



# **HUNT FOR A SUSTAINABLE BOROUGH TO LIVE IN LONDON**

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# Introduction

- London - Leading global city
- 2<sup>nd</sup> in the Global Cities Index Rank 2019 published by [Kearney](#)
- 23% of the UK's economic output with just 13% of the national population
- Total population just over 8 million
- 36% of the Londoners are born outside of the UK with 41% comprising of Black and Minority Ethnicity.
- Ethnically diverse region in the UK with over 300 languages spoken.



# Business Problem

- More people moving to London for job opportunities and Education
- Necessity of finding a place to live which is economical and sustainable



# Factors Considered

- Rent Affordability - Borough wise Rent for past 2 years
- House Affordability - House price per earnings for 2019
- Quality of Education - Average Attainment of 8 score
- Crime Safety - Crime Incident per month per 1000 people
- Public Transport Accessibility Levels
- Types of Venues available

# Data Sources

- [https://en.wikipedia.org/wiki/London\\_boroughs](https://en.wikipedia.org/wiki/London_boroughs)
- <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/adhocs/12435privaterentalmarketinlondonoctober2019toseptember2020>
- <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/adhocs/11100privaterentalmarketinlondonjanuary2019todecember2019>
- <https://data.london.gov.uk/dataset/index-private-housing-rental-prices-region>

# Data Sources Continued..

- <https://data.london.gov.uk/dataset/gcse-results-by-borough>
- [https://data.london.gov.uk/dataset/recorded\\_crime\\_summary](https://data.london.gov.uk/dataset/recorded_crime_summary)
- <https://data.london.gov.uk/dataset/land-area-and-population-density-ward-and-borough>
- <https://data.london.gov.uk/dataset/public-transport-accessibility-levels>
- [https://joshuaboyd1.carto.com/tables/london\\_boroughs\\_proper/public](https://joshuaboyd1.carto.com/tables/london_boroughs_proper/public)

# Data Cleaning - Part 1

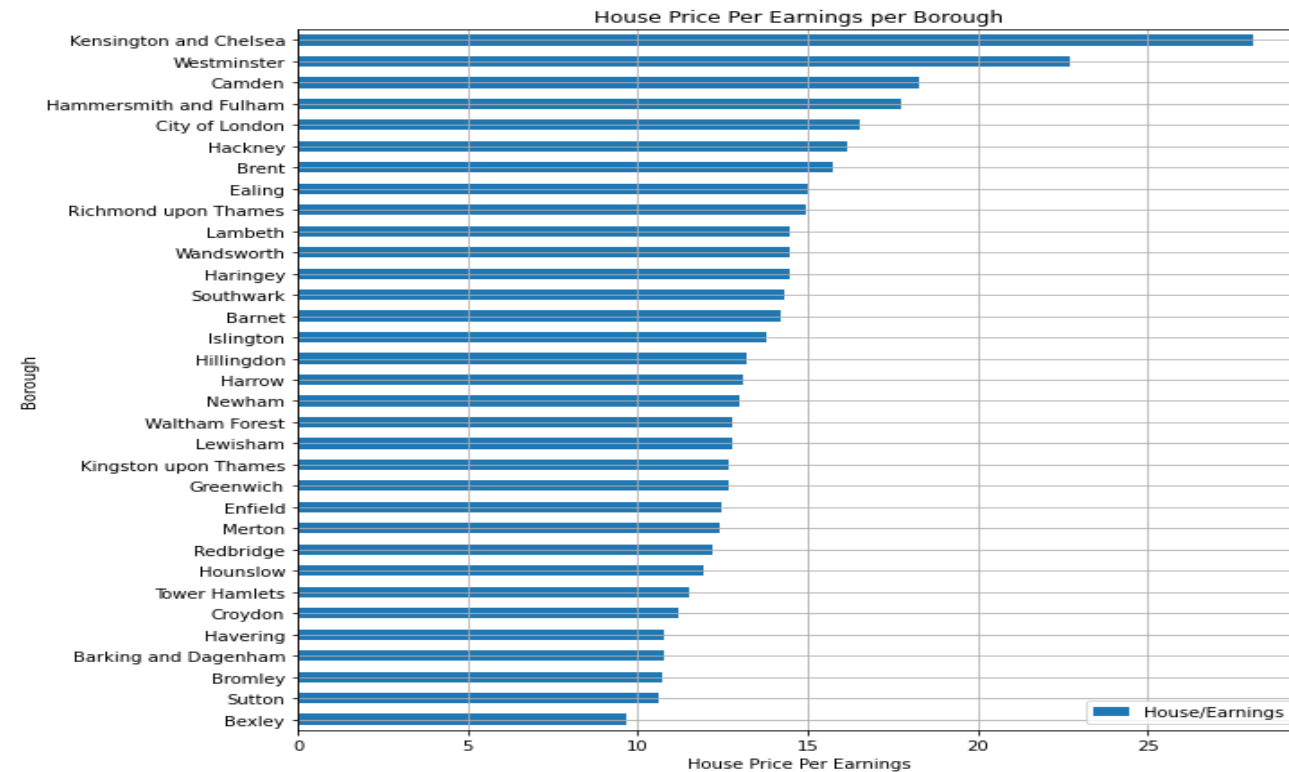
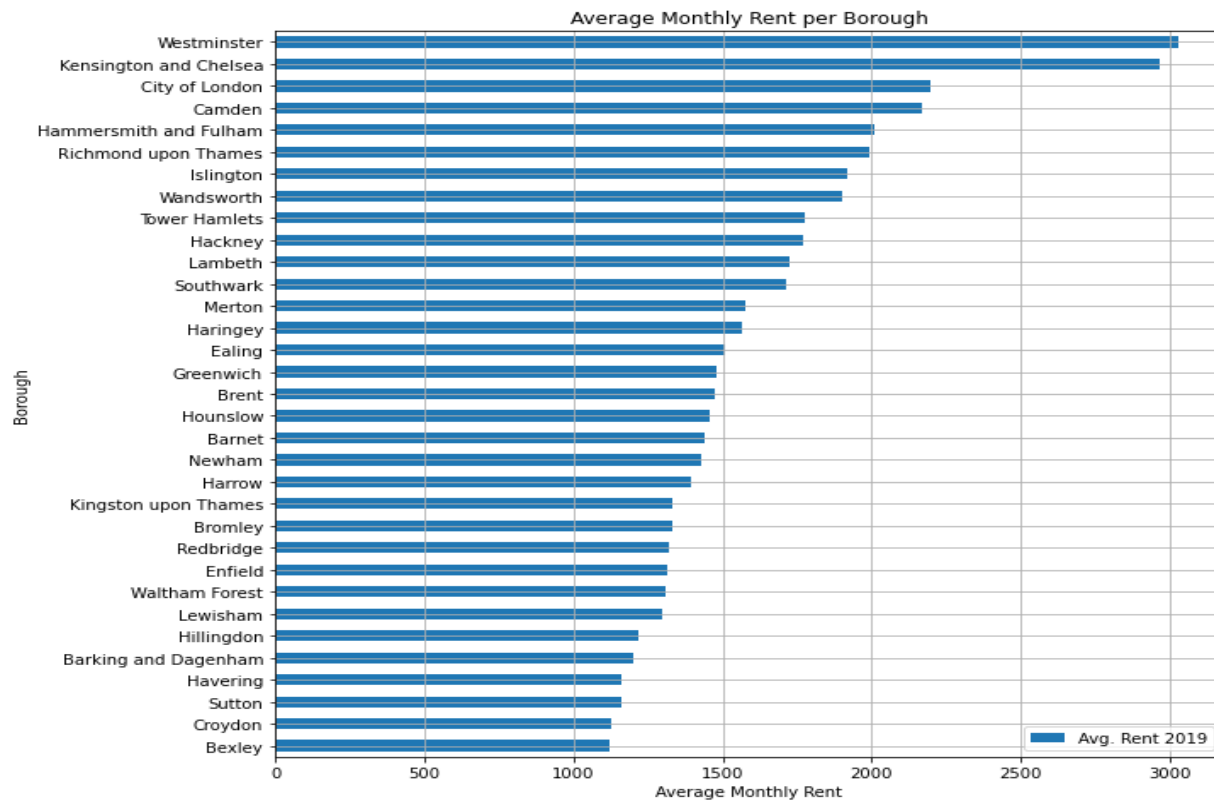
	Borough	Avg. Rent 2020	Avg. Rent 2019	House/Earnings	Avg. Attainment 8 Score	Avg. PTAL	Monthly incidents per 1000 people
0	Barking and Dagenham	1208.235294	1202.723404	10.76	46.4	5.583730	7.830753
1	Barnet	1481.329341	1442.595376	14.21	57.1	5.542330	6.541564
2	Bexley	1111.702381	1119.492958	9.68	49.6	4.552927	5.955276
3	Brent	1487.036036	1476.425197	15.74	50.2	9.223249	7.449395
4	Bromley	1317.445087	1331.671429	10.73	50.8	3.592084	6.282681

# Data Cleaning - Part 2

	Borough	Rent Affordability	House Affordability	Quality Education	Avg. PTAL	Crime Safety
0	Barking and Dagenham	0.956335	0.941304	0.791809	0.032206	0.707374
1	Barnet	0.830493	0.753804	0.974403	0.031736	0.755550
2	Bexley	1.000000	1.000000	0.846416	0.020499	0.777459
3	Brent	0.812745	0.670652	0.856655	0.073538	0.721625
4	Bromley	0.888686	0.942935	0.866894	0.009588	0.765224

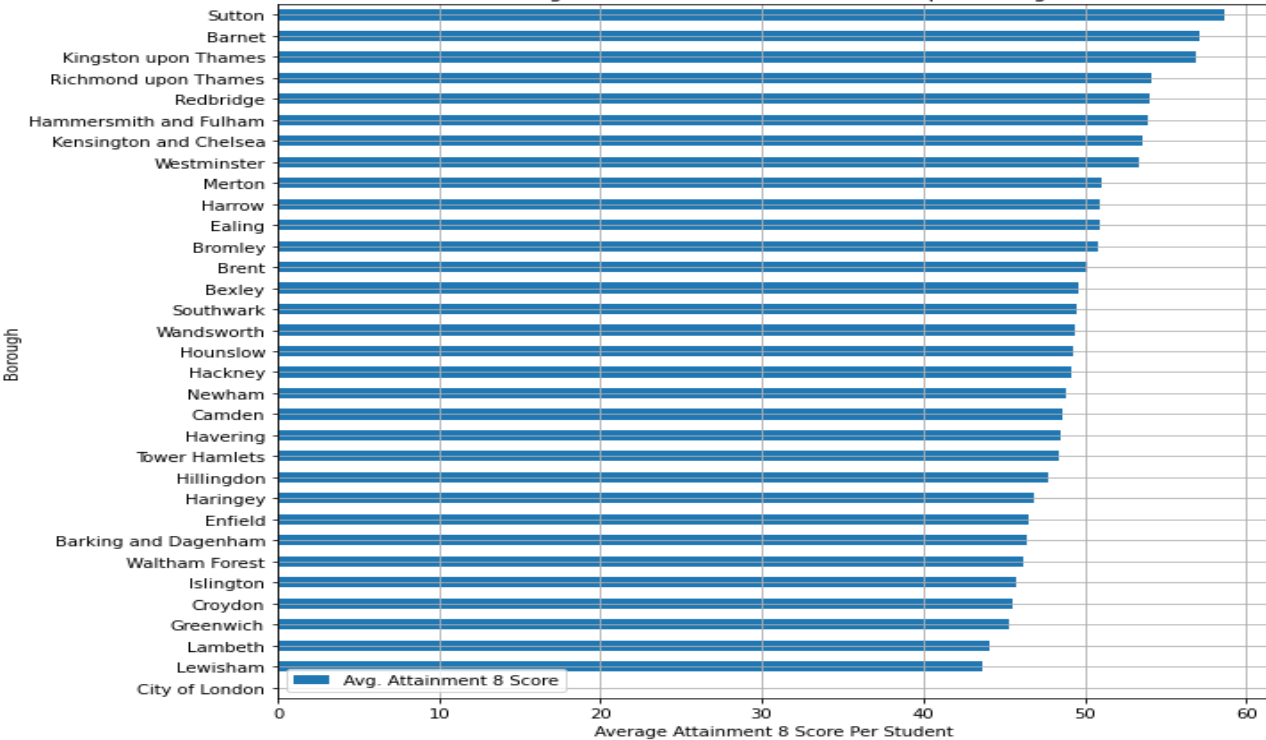


# Data Analysis : Exploratory - 1

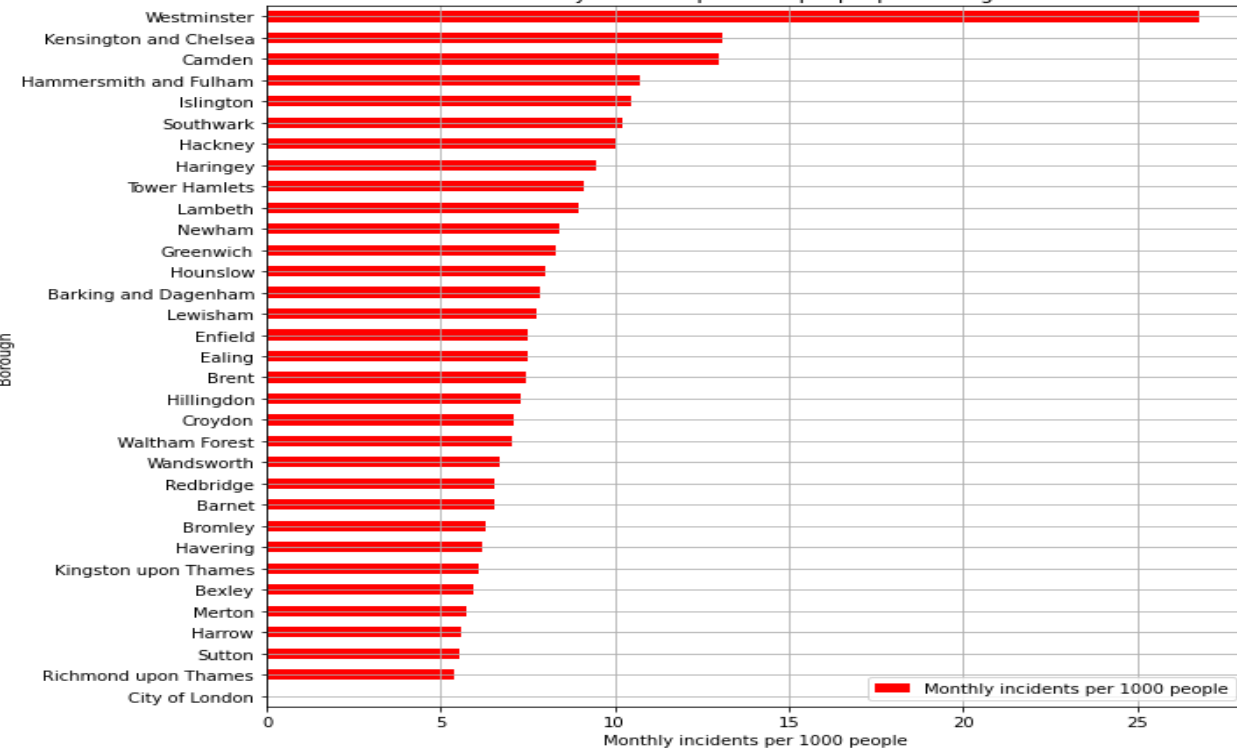


# Data Analysis : Exploratory - 2

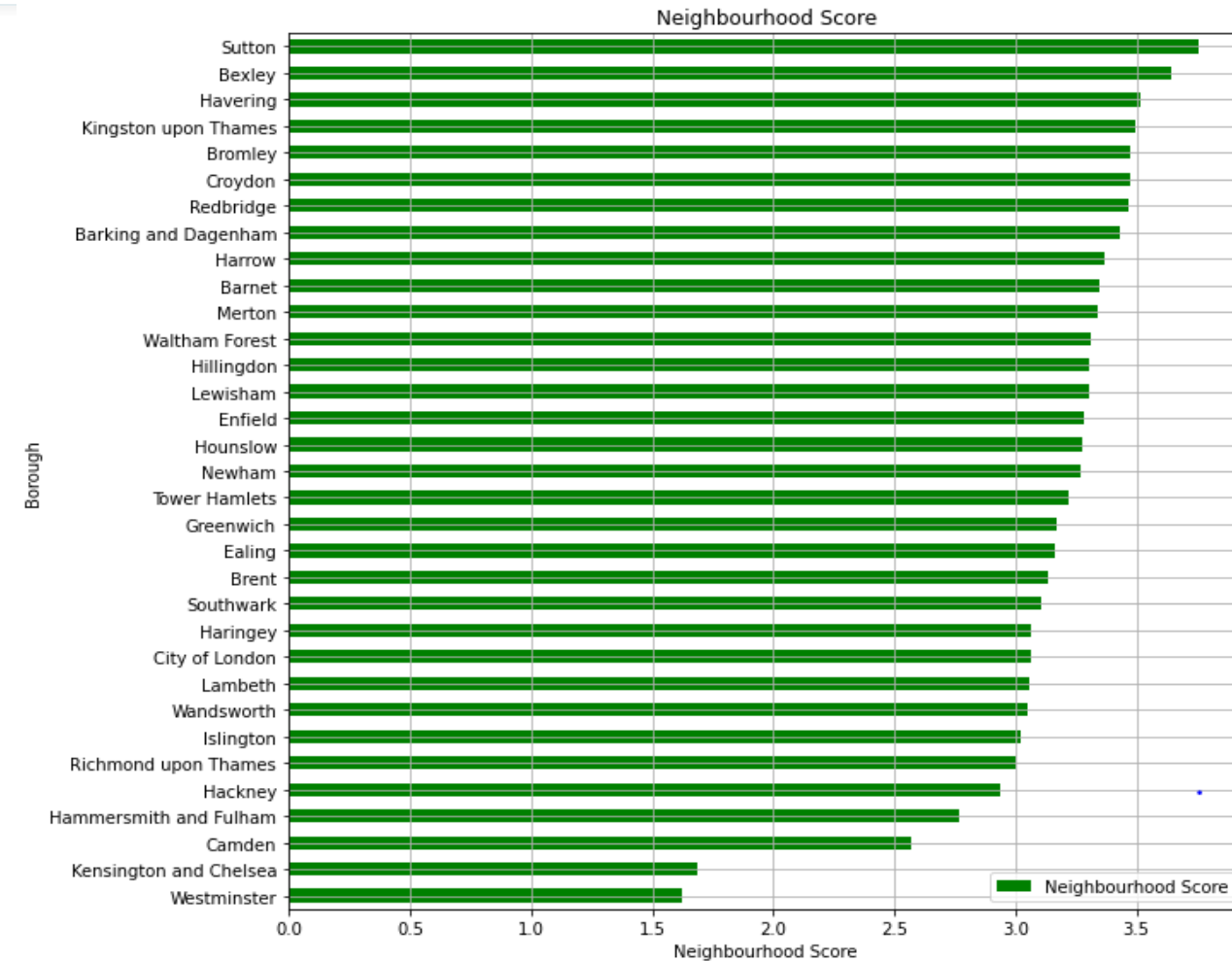
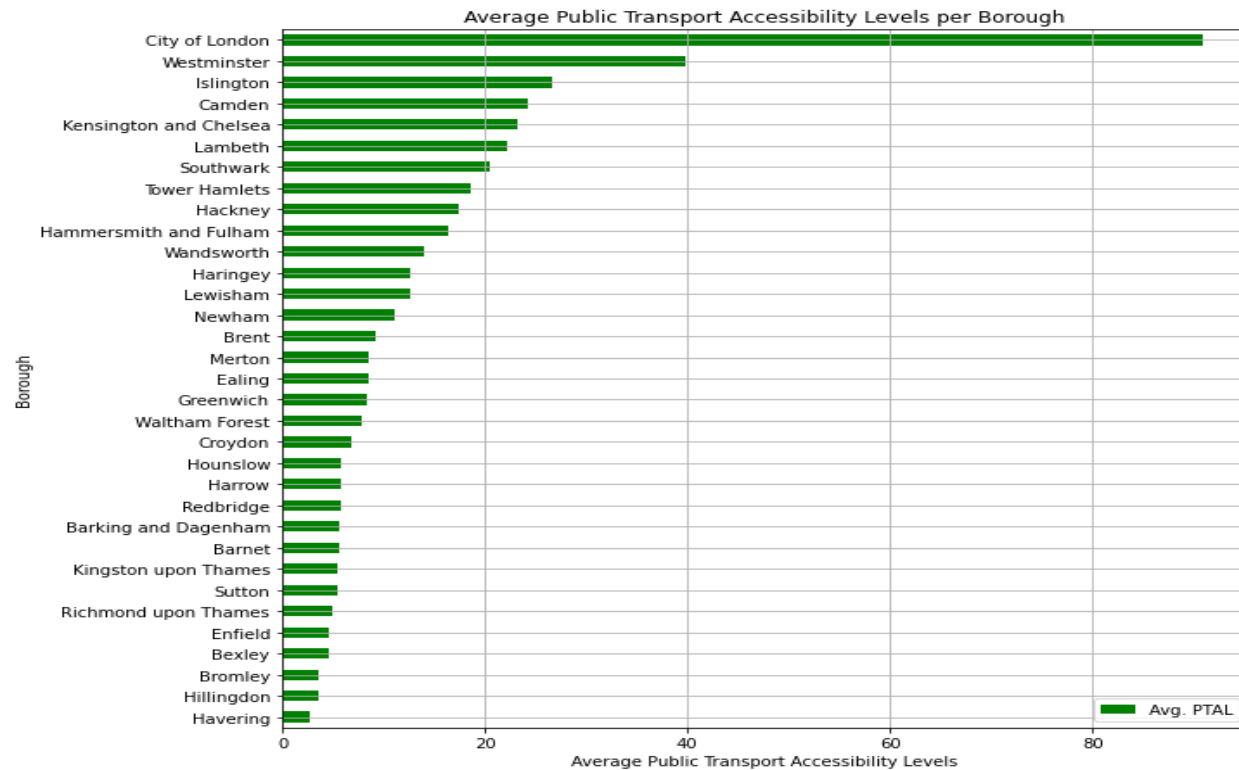
Average Attainment 8 Score Per Student per Borough



Monthly incidents per 1000 people per Borough



# Data Analysis : Exploratory - 3



# Data Analysis : Cluster - 1

- OneHot coding

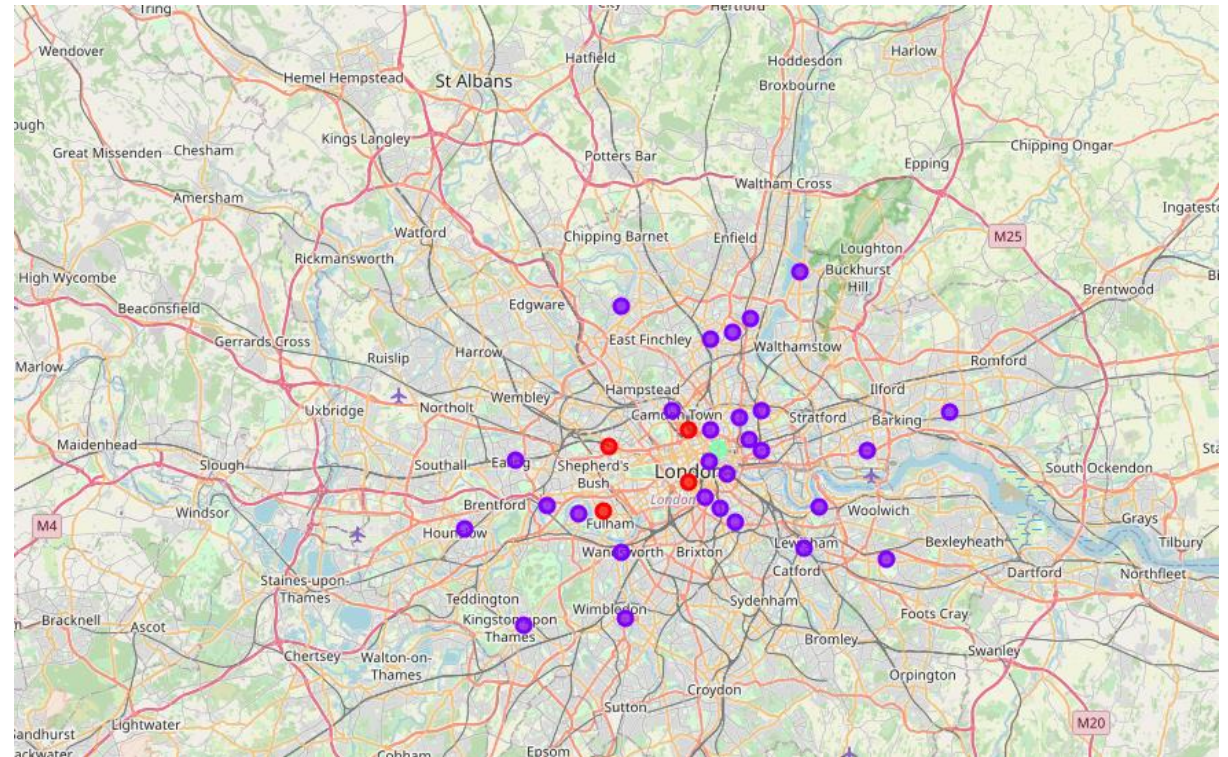
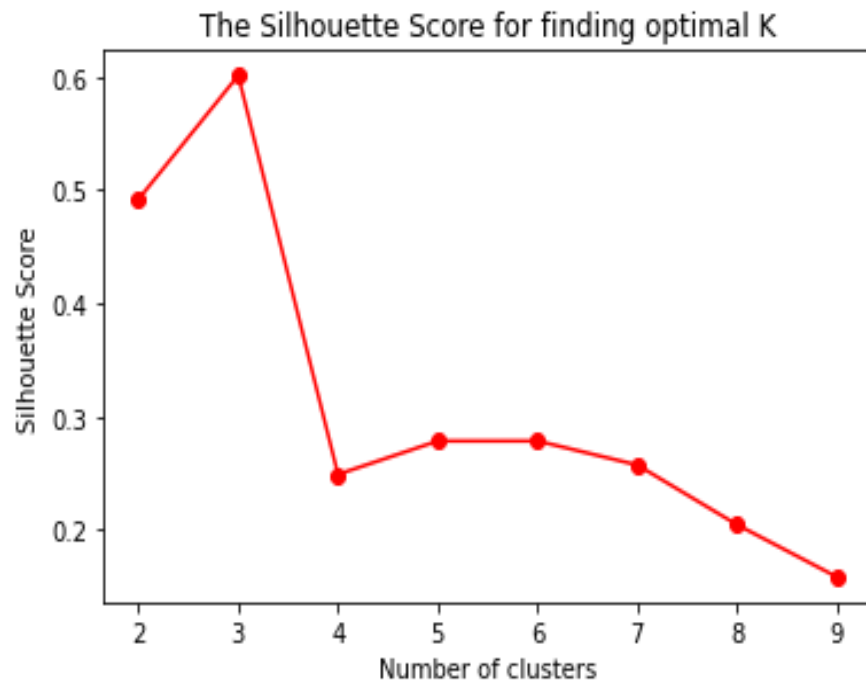
	Borough	Arts & Entertainment	College & University	Food	Nightlife Spot	Outdoors & Recreation	Professional & Other Places	Residence	Shop & Service	Travel & Transport
0	Barking and Dagenham	0	0	0	0	0	0	0	1	0
1	Brent	0	0	0	0	0	0	0	1	0
2	Bromley	0	0	0	0	0	0	0	1	0
3	Camden	0	0	0	0	0	0	0	1	0
4	City of London	0	0	0	0	0	0	0	1	0

- Snap of Borough with most visited venues

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
0	Barking and Dagenham	Shop & Service	Travel & Transport	Outdoors & Recreation	Residence	Professional & Other Places	Nightlife Spot	Food
1	Barnet	Food	Shop & Service	Nightlife Spot	Outdoors & Recreation	Professional & Other Places	Arts & Entertainment	Travel & Transport
2	Bexley	Outdoors & Recreation	Food	Shop & Service	Nightlife Spot	Travel & Transport	Residence	Professional & Other Places
3	Brent	Food	Shop & Service	Outdoors & Recreation	Nightlife Spot	Travel & Transport	Residence	Professional & Other Places
4	Bromley	Nightlife Spot	Shop & Service	Travel & Transport	Food	Outdoors & Recreation	Arts & Entertainment	Residence

100

- Silhouette Score Method - 3 Optimal Cluster



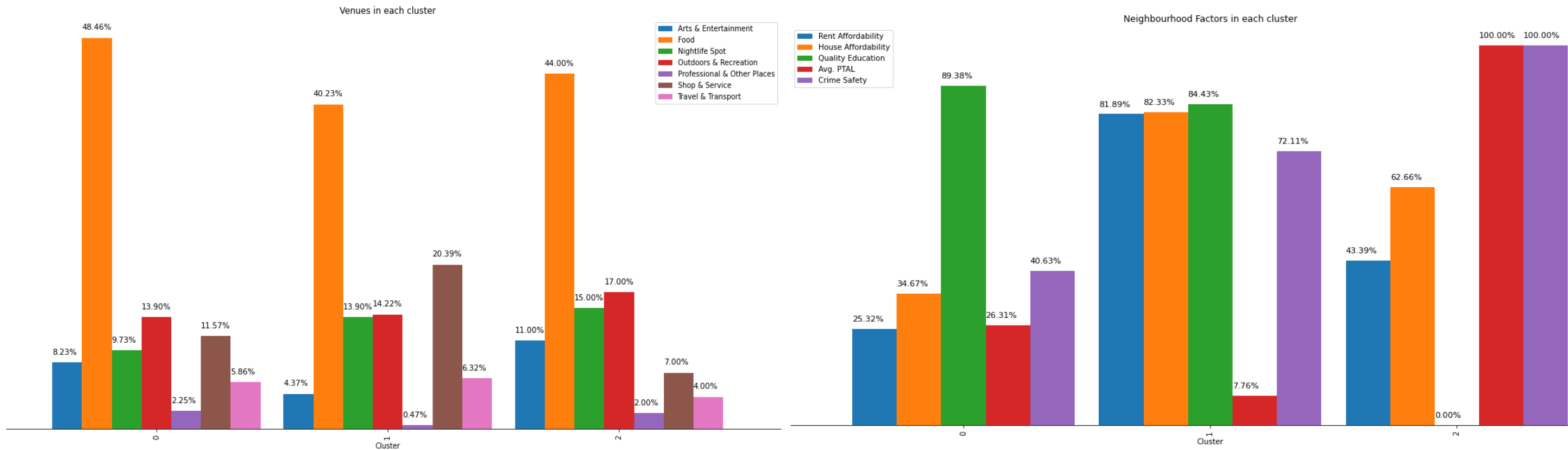
# Data Analysis : Cluster - 3

- Borough Clustering with most common venues

	Borough	Avg. Rent 2020	Avg. Rent 2019	House/Earnings	Avg. Attainment 8 Score	Avg. PTAL	Monthly incidents per 1000 people	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
0	Barking and Dagenham	1208.235294	1202.723404	10.76	46.4	5.583730	7.830753	51.543932	0.133157	1	Shop & Service	Travel & Transport	Outdoors & Recreation	Residence	Professional & Other Places	Nightlife Spot	Food
1	Barnet	1481.329341	1442.595376	14.21	57.1	5.542330	6.541564	51.527095	-0.066826	1	Food	Shop & Service	Nightlife Spot	Outdoors & Recreation	Professional & Other Places	Arts & Entertainment	Travel & Transport
2	Bexley	1111.702381	1119.492958	9.68	49.6	4.552927	5.955276	51.452078	0.069931	1	Outdoors & Recreation	Food	Shop & Service	Nightlife Spot	Travel & Transport	Residence	Professional & Other Places
3	Brent	1487.036036	1476.425197	15.74	50.2	9.223249	7.449395	51.609783	-0.194672	1	Food	Shop & Service	Outdoors & Recreation	Nightlife Spot	Travel & Transport	Residence	Professional & Other Places
4	Bromley	1317.445087	1331.671429	10.73	50.8	3.592084	6.282681	51.601511	-0.066365	1	Nightlife Spot	Shop & Service	Travel & Transport	Food	Outdoors & Recreation	Arts & Entertainment	Residence
5	Camden	2027.228916	2171.184615	18.28	48.6	24.316782	12.983349	51.532360	-0.127960	0	Food	Shop & Service	Arts & Entertainment	Outdoors & Recreation	Travel & Transport	Nightlife Spot	Professional & Other Places
6	City of London	2071.000000	2198.600000	16.55	0.0	90.802508	0.000000	51.520500	-0.097430	2	Food	Outdoors & Recreation	Nightlife Spot	Arts & Entertainment	Shop & Service	Travel & Transport	Professional & Other Places
7	Croydon	1149.169399	1126.730924	11.18	45.5	6.757744	7.116415	51.593480	-0.083420	1	Food	Shop & Service	Outdoors & Recreation	Arts & Entertainment	Travel & Transport	Residence	Professional & Other Places

# Data Analysis : Cluster - 4

- Stats per Cluster



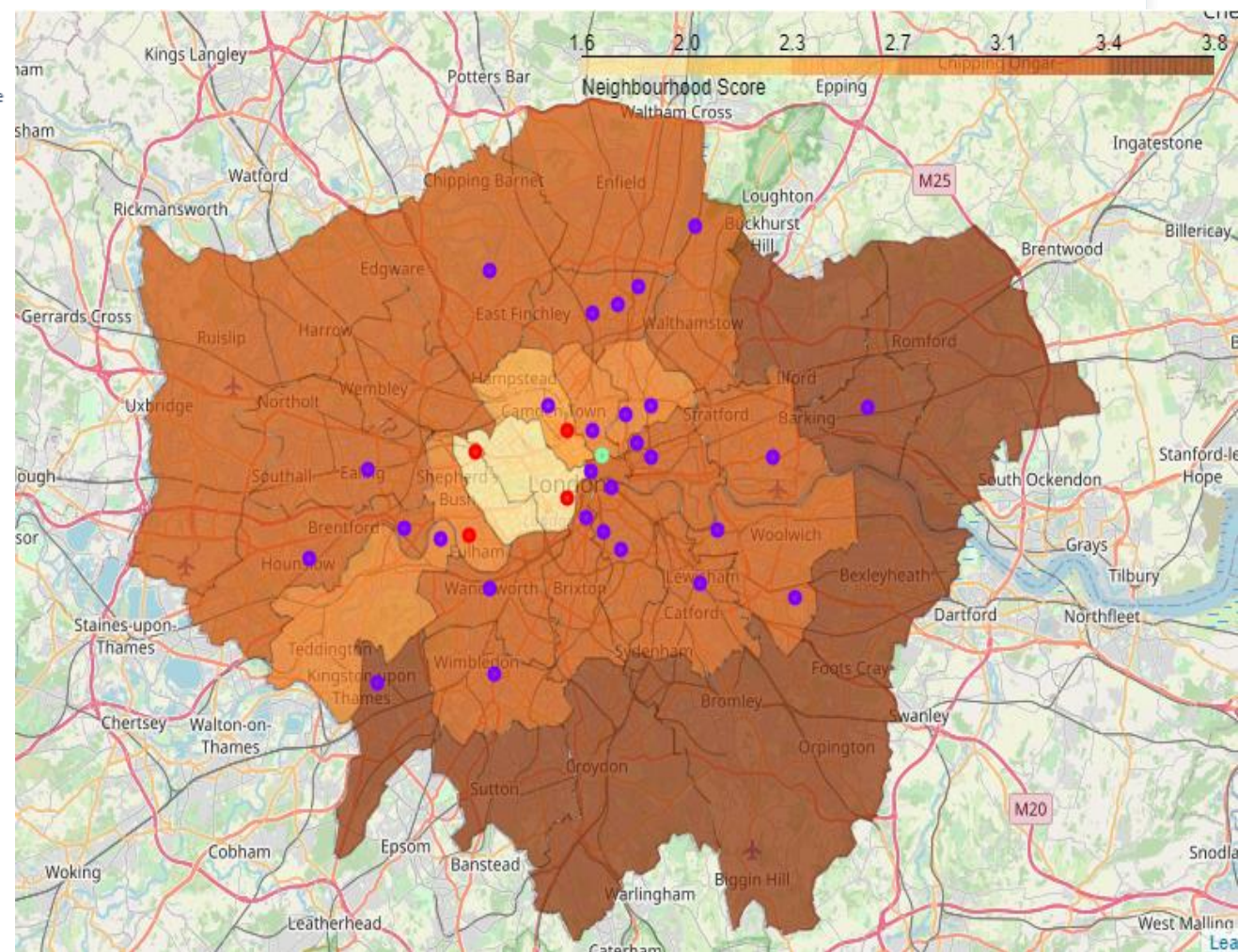
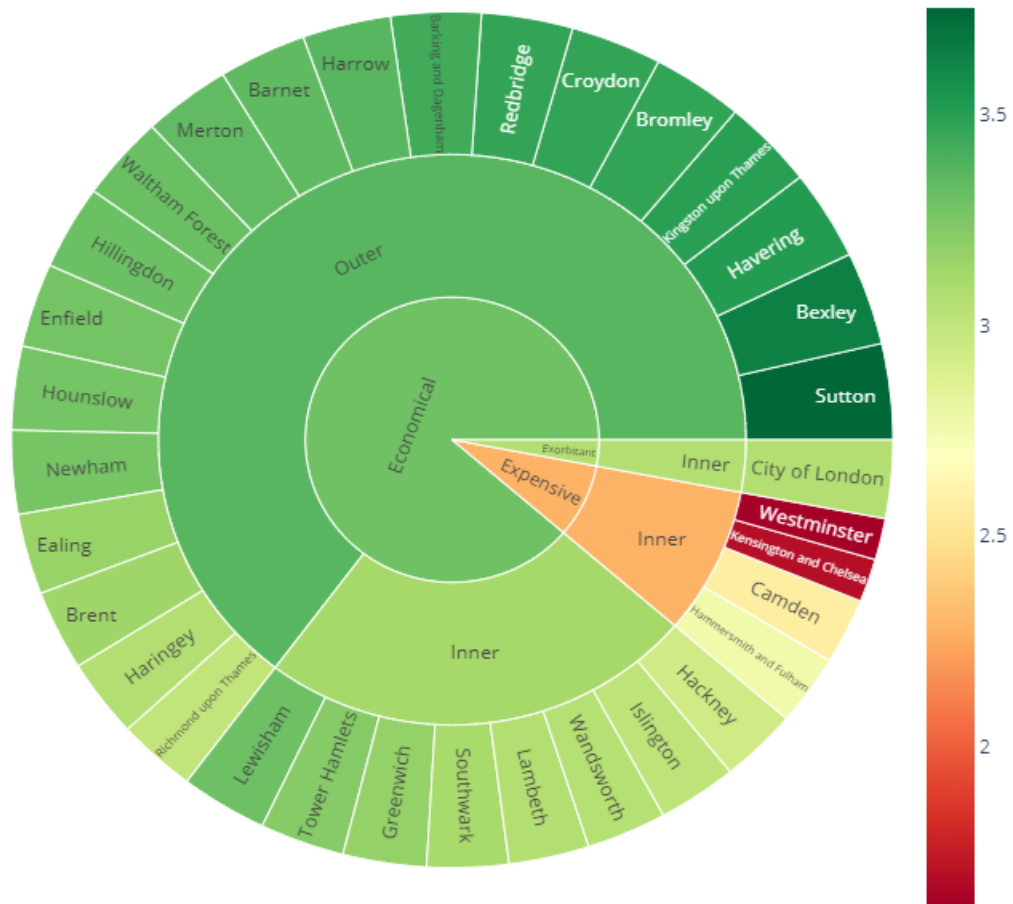
# Data Analysis : Cluster - 5

Cluster	Venues	Neighbourhood
<b>2 - Exorbitant : City of London</b>	Mostly has places for Food, Night Life and Art	Average PTAL and Crime Safety is highest which is expected as it's has lower population and located at heart of the London with commuters coming to work from other Boroughs
<b>1 - Economical: Comprises of all the Outer and few Inner Boroughs</b>	Has Higher concentration of Food places but lower than other clusters, followed by Shop and services	Best Rent and House Affordability as compared to other 2 clusters.  PTAL is Lower than other clusters with better Education quality and Crime Safety
<b>0 - Expensive : Westminster, Kensington and Chelsea, Camden and Hammersmith &amp; Fulham</b>	Better spots for Food. Other venues are not	Renting or purchasing property is costlier but Education quality is a bit better compared to Cluster 1.



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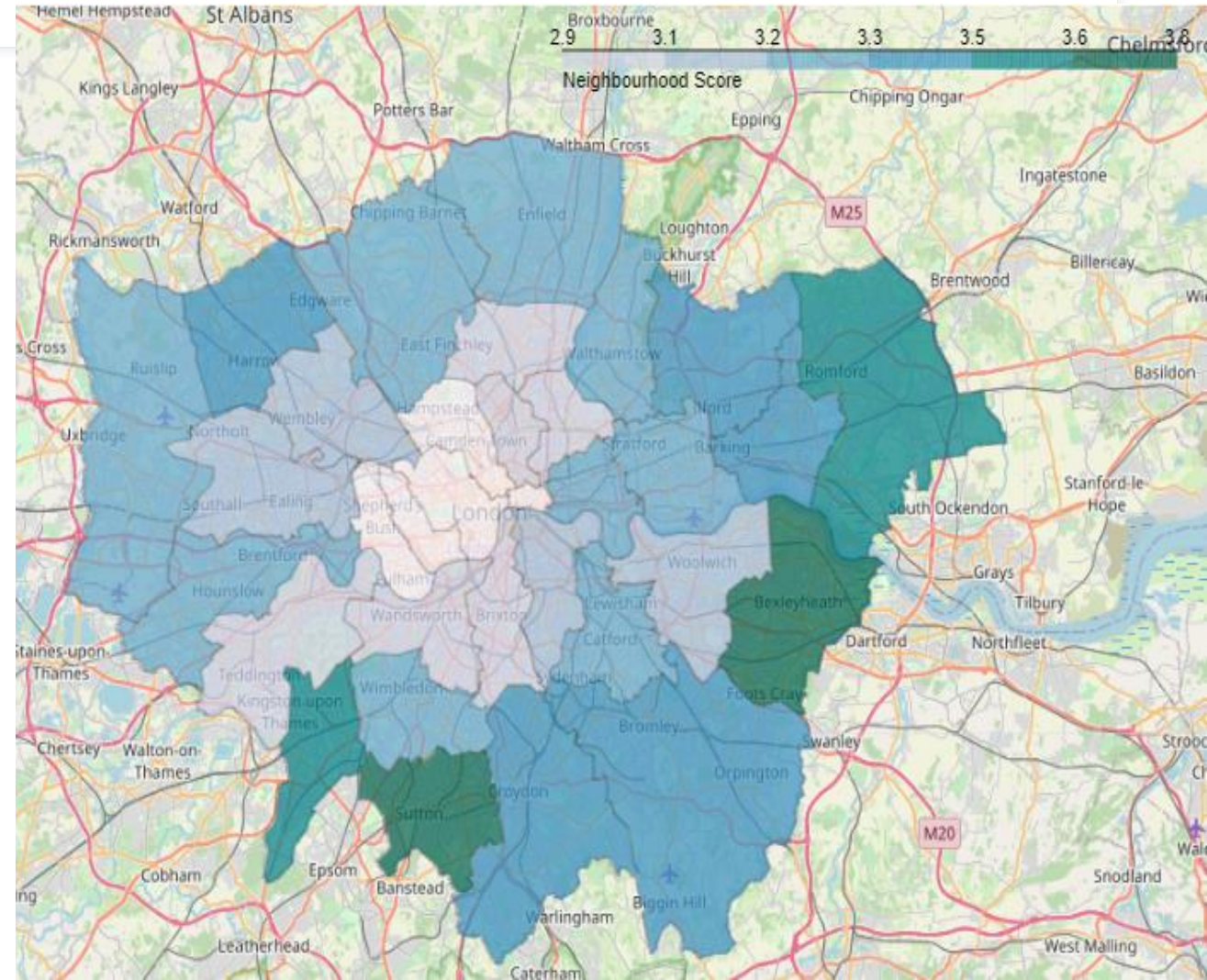
### Sustenance Level per Borough for London





# Results Continued

Borough	Designation	Sustenance Level	Neighbourhood Score
Sutton	Outer	Economical	3.752440
Bexley	Outer	Economical	3.644374
Havering	Outer	Economical	3.515389
Kingston upon Thames	Outer	Economical	3.497726
Bromley	Outer	Economical	3.473327
Croydon	Outer	Economical	3.470738
Redbridge	Outer	Economical	3.469958
Barking and Dagenham	Outer	Economical	3.429029
Harrow	Outer	Economical	3.364643
Barnet	Outer	Economical	3.345985
Merton	Outer	Economical	3.337109
Waltham Forest	Outer	Economical	3.313820
Hillingdon	Outer	Economical	3.307263
Lewisham	Inner	Economical	3.305107
Enfield	Outer	Economical	3.281500
Hounslow	Outer	Economical	3.276462
Newham	Outer	Economical	3.270877
Tower Hamlets	Inner	Economical	3.220094
Greenwich	Inner	Economical	3.173046
Ealing	Outer	Economical	3.159853
Brent	Outer	Economical	3.135216
Southwark	Inner	Economical	3.103356
Haringey	Outer	Economical	3.065031
Lambeth	Inner	Economical	3.059469
Wandsworth	Inner	Economical	3.050591
Islington	Inner	Economical	3.019902
Richmond upon Thames	Outer	Economical	3.003035
Hackney	Inner	Economical	2.939945



# Discussion

- Economical Clusters comprises of all Outer Boroughs including some Inner Boroughs
- The Neighborhood score gets better as we move away from the Inner Boroughs into the Outer
- Sutton, Bexley, Havering, Kingston Upon Thames and Bromley - Top 5 Boroughs to Live belong to Outer Boroughs
- Inner Boroughs - Lewisham and Tower Hamlets as Top 2 options but a bit costlier as compared to the Top choices.
- The analysis is based on the 2019 data - accuracy of the analysis might not be spot on.
- For detailed analysis - other important factors like air quality, social integration and access to nature can also be considered
- COVID situation and WFH environment - "Internet Broadband Speed" per Borough could also be considered as an important factor.

# Conclusion

- Based on the Factors considered and clustering of Boroughs – Conclusion - tat Outer Boroughs are the better to live as compared to the Inner Boroughs
- The results in the study are based on the limited factors as well as limited dataset which have provided a Higher-level result
- For better accuracy and get more granular results, its recommended to consider more factors and a detailed data set over a period of time



Thanks..