



## UK 2011 Census Data

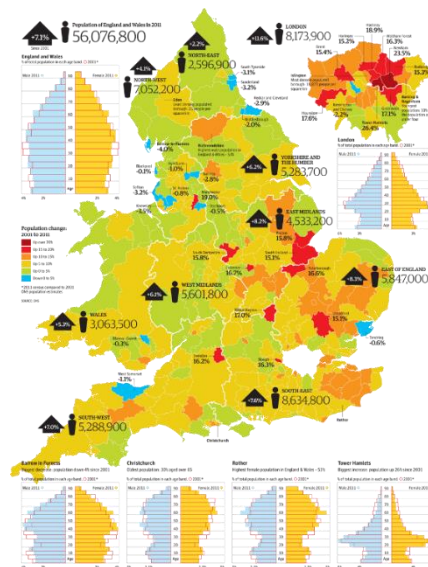
This activity will allow students to explore the 2011 census data using GIS and understand how the census is so important for influencing decision making

🕒 30 – 45 mins

## Introduction

This exercise will allow students to explore census data using GIS and understand why the census is important for helping influence decision making. Students will become familiar with the data included within the census and will be able to display the data using online GIS mapping tools.

As of the 2011 census conducted by the UK Government, England and Wales were home to 56 million people living in 25 million different households (Scotland run their own census separately, but normally at the same time). The census is a way of collecting information about the people living in each household updated every 10 years by the Government, giving them a range of information about all people and households in England and Wales. 94% of households completed the 2011 census hence the Government is able to understand in detail the socioeconomic profile(s) of England and Wales. Your household may have recently completed the 2021 census. The full census data is not available until 100 years after the census date for data protection purposes, but summary data is released in the years following each census, so some useful data is available from the 2011 census, which we will use in this exercise.



*Population map created using 2011 census data (Source: The Guardian)*

The census groups (aggregates) people together based on the areas where they live, known as census output areas, which at the smallest scale typically contain a maximum of 250 households. For each of these areas we can only access generic information, for example, we can only see the number of people who work in a particular industry rather than specific job titles of individuals.

Census data can be used to understand a range of areas such as employment, living arrangements and health. The census output areas are geographic and therefore we can use these to map the data as we will do during this exercise. The census is useful for demonstrating the spatial distribution of data, by allocating values to each of the areas that can then be mapped using GIS and software such as DataShine.

## Learning Outcomes

In this practical, students will learn how to:

- Use free online census data maps
- Display census data variables
- Change symbology by selecting different colour ramps
- Analysing census data to explore economic activity and other variables
- Creating and exporting PDF maps

This activity is aimed at KS4 – KS5 students, however students of all ages are welcome to complete the activity.

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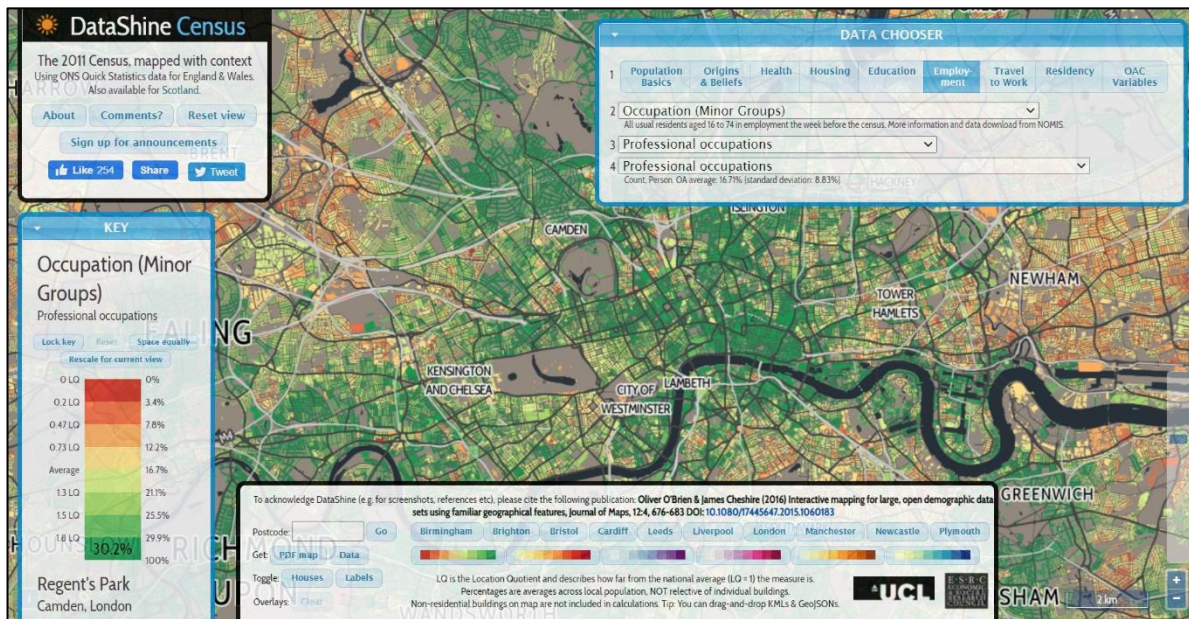
## Section 1: Displaying Census Data

This section will introduce how to use a website to visualise data for the 2011 census, the most recently available data.

### 1.1. Accessing DataShine

- a. Go to <https://datashine.org.uk/>

This should open a map in DataShine which looks something like this:



- b. Spend a few minutes exploring the map and getting familiar with the controls by scrolling in and out of different areas.

### 1.2. Displaying Data

- a. We are going to use York, North East England, as our example. Locate York either by using your knowledge of the UK or by typing in 'YO1' in the 'postcode' box using the 'options' toolbar which should be visible at the bottom of the screen.

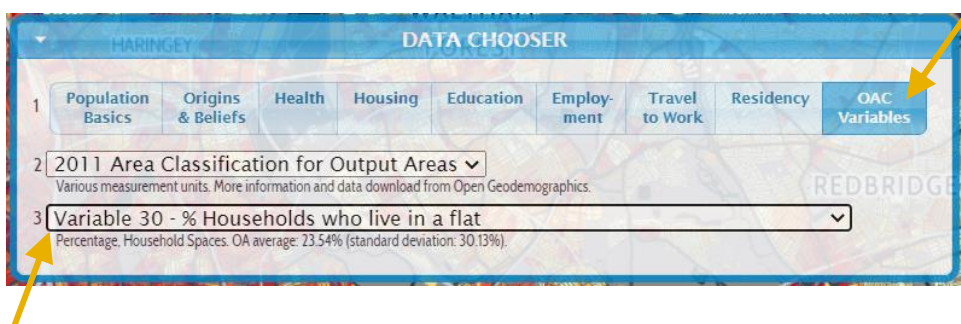


- b. We are going to look at the number of people who live in flats.

Often with census data we can predict certain patterns using our existing knowledge.

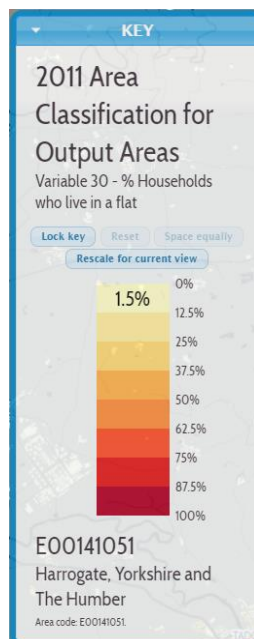
What part of the city do you expect to see the highest number of people living in flats (e.g., city centre, suburbs or rural areas)? (If you don't know York, think about a town or city you do know).

- c. In the Data Chooser toolbar in the top right corner, click on 'OAC Variables'. OAC stands for Output Area Classification and includes a list of various census records.



- d. From the drop-down menu, select 'Variable 30 - % Households who live in a flat'.
- e. Use the Key at the left-hand side to see what the colours mean.

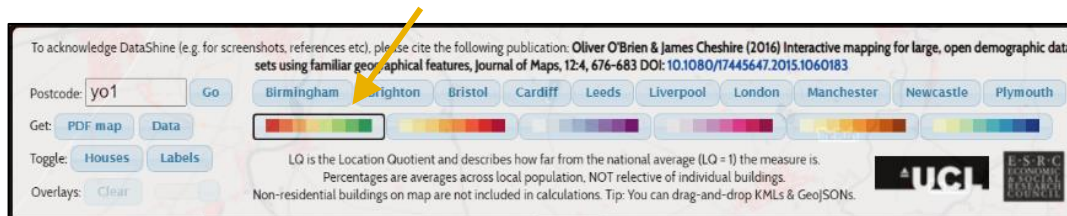
The red shows areas with a high percentage of households living in flats and the cream shows low percentages of households living in flats.



- f. Which areas have the highest percentage living in flats? Which areas have the lowest percentage living in flats?

### 1.3. Changing the Colour Ramp

- Colour ramps are useful for showing numeric data. Often, we use light colours to show low numbers and darker colours to show high numbers.
- Use the Options toolbar to change the symbology by selecting a different colour ramp. You can use this option with any of the datasets in this activity.



## Section 2: Investigating Commuting Behaviour

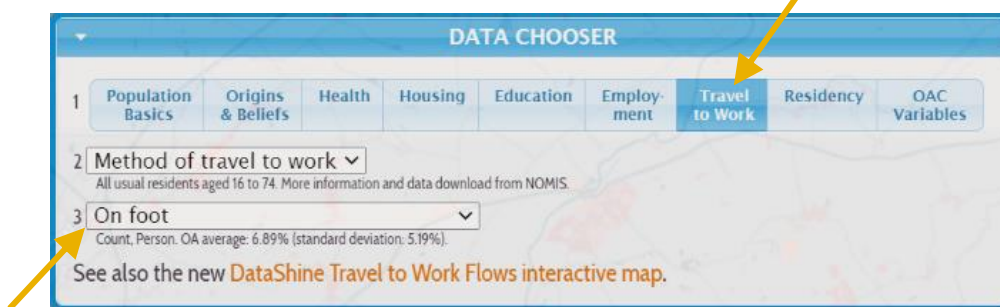
Symbology in GIS is very important as it refers to the way data is displayed, and the symbols or colours used to convey information.

### 2.1. Displaying Distances in DataShine

- a. We will now explore DataShine's features further.

In the Data Chooser toolbar, click on the 'Travel to Work' tab. Then select 'On Foot' from the drop-down menu.

This displays the number of people who travel to work on foot (walk/run).

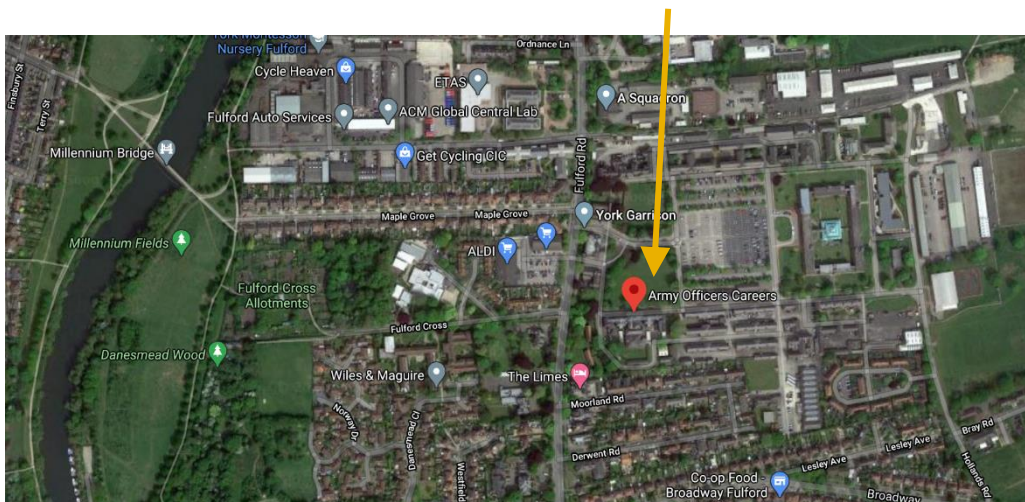


- b. You can select a different colour ramp to display the data more effectively (Section 2.1).
- c. What do you notice about the map?

Most people who walk to work in York also live in or near the city centre.

There is a small area in the South of the City where lots of people walk to work and this could be seen as an outlier (something we might not expect to see). What might explain this unexpected observation?

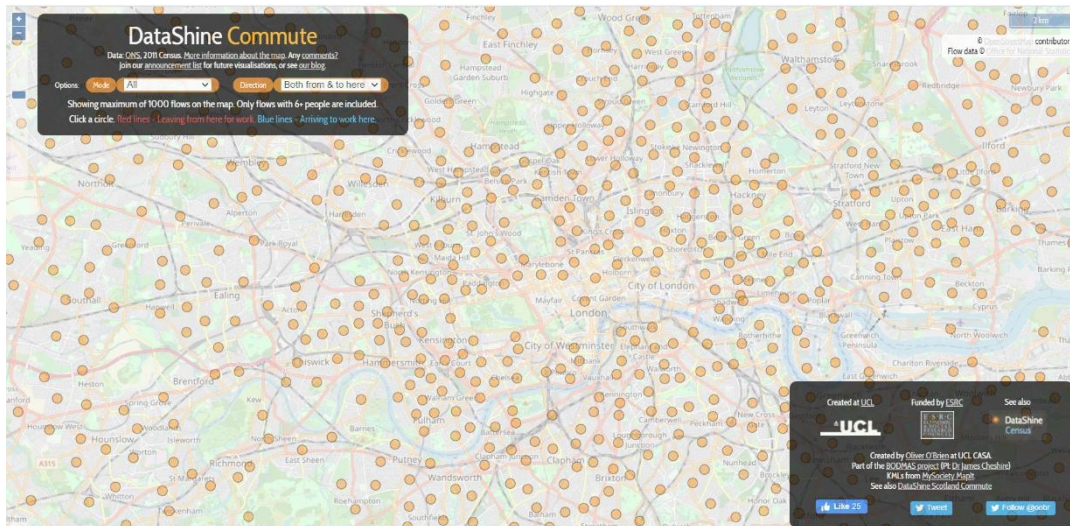
Using Google Maps, we can see that this area is an Army Barracks, so it is likely that those who work here also live at the barracks.



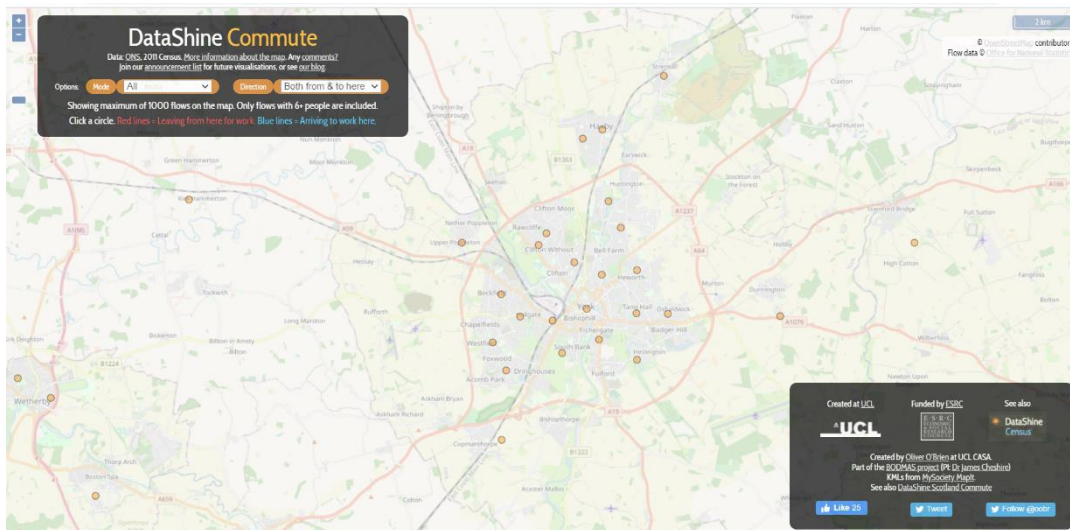
## 2.2. Displaying Distances in DataShine Commute

- a. Go to <https://commute.datashine.org.uk>

Although they are called a similar name, DataShine Commute displays census data in a slightly different way. This uses the 'Travel to Work' data explored previously to look in more detail at how people commute (travel) to work and where from.



- b. Navigate to York again by scrolling out and finding it on the map. It may be a little slower as there are many datapoints to load.



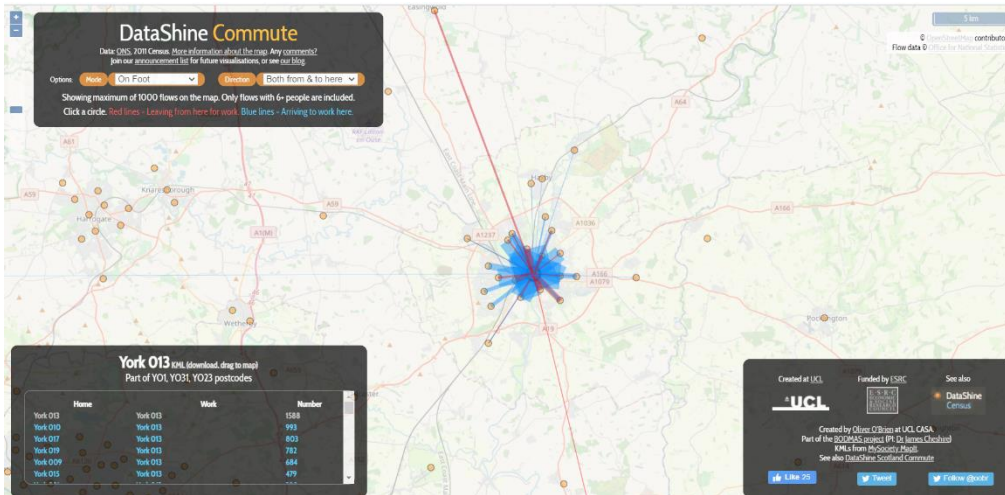
- c. Select 'On Foot' from the Mode list in the Options toolbar in the top left corner. Then select 'To here (from home)' in the Direction Menu.





This displays the number of people travelling towards the city centre using proportional symbology, where the thickness of the line varies to display commuter flow, with thicker lines representing a higher number of people commuting, and narrower lines a smaller number of people.

- d. Select the point located in York City Centre. This may take a minute to load but it shows the number of people who travel to work on foot and where they travel from.

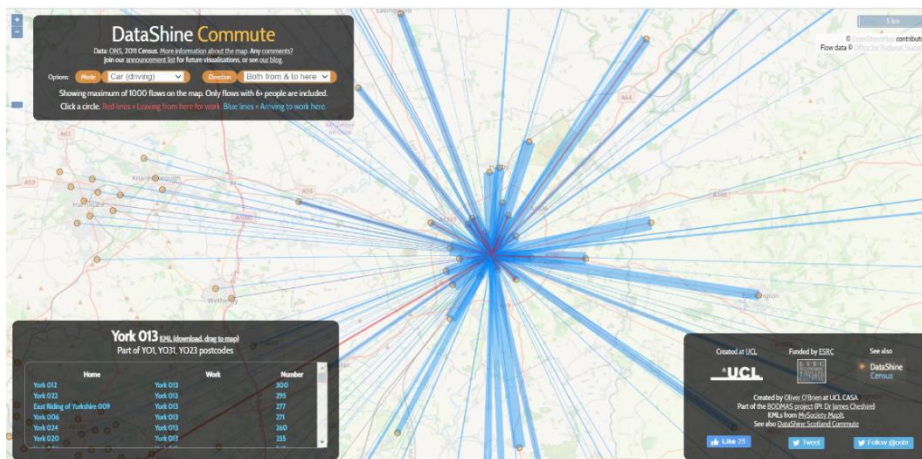


Take a moment to look at the data. Do you spot anything strange?

Apparently one person walks from Skipton to York (42 miles). Even if they ran that and were a marathon world record holder it would take them over 4 hours each way, which seems unlikely for a commute. It is much more likely that the person gets the train, then walks from the station to their work. This shows us that there are errors with the data as the census cannot capture multi-modal commuting methods.

- e. Change the transport method to 'Car (driving)' to see how the distance changes.

This shows that people who drive to work tend to travel much further than those who walk. Is this what you would expect? Change the mode of transport to see what effect this has on distances of commutes.



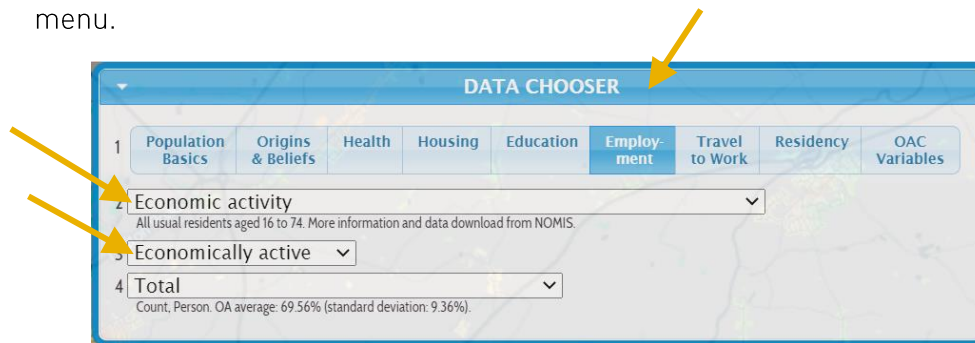
- f. Look at the other methods of transport and compare your findings.

## Section 3: Interpreting Census Data

Being able to extract data from the census is extremely useful as it helps the user to have a better understanding of the area they are looking at.

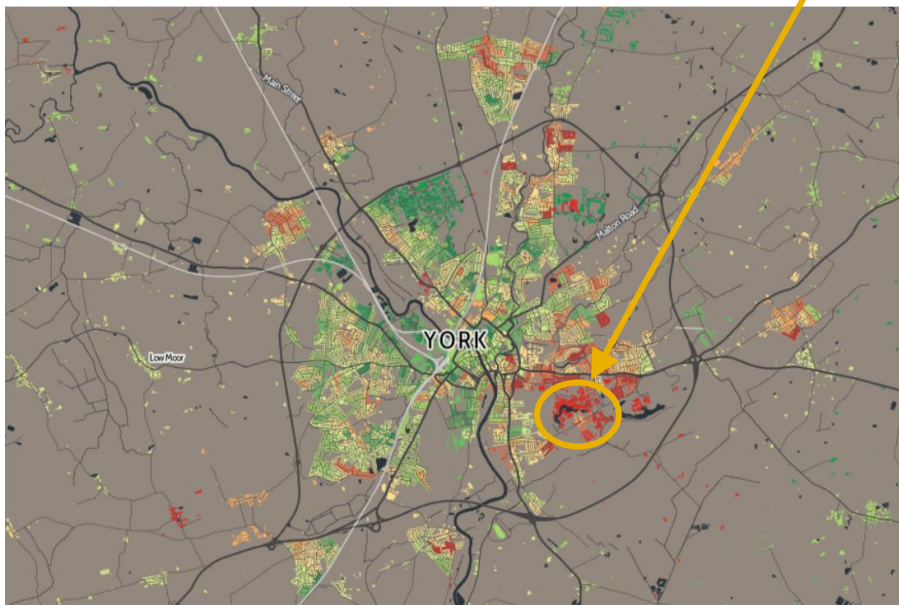
### 3.1. Exploring Economic Activity

- Return to York on the original DataShine website: <https://datashine.org.uk/>
- From the Data Chooser toolbar, click on the 'Employment' tab. Select 'Economic Activity' from the drop-down menu, then select 'Economically Active' from the next menu.



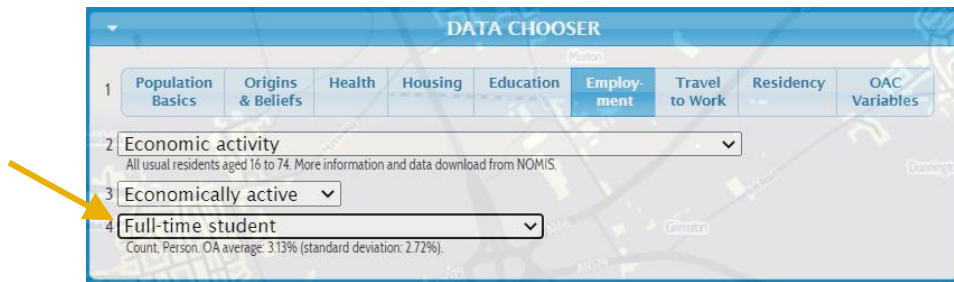
This displays the number of people who are economically active (have a job) in York.

- What do you notice about the map? Are there any areas with particularly high or low areas of economic activity?
- If you zoom into the area South East of York, you can see an area where the number of economically active people is low. if you look carefully by zooming in you will see why.



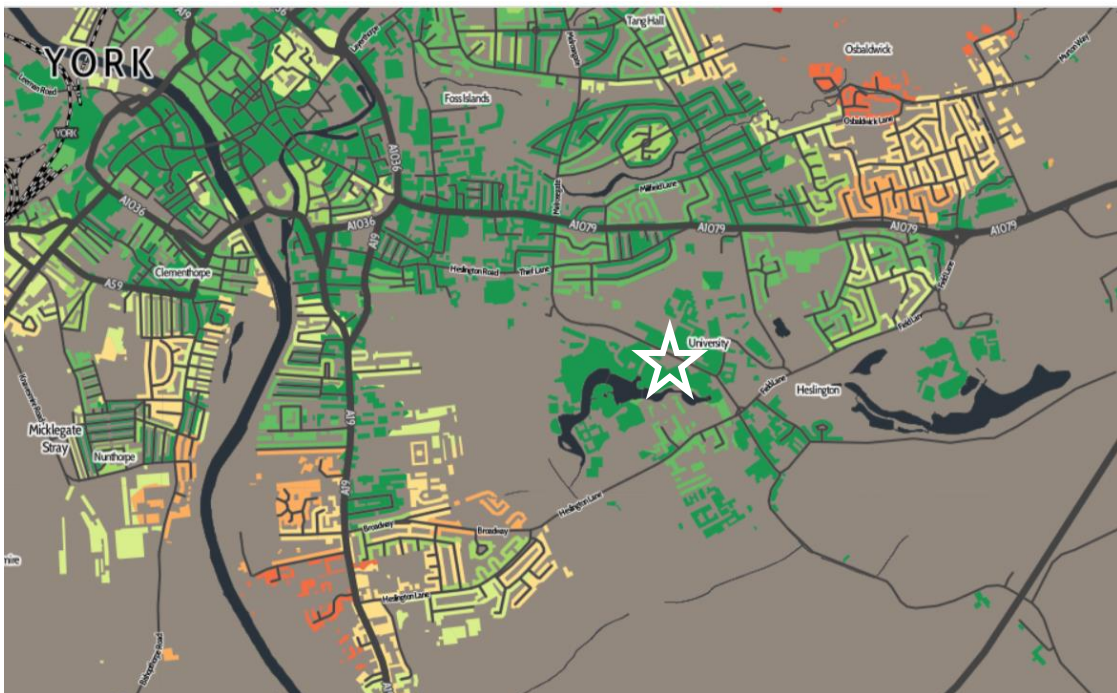
This is the location of the University of York, where lots of students live and may not have jobs if they are studying full-time.

You can check this by changing the 'Count' to 'Full-time student' rather than 'Total'.

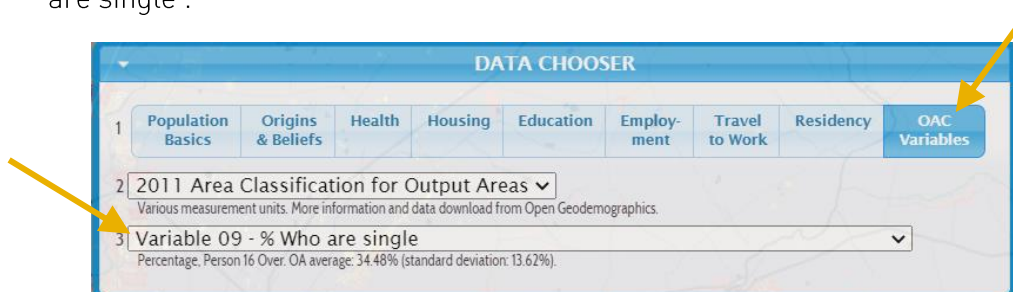


### 3.2. Analysing Economic Activity

- a. The next part of this practical will focus on the University of York. We can extract useful information about the people living at the university campus by using the key.

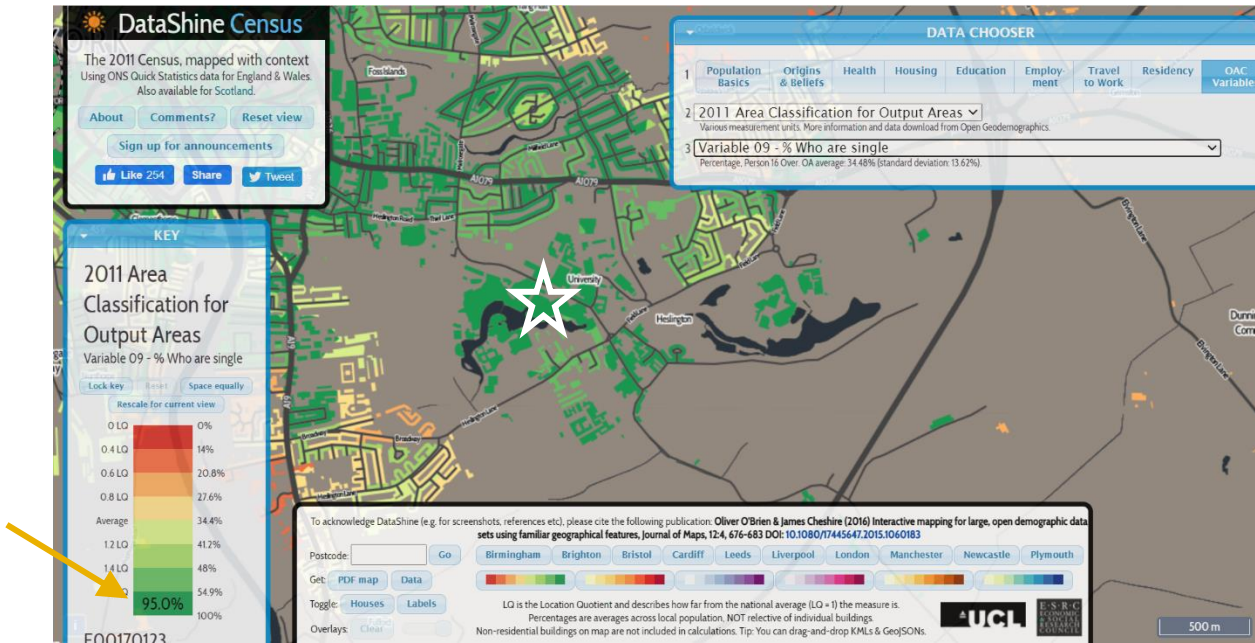


- b. In the Data Chooser toolbar, click on the 'OAC Variables' tab. Now select any variable from the drop-down menu. For this example, we have chosen 'Variable 09 - % Who are single'.



- c. First, make a prediction about what you would expect to see and enter it into the table on the next page, for example, 70% of people living in this area identify as single.

- d. Use your mouse to hover over the university (indicated with a star), then record the percentage that is displayed by the key in the 'actual percentage' column.



Census Variable (Find using the 'data chooser' toolbar)	Expected Percentage	Actual Percentage
OAC Variables → 2011 Area Classification for Output Areas → Variable 09 - % Who are single	70%	95.0%
OAC Variables → 2011 Area Classification for Output Areas → Variable 08 - % Living in a *communal establishment		
OAC Variables → 2011 Area Classification for Output Areas → Variable 46 - % Work Part-time		
Health → General Health → Very good health		
Origins and beliefs → Main Language (detailed) → Spanish		

(\*A communal establishment is a place providing managed residential accommodation)

- e. Does the data fit with what you expected?
- f. Repeat for the other variables.
- g. This brief task gives examples of the types of data we can extract data from the census.

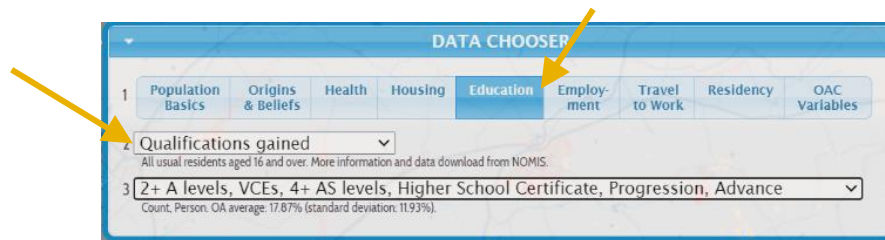
An example use of census data is to choose where to build new health services. Given the percentage of people with very good health at the university would you recommend building a new health service nearby? Why or why not?

## Section 4: Producing a Map of Census Data

A lot of GIS work involves exploring the relationship between numeric data and space using a range of techniques. The census includes lots of data but without a way of presenting this data it can become difficult to understand what exactly you are looking at. GIS offers numerous ways of analysing and presenting census data that increase the value of data by making it easier to understand and identifying hidden trends.

### 4.1. Exploring Qualifications

- a. In the Data Chooser toolbar, click on the 'Education' tab then select 'Qualifications gained' from the drop-down menu.



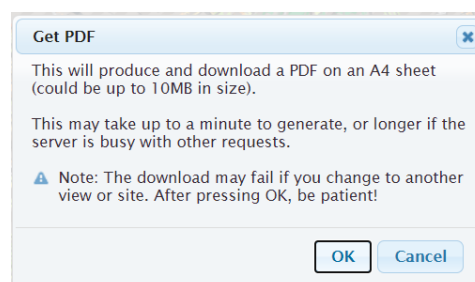
- b. Select '2+ A levels, VCEs, 4+ AS levels, Higher School Certificate, Progression, Advance' from the drop-down menu.
- c. This shows you the percentage of people in the area who gained any of the following qualifications: 2+ A levels, VCEs, 4+ AS levels, Higher School Certificate, Progression, Advance'.

### 4.2. Creating a PDF Map

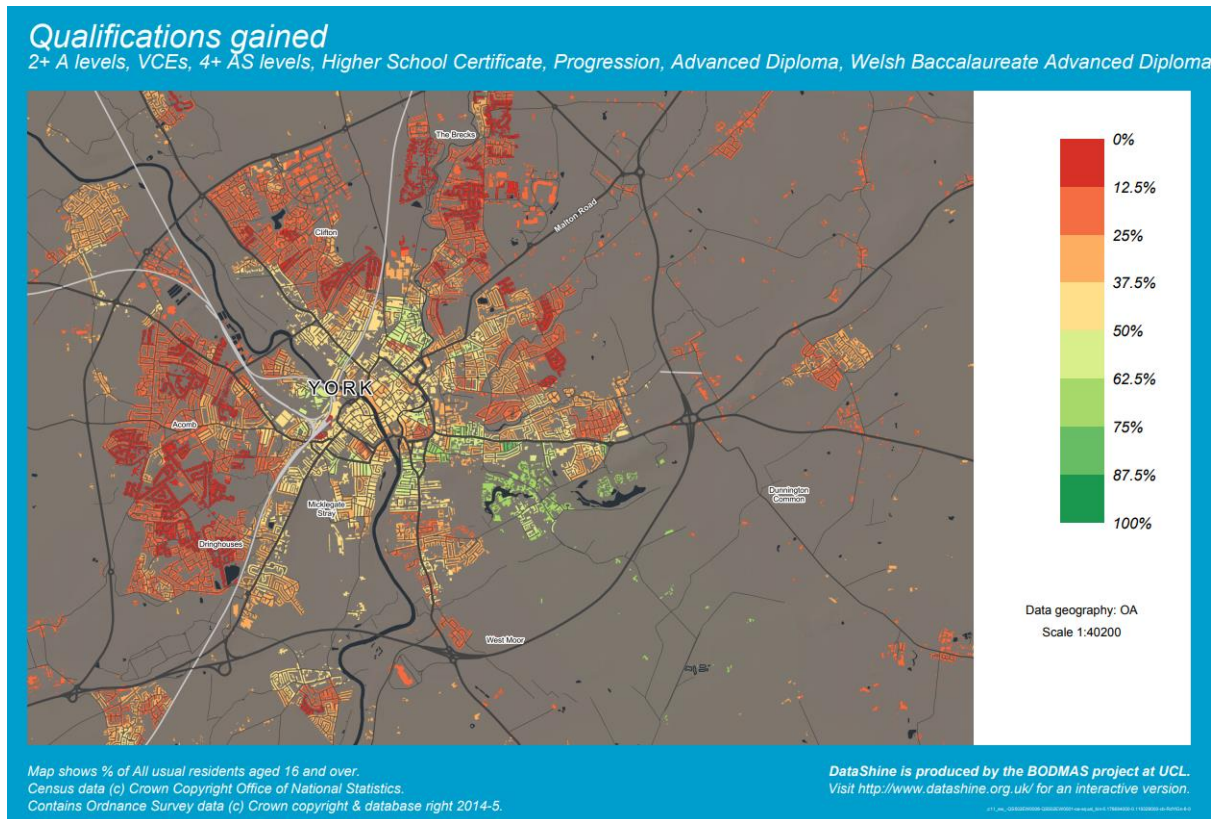
- d. You can produce your own map that you can save to your computer. On the left of the bottom toolbar, select 'PDF map'.



- e. A pop-up will appear. Click 'OK' to proceed.



- f. A PDF map will be generated for the area of the map you can see on your screen. You can save this on your computer.



- g. Now repeat the above steps with a nearby city or town.

## Section 5: Summary

This activity will allow students to explore the 2011 census data using GIS and understand how the census is so important for influencing decision making. For example, knowing the number of people who live in flats may indicate whether there is a need for new car parks in the area. This activity also highlights how the same dataset can be visualised in different ways, for example the number of people walking to work. Additionally, being able to extract data from the census is extremely useful as it helps the user to have a better understanding of the area they are looking at. This activity only gives a few examples of the types of data we can extract data from the census.

If you want to investigate further, repeat the activity with a town or city nearby and explore some of the other data using the 'data chooser' toolbar that we have not used in this practical.

This concludes the exercise.



# Geospatial UK

**This activity was created by  
Newcastle University on behalf of  
Geospatial UK.**

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**[www.geospatialuk.org](http://www.geospatialuk.org)**