Bar Charts and Beyond: Plot-by-Plot Instructions

Get the most out of this toolkit!

- Start with the Word document ("Bar Charts and Beyond: Choosing Data Visualizations")—this **guide** will help you understand the context behind the plots. Read through the parts that are relevant to your interests.

- Open the Excel **spreadsheet** ("Bar Charts and Beyond: Visualizing in Excel") and locate the sample data for the plot types you are interested in. Start with one or two plot types based on your comfort level, data, and available time.

- Refer to this **instructions** document ("Bar Charts and Beyond: Plot-by-Plot Instructions"). Follow the instructions to replicate the example plots using the sample data in the spreadsheet.

Table of Contents

Getting Oriented in Excel[1]

The plot-specific instructions in this document include references to Excel menus for creating and refining your plots. The screenshots below will help you locate these menus.

> **Reminder!**
> Different versions of Excel may organize the menus and features differently. The screenshots below give examples of how your screen *may* look. When in doubt, use Excel's Search feature to locate the menu you need. This document uses the specific names of menus and features to help you do this.
>
> For example, if your version of Excel does not have a menu called "Chart Design," you could search for the specific feature that the instructions recommend (e.g., data labels).

Insert > Chart Menu

You can find the Insert menu at the top, next to Home. Within the Charts section, outlined in red below, you will find the following options:

- Recommended Charts
- The bar chart icon (outlined in yellow)
- The line graph icon (outlined in blue)
- The pie chart icon (outlined in pink)
- The statistic chart icon (outlined in green), which is where you will find boxplots
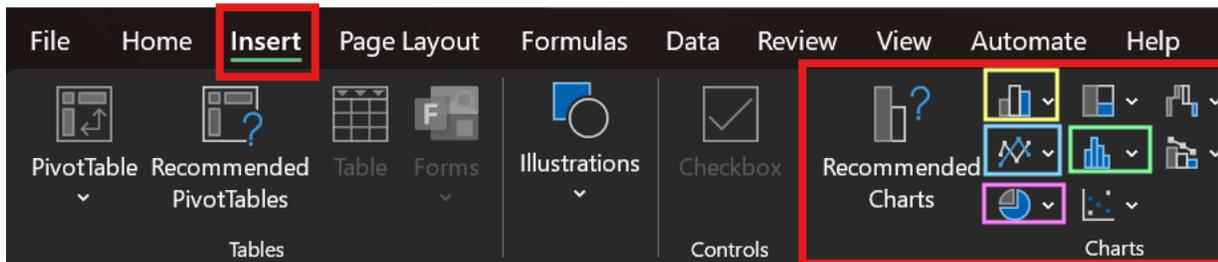
Format Axis Menu

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[1] Microsoft Excel is a product of the Microsoft Corporation, a for-profit company. This guide and accompanying materials were created with Microsoft Excel since it is the most widely used spreadsheet software and an industry standard. However, there are free software options (e.g., Google Sheets) that have similar data visualization functionality. Neither Switchboard nor the International Rescue Committee has a financial relationship with the Microsoft Corporation.

The Format Axis Menu is where you can adjust the number of tick marks, label spacing, and other axis features. You can access it by right-clicking on one of the axes of your plot and then selecting Format Axis (outlined in red below).
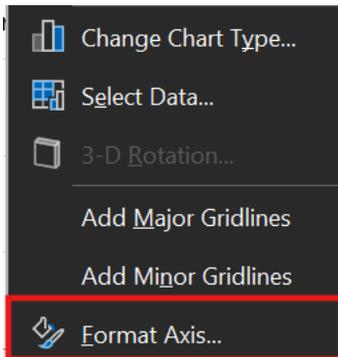
This is what the Format Axis menu looks like:
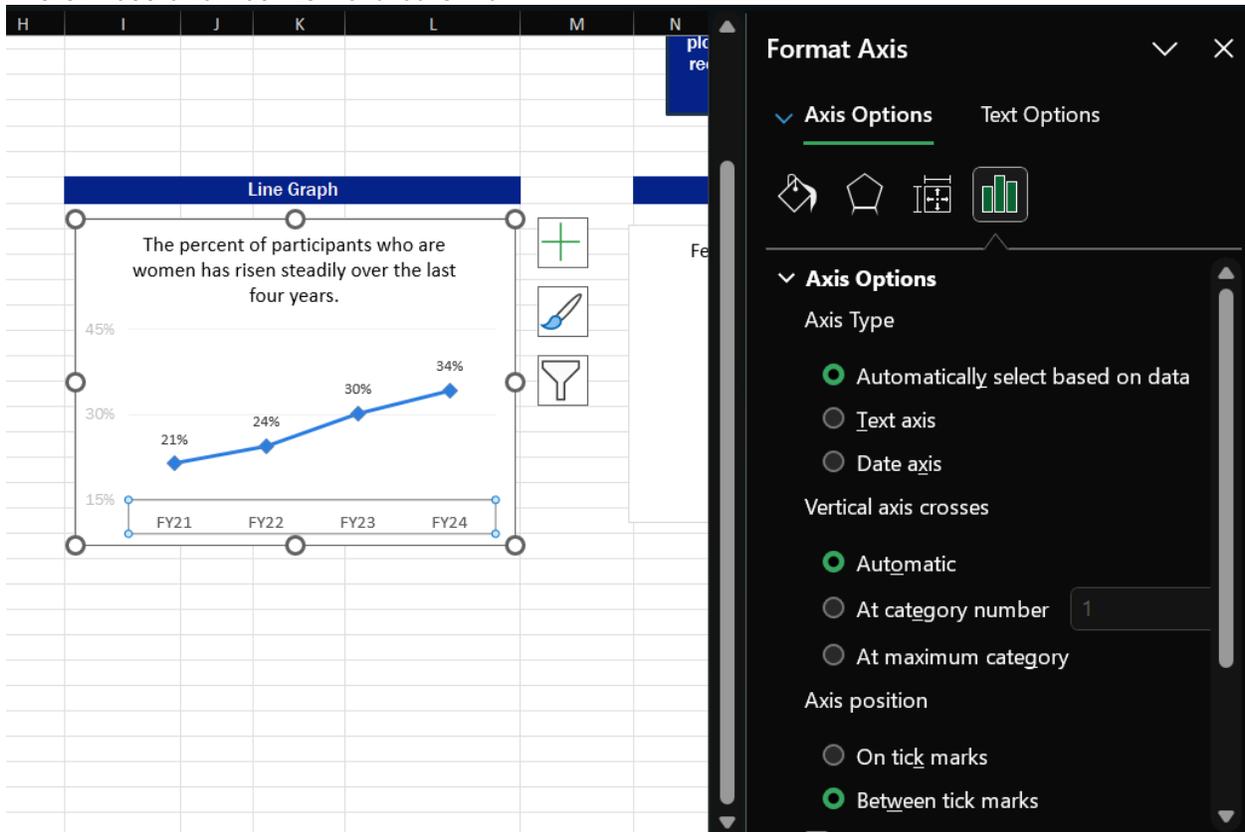
Right-clicking on different parts of the chart will give you the option to bring up its formatting menu. One example is the Format Data Series menu, which looks like this:

Format Data Series

Series Options

Series Options

Plot Series On
- Primary Axis
- Secondary Axis

Series Overlap   -27%

Gap Width   219%

Following increased outreach to the Iraqi community, ESL enrollments among this group increased by 570% from FY22 to FY24.
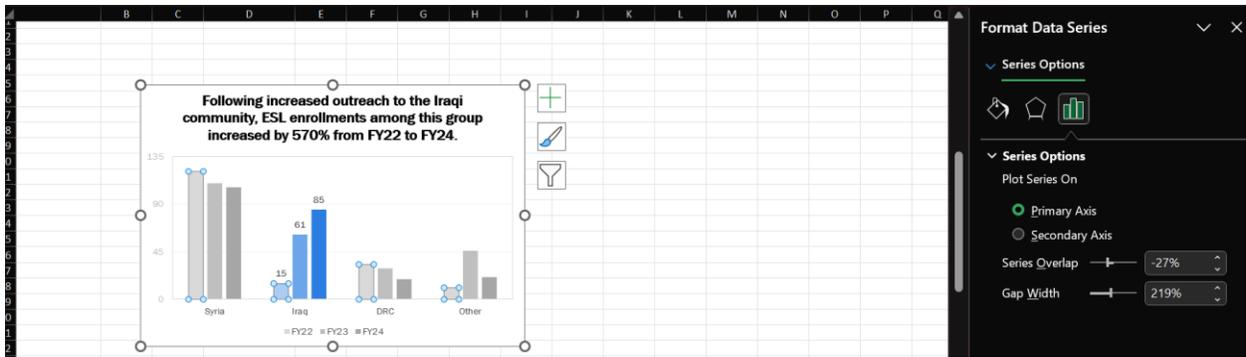
Fill & Line Menu

Within these formatting menus, you can access the Fill & Line Menu (outlined in red below) to adjust the colors.
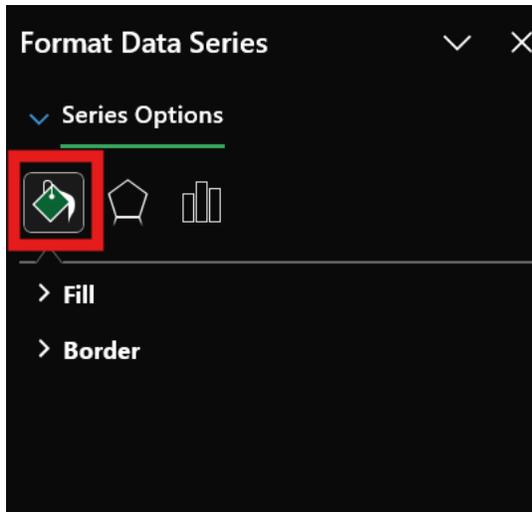

Chart Design Menu

The Chart Design Menu (outlined in red) is where you can add data labels and legends via the Add Chart Element option (outlined in blue).

Section 1 – Excel Plot Basics

Bar Chart

1. Select cells I1 - I2 and I5 on the "Basic Bar, Line, and Pie Charts" tab (the Fiscal Year column header, FY21, and FY24) and cells L1 - L2 and L5 (the Total Number of Participants column header and values for FY21 and FY24). You can do this by holding down the Control key while clicking on each of those cells.

2. Click "Insert," then in the Charts section, click the first small icon showing columns. (If you hover over it, the text will read "Insert Column or Bar Chart.") Click the first option under 2-D Column.

The total number of participants in the program has risen substantially between FY21 and FY24.
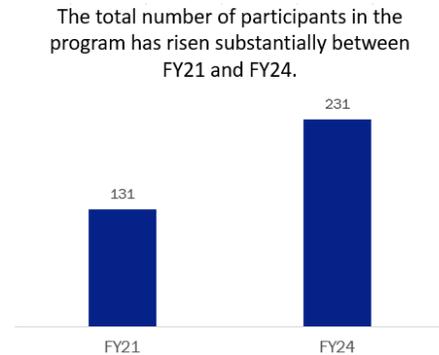
Congratulations! You've now created a bar chart. What follows is guidance on adjusting the formatting.
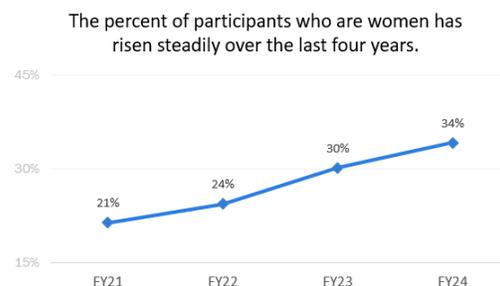
3. To change the bar colors, double-click on one of the bars. Select the paint bucket (Fill & Line) icon, then click the paint bucket in the Fill menu to change the color. This will change both of the bars.

4. Double-click the automatically generated title and replace it with something descriptive, such as "The total number of participants in the program has risen substantially between FY21 and FY24." Use the usual font settings (in the Home menu) to adjust the color, font, and font size as desired.

At this point, you have a plot that shows your data. However, many readers find plots easier to read when data points are labeled with their values, minimizing or eliminating the need for gridlines. Continue with the instructions here to update your plot accordingly.

5. Click one of the bars, which should highlight both bars on the plot. Go to "Chart Design" and then "Add Chart Element." In the Data Labels menu, select a location for the labels. The example used "Outside End."

6. Because this is a simple plot and the bars are now labeled, you can remove the gridlines and y-axis values: In the chart area, click one of the gridlines. This should highlight all of the gridlines. Hit the "Backspace" or "Delete" button on your keyboard to remove the gridlines. Do the same with the values on the y-axis.

Line Graph

1. Select cells I1 - I5 (the column for Fiscal Year) and M1 - M5 (the column for Percent Female). You can do this by holding down the Control key when you select the second set of cells.

2. Click "Insert," then in the Charts section, click the second small icon on the left showing lines with markers. (If you hover over it, the text will read "Insert Line or Area Chart.") Click the fourth option under 2-D Line ("Line with Markers").

The percent of participants who are women has risen steadily over the last four years.

Congratulations! You've now created a line graph. What follows is guidance on adjusting the

formatting.

3. To change the line and marker (data point) colors, double-click on the line. Select the paint bucket (Fill & Line) icon, then click the paint bucket in the Fill menu to change the color. You will start off in the Line menu. Scroll down and click the paint bucket to select a new color. This will change just the line color. Scroll back to the top and select "Markers," then repeat the color selection process. You may select the same color or a different one.

4. In this menu, you may also change the marker size and/or shape. Scroll down in the Fill & Line > Markers > Marker Options menu to make these adjustments (under Size and Type, respectively). Note that you must first select the "Built-in" radio button to change the size and type of the markers.

5. 4. Double-click the automatically generated title and replace it with something descriptive, such as "The percent of participants who are women has risen steadily over the last four years." Use the usual font settings (in the Home menu) to adjust the color, font, and font size as desired.

   At this point, you have a plot that shows your data. However, many readers find plots easier to read when data points are labeled with their values, minimizing or eliminating the need for gridlines. Continue with the instructions here to update your plot accordingly.

6. Click one of the data points, which should highlight all points on the plot. Go to "Chart Design" and then "Add Chart Element." In the Data Labels menu, select a location for the labels. The example used "Above."

7. Because this is a simple plot and the points are now labeled, you can limit the number of gridlines and corresponding values on the y-axis: Right-click on the y-axis values and click "Format Axis." In the Axis Options menu (which looks like a bar chart), under Axis Options, change the value of the Major units to 0.15. This sets the gridlines to appear every 15%.

8. Still in the Format Axis menu, navigate to the Fill & Line (paint bucket) menu. Click one of the gridlines in the plot area. Again in the Fill & Line menu, under Line, select a light gray shade for the Color. Finally, click on the y-axis values and change the font color to a light gray. (You can do this the way you would change the font color in a text box—use the Font menu under Home).

Pie Chart

1. Select cells J1 - K1 (the Number of Men and Number of Women headings) and J5 - K5 (the values of those columns for FY24). You can do this by holding down the Control key when you select the second set of cells.

2. Click "Insert," then in the Charts section, click the third small icon on the left, showing a pie chart. (If you hover over it, the text will read "Insert Pie or Doughnut Chart.") Click the first option under 2-D Pie.
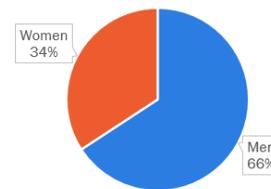
   Congratulations! You've now created a pie chart. What follows is guidance on adjusting the formatting.

3. To change the pie section colors, double-click on one of the sections. Select the paint bucket (Fill & Line) icon, then click the paint bucket in the Fill menu to change the color. This will change the color of the section you selected. Repeat this process with the other section, selecting a contrasting color.

Female clients still barely exceeded one-third of the participant population in FY24.

Women 34%

Men 66%

4. Double-click the automatically generated title and replace it with something descriptive, such as "Female clients still barely exceeded one-third of the participant population in FY24." Use the usual font settings (in the Home menu) to adjust the color, font, and font size as desired.

   At this point, you have a plot that shows your data. However, many readers find plots easier to read when data points are labeled with their values, eliminating the need for a legend. Continue with the instructions here to update your plot accordingly.

5. Click on the pie chart and go to "Chart Design" and then "Add Chart Element." In the Data Labels menu, select "Data Callout." This labels each section of the pie chart with both the value and the category (Men/Women). Notice that it automatically converts the values to percentages as well, saving you a step!

6. Because this is a simple plot and the sections are now labeled, you can remove the legend. Simply click on it and use the Backspace/Delete key on your keyboard to remove it.

7. Finally, you can change the font, font size, and font color of the data labels by clicking one of them and navigating to Home > Font, just as you would for a text box.

Section 2 – Using Bar Charts

Change Over Time

1. Create the bar chart: Highlight the data in cells B1:E5 (i.e., all of the data – representing Country of Origin, FY22, Fy23, and FY24), then click the Insert menu. In the Charts area, click "Recommended Charts," then select the clustered column chart.

2. Change the overall color scale: Right-click on the leftmost bar (representing Syria in FY22) of the graph and select "Format Data Series." In the Fill & Line (paint bucket) menu, change the fill to a light gray color. Repeat this with the next two bars (Syria FY23 and FY24), choosing a darker gray each time.

Following increased outreach to the Iraqi community, ESL enrollments among this group increased by 570% from FY22 to FY24.

3. Change the color scale for one set of bars to make them stand out: Double-click on the leftmost bar for Iraq (representing FY22). Single click again on this bar, so it is the only one selected. Right-click on it and choose "Format Data Point." In the Fill & Line (paint bucket) menu, select a color. Repeat this with the remaining two bars (Iraq FY23 and FY24), selecting a darker shade of the color each time.

4. Add data labels: To add data labels only to the Iraq data, select each column individually, as done in Step 3. For each one, click "Chart Design," then "Add Chart Element," and select "Outside End" in the Data Labels menu.

5. Make any final formatting adjustments: Refer to the recommendations in the Section 2 tab of the spreadsheet for tips. This example included the following steps:
   a. Add a descriptive title, such as "Following increased outreach to the Iraqi community, ESL enrollments among this group increased by 570% from FY22 to FY24."
   b. Change the gridline and axis label colors to light gray.
   c. Decrease the number of gridlines by setting the Major axis units to a value of 45.

6. Finally, give your graph a title that clearly conveys the key takeaway. For example, you may title this graph "Following increased outreach to the Iraqi community, ESL enrollments among this group
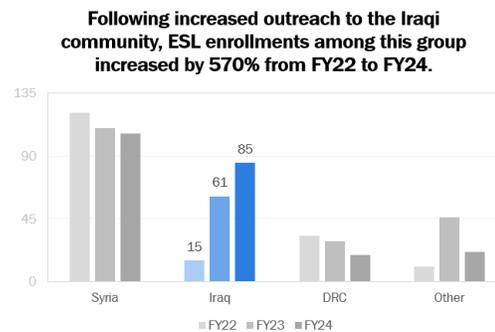
increased by 570% from FY22 to FY24."

Comparison of A and B Example 1

1. Create the bar chart: Highlight the data in cells B1:D5 (i.e., all of the data – Indicator, Target, and Actual), then click the Insert menu. In the Charts area, click "Recommended Charts," then select the clustered bar chart.

2. Add data labels: Click on a bar representing the Actual data. Click "Chart Design," then "Add Chart Element." In the Data Labels menu, select "Inside Base." Repeat this process with the Target data, choosing the "Outside End" option.

Based on year-to-date data, the job-readiness training program is on track to meet or exceed its targets.

3. Adjust formatting as desired: Change any fonts and font sizing, if desired. Change the bar color of the Actual data (we will adjust the Target data below) by right-clicking on one of the bars, navigating to the Fill & Line (paint bucket) menu, and selecting a new color in the Fill and Outline menus.

4. Using formatting, create the "thermometer" effect: Right-click the Target series and choose "Format Data Series." Click the paint bucket (Fill & Line) icon to edit formatting. Under Fill, choose "No Fill" and under Border, choose "Solid Line." Increase the width of the line by a few points and change the color if desired. Leave the Actual series bars filled as they are.

5. Overlap the bars: Right-click the Target series and again choose "Format Data Series." Under Series Options > Plot Series On, choose "Secondary Axis." The bars should now be overlapping, with a second axis visible above the chart. Click this axis and delete it.

6. Make any final formatting adjustments: Refer to the recommendations in the Section 2 tab for tips (the example plot includes a descriptive title, as recommended in the Section 2 tab).

7. Finally, give your graph a title that clearly conveys the key takeaway. For example, you may title this graph "Based on year-to-date data, the job readiness training program is on track to meet or exceed its targets."
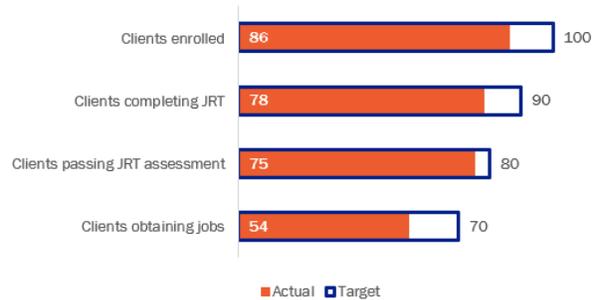
Comparison of A and B Example 2

1. This is a combo chart: The quarters are visualized using a stacked column and the targets using a line with markers. Highlight the data in cells B1:G5 (i.e., all of the data – Location, Annual Target, Q1, Q2, Q3, and Q4) and go to Insert menu. Click "Recommend Charts," then the "All Charts" tab. Select "Combo" (bottom left).

2. Select chart type for each series: Use the dropdown menus under Chart Type to select "Stacked Column" for each series, then click "OK."

Based on year-to-date data, three of the four job sites have met or exceeded their targets.

3. Rearrange the plot to show the data in the desired form: Click on the newly inserted chart. Click "Chart Design," then "Switch Row/Column." This results in a stacked column chart in which all four quarters
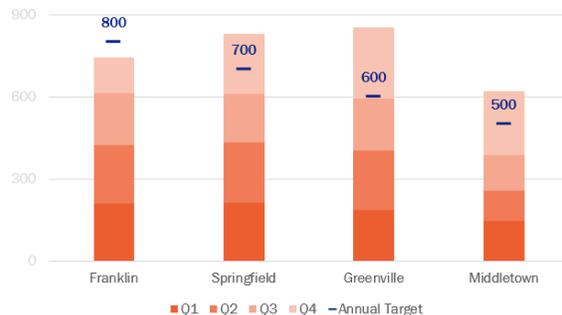
and the annual target are stacked in each column.

4. Keeping the chart selected, go again to "Chart Design" and click "Change Chart Type." Again under Combo, ensure all four quarters have a Chart Type of Stacked Column, but for the Annual Target series, choose Line with Markers (the fourth option, indicating a line with square data points on it), then click "OK."

5. Remove the target line: In your chart, right-click the Annual Target line and go to Format Data Series. Click the paint bucket (Fill & Line) icon to edit formatting. Under Line, select "No line." Under Marker, go to Marker Options, and select "Built-in." Under Type, choose the long dash shape. Increase the size of the marker and adjust the color as desired.

6. Add data labels: keeping the Annual Target data selected, go to "Chart Design" and open the "Add Chart Element" menu. Add Data Labels (this example used the Above Data option). If desired, change the font and/or font color in the Home > Font menu (the example bolded the labels to make them more visible).

7. Create a color gradient: click the bottom component of one of the bars (representing Franklin). Right-click and select "Format Data Series," then in the Fill & Line (paint bucket) menu, choose a fill color. Repeat this process for each of the stacked bars, choosing a lighter shade of the base color each time.

8. Make any final formatting adjustments: Refer to the recommendations in the Section 2 tab for tips. You may also adjust the color for each quarter by right-clicking on one of the relevant sections and changing the color in the Fill and Outline menus. This example included the following steps:
    a. Add a descriptive title, such as "Based on year-to-date data, three of the four job sites have met or exceeded their targets."
    b. Change the gridline and axis label colors to light gray.
    c. Decrease the number of gridlines by setting the Major axis units to a value of 300.

Part of a Whole
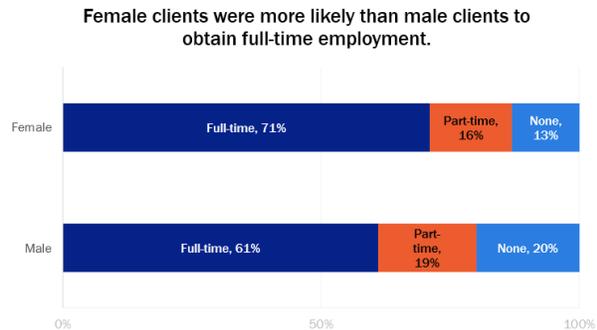
1. Create the bar chart: Highlight the data in cells C1:F3 (i.e., all of the data – Sex, Full-time, Part-time, and None), then click the Insert menu. In the Charts area, click "Recommended Charts," then "Bar Chart."
    In the bar chart options, choose 100% Stacked Bar.

Female clients were more likely than male clients to obtain full-time employment.

Female	Full-time, 71%	Part-time, 16%	None, 13%
Male	Full-time, 61%	Part-time, 19%	None, 20%
0%	50%	100%	

2. Switch rows and columns: To achieve a plot in which each bar represents a sex, click on the newly inserted chart. Click "Chart Design," then "Switch Row/Column."

3. Adjust axis limits as needed: Ensure that the x-axis maximum is 100%. If it is higher, right-click on the x-axis and click "Format Axis." Under Axis Options > Bounds, set the Maximum to 1.

4. Add data labels: Click one of the bars near its lefthand end. This should highlight the largest section of the bar and the corresponding section on the other bar. Click "Chart Design," then "Add Chart Element." Under Data Labels, click "Data Callout." Right-click one of the callouts and click "Format Data Labels." Under the Label Options menu, uncheck the "Category Name" box and check the "Series Name" box instead. (Notice what this does!)

5. Adjust callout formatting: Right-click on one of the callouts and click "Format Data Labels." Under the Fill & Line section, select "No fill" and "No line," so only the text is visible. Adjust the font and color of

the text as desired.

6. Repeat Steps 4 and 5 for each section of the bar, adjusting the chart and/or label size as needed to accommodate the label text length.

7. Make any final formatting adjustments: Refer to the recommendations in the Section 2 tab for tips. This example included the following steps:
    a. Add a descriptive title, such as "Female clients were more likely than male clients to obtain full-time employment."
    b. Change the gridline and axis label colors to light gray.
    c. Decrease the number of gridlines by setting the Major axis units to a value of 300.
    d. Delete the legend (since the data labels contain this information).

Section 3 – Advanced Charts

Boxplot

1. Create your boxplot: Click the Insert menu. In the Charts area, click "Insert Statistic Chart" (the icon looks like a blue histogram), then "Box-and-Whisker Plot." This will bring up a blank chart.

2. Add data: Right-click on the chart area and click "Select Data." Under Legend Entries (Series), click "Add." Click the arrow next to Series name and select cell G1 to tell Excel that this plot will be of Starting Scores. Click the arrow again to go back, then click the arrow next to Series values and select cells G2 - G52. Click the arrow again to go back, then click "OK." Under Legend Entries (Series) select "Series1" and then click "Remove." (This is a placeholder that Excel adds when you insert a chart without selecting data.)

3. Add data categories: Under Horizontal (Category) Axis Labels, click "Edit." Select cells D2 - D52 to add a sex label to each point. Click "Okay." You should now have a boxplot showing the starting scores for both male and female participants.

4. Format the plot: You are now free to format the plot according to your preference. Below are a few steps you may wish to take. Refer to the recommendations in the Sections 2 and 3 tabs for additional tips.

5. Remove data point markers: While data point markers can sometimes be useful, they can often cause a plot to look cluttered. Remove them by right-clicking on one of the boxplots, then clicking "Format Data Series." Uncheck the box that says "Show inner points."
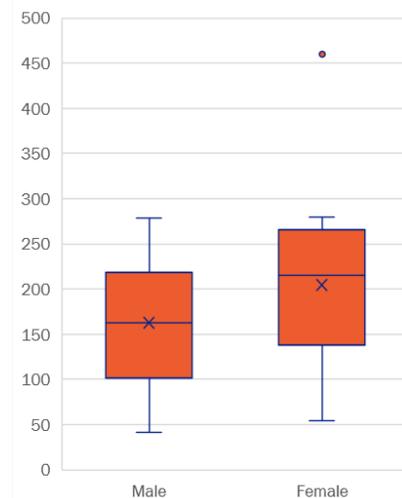
    Note: The outlier point in the female data remains after taking this step, because it is considered separate by Excel. To visually remove outliers, uncheck the "Show outlier points" box in the Format Data Series menu. By default, the plot also shows an X indicating the mean value. This can likewise be removed by unchecking the corresponding box.

6. Adjust the spacing: Drag the corners of the plot until you are happy with its size and shape. If the two boxplots seem too wide or narrow, return to the Format Data Series menu. Increase the Gap Width to make the bars narrower, or decrease it to make them wider.

    Note: If you'd like to use this tool with your own data, you may want to check out the following tool to get your data into a usable format: Preparing for Data Analysis.

Spider Plot

Note: The spreadsheet has a data table set up for you already. The instructions below walk you through how to fill it in.

1. Calculate the average score for each need type and country: In cell L2, enter this formula: "=AVERAGEIF($E$2:$E$268, $K2, F$2:F$268)". Click and drag the bottom right corner of this cell down to row 3 and across to column O to populate all of the cells.

   Note that this formula is calculating the average over all cells for which the country of origin matches the value in column E and the need type matches the value in row 1.
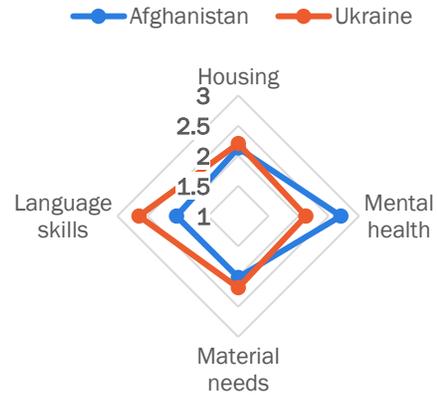
2. Create the spider plot: Select cells K1 - O3 and click the Insert menu. In the Charts area, click "Recommended Charts," then the "All Charts" tab at the top. From there, you can select "Radar Chart" and choose your style (the example is the option with markers).

3. Adjust formatting: Adjust the font, font size, colors, etc. to your liking. You may wish to add a highlight color to the axis labels to help them stand out (do this via the Font menu as you would for any other text). The example changed the scale on the axis to better show distinctions between the groups. This can be achieved by double-clicking on the numbers and changing the minimum and maximum values to 1.0 and 3.0, respectively. As you enlarge the plot, you may find that Excel automatically changes the number of values along the axis. You can reset these by double-clicking on the numbers and changing the value of Major to 0.5 (this ensures that the axis values increase by 0.5 each time). Refer to the recommendations in the Sections 2 and 3 tabs for additional tips.

   Note: If you'd like to use this tool with your own data, you may want to check out the following tool to get your data into a usable format: [Preparing for Data Analysis.](#)

Heatmap

1. Set up the country categories: In cells I2 - I8, enter the seven countries of origin from column D. A quick way to do this would be to enter the following formula in cell I2: "=unique(D2:D501)".

2. Set up the age group categories: In cells J1 - P1, enter the seven age groups from column E.

3. Calculate the average literacy level for each country/age group combination: In cell J2, enter the following formula: "=AVERAGEIFS($F$2:$F$501, $D$2:$D$501, $I2, $E$2:$E$501, J$1)". Click and drag the bottom right corner of this cell down to row 8 and across to column P to populate all of the cells.

   Note that this formula is calculating the average over all cells for which the country of origin matches the value in column I and the age group matches the value in row 1.

4. Select cells J2 - P8. In the Number section of the Home menu, click the "Decrease Decimal" button until the numbers show two decimal places.

5. Select cells J2 - P8. In the Home menu, click Conditional Formatting. Select "Color Scales," then "More Rules." In the bottom of this menu, you can now select a color scale of your choice. The example shows the default: a red/orange gradient.

6. Adjust formatting: Change the font, font size and color, cell background for the headings, row height, and column width to your liking. The spreadsheet has already been adjusted to increase the row height, which helps make the heatmap more readable. Refer to the recommendations in the Sections 2 and 3 tabs for additional tips.

7. Export your chart as an image: Select cells I1 - P8, then right-click and select Copy (or use Ctrl+C). In your Word document or PowerPoint slides, go to the Home menu, then click the arrow under Paste and select the Paste as Image option.

   Note: If you'd like to use this tool with your own data, you may want to check out the following tool to get your data into a usable format: [Preparing for Data Analysis.](#)