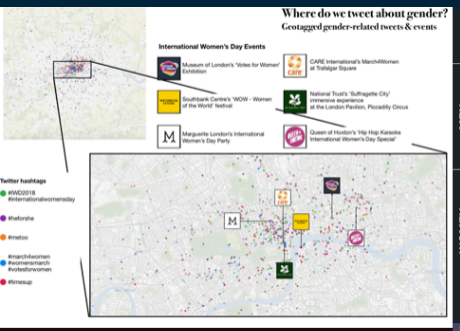
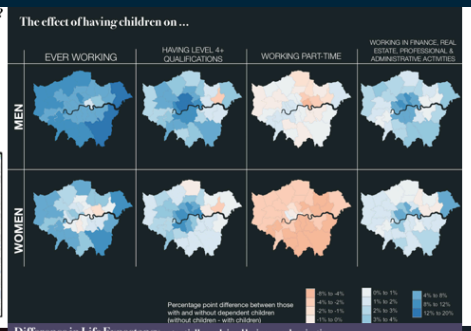
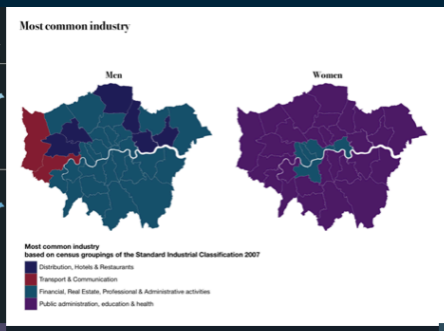
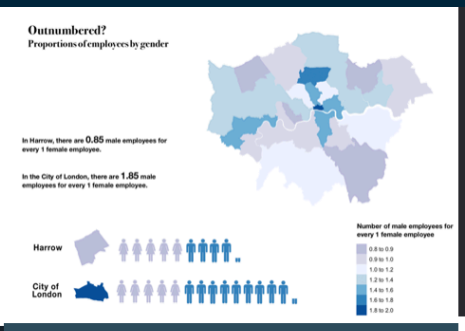
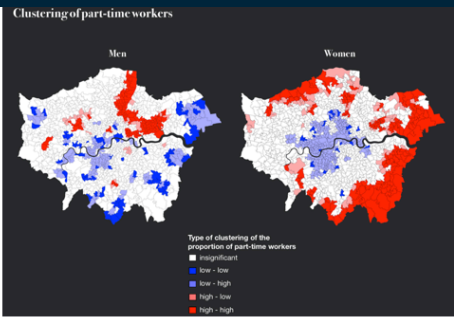
# A Social Atlas of Gender in London

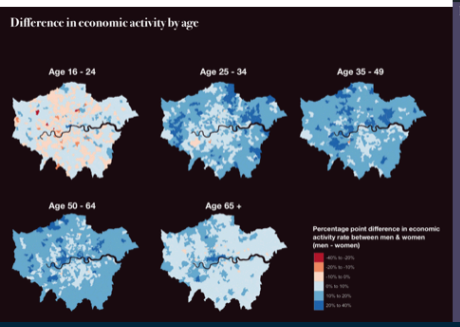


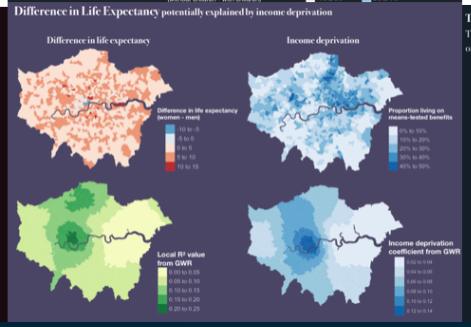



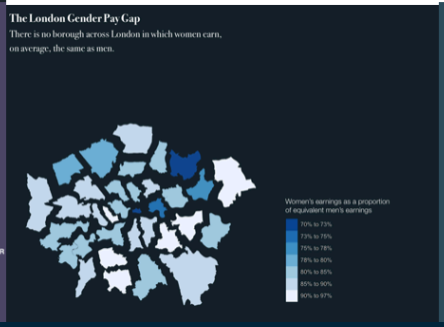



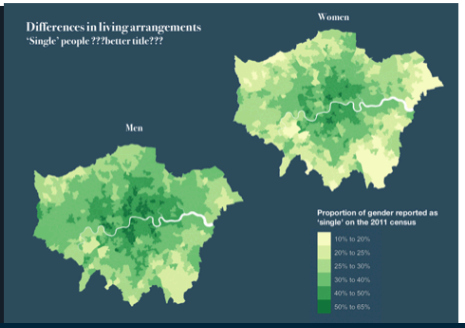



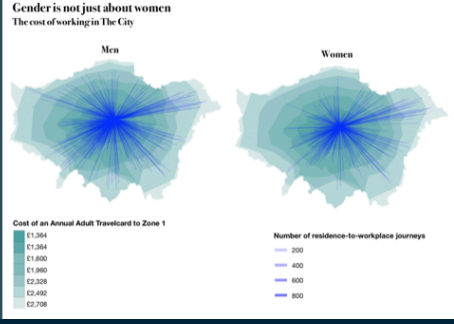



# Introduction

Despite several papers calling for synthesis across the fields of feminist geography and GIS (McLafferty 2002; Pavlovskaya & St. Martin 2007), applications of this alliance remain sparse. This atlas aims to contribute to this notion of “us[ing] spatial data, statistics, and spatial analysis to […] make these gendered experiences visible” (Pavlovskaya 2009: 40).

David McCandless described the four key elements necessary for good visualisations as information, story, goal and visual form (see Figure 1). My aim is to represent data in various visual forms which together tell a story of gender in London. The goal is highlighting issues of gender disparities, to both add to knowledge on the subject, and to potentially influence policy that might address these inequalities.

**Figure 1 : Taken from McCandless (2018)**

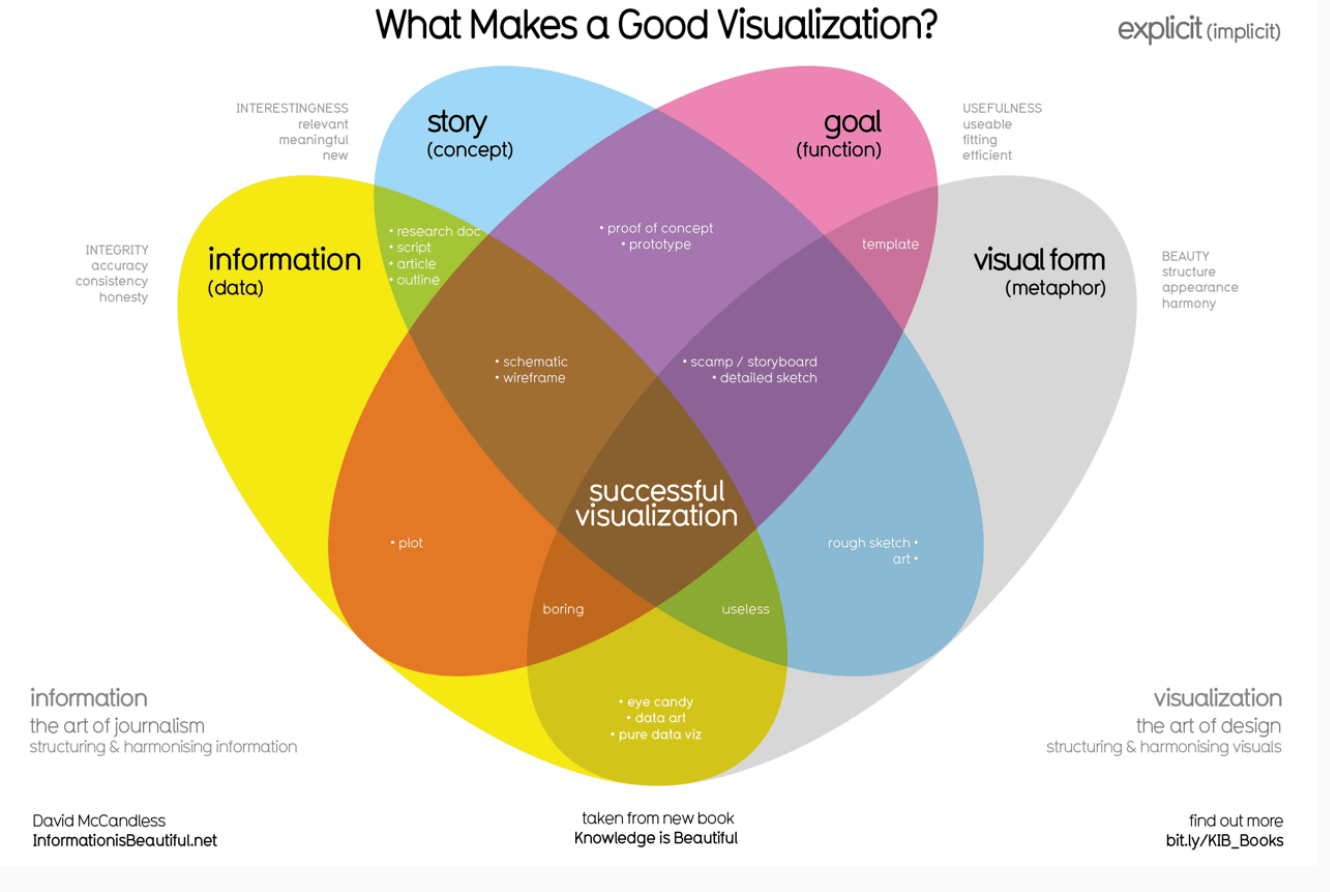
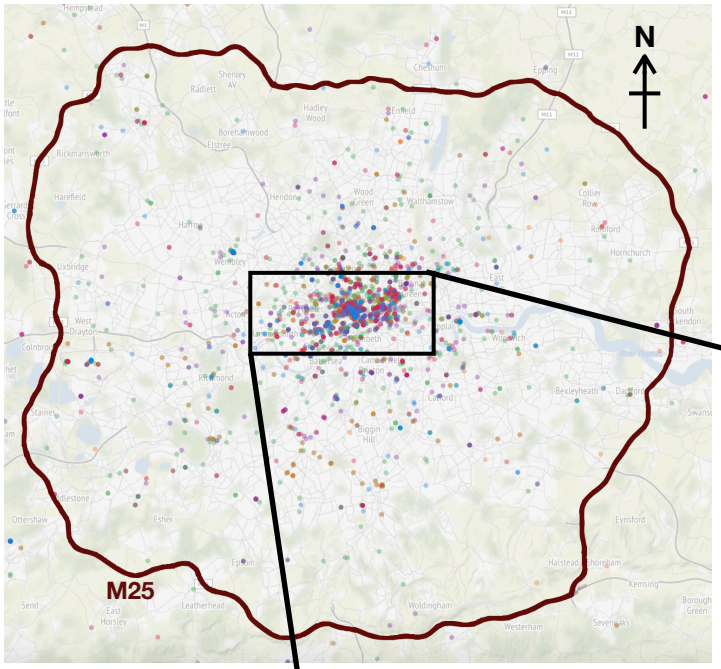


Figure 2

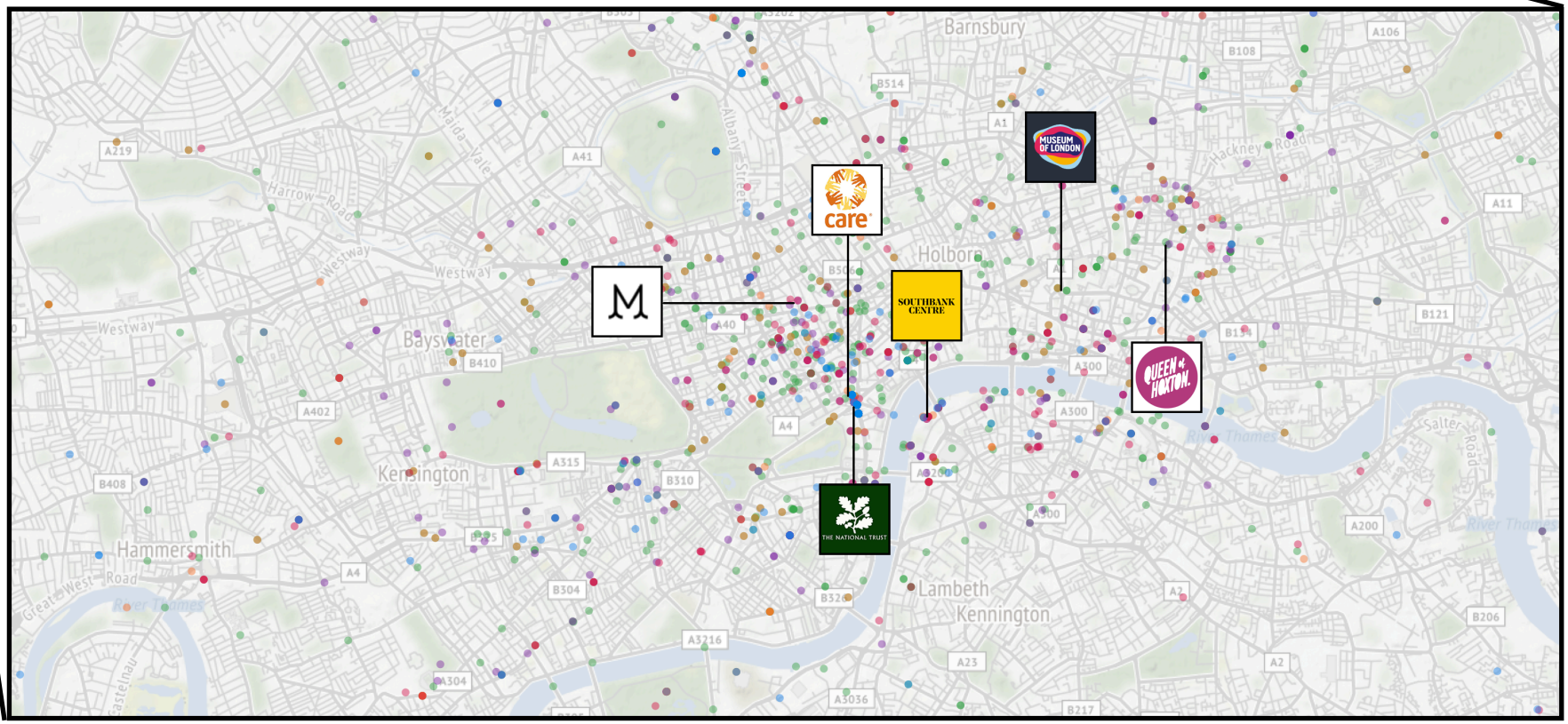
# Where do we tweet about gender?

## Geotagged gender-related tweets & events




### International Women's Day Events

- Museum of London's 'Votes for Women' Exhibition
- CARE International's 'March4Women' at Trafalgar Square
- Southbank Centre's 'WOW - Women of the World' festival
- National Trust's 'Suffragette City' immersive experience at the London Pavilion, Piccadilly Circus
- Marguerite London's International Women's Day Party
- Queen of Hoxton's 'Hip Hop Karaoke International Women's Day Special'




### Twitter hashtags

- #IWD2018 #internationalwomensday
- #heforshe
- #metoo
- #march4women #womensmarch #votesforwomen
- #timesup

Recently, various gender activism campaigns have been gaining momentum, including the “Me Too” and “Times Up” movements (Smith 2018). Much debate and conversation regarding these topics happens on Twitter (Graham 2018). Figure 2 shows the distribution of geotagged tweets that include various trending topics about gender across London. The tweets were all published between 12:35am on Wednesday 23rd February and 10:27pm on Thursday 8th March 2018. Unsurprisingly, the spatial distribution of tweets shows clustering in Central London (see zoomed in map to the right in Figure 1), perhaps due to the volume of events related to gender happening during this period. For example, Thursday 8th March was ‘International Women’s Day’ and the Academy Awards - Hollywood being the source of the “Me Too” and “Times Up” movements (Smith 2018) - took place on Sunday 4th March.

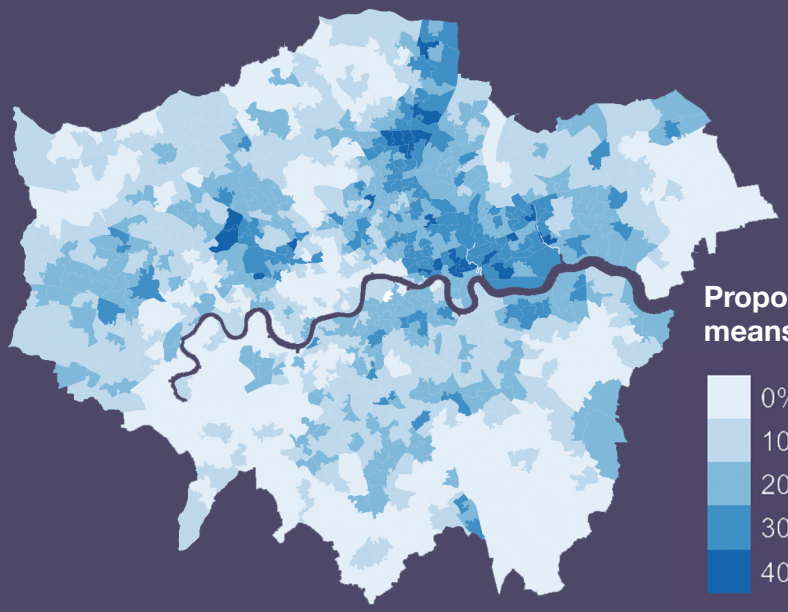
Mapping tweets can allow us to infer associations between increased volumes of tweets at the locations of events relating to their content. For example, several tweets including the topics of “#march4women”, “#womensmarch” and “#votesforwomen” are located at Trafalgar Square, where Care International’s ‘March4Women’ took place on 4th March, and at Piccadilly Circus, where the National Trust are running an immersive experience about the Suffragette movement. Similarly, there appear to be clusters of tweets near the Southbank Centre where the ‘Women of the World’ festival happened between 7th and 11th March. As identified by McLafferty (2002), feminist geography and GIS are amongst the most rapidly-growing fields in geography, yet rarely combined in practice. Figure 2 demonstrates how these spheres could be integrated to critically examine the spatialities of feminist geography.

# Difference in Life Expectancy potentially explained by income deprivation

**Figure 3**

**Difference in life expectancy (women - men)**

- -10 to -5
- -5 to 0
- 0 to 5
- 5 to 10
- 10 to 15



**Proportion living on means-tested benefits**

- 0% to 10%
- 10% to 20%
- 20% to 30%
- 30% to 40%
- 40% to 50%

**Local $R^2$ value from GWR**

- 0.00 to 0.05
- 0.05 to 0.10
- 0.10 to 0.15
- 0.15 to 0.20
- 0.20 to 0.25

**Income deprivation coefficient from GWR**

- 0.02 to 0.04
- 0.04 to 0.06
- 0.06 to 0.08
- 0.08 to 0.10
- 0.10 to 0.12
- 0.12 to 0.14

Studying health across England, Raleigh and Kiri (1997: 650) found that “deprived areas have the greatest gender differences in life expectancy”.

A global regression of this relationship across London revealed that for every additional year that women live longer than men, the proportion living on means-tested benefits increases by 6%. However, the relationship varies greatly across space, as demonstrated by a Geographically-Weighted Regression (GWR) of in Figure 3.

**Figure 4: Life expectancy differences & income deprivation by borough**
*Legends in Figure 3 apply*

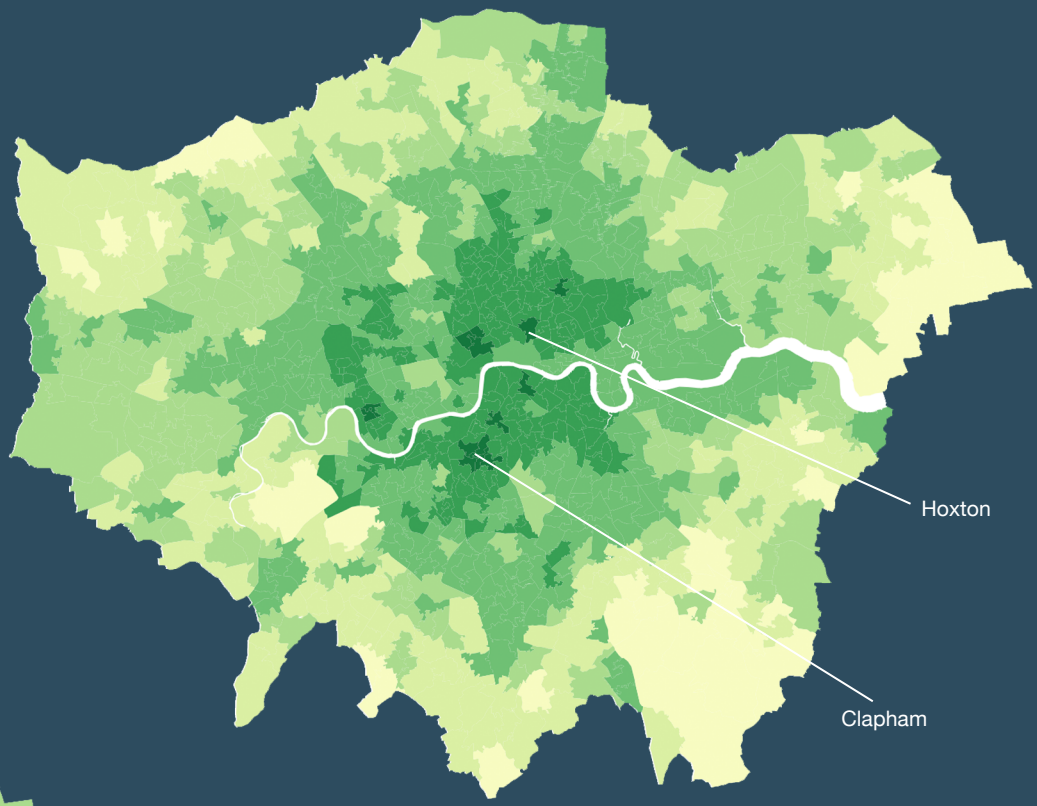

For every additional year that women live longer than men, the proportion living on means-tested benefits is expected to increase by between 2.3% and 13.9% across London’s MSOAs. The distribution of income deprivation is quite different to the distribution of its coefficient. That is, greater income deprivation is not matched by higher values of the income deprivation coefficient, or by greater disparities in life expectancy between men and women. In fact, where there is greater income deprivation, such as in East London, we see lower values of its coefficient (around 0.04). Furthermore, the local $R^2$ values from this regression show that income deprivation may only explain 1.7% of the variation in the life expectancy differences in some MSOAs, but as much as 22.4% in others. There is a very similar spatial pattern of local $R^2$ values as there is of the income deprivation coefficient. Income deprivation explains more of the difference in life expectancy in areas such as Kensington, with $R^2$ decreasing from this central area, along with some areas of higher $R^2$ in North London. Local $R^2$ in East London - where income deprivation is greater - has the lowest $R^2$ values.

It is also worth noting that the differences in life expectancy can vary greatly across MSOAs in close proximity to each other. Figure 4 shows three boroughs with great internal disparities, in which MSOAs directly next to each other can have differences in life expectancy that are more than 10 years apart. Additionally, the boroughs shown here have very different levels of income deprivation, that do not account for the differences in life expectancy.

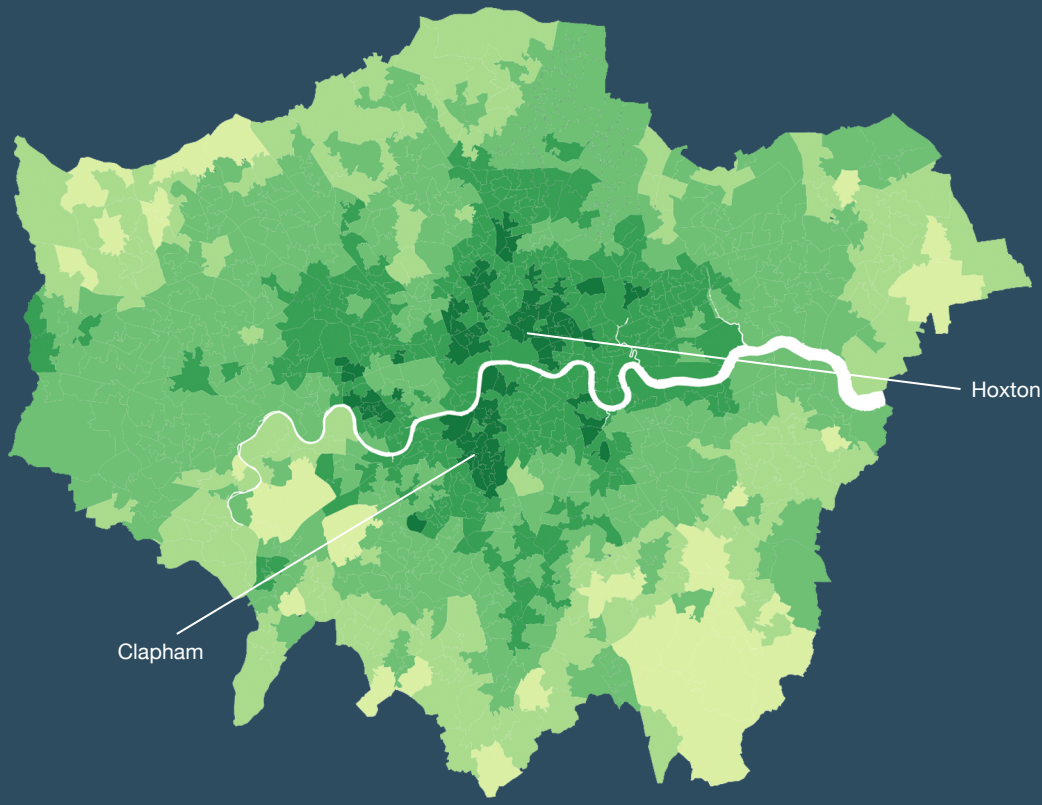
# Proportion of single people

Figure 5

## Women




## Men




**Proportion of gender reported as 'single' on the 2011 Census**

- 10% to 20%
- 20% to 25%
- 25% to 30%
- 30% to 40%
- 40% to 50%
- 50% to 65%

The Census asks people to report on their living arrangements, with Figure 5 visualising the distribution of those reporting themselves as ‘Single (never married or registered in civil partnership)’. The spatial distribution of ‘single’ people is much the same across genders, however the proportions for men are generally higher than those for women. Across the City of London and its neighbouring areas, between 40-65% of the population are reportedly ‘single’. This proportion decreases further out, with proportions of only 10-20% of single women and between 20-25% of single men in the Eastern corners of London.

In Western London, in boroughs such as Ealing and Hounslow, consistently between 30-40% of men are single, yet some MSOAs in these boroughs report as little as 20% of single women. The largest difference between men and women is found in the north of Newham, where the proportion of single men is 22.8 percentage points larger than that of women.

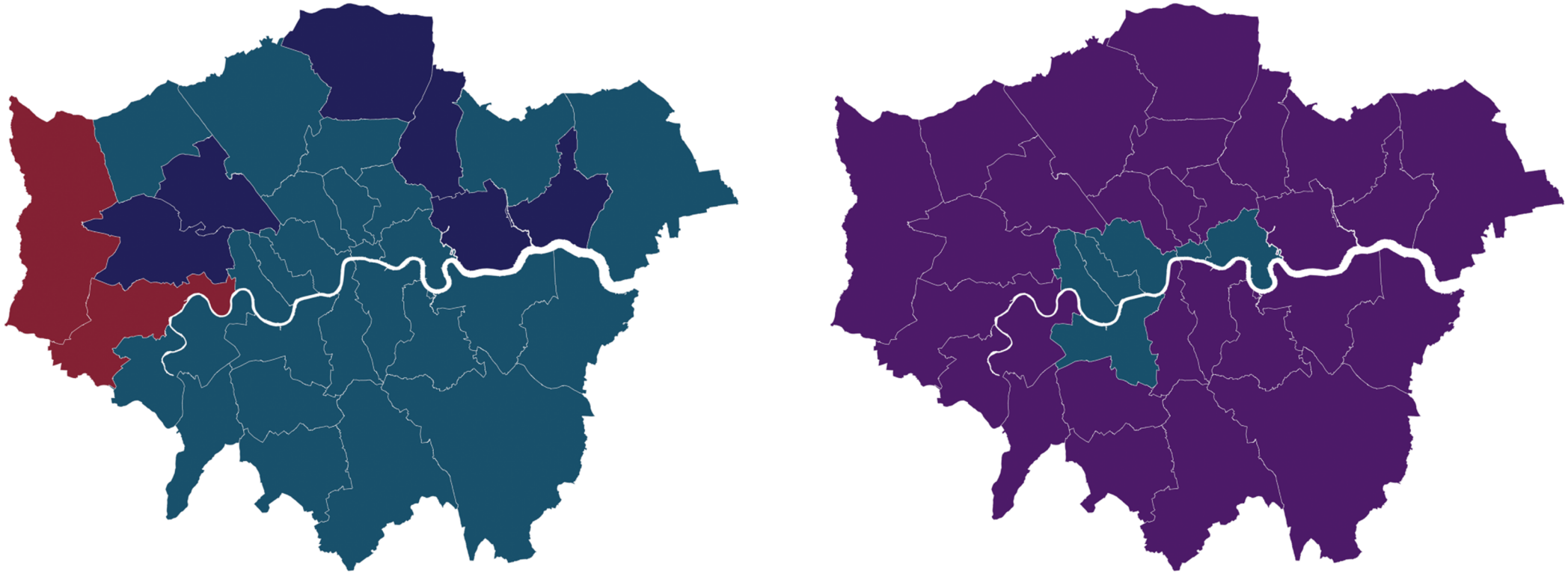
As revealed by Cheshire & Uberti (2014: 84), single people (particularly young singles) live in areas such as Hoxton & Clapham. These areas have 50-65% of both single men and women.

# Most common industry

**Figure 6**

## Men

## Women



**Most common industry**
**based on Census groupings of the Standard Industrial Classification 2007**

- Distribution, Hotels & Restaurants
- Transport & Communication
- Financial, Real Estate, Professional & Administrative activities
- Public administration, education & health

Figure 6 maps the most common industry for men and women at borough level. Women in some Inner London boroughs, such as Westminster and Tower Hamlets, most frequently work in ‘Financial, Real Estate, Professional & Administrative activities’; yet this is the most common sector for men in 25 out of London’s 33 boroughs (including the City of London). In 2011, median annual earnings across these sectors was £27,650 (see Figure 7).

Everywhere else in London, ‘Public administration, education & health’ are the most common industries for women, the median annual earnings of these being £21,275. Men in West London most commonly work in ‘Transport & Communication’, as well as ‘Distribution, Hotels & Restaurants’; which have median annual earnings of £28,401 and £23,937, respectively. In some boroughs through the north and east of London, ‘Distribution, Hotels & Restaurants’ is also the most common sector for men.

Three considerations should be acknowledged with Figure 6. Firstly, it is based on Census data that is seven years old, during which time the most common industries may have changed. Secondly, the Census groups industries in the Standard Industrial Classification together. More women may work in administration and more men in finance (or vice versa), yet the maps would fail to capture this information. Thirdly, it may appear as if large majorities of people in a borough work in the industry plotted, however if two industries are very common, the proportion working in the ‘most common’ industry may be a smaller proportion of the population than assumed.

**Figure 7: Median Annual Earnings by Industry Grouping**
*Source: ONS 2018*

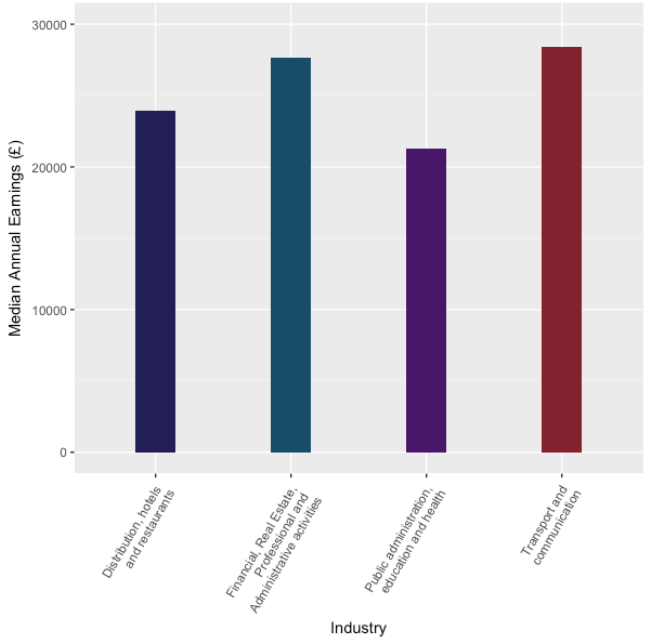
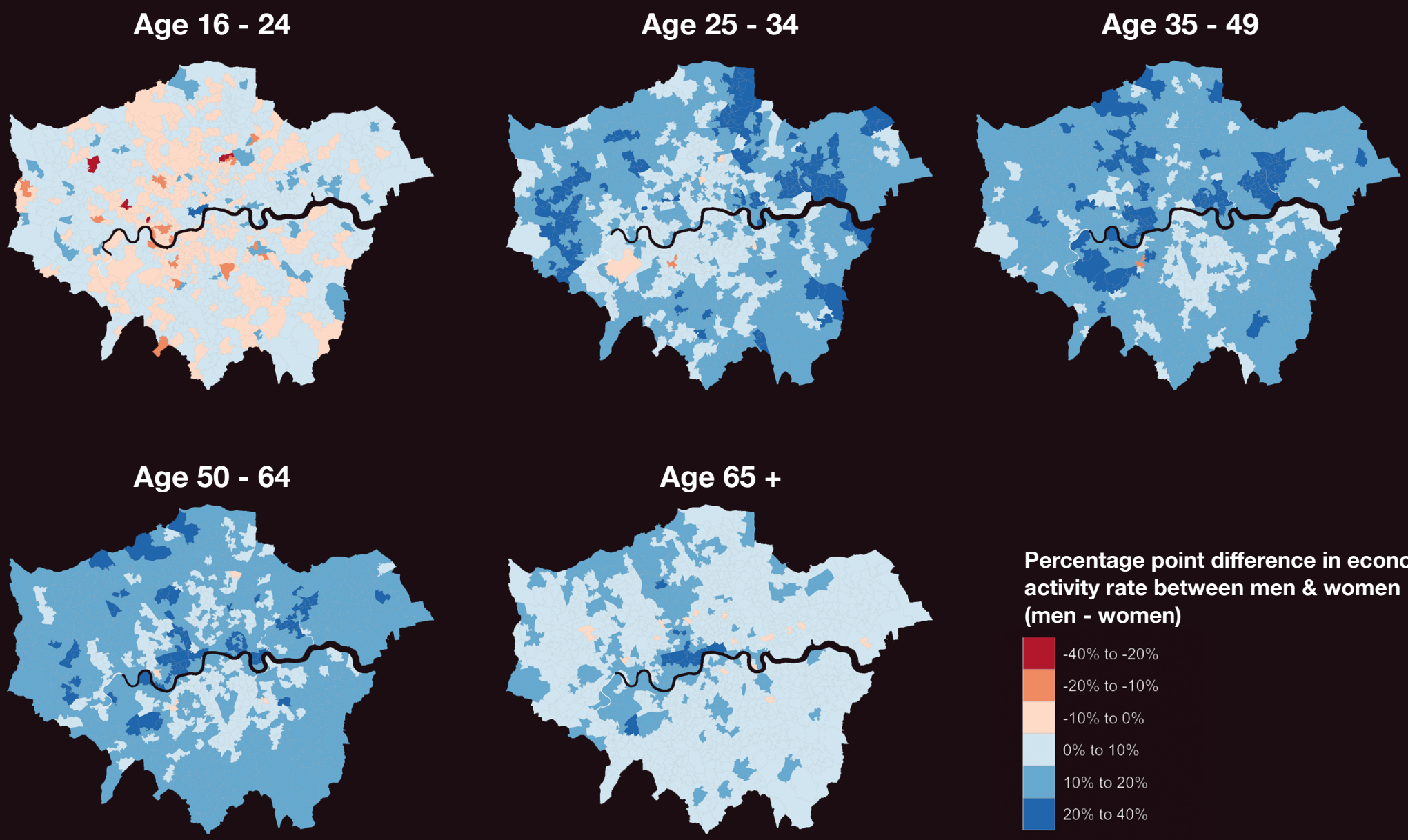


Figure 8

# Difference in economic activity by age



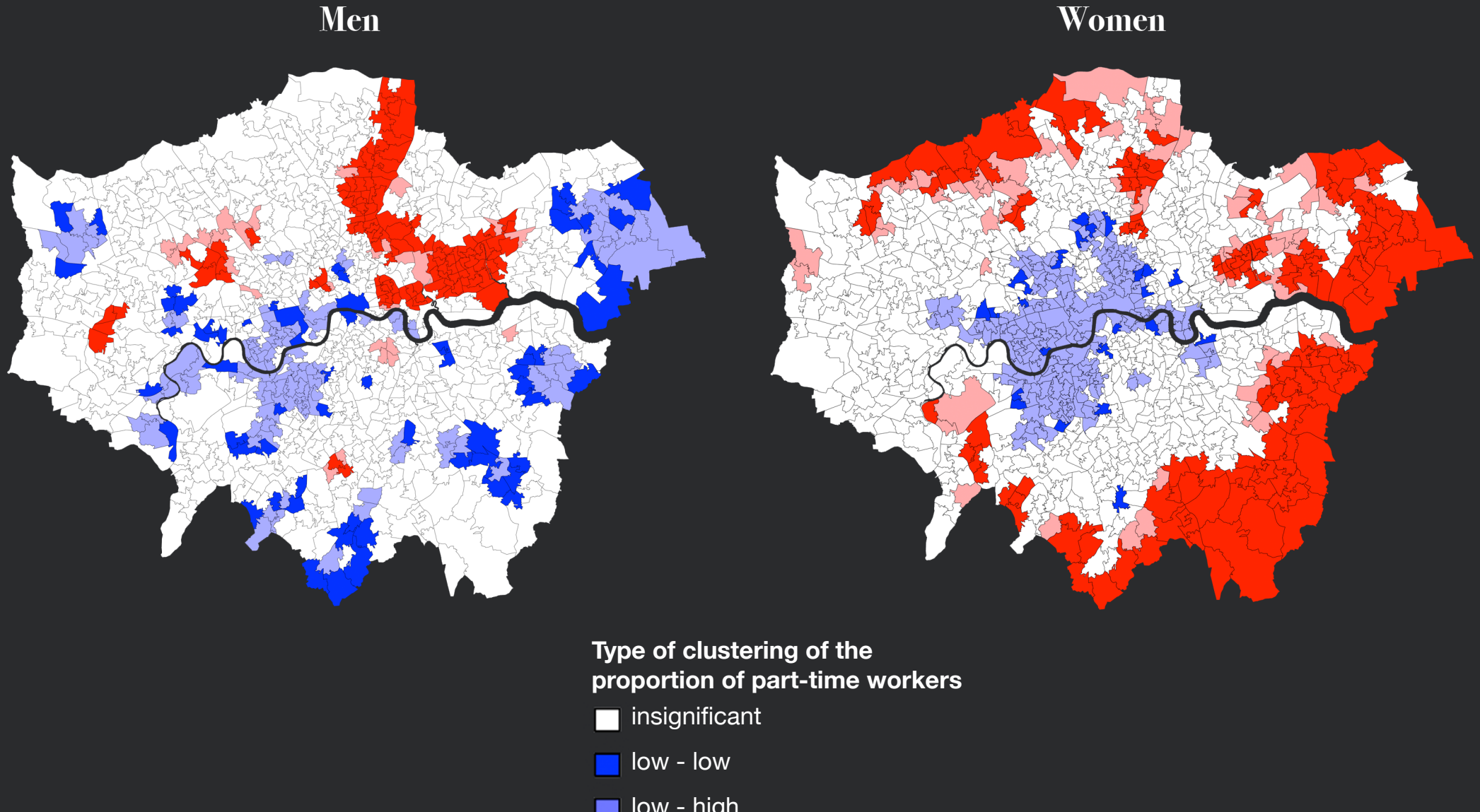
As Figure 8 demonstrates, gender differences in economic activity rates depend greatly on age. Rates are most similar in young people and the elderly, though these groups are characterised by students and retired people; suggesting that where economic activity rates are lower across genders, the difference between them is generally smaller.

Betweens the ages of 25-64, rates among men are almost always greater than for women; the main exception being a group of MSOAs in Richmond in the 25-34 age group, in which up to 10 percentage points more women are economically active than their male counterparts.

A key consideration is the extent of the differences, with rates among men most commonly between 10 and 20 percentage points greater than rates for women. Furthermore, in the 35-49 age group, 120 of London's 983 MSOAs report a 20 to 40 percentage point difference in economic activity between men and women.

# Clustering of part-time workers

Figure 9



Across all London boroughs, women are more likely to work part-time and less likely to work full-time than men (ONS 2016). This is a fact well-documented in literature, and has been substantiated by the idea that part-time work is a good employment opportunity for women with children (Townsend 1986). From Figure 9, demonstrating clustering of part-time workers, it could be inferred that 'high-high' clustering of female part-time workers in outer boroughs, such as Bromley, Bexley and Havering, is due to families moving further out to have children. In examining part-time workers across London, Hamnett (2003) identifies these boroughs as having the smallest increases in house prices across London (see Figure 10). Perhaps, families move here to take advantage of lower house prices, therefore we see distinctive clustering of female part-time workers.

'Low-high' clustering of women is found across Central London, suggesting that part-time working remains prevalent in the centre of the City, but that proportions range from very low to very high across MSOAs.

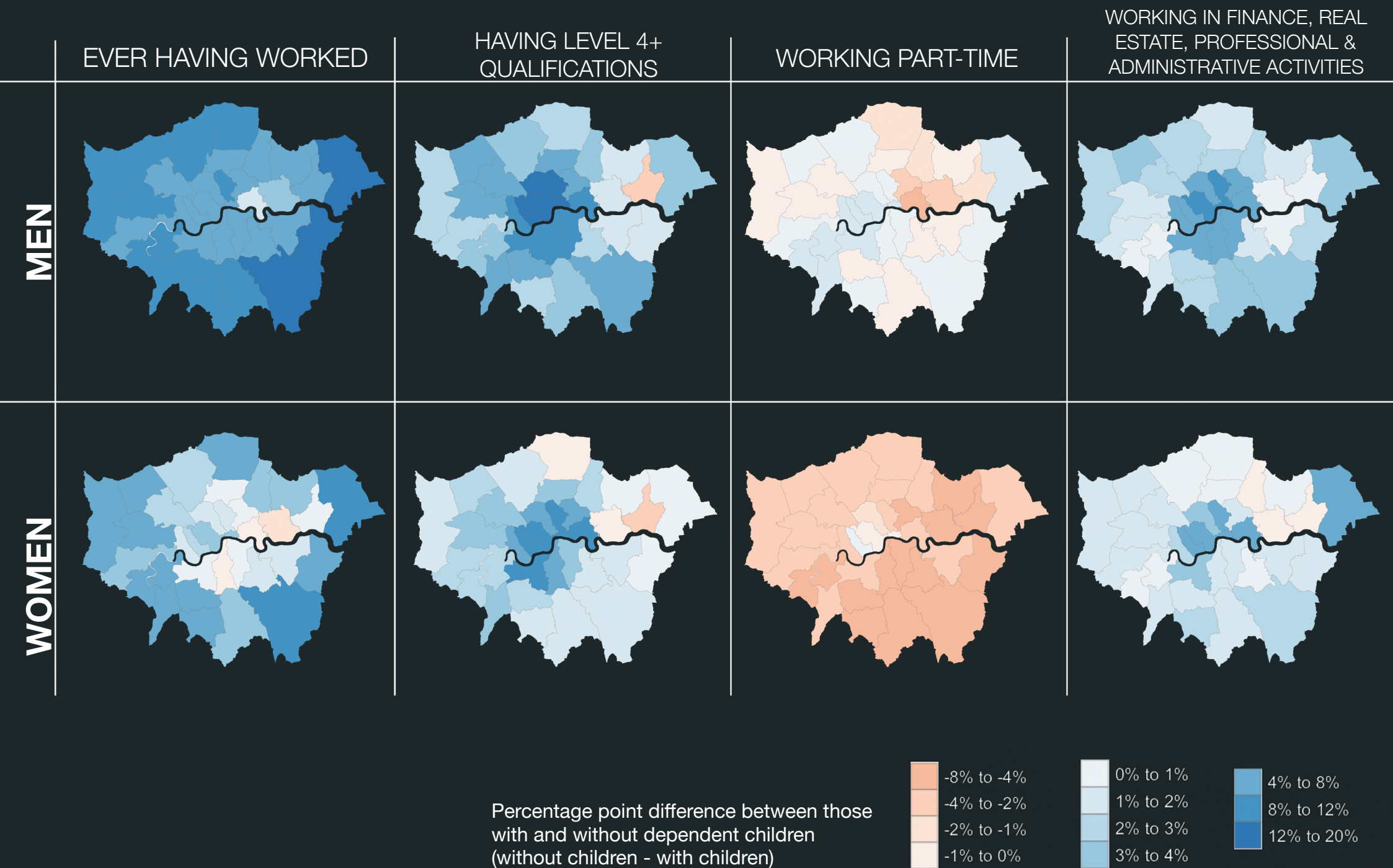
**Figure 10 : Taken from Hamnett (2003: 2411)**

For men, the clustering of part-time workers is less substantial. 'High-high' clustering appears through Enfield, and further east into Newham. Some 'low-low' clustering is found further out; perhaps more full-time workers exist here, potentially commuting fathers from families in Outer London.


**Figure 4.** Percentage change in house prices in London boroughs, 1995–2002.

# The effect of having children on ...

**Figure 11**



A Greater London Authority report analysed the effect of having children on economic activity; finding greater disparities between women with and without children (up to a 25 percentage point difference) than for men (GLA 2015). Taking the same Census Microdata, Figure 11 investigates the effect of having children on several other variables. Generally across men and women, those with children are less likely to have ever worked, to have Level 4+ qualifications, and to work in 'Finance, Real estate, Professional & Administrative activities'; and are more likely to work part-time. However, these effects vary across gender, and across London - particularly between Inner and Outer London.

The effect of children on ever having worked is greater for men than women; particularly in East London, where there is a difference of up to 20 percentage points in the proportion who have ever worked between men with and without children.

Across genders, the difference in the proportion that have Level 4+ qualifications between those with and without children is greater for Inner London, with especially large differences in Hammersmith & Fulham, Kensington & Chelsea and Islington. For women, there is a smaller effect of children on having advanced qualifications in the outer boroughs, with a maximum of a 3-4 percentage point difference. In Barking & Dagenham, having children appears to increase the likelihood of having advanced qualifications.

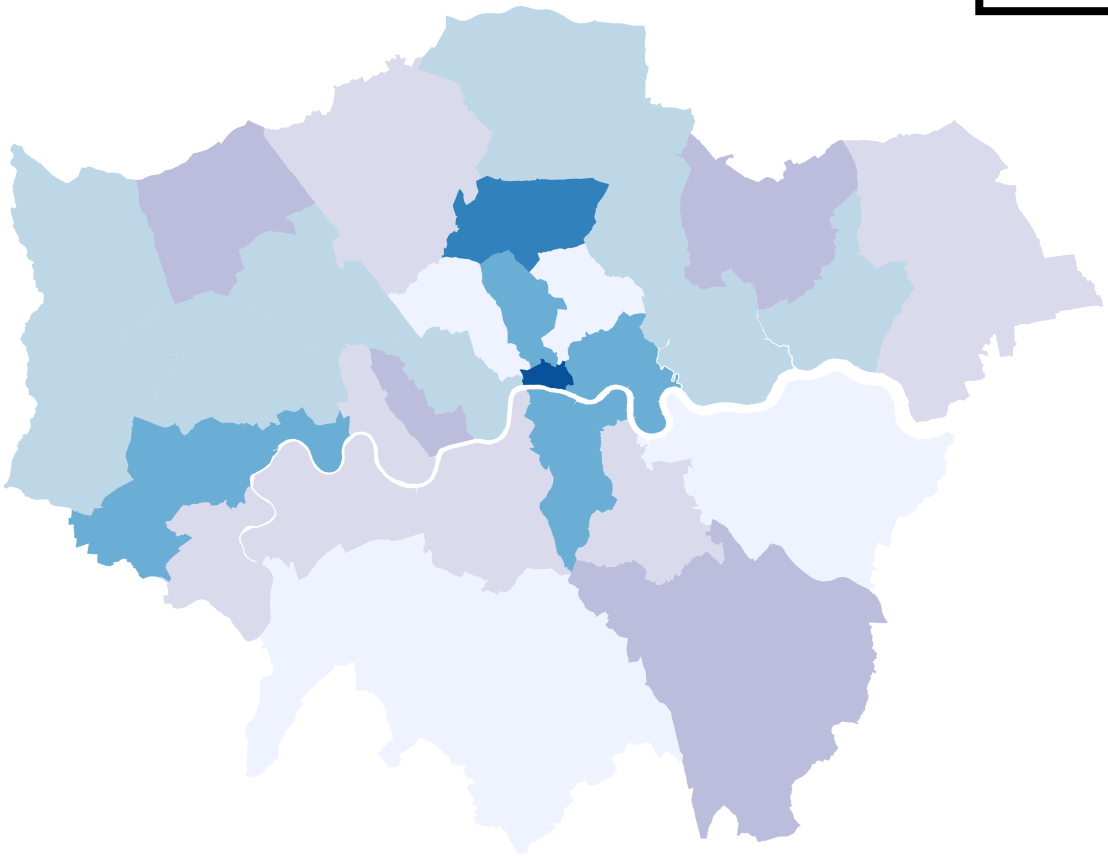
Having children has great influence over working part-time for women. In Figure 9, clusters of lots of part-time workers were found in South East London. Figure 11 demonstrates that in this area, women with children are up to 8 percentage points more likely to work part-time than women without children. This effect is much smaller for men.

The effect on working in 'Financial, Real estate, Professional & Administrative activities' is spatially similar across genders. Having children reduces the likelihood of working in these sectors overall, but to a greater extent in Inner London.

Figure 12

# Outnumbered?

## Proportions of employees




**Number of male employees for every 1 female employee**

- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.2
- 1.2 to 1.4
- 1.4 to 1.6
- 1.6 to 1.8
- 1.8 to 2.0

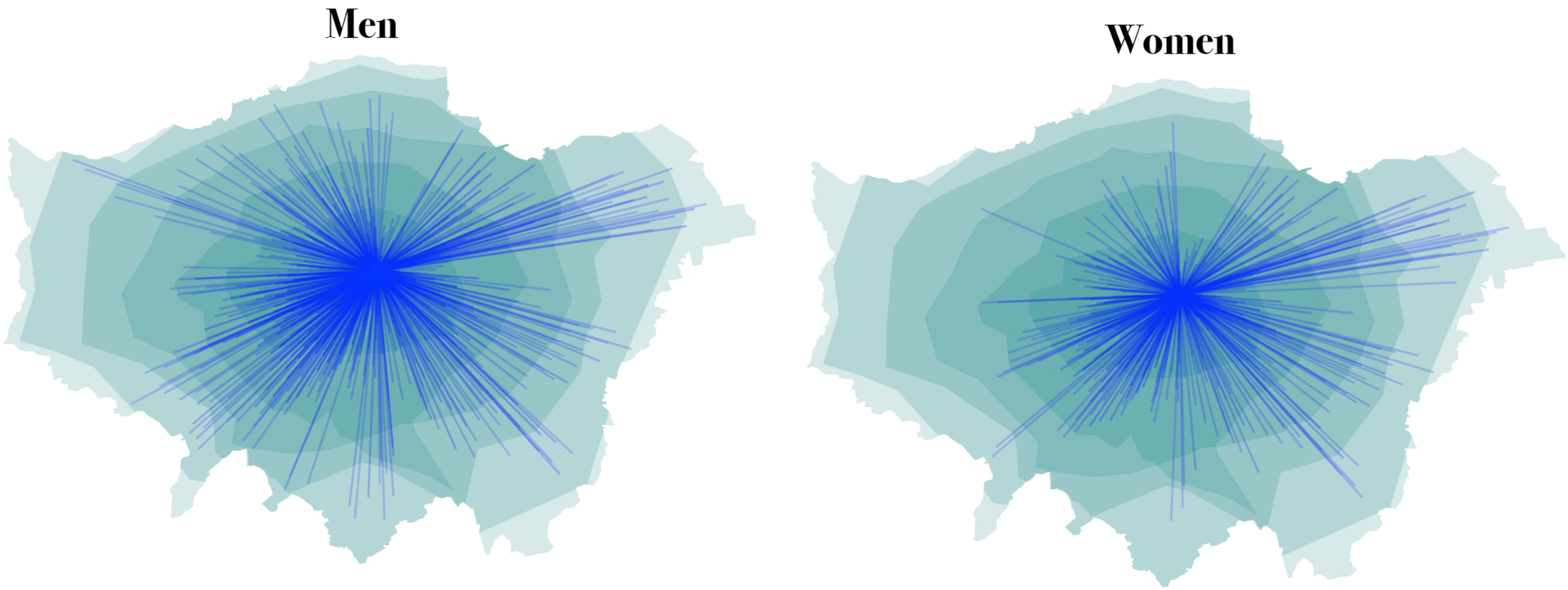
The balance of male and female employees varies significantly across London's boroughs. Figure 12 takes Harrow and the City of London as examples of the largest disparities. In the City of London, for every female employee, there is close to double (1.85) male employees. Yet, there is never any less than 0.85 men for every woman; as there is in Harrow.

Interestingly, there is a North-South divide in the proportions, as well as the Inner-Outer divide. South of the river, only in Southwark are there more male employees than female, however North London is dominated by male workers. In particular, Haringey has 1.73 men for every woman, the next largest difference after the City, and even Hounslow far to the West has many more male employees than female.

Figure 13

# Gender is not just about women

## The cost of working in the City



As Figure 12 revealed, many more men work in the City of London than women. Additionally, Figure 6 revealed that the City is dominated by industries like finance that are often more highly-paid. However, there is the additional cost of travelling to work in the City.

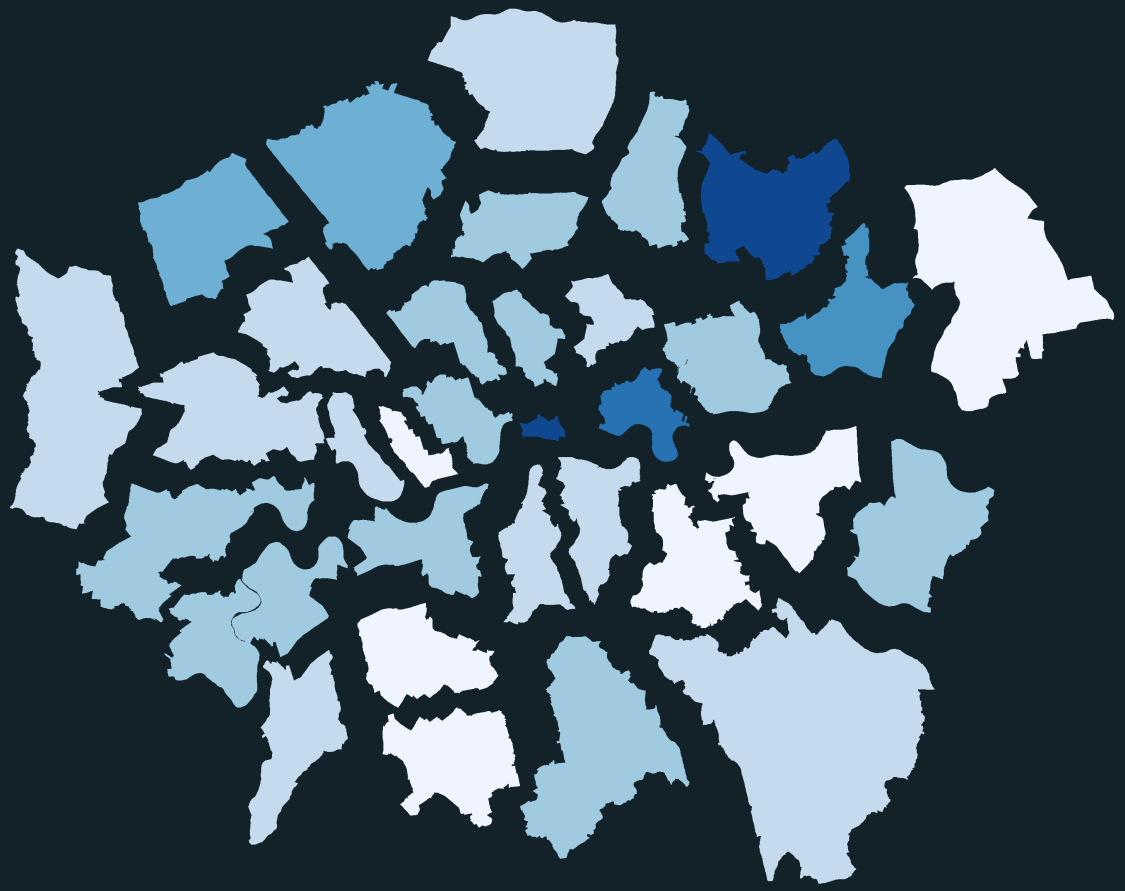
Figure 13 shows the residence-to-workplace flows of men and women working in the City, along with the London Transport Zones; given that 43% of all journey stages in London in 2011 were made by public transport (TfL 2016: 29). Millions of people commute into the City every day, and this comes at a substantial cost, that can make up a significant proportion of one's salary.

Figure 13 clearly shows both the greater volume and length of men's commutes into the City, many hundreds of journeys extending into the outer Transport Zones, particularly from West London. An annual adult Travelcard from Zone 7 to Zone 1 costs £2,708 - close to 10% of that median annual salary of a job in 'Finance, Real estate, Professional & Administrative activities' (ONS 2018).

Figure 14

# The London Gender Pay Gap

There is no borough across London in which women earn, on average, the same as men.



Women's earnings as a proportion of equivalent men's earnings

- 70% to 73%
- 73% to 75%
- 75% to 78%
- 78% to 80%
- 80% to 85%
- 85% to 90%
- 90% to 97%

The gender pay gap is one of the most commonly written about and talked about concerns with regard to gender inequalities, particularly more recently in the media (*The New York Times* 3 February 2018; *The Guardian* 28 February 2018; *BBC* 21 March 2018). Figure 14 shows women's average weekly earnings as a proportion of equivalent men's earnings. These data are a mean of earnings over the last 5 years (2013-2017), and they reveal that there is no borough across London in which women earn, on average, the same as men.

The closest women get to equal pay is in Havering, where women earn 96% of the earnings of their male counterparts, on average. Again, the City of London has the greatest gender gap, where women only earn, on average, 70.1% of equivalent men's earnings.

# Conclusion

This social atlas has explored how the spatialities of employment, health, lifestyle and travel differ remarkably by gender across London. In general, women experience longer lives, more part-time work and lower earnings. However, gender is not all about women; it has also revealed implications that men face, such as longer, more expensive commutes. It has provided some insight into these disparities, and given the array of gender-based data available, I hope it functions as a starting point of evaluating gender further through spatial analysis.

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# Appendix 1: Data sources

- **Figure 2: Where do we tweet about gender?**
  - base maps retrieved from Stamen Maps, using 'get_stamen_map' function in the 'ggmap' package
  - geotagged tweets retrieved using Twitter API calls of various queries through the 'streamR' package
  - **PLEASE NOTE:** owning to there being a maximum file size on the ZIP file upload of 160MB, I have had to exclude some of my JSON files containing tweets for queries relating to 'International Women's Day', 'TimesUp' and 'March4Women'. As such, the code for this map will create a different one to Figure 2 with far fewer points plotted, but will still give an idea of how I plotted it from the other JSONs still included. I hope you will appreciate that this was the best solution I could think of!
  - International Women's Day events and locations retrieved from the below web sources:
    - Museum of London's 'Votes for Women' Exhibition:
      - https://www.museumoflondon.org.uk/museum-london/whats-on/votes-women-museum-london
    - Southbank Centre's 'WOW - Women of the World' festival:
      - https://www.southbankcentre.co.uk/whats-on/festivals-series/women-of-the-world
    - Marguerite London's International Women's Day Party:
      - http://margueritelondon.com/upcoming-events/2018/3/8/international-womens-day-party
    - CARE International's 'March4Women' at Trafalgar Square:
      - https://www.careinternational.org.uk/march4women
    - National Trust's 'Suffragette City' immersive experience at the London Pavilion, Piccadilly Circus:
      - https://www.nationaltrust.org.uk/features/suffragette-city-
    - Queen of Hoxton's 'Hip Hop Karaoke International Women's Day Special':

- https://queen-of-hoxton.eventcube.io/events/10752/hip-hop-karaoke-international-womens-day-special

- **Figure 3: Difference in life expectancy**
  - London MSOA & borough shapefiles from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
  - ONS: 'Life Expectancy (LE) and Healthy Life Expectancy (HLE) at Birth by Sex for Middle Layer Super Output Areas (MSOAs) in England, 2009-2013'
    - https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/datasets/lifeexpectancyleandhealthylifeexpectancyhleatbirthbysexformiddlelayersuperoutputareasmsoasinengland
    - Life expectancy for men & women at MSOA level extracted, and the difference between them found by subtracted women's life expectancy from men's life expectancy
  - MSOA atlas from the London Datastore
    - https://data.london.gov.uk/dataset/msoa-atlas?q=msoa%20atlas
    - Proportion living on means-tested benefits extracted at MSOA level

- **Figure 5: Proportion of single people**
  - London MSOA shapefile from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london

- ONS: Census table LC1108EW - Living arrangements by sex by age
  - https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=848
  - used ‘nomis’ to query data online, specifying all MSOAs within the London region, all age categories, all living arrangements categories, for men & women

- **Figure 6: Most common industry**
  - London borough shapefile from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
  - ONS: Census table LC6118EW - Industry by sex
    - https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=1020
    - used ‘nomis’ to query data online, specifying all MSOAs within the London region, all industry categories, for men & women

- **Figure 8: Difference in economic activity by age**
  - London MSOA shapefile from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
  - ONS: Census table LC6107EW - Economic activity by sex by age
    - https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=1046
    - used ‘nomis’ to query data online, specifying all MSOAs within the London region, those economically active and economically inactive for all separate age groups, for men & women

- **Figure 9: Clustering of part-time workers**

- London MSOA shapefile from the London Datastore:
  - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
  - ONS: Census table LC6109EW - Hours worked by sex
    - https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=1011
    - used ‘nomis’ to query data online, specifying all MSOAs within the London region, data for all those working, and for those working part-time, for men & women

- **Figure 11: The effect of having children on…**
  - London borough shapefile from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
  - Department for Education: New local authority codes: January 2011
    - https://www.gov.uk/government/statistics/new-local-authority-codes-january-2011
    - a lookup table between old and new Local Authority codes
      - only new Local Authority codes and names extracted simply to merge with names of Local Authorities in the micro data
  - UK DataService: 2011 Census Microdata Individual Safeguarded Sample (Local Authority): England and Wales
    - https://discover.ukdataservice.ac.uk/catalogue?sn=7682
    - local authority grouping lookup CSV file used to identify and subset only London Local Authorities
    - within the micro data codebook, the following variables were used in analysis:
      - GROUPED LA: Local Authority
      - SEX: Sex
      - DPCFAMUK11: Family dependent children

    - EVERWORK: Ever worked
    - HLQUPUK11: Level of highest qualifications
    - HOURS: Hours worked per week
    - INDGPUK11: Industry of business
  - these variables were converted into binary categories, as follows:
    - Family dependent children —> 0 = no dependent children, 1 = has dependent children
    - Ever worked —> 0 = has never worked, 1 = has worked
    - Level of highest qualifications —> 0 = does not have Level 4+ qualifications, 1 = does have Level 4+ qualifications
    - Hours —> 0 = does not work part-time, 1 = does work part-time
    - Industry of business —> 0 = does not work in finance, real estate, professional & administrative activities,
      1 = does work in finance, real estate, professional & administrative activities
  - data was separated into 4 data frames: men with & without children, and women with & without children
    - after aggregating the total number of individuals by local authority, I plotted the percentage point difference between those with and without children for both men & women

- **Figure 12: Outnumbered? Proportion of employees**
  - London borough shapefile from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
  - Workplace Employment by Sex and Status, Borough, 2016, from the London Datastore
    - https://data.london.gov.uk/dataset/workplace-employment-sex-and-status-borough
    - number of employees for men and women extracted

- number of male employees divided by the number of female employees

- **Figure 13: Gender is not just about women: the cost of working in The City**
  - London transport zones shapefile
    - created by me, using Google MyMaps
      - zone polygons derived by connecting up stations in each zone, and then clipping the outer zones to the GLA boundary for a recognisable 'London' shape
        - these were reprojected with the British National Grid coordinate system in order to plot the eastings and northings used in the residence & workplace data
      - available at: https://www.google.com/maps/d/edit?mid=1RhW0c-hk7QWczhaWRP4xa4QS7fRtK3cy&ll=51.51429616242985%2C-0.1387144499999522&z=10
  - Transport for London: Adult caps and Travelcard prices
    - http://content.tfl.gov.uk/adult-fares-2018.pdf
    - Prices for Annual Adult Travelcards from Zones 2-7 into Zone 1 taken from table to create legend on Transport Zones shapefile
  - London MSOA shapefile from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
      - data frame of MSOA names & codes extracted to merge with MSOA codes of residence & workplace data
  - CDRC: 2011 Residence-Workplace Geodata Pack - City of London (E09000001)

- filename: ‘wu01ew*msoa*E09000001*City*of_London.csv’
- https://data.cdrc.ac.uk/dataset/cdrc-2011-residence-workplace-geodata-pack-city-of-london-e09000001
  - includes a variable called ‘flow_geom’ which contains a string of the eastings and northings of both the residence MSOA and workplace MSOA
    - this string was divided into columns of origin and destination eastings and northings, in order to plot ‘geom_segment’ flow lines using ‘ggplot2’ package

- **Figure 14: The London gender pay gap**
  - London borough shapefile from the London Datastore:
    - https://data.london.gov.uk/dataset/statistical-gis-boundary-files-london
      - this was used to plot a facet of boroughs in order to edit in Photoshop to created an ‘exploded’ borough effect
  - Earnings by gender, and full-time/part-time, from the London Datastore
    - https://data.london.gov.uk/dataset/earnings-by-gender-and-full-time-part-time
    - full-time average weekly earnings for men & women extracted and averaged over the past 5 years (2013-2017)
    - calculated women’s average weekly earnings as a proportion of equivalent men’s average weekly earnings (women’s divided by men’s)