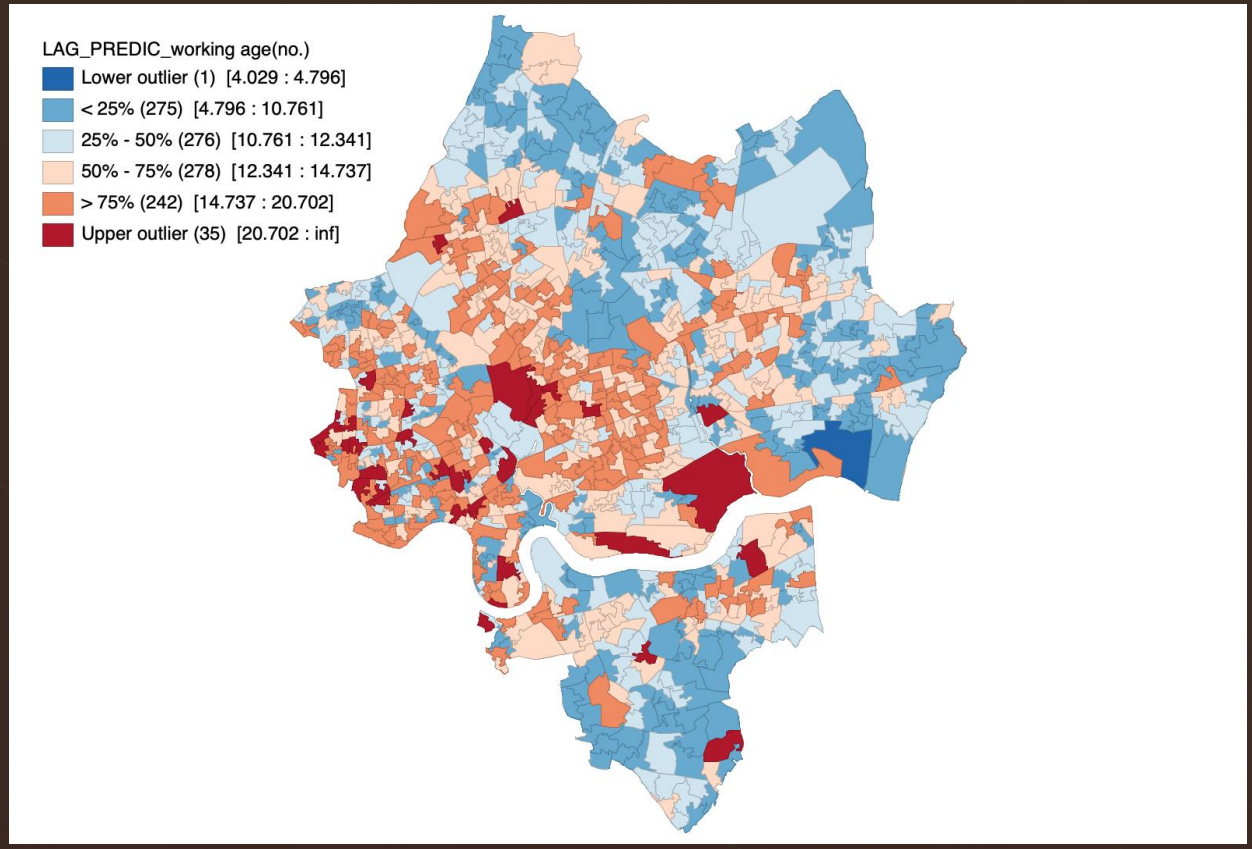
Demographic factors

Working Age

Stats

- Correlation: 0.3234
- *Spatial Regression model*

Working age coefficient: 0.0130591



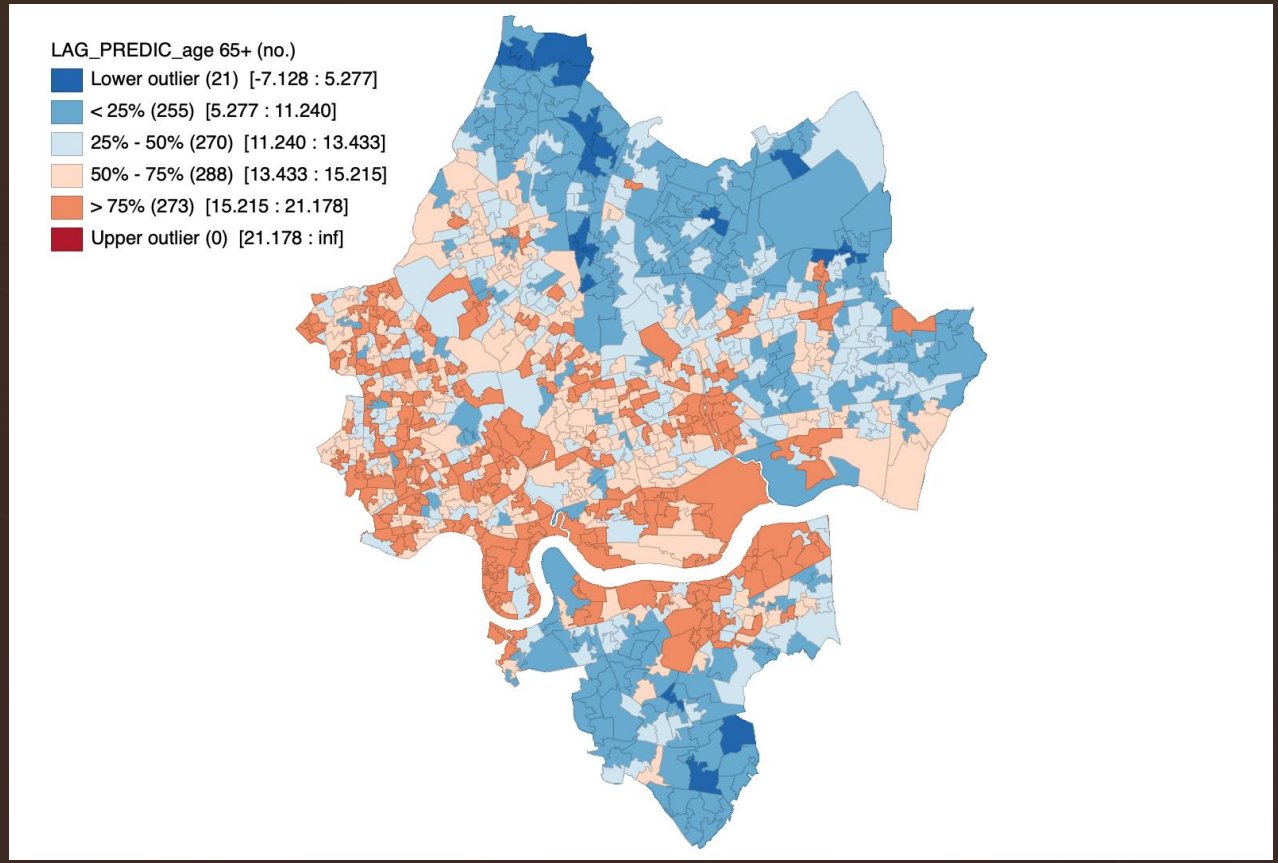
Age 65+

Stats

- Correlation: -0.3212
- *Spatial Regression model*

Age 65+ coefficient:

-0.045692



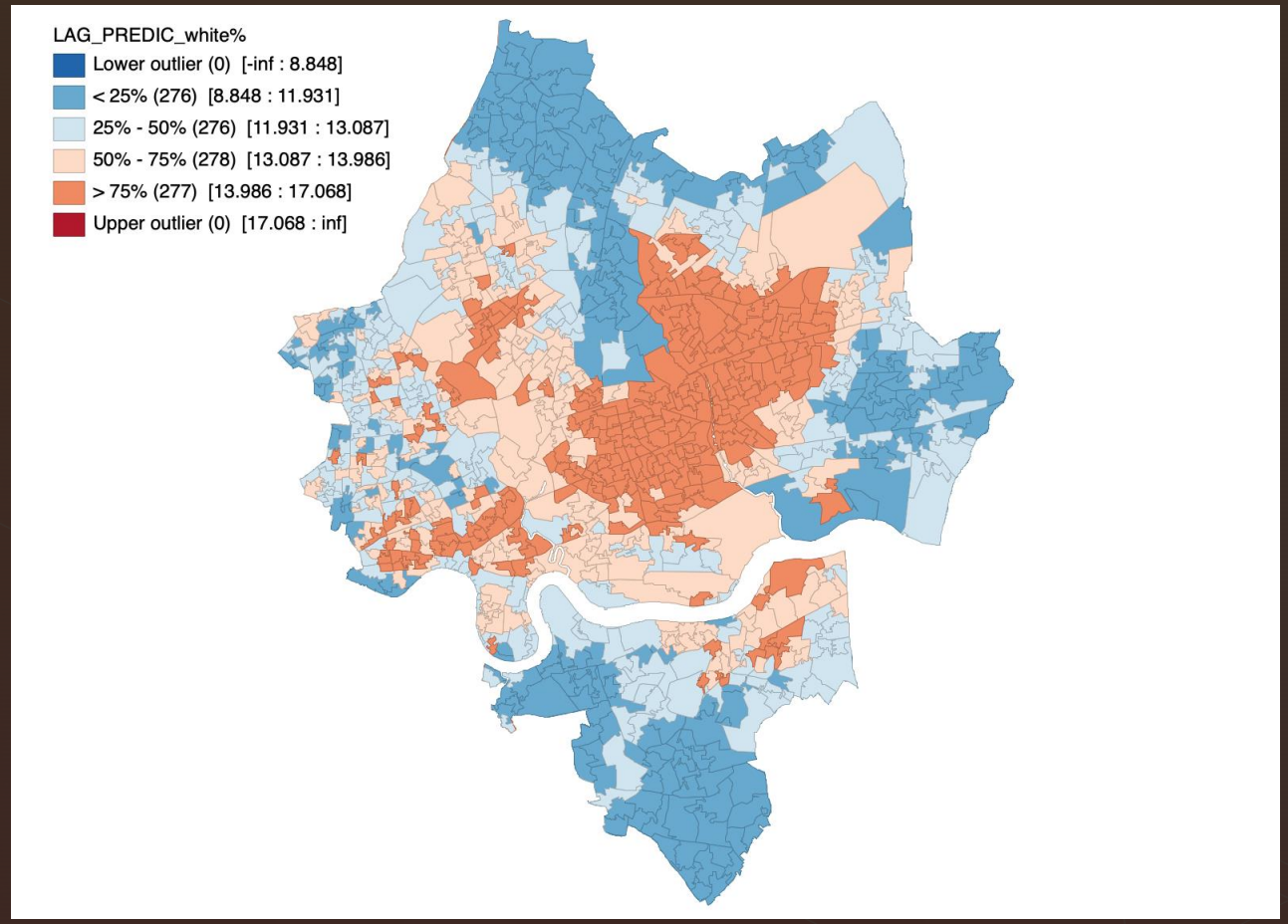
White (%)

Stats

- Correlation: -0.133
- *Spatial Regression model*

White (%) coefficient:

-0.0675956



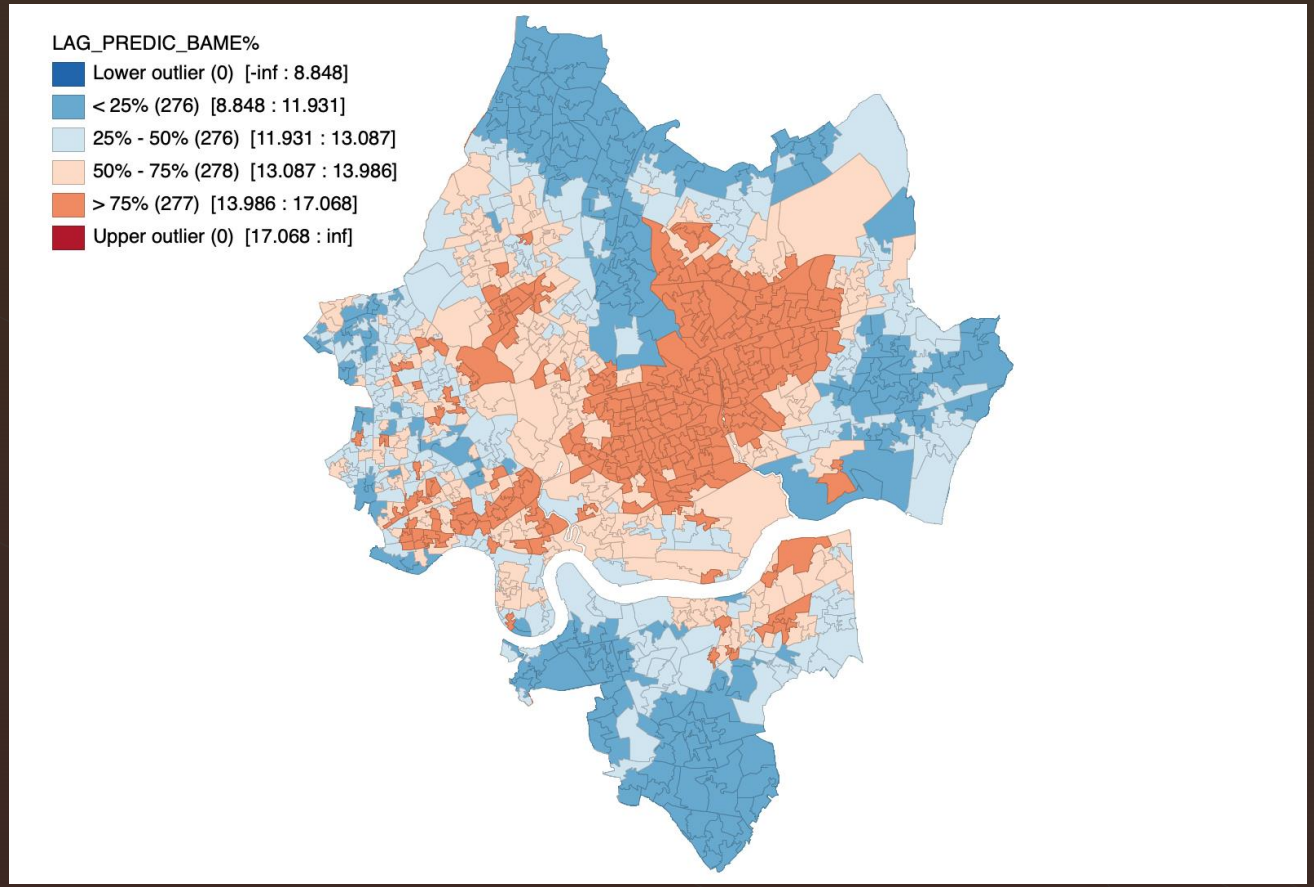
BAME (%)

Stats

- Correlation: 0.1333
- *Spatial Regression model*

BAME (%) coefficient:

0.0675956



Challenges and Limitations

- Aggregating the grid data- overcome by changing source of data
- Imperfections in the data led to inclusion of other boroughs' data- within our boundaries
- Reverse causality and the difficulty of pinning down a relationship
- Temporal differences
- We can't identify the users of public transport – Accessibility does not imply use

Final Insights for on well-being

- strongest correlation among data was between PTAL and Barriers to housing
- noticeable correlations between PTAL with health, education
- stronger relationship between the well-being indices with PTAL near the centre/ closer to the City of London/ River Thames

Final Insights for on demographic factors

- Strong contrast between the correlation of PTAL with working age and the correlation of PTAL with age 65+
- Entirely opposite correlation coefficients for White and BAME
  - White: Positive
  - BAME: Negative
- Strongest relationship [/upper outliers] between PTAL and age actually are in the places with the highest working age populations
- Strongest relationship between PTAL and ethnicity actually are in the places with the highest BAME populations

Conclusion

- The relationship of well-being indicators with PTAL varies spatially
- Different social/ demographic groups also vary with the accessibility to public transport (Banister 2018)
- We need to consider that not all defined correlations represent true links, some correlations might be accidental eg. PTAL with age 65+

Further research?

- Analyze deeper the correlations to find out true links
- Cluster the data using other methods dividing by proper number of clusters (KNN)
- Using machine learning tools to build decision trees, Bayesian theorem and logic regression to find out algorithms of forecasts for PTAL
- Alternative data sources – we rely on an identification assumption of constant modal share
  - A format such as that employed by the National Passenger Survey on UK railways could be an alternative
- Further research using other research methods such as qualitative and mixed methods(as wellbeing is of qualitative nature, there is always a chance of missing out subjective perceptions and experiences of individuals and communities.)

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