

Tutorial 18: Making tables and graphs based on database searches

To start analysing and to present your data it is very helpful to produce tables and graphs. In this tutorial you will learn how to use a spreadsheet programme, such as Google Spreadsheets, Open Office Calc, or Microsoft Excel, to create such tables and graphs.

To start

- Complete ***Tutorial 17: Searching the Database 2 – Advanced Search***.
- Make sure all the data you want to analyse have been entered into the database (see also the forthcoming tutorials on exporting and cleaning data).
- Make sure you have access to one of the following spreadsheet programmes:
 - Google Spreadsheets, accessible online via your browser. Free, but you need a Google account.
 - Open Office Calc. This is freely available and needs to be downloaded onto your computer.
 - Microsoft Excel. This is still the most used programme, which has the most advanced and user-friendly functionalities of the programmes mentioned here. The version you download onto your computer is paid-for, but you can access a free, more basic version online. For this you need to make a (free) Microsoft account.
 - For more information see the ***EAMENA-CPF training software requirements*** document on the website.

Step 1: Deciding on what to search for

First, you need to decide what it is you would like to know. For example:

- Are you interested in the types of sites that have been recorded in your area of interest?
- Or in the most common disturbances and threats?
- Or perhaps a combination of the two, where you want to know what the most common disturbances are for each type of site?

What you are asking will depend on the aims and objectives of the analyses that you are doing and the report or publication that you are planning to write. Once you know what information you would like to gather, you can decide which fields you need in your search(es). As you have learned in ***Tutorial 17: Searching the Database 2 – Advanced Search***, you can search by any field in the database and combinations thereof, as well as in combination with location and date searches.

- You should also decide if you want to take into account all the values in the fields, or only those that are, for example, of medium, high, and definite certainty.
- Or, you might want to take into account all values in your field of interest (e.g. Overall Condition), but only for those records that have a medium-definite Archaeological Certainty. Again, this will depend on your aims and the questions you are trying to answer.

Step 2: Setting up your spreadsheet

- Before conducting the actual searches in the database, open the spreadsheet programme of your choice.

- Open a new spreadsheet and save it.
 - Refer to the guidelines of the programme you are using if you don't know how to open or save spreadsheets in the programme.
 - Refer to what you have learned during the Basic Training about file naming and having a systematic folder system on your computer.
- Set up the different sheets in your spreadsheet.
 - Use one sheet (tab) for each topic, i.e. each database field. For example, one sheet for Interpretation, one for Condition, one for Disturbances, and one for Threats, and so on (Figure 1).
 - In each sheet, put the terms in each field (the ones in the Dropdown menu) in the rows (Figure 2a). Refer to the Glossary for the complete list of values and their exact spelling.
 - You can use the columns for numbers and percentages, and for different regions (Figure 2b).
 - Make sure to keep it as simple as possible. The aim here is to analyse your data, making a table look nice is better done in the final, presentation stage, and using text editing software like MS Word.

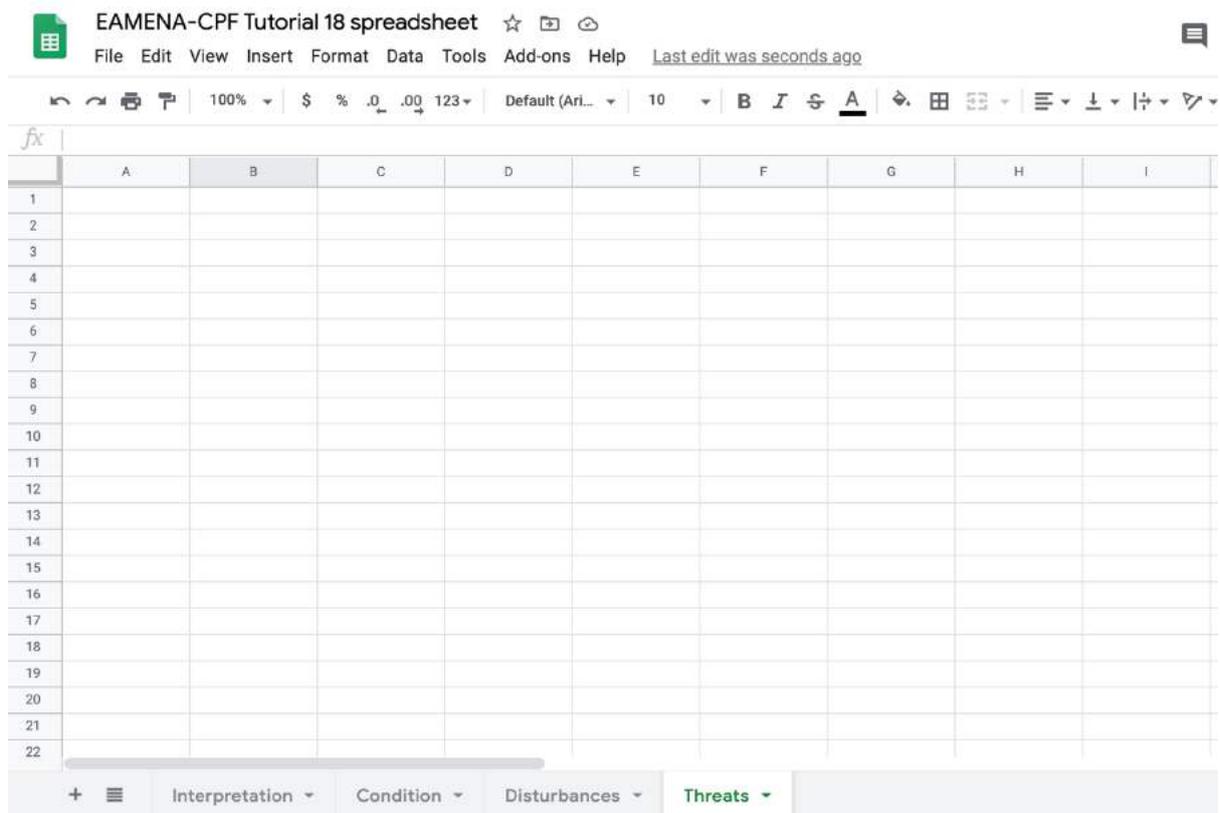


Figure 1: One sheet per topic or database field. Use the '+' button to add more sheets.

	A	B	C
1	Overall Condition	Number of records	
2	Good		
3	Fair		
4	Poor		
5	Very bad		
6	Destroyed		
7	Unknown		
8	Total		
9			
10			

Figure 2a: An example of a spreadsheet table setup, in this case for Overall Condition.

	A	B	C
1	Overall Condition	Karak Governorate number of records	Amman Governorate number of records
2	Good		
3	Fair		
4	Poor		
5	Very bad		
6	Destroyed		
7	Unknown		
8	Total		
9			
10			

Figure 2b: Spreadsheet setup for Overall Condition, comparing different regions.

Step 3: gathering the data by searching the database

- Using what you have learned in **Tutorial 17: Searching the Database 2 – Advanced Search**, conduct the required searches and enter the numbers in the spreadsheet.
 - For example, search for each of the Dropdown menu values of Overall Site Condition in Egypt (Figure 3) and enter the resulting numbers in the spreadsheet (Figure 4).

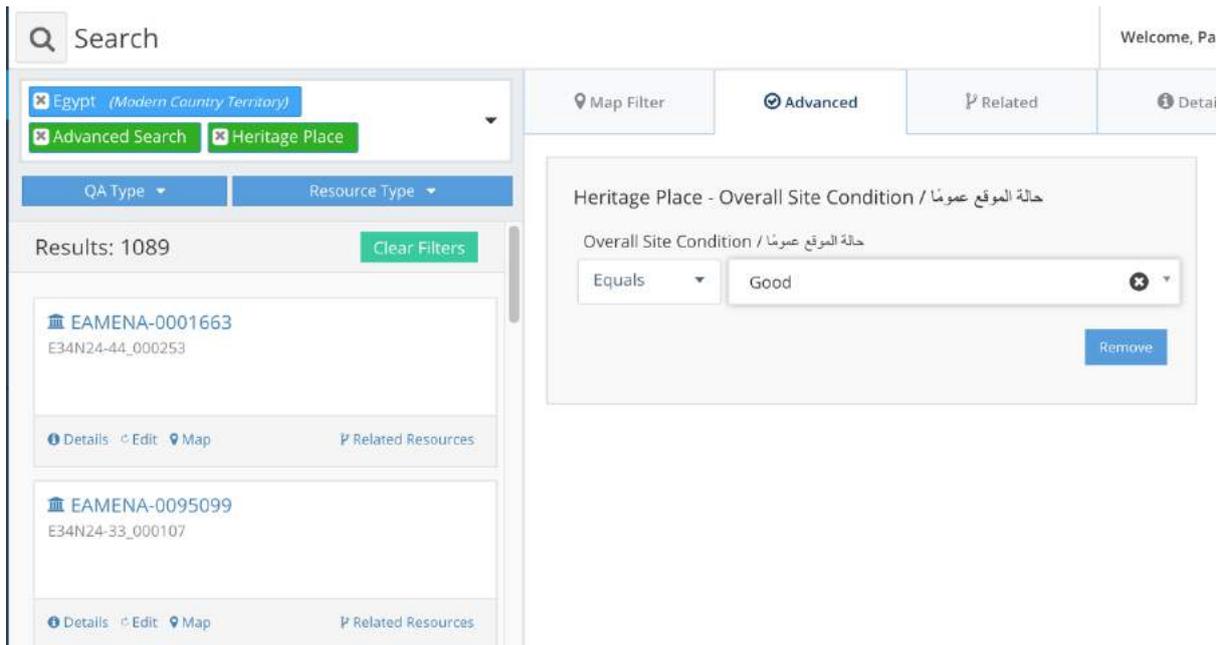


Figure 3: Searching for Heritage Place records in Egypt with a 'Good' Overall Condition; there are 1089 of such records.

	A	B
1	Overall Condition	Number of records
2	Good	1089
3	Fair	
4	Poor	
5	Very bad	
6	Destroyed	
7	Unknown	
8	Total	
9		
10		

Figure 4: Entering the number of Heritage Places with a 'Good' Overall Condition into the spreadsheet. Repeat for each value in this Dropdown by adjusting the search.

- It is very important to realize that the total is NOT the sum of the numbers. This is a common mistake. Because many of the fields in the database can have multiple values (e.g. a site with a Domestic and Agricultural/Pastoral function) you cannot just add up the numbers.
 - Instead, in the search box, type in the name of the field and select 'Concepts'. Click on the correct field. This gives the total number of records for which this field has been filled in (Figure 5). If you are only searching within a specific country or area, make sure to leave this part of the search intact as well.

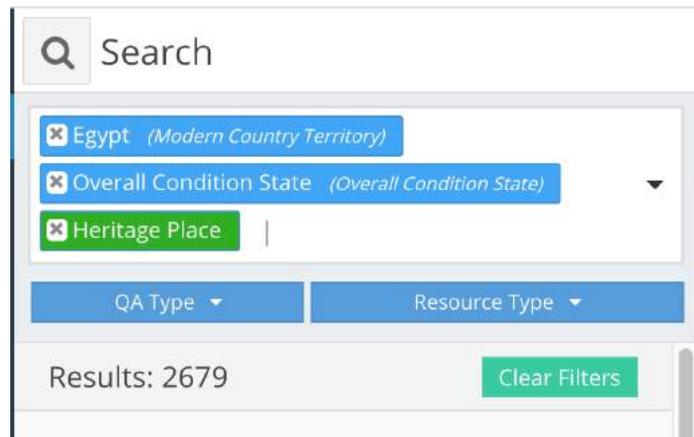


Figure 5: Searching for the total number of Heritage Place records in Egypt for which the Overall Condition field has been filled in. In this case the number is the same as adding up the values, because there is only ever one Overall Condition per record; for other fields this is, however, not the case!

Step 4: Percentages

To get a better understanding of your data, especially in relation to the data in the database as a whole, or in other countries or regions, it is very useful to calculate the percentages of the data.

- In the spreadsheet, in the column next to your numbers, type `'=B2/B8*100'` (Figure 6).
 - Instead of actually typing each cell number, you can also select the cells – the numbers might well be different in your spreadsheet, depending on which column you are doing this for.
 - The '\$' signs keep this cell in place when you are dragging your formula down (next step).
 - Instead of using `"*100"` (multiply by 100) in the formula, you can leave this out, and format the cell as a 'percentage'.
- Select the cell and drag this formula down until the end of the filled in rows (Figure 6).
 - For more information, see the online information for the programme you are using.
 - You can, and normally should, format the number in the cell to make it better readable (e.g. remove the decimal numbers) (Figure 7).

	A	B	C
1	Overall Condition	Number of records	% of records
2	Good	1089	40.64949608
3	Fair	589	21.9858156
4	Poor	207	7.726763718
5	Very bad	159	5.935050392
6	Destroyed	390	14.55767077
7	Unknown	251	9.3691676
8	Total	2679	100
9			

Figure 6: Calculating percentages for each of the categories.

Figure 7: Adjusting the number format in Google Spreadsheets.

Step 5: Making a graph

For your own understanding as well as to visualize the data for others, it is very useful to make a graph, or chart. For the kind of data in the database, a simple bar chart will generally be most suitable (but you can play around with the different graph types available).

- Decide what order you want the columns on the graph to be in: perhaps descending from highest to lowest percentage is clearer, especially if you have many values.
 - Select the WHOLE table and click on 'Data – Sort' to sort your data in a different order. Refer to the guidelines of each of the programmes for more information on sorting.
 - You can change this later if you are not happy with the resulting graph.

- Select the data you want to make a graph of (Figure 8).
 - You can put the columns so that the ones you need are adjacent, or you can use Control (Windows) or cmd (Mac) to select the data.
 - Do not select the 'total' row but include the column headers.

	A	B	C
1	Overall Condition	Number of records	% of records
2	Good	1089	41%
3	Fair	589	22%
4	Poor	207	8%
5	Very bad	159	6%
6	Destroyed	390	15%
7	Unknown	251	9%
8	Total	2679	100%
9			

Figure 8: Selecting the two columns relevant for the graph (column A for the labels, column C for the values; it is also possible to only select the value or data column C and add the labels to the graph later).

Then, find the relevant section below, depending on which software you are using for instructions on how to insert a chart:

- Google Spreadsheets
- Open Office Calc
- Microsoft Excel

Google Spreadsheets

- From the menu at the top of the page, choose 'Insert' and then 'Chart' (Figure 9).
- This opens the chart itself and the Chart Editor to the right of the page (Figure 10).
- In the Chart Editor:
 - In Chart type, choose 'Column chart'.
 - Leave Stacking to 'None'.
 - If you want to add or change data, you can do this in 'Data range' by clicking on the table symbol.
 - You can add a second series, for example for a different region here (Figure 11)
 - If you did not already add the X-axis values in the previous steps, you can do this under X-axis – three dots – add labels and select the labels (column A 'Overall Condition' in the example).

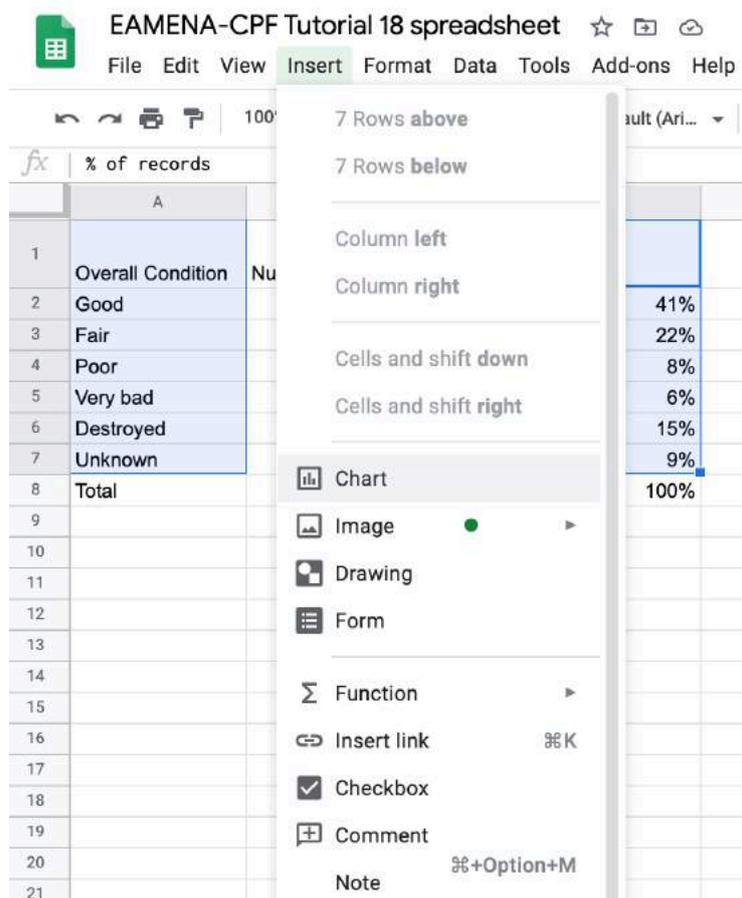


Figure 9: Choose Insert – Chart to add a chart in Google Spreadsheets.

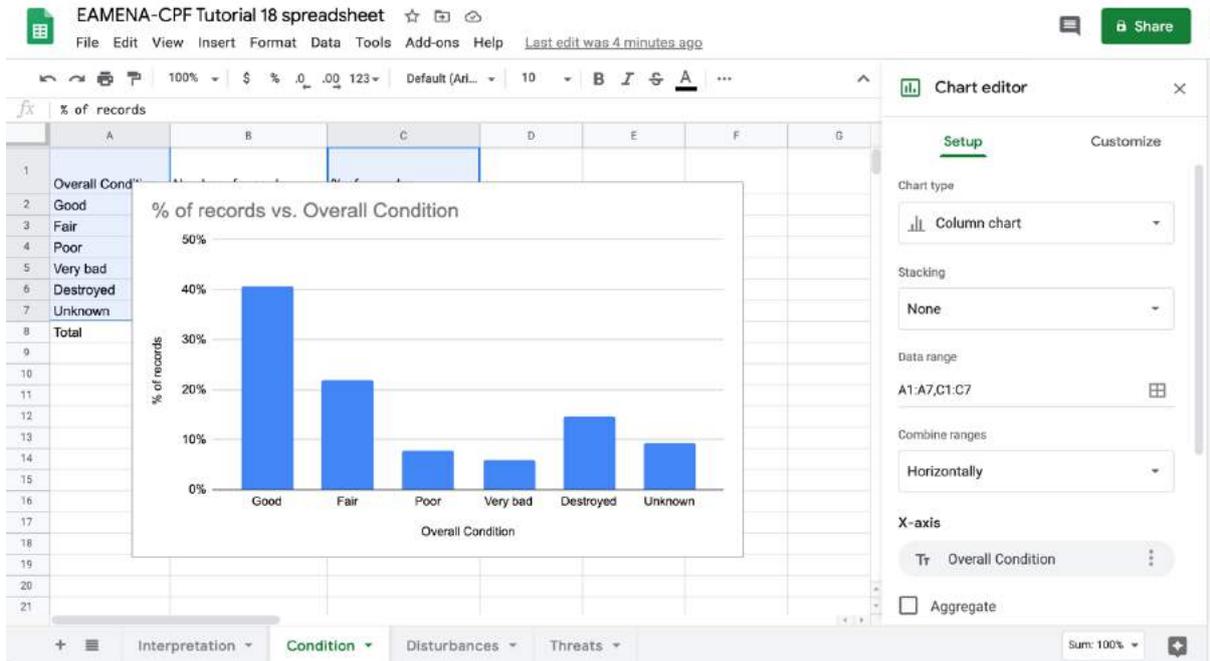


Figure 10: the produced chart and the Chart editor window to the right of the screen.

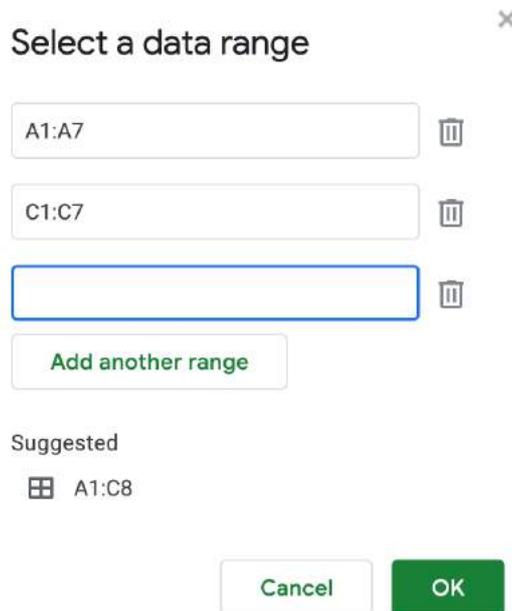


Figure 11: Adding more data to the graph, like a second column for a different region.

You now have a graph!

To change the layout:

- If the Chart editor is closed, click on the three dots in the upper right corner of the graph and choose 'Edit chart' (Figure 12).
- In the Chart editor, go to 'Customise' (Figure 13)

- Here you can add or edit the style of the chart, titles on the axes, the font on all of these, and much more. To find out more, play around with this, or refer to the [Google Spreadsheet help pages](#), especially [here](#).

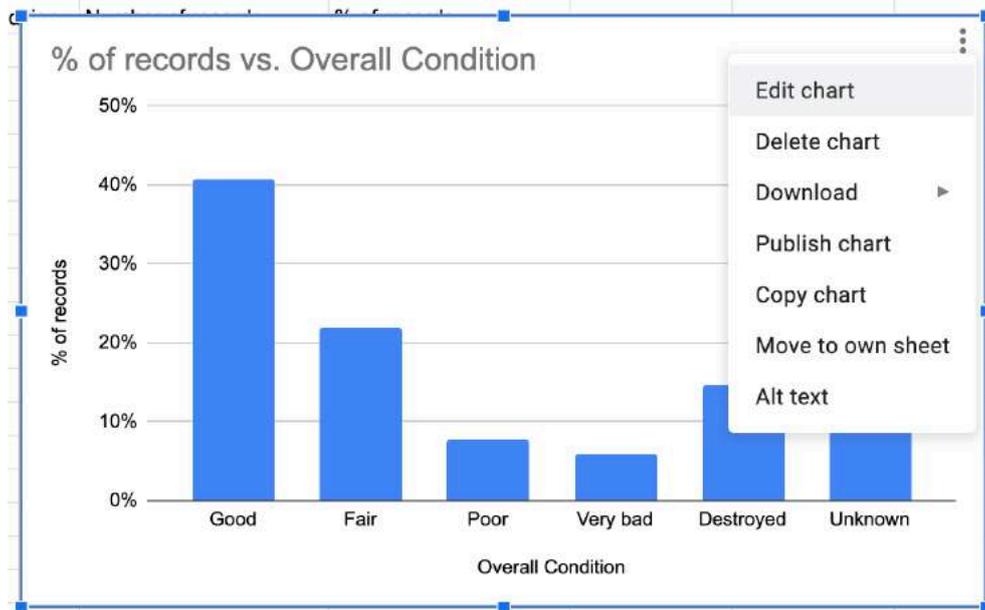


Figure 12: Opening the Chart editor.

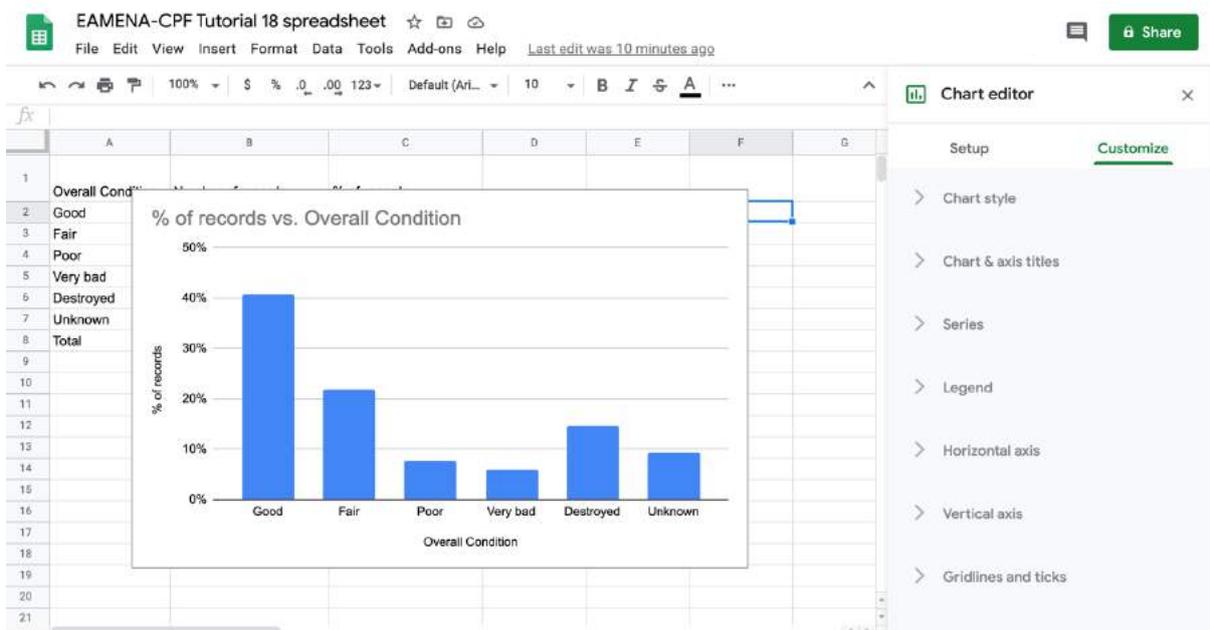


Figure 13: The Chart editor, Customize menu.

Open Office

- Choose Insert – Chart or click on the ‘Chart’ button in the menu bar (Figures 14a-b).

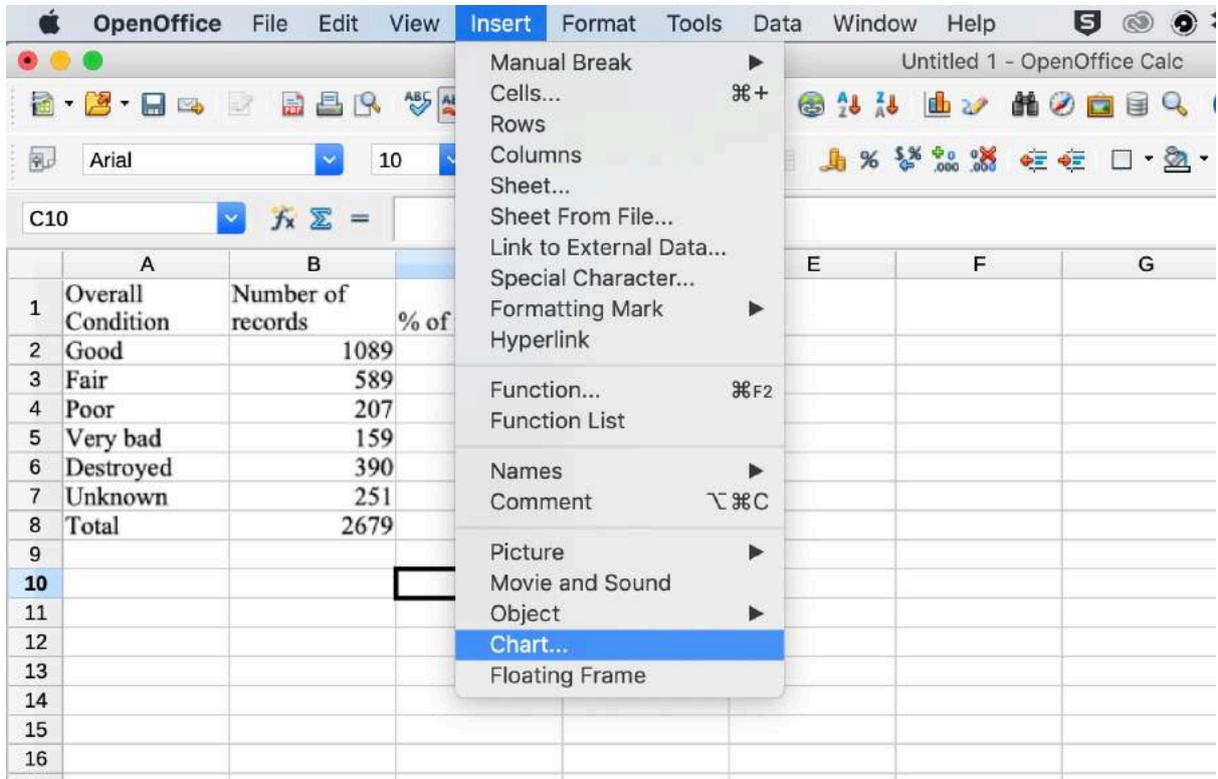


Figure 14a

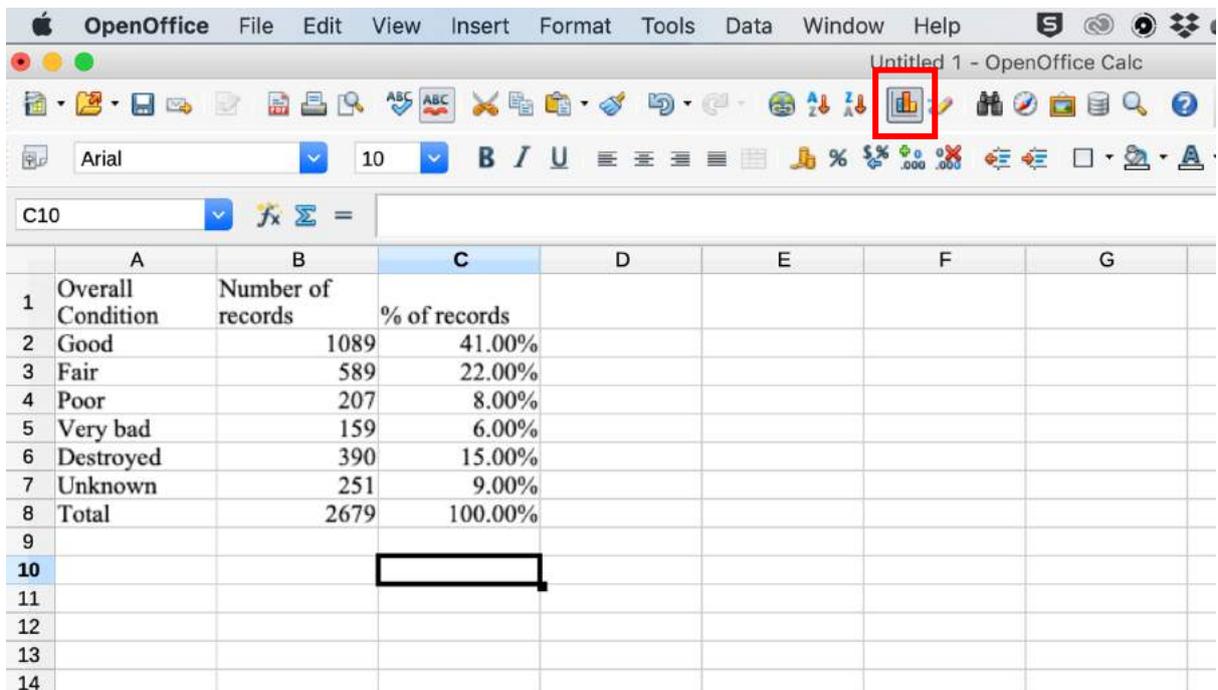


Figure 14b: Chart button.

- In the Chart Wizard, choose the chart type (e.g. bar chart) (Figure 15).
- Click next.

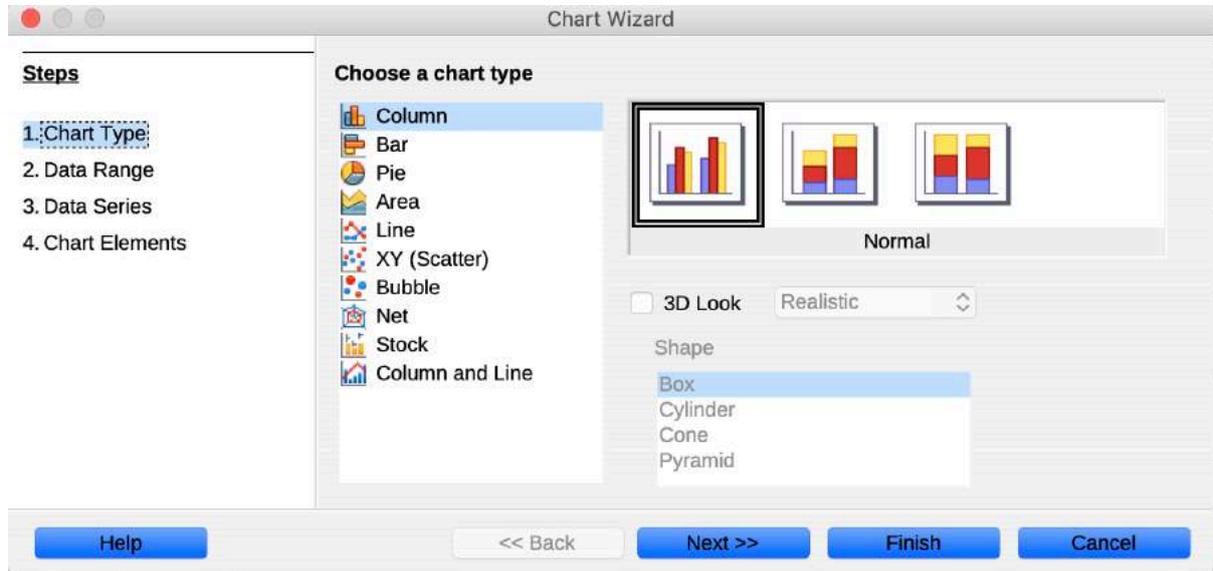


Figure 15

- In the Chart Wizard, Data Range, click on the select icon and select the area where your data are (Figure 16).
- Click next.

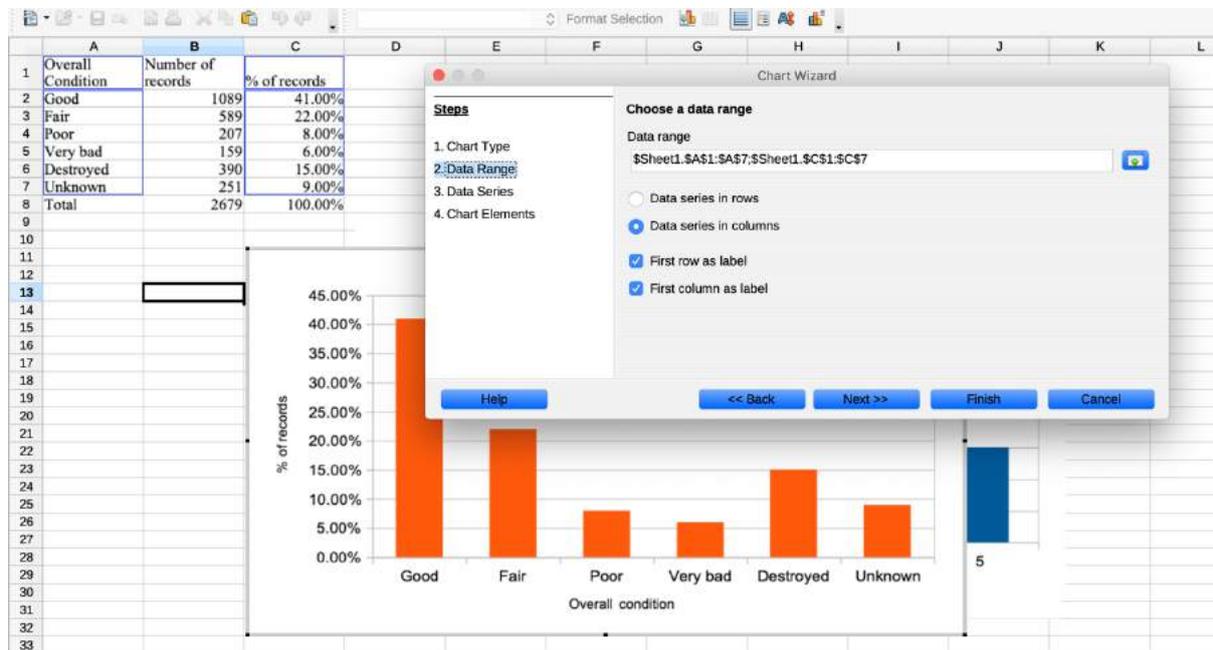


Figure 16

- In the Chart Wizard, Data Series, choose what to display as data on the Y-axis, and what to display as the labels or 'categories' on the x-axis (Figures 17a-b).
 - Only choose the values, not the column headers.
 - To add multiple series, for example for different regions, click 'Add'.
 - To remove a series, for example if you do not want to display the 'number of records column', but only the '% of records column', select the data series and click on 'Remove'
 - Click 'Next'.

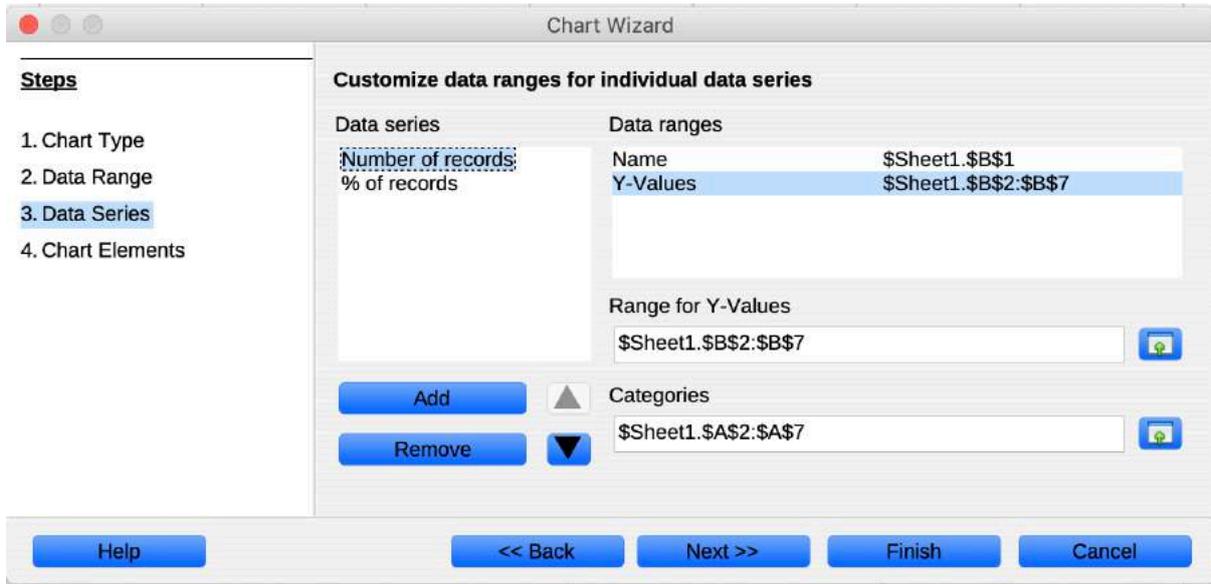


Figure 17a: Two data series.

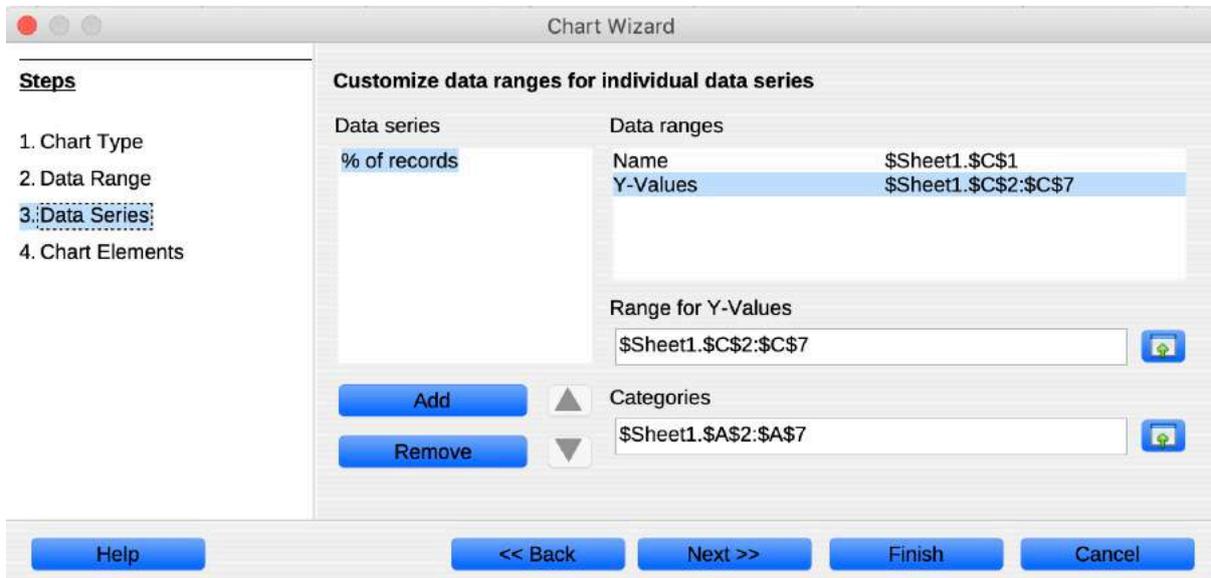


Figure 17b: The 'Number of records' data series was removed, using the 'Remove' button, so that only the '% of records' data series remains to be shown in the graph.

- In the Chart Wizard, Chart Elements (Figure 18), you can:
 - Type a title and subtitle to display at the top of the chart.
 - Type a title for the X-axis (Figure 18).
 - Type a title for the Y-axis (Figure 18).
 - Choose if you want to display grid lines.
 - Choose if you want to display a legend, and where.
- Click on 'Finish'.

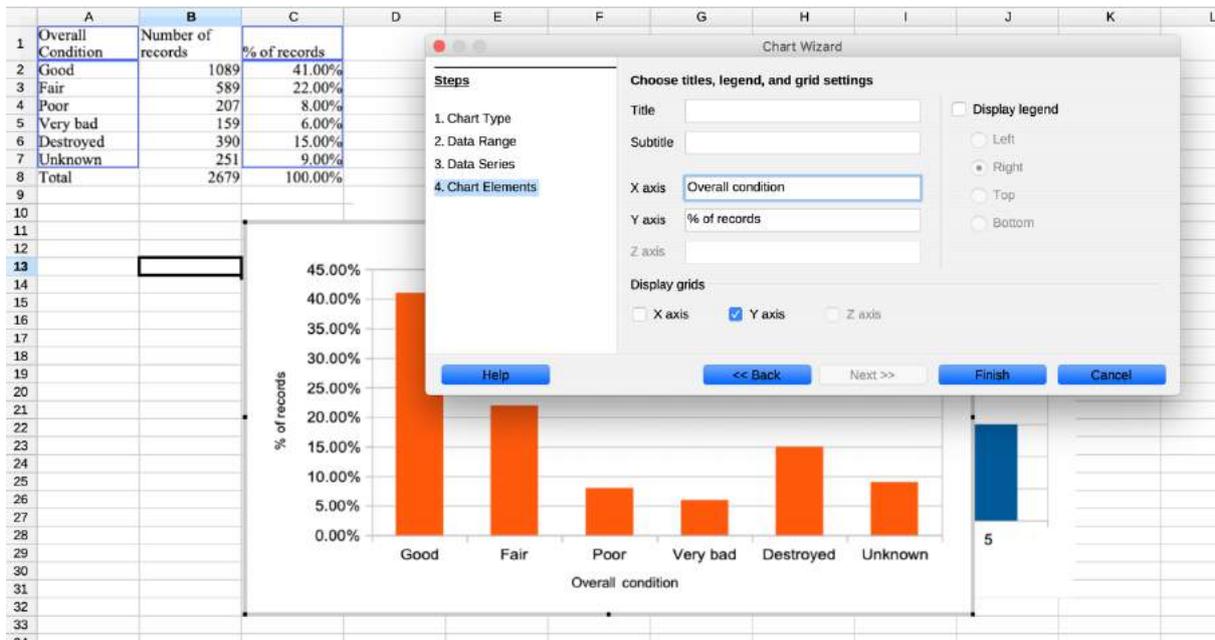


Figure 18: Chart Wizard, Chart Elements window, with X- and Y-axis titles added, and the display legend box unticked.

- You can further edit the chart by choosing what chart element you want to edit and clicking on 'Format selection' (Figure 19).
 - The chart needs to be selected for this. To select it, double-click on it.

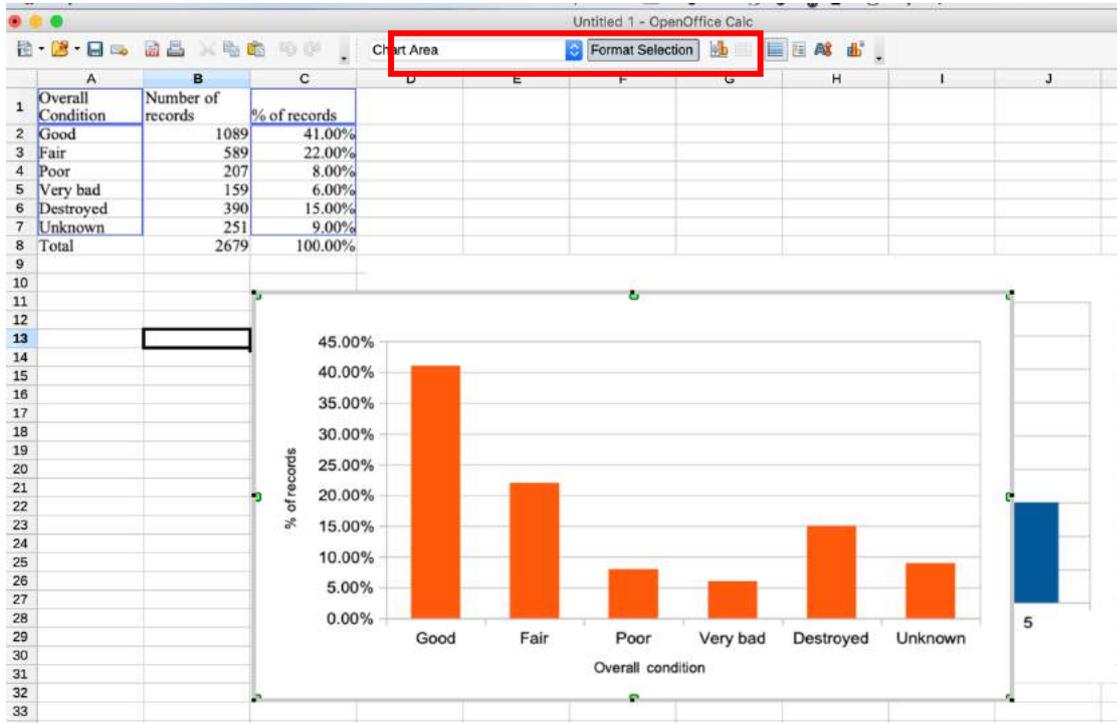


Figure 19: Format selection button.

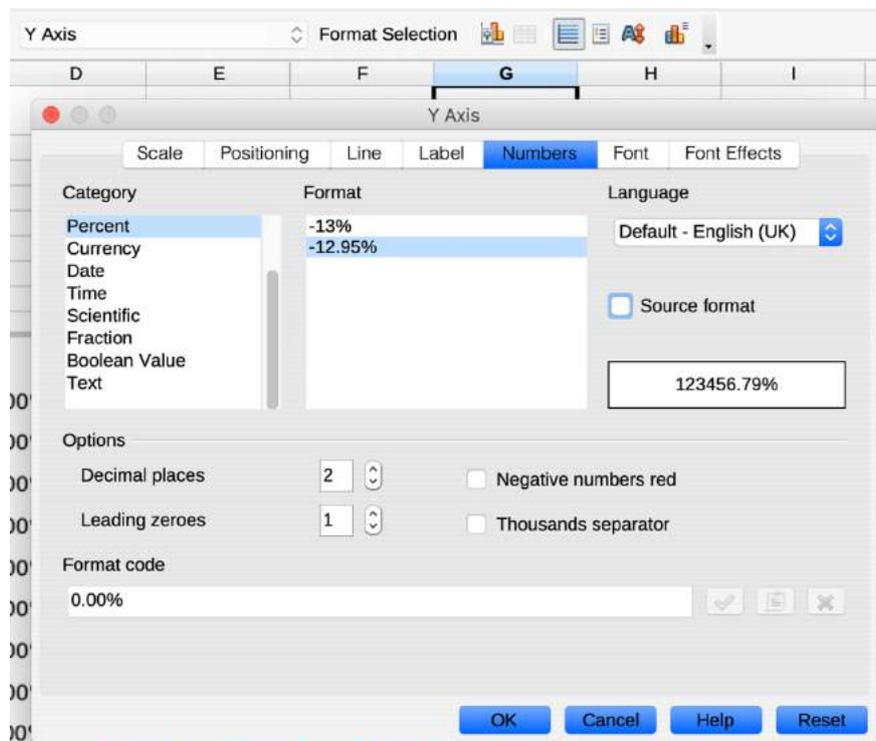


Figure 20: Formatting the Y Axis numbers (deselect 'Source format' to be able to do this).

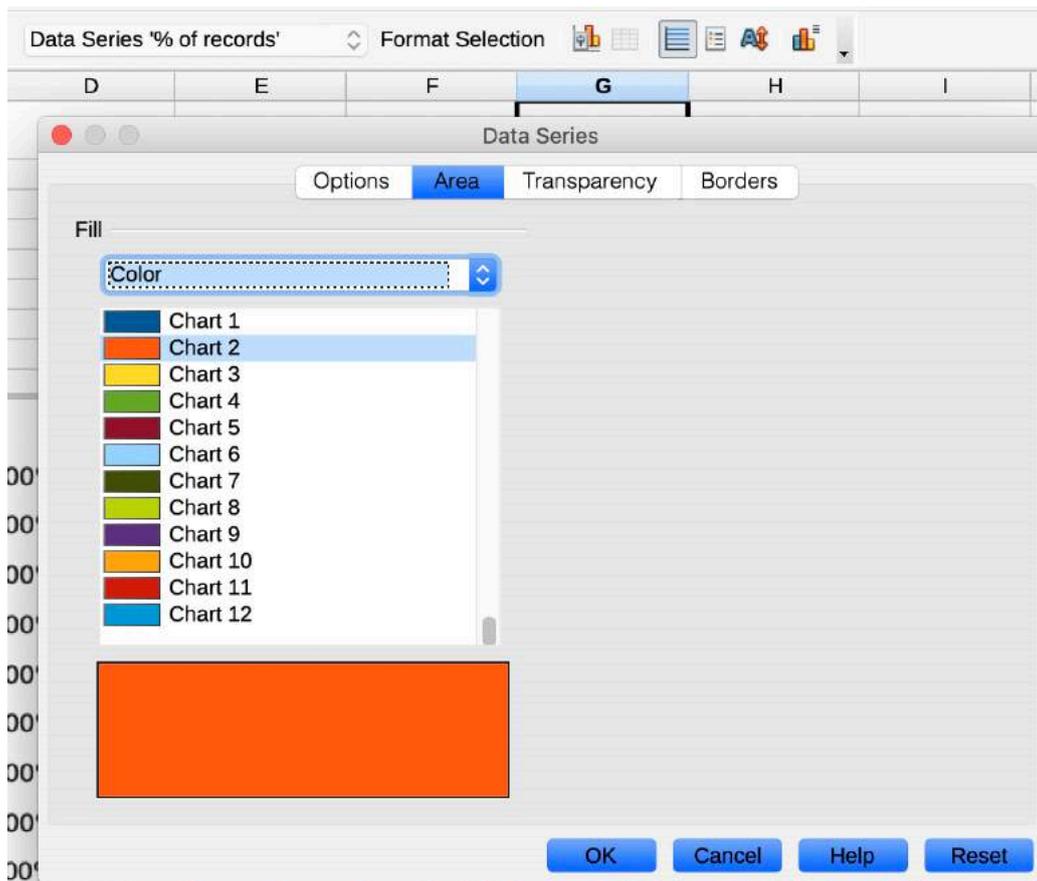


Figure 21: Formatting the Data Series, changing the colour of the bars.

- You can access other options by clicking on the buttons, or by choosing 'Format' from the top menu.
 - For example, to change the range of values the graph is drawing from, choose Format – Date range.

Microsoft Excel

This guide was made using a Mac, and things may look a bit different if you are using Windows, and things might look different again if you are using the free online version of Excel. They will also differ between different versions of Excel. Please see the [extensive guidelines provided by Microsoft](#) for more information.

- After selecting your data, in 'Insert' (top of page, near the left), choose the bar chart symbol (towards the right of the page), and select '2D charts' (or any chart of your choice) (Figure 22).
- A chart is now produced.

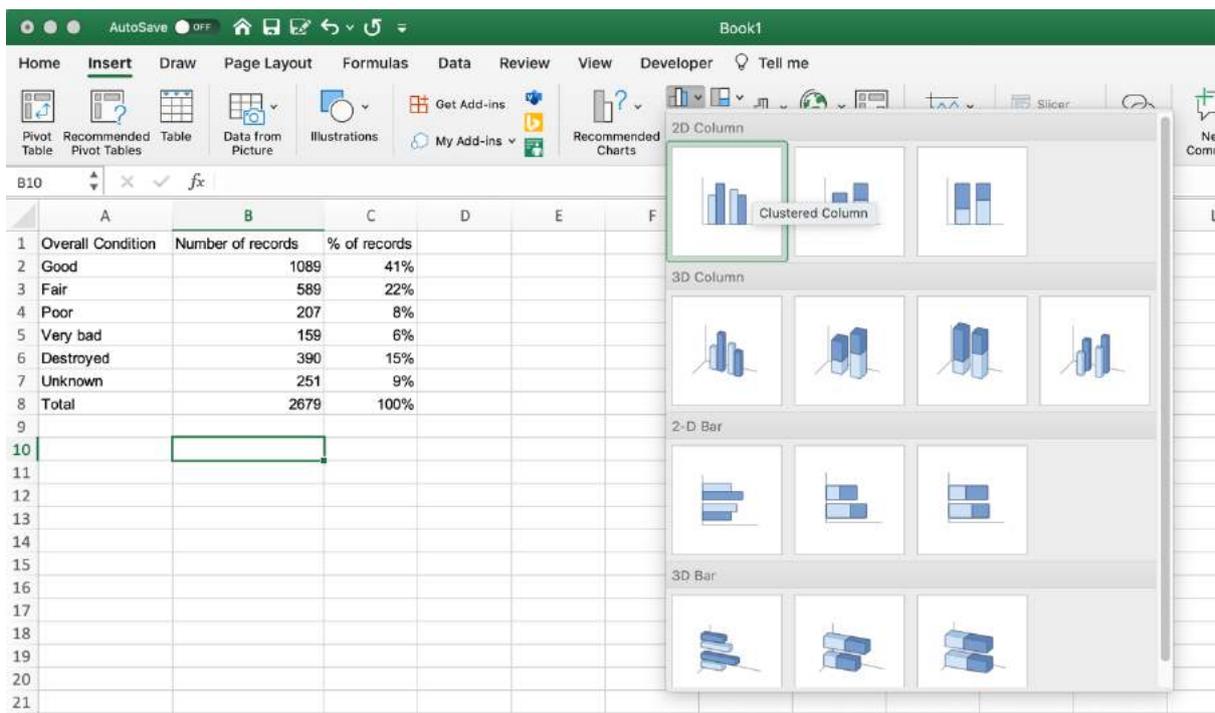


Figure 22: Insert – Chart – 2D column.

- In Chart Design (upper right), you can, for example:
 - 'Add Chart Element': Add chart elements like a title for the vertical or Y axis (Figure 23).
 - 'Select Data': Add additional data, for example to add a second data series for a different region (Figure 24).
 - In the Select Data Source Window, click on the '+' to add more data.
 - In this window, you can also edit the existing data series.

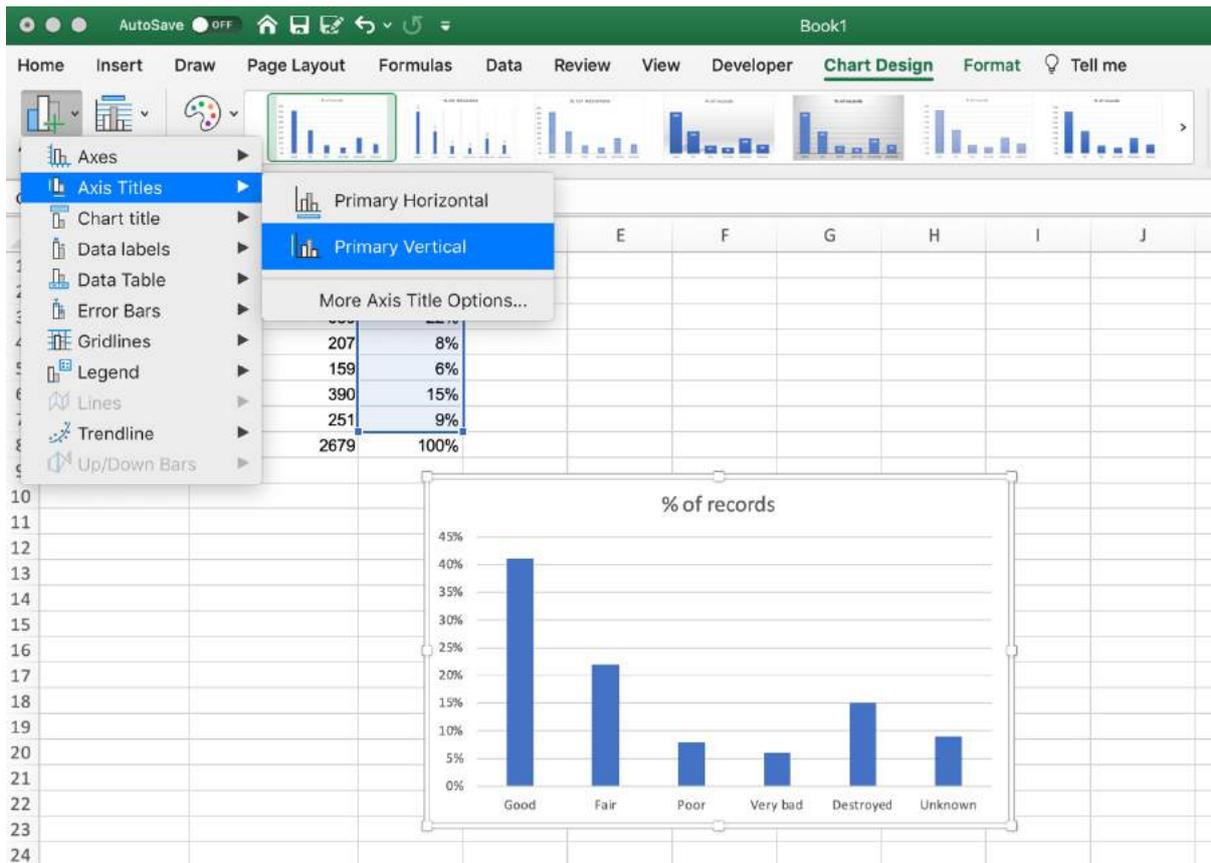


Figure 23: Choosing a chart element to edit.

Figure 24: Clicking on 'Select Data' opens this window. Here you can select data to show in the graph, and you can edit the data that you already selected. Click on the '+' to add an additional data series.

- To format the graph and work on the lay out, choose 'Format' in the upper right corner (Figure 25).
- Here you can change the colours and styles of the whole chart or of specific elements.
 - Click on 'Format Pane' to open the format pane to the right.
 - Click on 'Chart Area' (left) to choose which part of the chart you want to edit (or click on this part in the chart).
 - Play around with the different options in the Format Pane to learn how to format your graph. You can also refer to the [detailed online information provided by Microsoft](#).

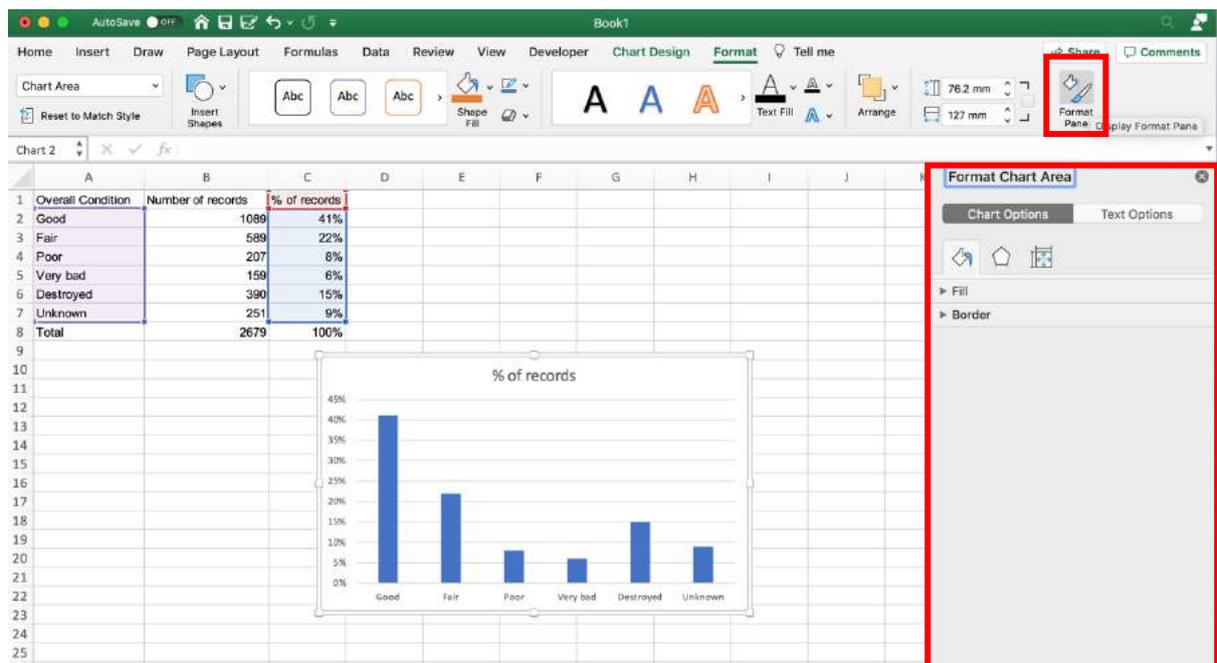


Figure 25: Opening the Format Pane and the resulting Format Chart Area pane to the right.

Step 6: Exporting your graph

Once you are happy with your graph, you can export it to use it in a presentation or report. Follow the instructions for the software you are using below.

Google Spreadsheets

- Click on the three dots in the upper right corner of the chart area, choose download, and what you want to download it as (Figure 26).
- Alternatively, you can copy-paste it into your Powerpoint/Google slides or document.

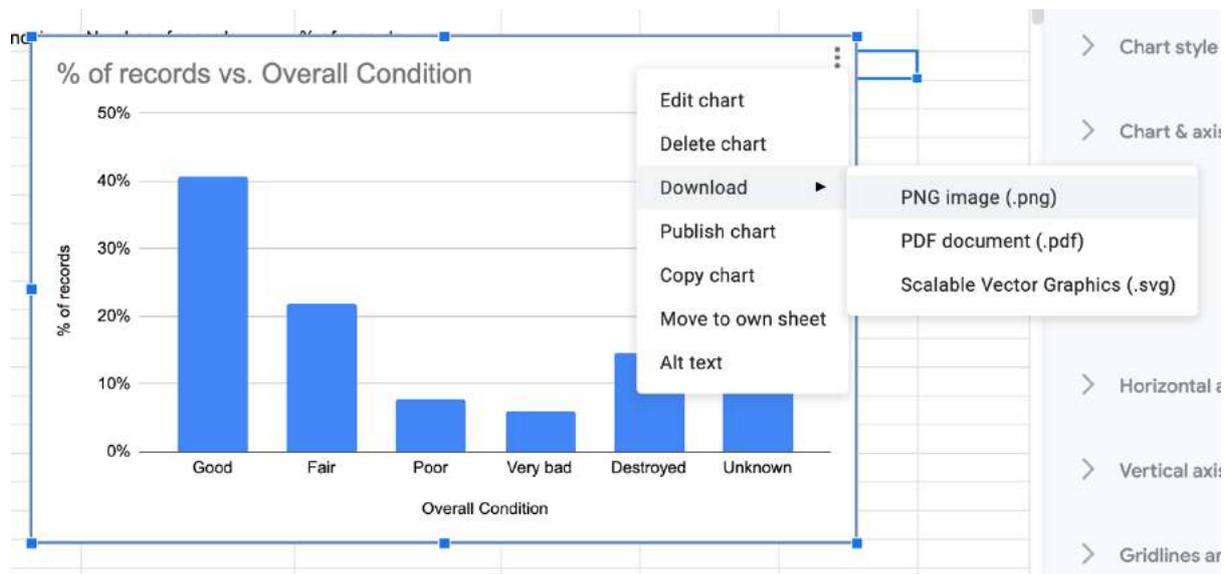


Figure 26

Open Office Calc

- Right-click on the chart.
- Choose 'Copy' and then paste it into your presentation or report.
 - Choose from the different paste options when pasting.

Microsoft Excel

- If you are using another Microsoft programme, like Powerpoint or Word you can simply copy-and-paste the image. When pasting, choose one of the following (Figure 27):
 - Microsoft Excel Chart Object – this will keep a connection with the Excel spreadsheet and changes made there will be reflected in this document as well.
 - Microsoft Office Graphic Object
 - Picture – this results in the lowest resolution, but it remains unchanged when you make changes in the Excel workbook.

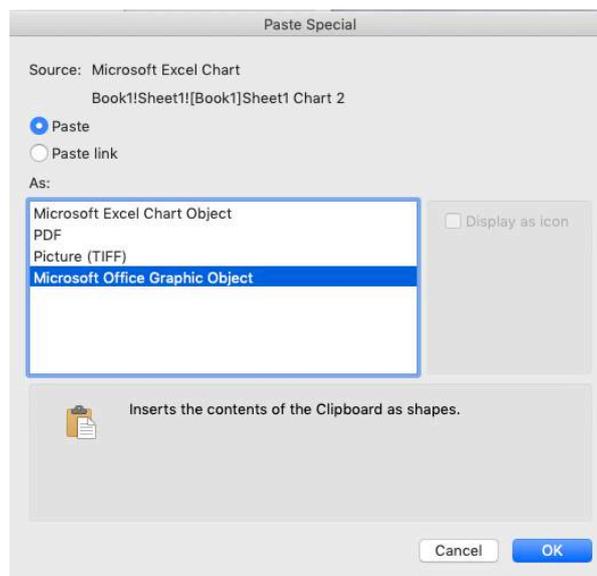


Figure 27

If you want to use the graph in a non-Microsoft programme, you can:

- Right-click on the graph and choose ‘Save as picture’. This results in a low resolution only.
- Copy-paste the graph as a Microsoft Excel Chart Object into Powerpoint, and:
 - Save as picture from there;
 - Save as PDF and open in another programme (e.g. Irfanview, Preview) to save the PDF in a higher resolution as a JPG, for example.

It is a weakness of Excel that it is this difficult to export graphs as a high-resolution image. For presentations or reports this is generally not a problem, but for publications this can cause issues.