

Changing Places: Lessons using data skills

Lesson 5: Connections and flows: How is the younger face of London changing?

Lesson objectives

- To investigate the ethnicity of non-UK born children living in Royal Greenwich and the connections they have with distant places
- To investigate how educational outcomes vary with ethnicity and explore the changing composition of ethnic groups in Royal Greenwich

Setting the scene

Every ten years the Office for National Statistics (ONS) publish census data for the UK, this results in a huge dataset that provides information about a wide range of socio-economic data. Census data such as population size, ethnicity and level of education can be compared each decade to show longitudinal changes over the last 210 years, as the first census was completed in 1801. The wide range of data collected in the modern census was not collected in the early years, therefore not all datasets go back to 1801.

The nature of places worldwide are continuing to change as people become ever more mobile. According to the Office of National Statistics (ONS, 2011) there are approximately 64,676 children and young people under the age of 18 years live in Royal Greenwich. More than half the children and young people in the borough are from Black and minority ethnic groups (BME). This compares with 22 per cent in the country as a whole. There are over 150 languages spoken by children in Royal Greenwich ([Borough report](#)). The BME population in Royal Greenwich has increased quite rapidly from 29.5 per cent in 2001 to 47.7 per cent in 2011 (ONS, 2011) and the White population has fallen by 12 per cent.

Children from BME groups will often have connections to friends and family in distant places. When people move from one place to another they bring their own culture, identity, religious beliefs and food with them. The effect of this can be seen in Greenwich. For example, you can buy Italian gelato from Black Vanilla, traditional North Indian food from Mogul, Ethiopian food from Greenwich market and traditional pie and mash from Goddards. There are many other connections to be found if you look carefully. To take this further a virtual trip using Google Street View will help find evidence of these connections to distant places. Start a search with the SE10 8NN postcode. This will take you to Greenwich Library, which is fairly centrally located.

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Tasks

1. Which ethnic groups are represented in the resident child population of Royal Greenwich?

Create a set of suitable graphs to represent the data in Figure 1. The data is available in an Excel Workbook called [Ethnicity data for Greenwich](#).

Tip: As you are comparing data, choose the same type of graphs and use the same scale for the axes. The nominal data would suit a bar chart, or could create pie charts. You could combine the data onto one graph, but be careful to colour code the different groups of people or ages.

2. How variable is the attainment level for the different ethnic groups in Royal Greenwich?

Investigate the data to see how attainment levels vary, using three measures of dispersion (range, inter-quartile range and standard deviation).

- Calculate the range – the difference between the highest and lowest value.
- Work out the inter-quartile range (IQR) by ranking the data, dividing it into four equal groups and noting the boundary at 25 per cent (LQ) and 75 per cent (UQ). As this data has 24 ethnic groups, there will be six groups in each of the four equal groups or quartiles. The interquartile range represents the spread of the middle 50 per cent or middle 12 groups.

$$\text{IQR} = \text{UQ} - \text{LQ}$$

- Standard deviation (SD) is a measure of the degree of dispersion about the mean value.

$$\sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

- Calculate the standard deviation by calculating the mean \bar{x} (add all attainment values then divide by the total number of values, in this case $n = 24$).
- Calculate the difference between each value (x) and the mean value (\bar{x}).
- Square each difference $(x - \bar{x})^2$ to remove negative values.
- Total these values and divide by the total number of values, in this case $n = 24$ to calculate the variance.
- The final step is to square root the variance to find the standard deviation (SD).

What does the standard deviation tell us? Is the standard deviation indicating that the data is clustered or more widely spread? What other information might be needed to begin to unpick this data and explain why certain ethnic groups achieve much higher exam results than others?

3. How has the ethnic composition of the Royal Greenwich changed over time?

Draw a comparative bar graph to show how the total number of individual ethnic groups has changed between 2001 and 2011 in the Royal Borough of Greenwich. A comparative bar graph is used to compare two sets of data on the same axis; in this case census data comes from 2001 and 2011. You may want to present all data from 2001 in a different colour to the data from 2011. Then describe the trends shown by the graphs.

Plenary

Discussion: How might the changing face of London affect the lives of young people growing up in the capital? (Start by thinking about connections and flows such as culture, shopping, food and social activities) Is the demographic composition in Greenwich representative of other areas across London and further afield?

Take it further

Present educational outcomes data on a choropleth map (using data in Figure 2) according to the countries with which students identify. By mapping the geospatial data, you will be able to see whether there is a geographical pattern – a relationship between where students come from and educational attainment.

Tip: As you can see, in 2015 pupils achieved between 14 and 81 per cent 5+ A* - C grades. This data will need to be split into five roughly equal groups. Assign a colour to each group. Ideally, the colours should be shades of one colour such as blues or reds, the darkest colour associated to the highest data group. On a world map shade the relevant country according to attainment, this can be done by hand or with a suitable GIS platform. Some data will not be possible to map, so leave it out. Add a key, title and then describe any patterns (unequal/ equal distribution, areas of high/low attainment and anomalies).

Figure 1 Resident child population, by age and ethnicity in Royal Greenwich

Ethnic Group		Age	Age	Age	Age	Under	Age	% Age
		0-4	5-9	10-15	16-17	18s	0-19	0-19
Asian	Bangladeshi	165	139	187	56	547	606	1%
	Indian	439	297	343	142	1221	1395	2%
	Pakistani	259	224	199	66	748	832	1%
	Other Asian Background	893	766	958	342	2959	3394	5%
Asian sub-total		1756	1426	1687	606	5475	6227	9%
Black	Black African	4349	3473	3205	925	11952	12757	19%
	Black Caribbean	457	537	650	210	1854	2099	3%
	Other Black Background	1020	822	654	170	2666	2795	4%
Black sub-total		5826	4832	4509	1305	16472	17651	26%
Mixed	White and Asian	507	295	248	91	1141	1211	2%
	White and Black African	728	443	333	81	1585	1648	2%
	White and Black Caribbean	690	555	588	227	2060	2247	3%
	Other Mixed Background	595	407	402	160	1564	1673	2%
Mixed sub-total		2520	1700	1571	559	6350	6779	10%
White	White British	8295	6661	8740	2958	26654	30485	45%
	White Irish	99	84	97	39	319	382	1%
	Other White Background	1649	959	890	303	3801	4216	6%
	Gypsy Roma/Irish Traveller	56	39	46	21	162	175	0%
White sub-total		10099	7743	9773	3321	30936	35258	52%
Other	Chinese	316	228	286	95	925	1065	2%
	Other Ethnic Group	428	396	298	92	1214	1335	2%
Other sub-total		744	624	584	187	2139	2400	4%
Black and Minority Ethnic		12650	9664	9384	3020	34718	37830	55%
% Black and Minority Ethnic		60%	59%	52%	51%	57%	55%	
All ethnicities total		20945	16325	18124	5978	61372	68315	100%

Source: ONS Census 2011

Figure 2 Pupils in each ethnic group achieving 5+ A* - C grades (including English & Maths) at Key Stage 4 in 2015 in Royal Greenwich

Ethnic Group		No.of pupils	% 5+ A*-C inc. E&M		
				$x - \bar{x}$	$(x - \bar{x})^2$
Asian	Bangladeshi	20	65		
	Indian	45	76		
	Pakistani	36	69		
	Other Asian Background	89	66		
Black	Black Caribbean	78	53		
	Black Ghanaian	51	55		
	Black Nigerian	217	71		
	Black Somali	72	61		
	Other Black African	120	62		
	Other Black Background	80	49		
Mixed	White and Asian	20	80		
	White and Black African	45	60		
	White and Black Caribbean	65	62		
	Other Mixed Background	69	62		
White	White British	832	50		
	White European	120	60		
	White Irish	19	53		
	Gypsy Roma	7	14		
	Turkish or Turkish Cypriot	34	56		
	Other White Background	22	41		
Other	Chinese	30	73		
	Vietnamese	26	81		
	Other Ethnic Group	21	52		
Black and Minority Ethnic		1287	62		
All Pupils		2157	58		

Source: Royal Greenwich Children's Services (2015)

Figure 3: Ethnic Group Comparison between 2001 and 2011 Census

Ethnic Group		2001 Census	2011 Census	2001-11 % change
Asian	Bangladeshi	1236	1645	33.1
	Indian	9389	7836	-16.5
	Pakistani	1909	2594	35.9
	Other Asian Background	2044	12758	524.2
Asian sub-total		14578	24833	70.3
Black	Black African	15312	35164	129.6
	Black Caribbean	6782	8051	18.7
	Other Black Background	1693	5440	221.3
Black sub-total		23787	48655	104.5
Mixed	White and Asian	1353	2361	74.5
	White and Black African	933	2699	189.3
	White and Black Caribbean	2175	4011	84.4
	Other Mixed Background	1389	3203	130.6
Mixed sub-total		5850	12274	109.8
White	White British	151291	133130	-12.0
	White Irish	4871	4291	-11.9
	Other White Background	9195	21581	134.7
White sub-total		165357	159002	-3.8
Other	Chinese	2540	5061	99.3
	Other Ethnic Group	2378	4732	99.0
Other sub-total		4918	9793	99.1
Grand Total		214490	254557	18.7

Source: ONS Census Table UV09 Ethnic Group (2001) & Table QS201EW Ethnic Group (2011)