

Inequality and Public Transport

The Case of East London

IM913 Group A

[1184 words]

Background, Objective and Research Questions:

Evidence from the literature suggests that there is a link between public transport accessibility and the wellbeing of the people (Gates et al, 2019; Banister, 2018). However, there is still much to be done in terms of research to uncover these links. (Gates et al, 2019; ITF Roundtable Report, 2017). Taking cue from the gaps in the literature, our research sets out to understand the links between public transport and inequality.

Our questions were:

- 1) How does public transport accessibility affect wellbeing?
- 2) Are there any demographic factors that affect the patterns of mobility within social groups?

Our chosen subset of London boroughs of Newham and its neighbours has brought about significant public transport investment as it is the location of the QEII Olympic Park. Figure 1 depicts the wide range of accessibility levels surrounding the Park.

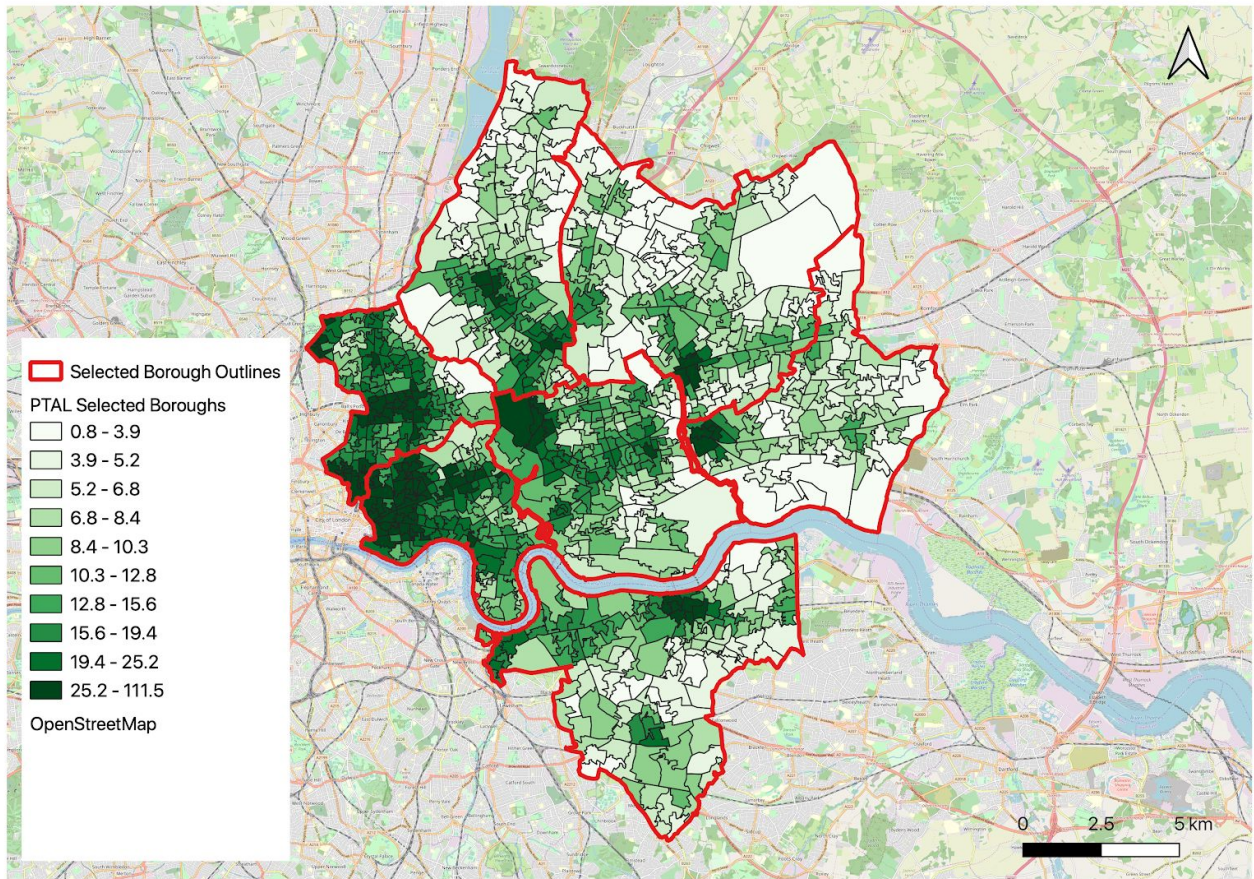


Figure 1

Theoretical Framework

Inequality is often understood in terms of income and wealth distribution in a society, leaving out the multidimensionality of inequality, that may be structural and institutional. To overcome this, we use wellbeing as it focuses on the potential and takes into account non-market factors. (Sen, 1999)

Sen's Capability Approach understands wellbeing as a totality of functionings and capabilities. Mobility is an individual's capacity to go anywhere at any time and their freedom to do so (Flamm and Kaufmann, 2006). This freedom of mobility is also a fundamental freedom for increased social integration and wellbeing (Banister, 2018). Freedom of mobility, for Sen, maybe (Sen, 1999) both a functioning and a capability.

While Sen's Capabilities approach is arguably useful to capture the multidimensional aspect of development and inequality, one limitation is the quantification/measurement wellbeing that may be subjective. To work around this issue, we go by the normative claims of freedom and capabilities such as mobility, education, health, shelter as multiple indices of wellbeing.

Data and Methodology

The PTAL: The Public Transport Accessibility Level (PTAL) is a metric produced by Transport for London. The Access Index, a quantitative metric, is used for our analysis, where higher values indicate greater accessibility, factoring in service frequency and waiting times. The latest scores (2015) are used at the Lower Super Output Area (LSOA) level.

Our Data: Given our theoretical framework, we use data from the Indices of Multiple Deprivation(IMD) (2019), the Household Income Estimates for Small Areas (2012/13), and the LSOA Atlas (2014)on median household income, mean house price, demographic information, and the individual components of the IMD.

Approach to GIS: Initial analysis is performed using QGIS, before statistical analysis using spatial regression in GeoDa and spatial correlation in R.

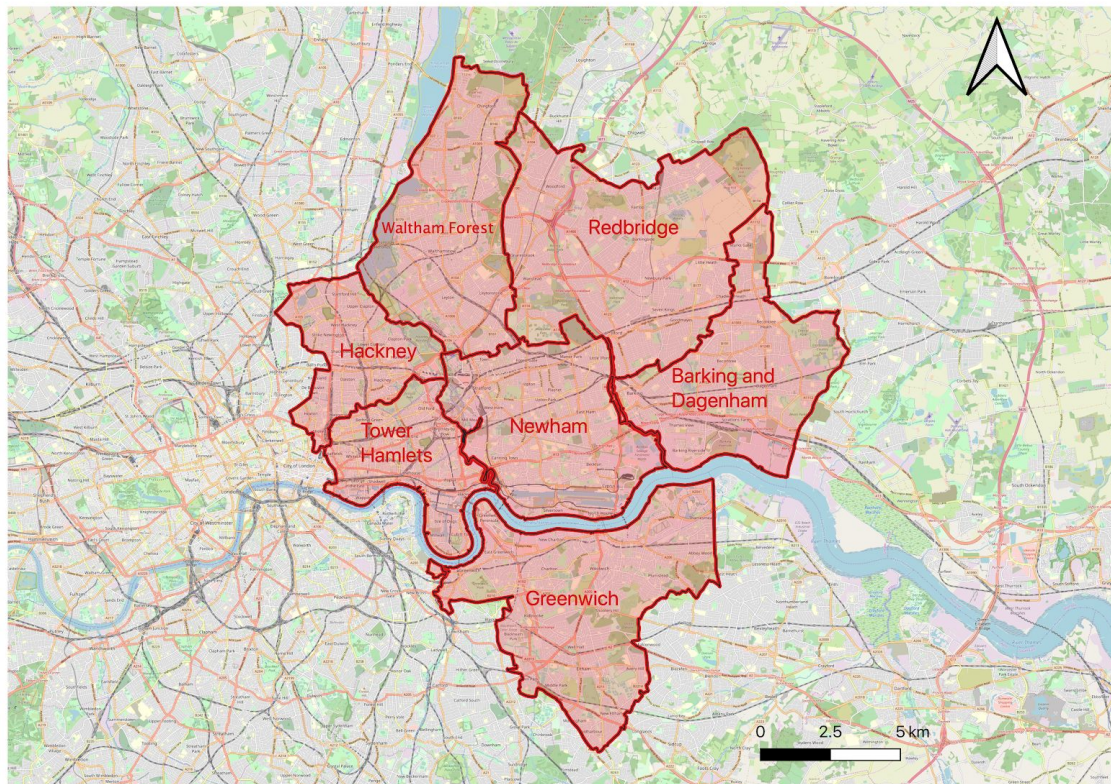


Figure 2a

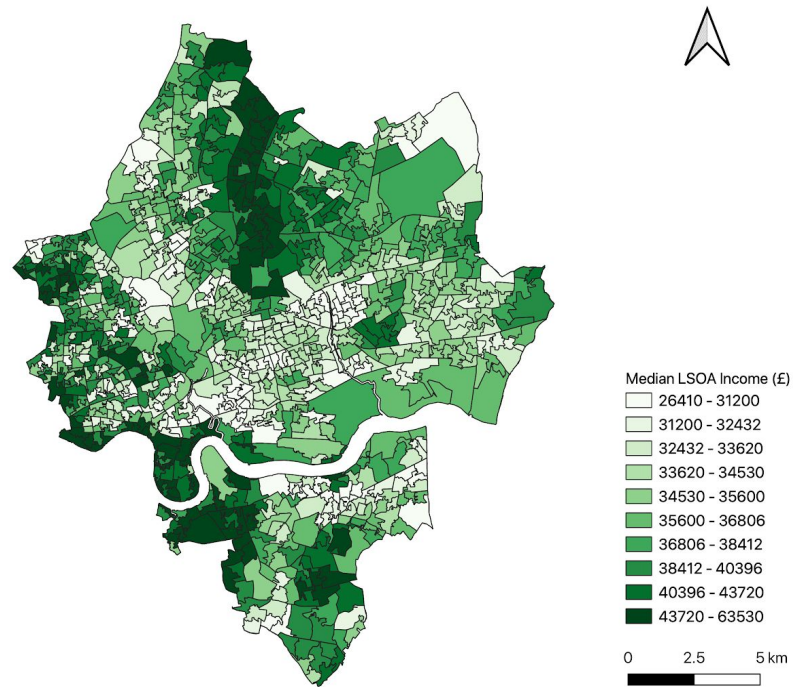


Figure 2b

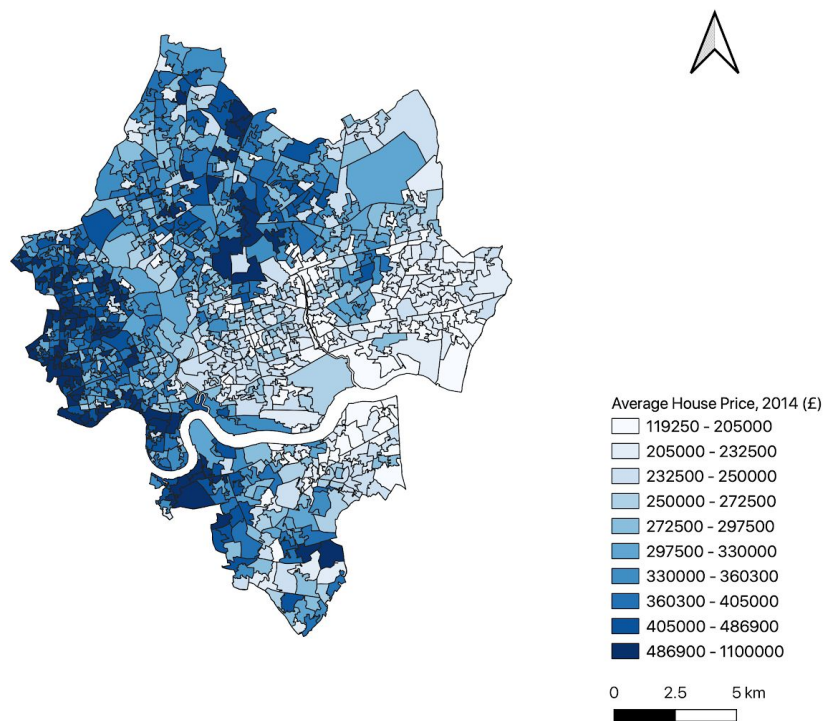


Figure 2c

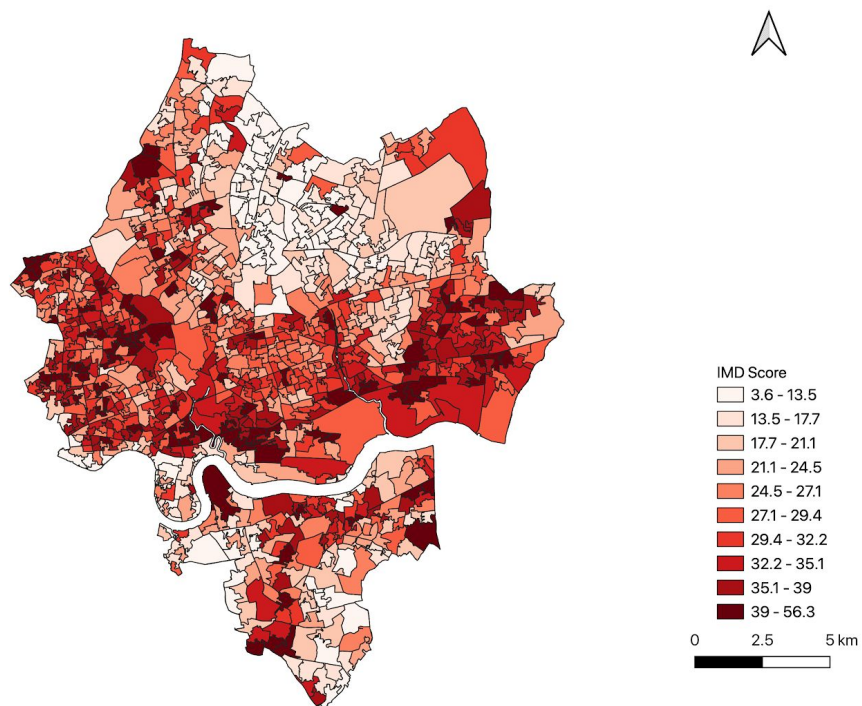


Figure 2d

Results

While normal correlation and the Moran's I were computed using R, the spatial regression model for PTAL was measured using queen-contiguity spatial weights in GeoDa. (Results below).

<i>Wellbeing indices</i>	<i>Normal Correlation</i>	<i>Moran's I (autocorrelation)</i>	<i>Spatial Regression coefficient</i>
IMD (deprivation)	0.1655	0.3083798102	0.0285752
Health	0.2405	4.032510e-1	0.514455
Education, skills & training	-0.1772	2.465767e-1	-0.0410766
Barriers to housing and services	0.6811	5.283758e-1	1.87415e-06

Table 1: Wellbeing indices with PTAL

<i>Demographic Factors</i>	<i>Normal Correlation</i>	<i>Moran's I (autocorrelation)</i>	<i>Spatial Regression coefficient</i>
Working Age	0.3234	1.716994e-01	0.0130591
Age 65+	-0.3212	3.653730e-01	-0.045692
White	-0.133	5.147346e-01	-0.0675956
BAME	0.1333	0.5818792104	0.0675956

Table 2: Demographic factors with PTAL

Analysis

Wellbeing

IMD For the IMD the results are quite weak.

Health: There is a relatively stronger correlation compared to IMD. However, there is a higher Moran's I and significantly higher health coefficient than the normal correlation.

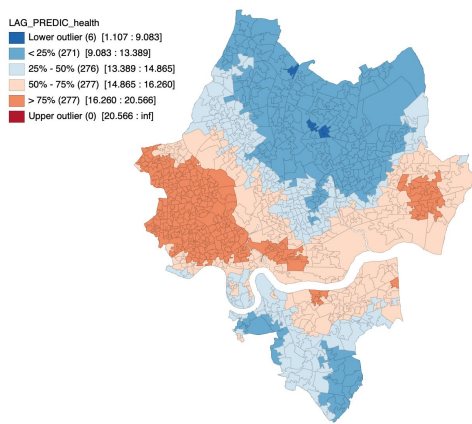


Figure 3a

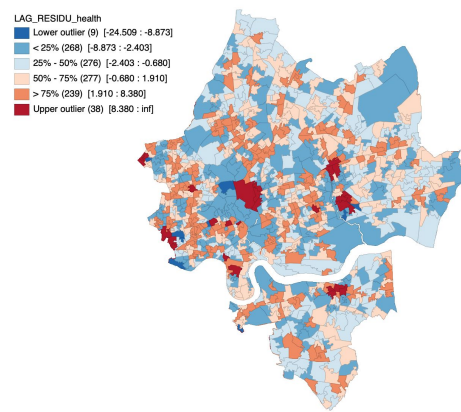


Figure 3b

The spatial lag for predicted values for health and residual are depicted in Figure 3a and 3b respectively. The relationship between PTAL and health varies spatially.

Education Skills and Training: There is a negative correlation and negative coefficient in the spatial regression model but a positive Moran's I.

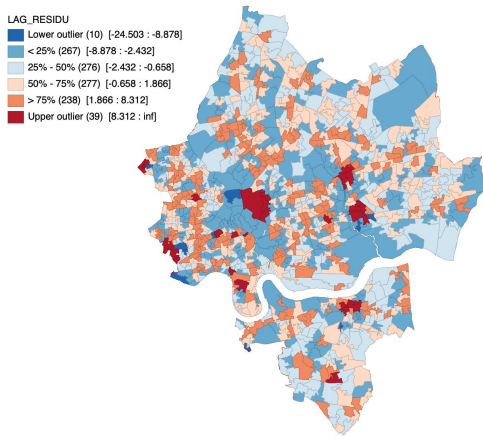


Figure 4a

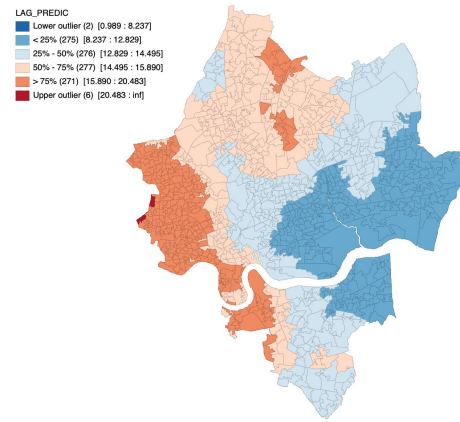


Figure 4b

Barriers to Housing and Services: There is a vast difference between the normal correlation and Moran's I with the spatial regression coefficient although both show a strong relationship between PTAL and barriers to housing and services. The relationship between PTAL and the index is stronger in the west (Figure 4a), the areas for health, the area with the strongest association includes Canary Wharf. There is a significant contrast in the Stratford area, where there are upper outliers and lower outliers side by side (Figure 4b).

Demographic factors

Working-age. The relation between PTAL and the proportion of the working-age population (aged 18-64) showed an unnoticeable correlation coefficient of 0.3234. Moreover, the fitted spatial regression coefficient was insignificant from zero.

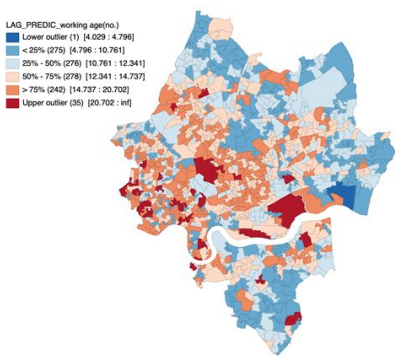


Figure 5a: Working Age

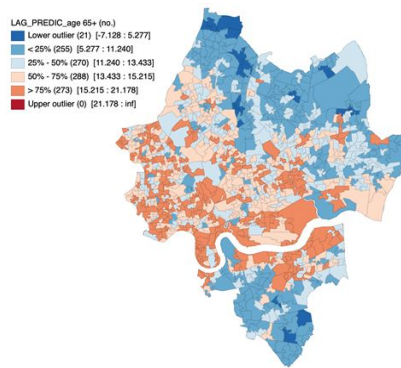


Figure 5b: Age 65+

Age 65+. This evidence also did not show a strong relationship to PTAL. The spatial regression coefficient is the almost opposite of that for working-age, at -0.045, and not significant to predict PTAL score.

Ethnic origins. Maps were visibly similar for white and BAME (black, Asian and minority ethnic), and the results near precisely opposite (Figures 6a, 6b). The ratio between PTAL and white ethnic origins was -0.133, BAME was 0.133. The spatial regression models depicted a similar pattern.

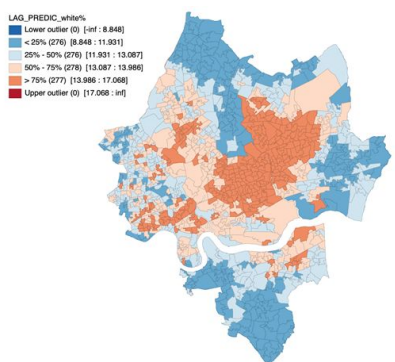


Figure 6a: White

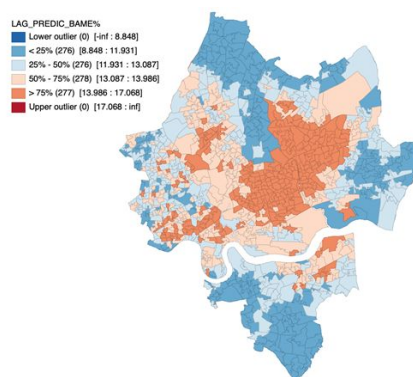


Figure 6b: BAME

Conclusions

The initial analysis was inconclusive with no apparent patterns outside of Redbridge, an area with higher incomes and lower levels of deprivation than the other boroughs.

Statistical analysis of the wellbeing indicators presented us with the following:

- (i) Stronger, positive association between public transport accessibility and health closer to central London.
- (ii) Minimal relationship between education and PTAL scores.
- (iii) The strongest correlation is between PTAL and barriers to housing and services.

The last one is striking, considering the spatial sub-domain of this indicator- the barriers to services measures road distances to services such as healthcare. A strong correlation could imply that higher accessibility implies further distances to services, although the housing sub-domain means this effect cannot be extracted easily.

Concerning demographic factors and PTAL scores, there were almost total opposite correlations between Working-age and Age 65+, also between White and BAME. The obtained regression models for PTAL score using the data related to White and BAME ethnic groups represented complete opposite coefficients to each other.

Challenges, Limitations and Further Research

Our challenges and limitations are twofold:

- (i) the practical challenges with the data and maps

Accessibility to public transport does not indicate use, and data on this is difficult to obtain. Potential solutions lie in surveying users of public transit, albeit at higher costs. Mapping the study area required the PTAL data to be clipped at borough outlines; the resultant small areas due to minor imperfections were discarded.

- (ii) in statistical analysis and interpretation of results

We do not identify a causal relationship here- reverse causality is highly likely as it is reasonable that each of our indicators could influence accessibility and vice-versa since transit expansion is endogenous, likely influenced by the local context

Two directions for further research may be expanding the area of study to include more central and suburban areas to investigate private vehicles or the impact of green spaces such as the Olympic Park on our indicators in greater detail.

References

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