

## Teacher Notes Correlation (PMCC)

### Getting started

Show the first slide of the powerpoint “Correlation world data”. Ask the students to think about which axis label belongs on which axis. Push for an explanation of why. You are looking for them recognising that the horizontal axis has negative values and therefore it doesn't make sense that this is birth rate.

At this point you may wish to probe their understanding further with questions like:

What trend does the data suggest? - Does this seem sensible?

How can an association like this be described? – *Do they remember the terms positive, and negative correlation.*

Do you think the association is strong or weak? How can you tell?

Are there any points which don't seem to fit the trend? Which ones? – *introduce the term outlier*

At this point they may be ready to start on the worksheet, alternatively you may want to use the teachers' spreadsheet “Correlation tasks – teacher sheet” to work with the students to identify the names of the countries they think are outliers.

You could discuss these with the students and decide if they feel they should be taken from the data set. (see answer section later in this document).

### Mini discussions during the lesson

The students sheet is structured to enable it to be worked through with minimal assistance, however to ensure that all of the key points are addressed, there are slides on the powerpoint which can be used periodically in the lesson. Use these slides in conjunction with the answers.

#### Answers

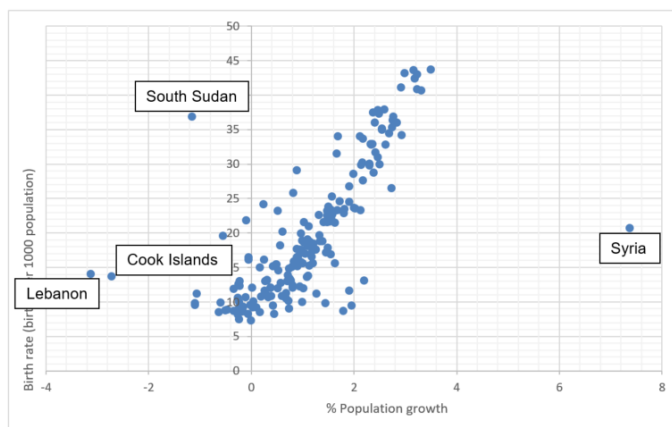
1. Work out which axis title is which and complete the statement below:

I think horizontal axis represents **% Population growth** because it has some negative values which would not make sense if it were birth rate. This means the vertical axis must be **birth rate**

2. Describe the general trend shown in the data.

The scatter diagram shows a positive correlation. As the % population growth increases, the birth rate also increases.

3. Possible outliers shown below



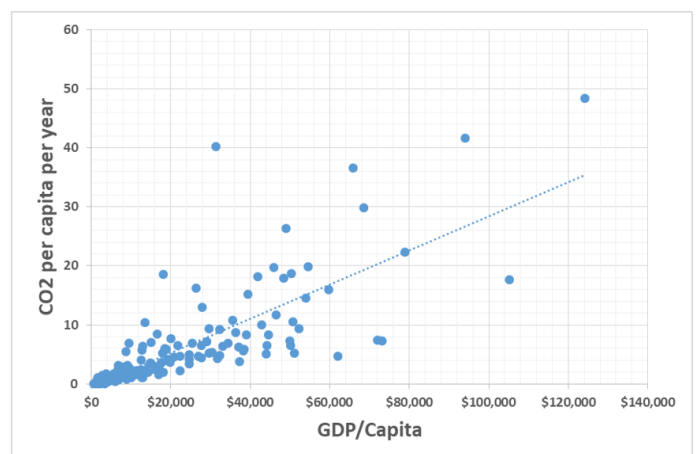
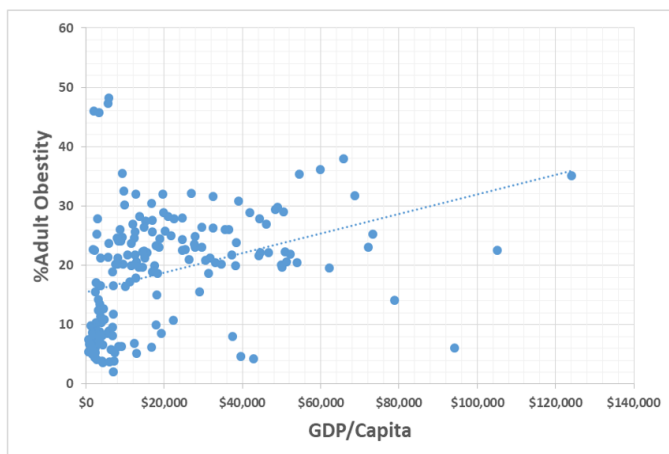
- See scatter diagram above for the names of countries which are possibly outliers.
- The population change which appears in the CIA World factbook is calculated by taking (births – deaths) + (people entering – people leaving) then dividing this by the population, this fraction is then expressed as a percentage.

The population growth figure for **Syria** is unusually high. Most other sources show a much smaller figure and some show a decline. All sources agree that determining a figure is very difficult under the current circumstances. **South Sudan** and **Lebanon** are also areas where conflict has made it difficult to obtain reliable data, so probably best to remove these three points. The **Cook Islands** has a very small population (17,800) in the *last census (2011)* this may make the percentage population figure sensitive to small changes, so this could also be considered for removal.

- Explain why GDP per capita may be better measure of wealth than GDP.  
*In general larger countries may earn more than smaller ones because there are more people to create wealth. Dividing GDP by the population gives a better indication of economic activity.*
- What general trend does this data show?  
*Countries with higher GDP/capita on average tend to generate more CO2 per person.*
- Can you suggest a possible reason for this trend?  
*In part it could be due to less agriculture and more industry in the countries with higher GDP per capita leading to greater energy consumption from fossil fuels. Other factors related to lifestyles such as car use, personal energy consumption will affect the figure also.*
- Which of the lines appears to fit the data better, the one in diagram A, or the one in diagram B?  
*(Explain your reasoning)*

Diagram A

Diagram B



*The line in diagram B appears to be the better fit, as the data points in diagram seem closer to the trend line than those in diagram A.*

- (See instruction sheet)
- See matchings on next page.

**(The Spreadsheet “Answers to Q11” has the actual values and the plots)**

