

Humana 201 Power BI Labs



DEMOGRAPHICS ANALYSIS
Power BI Report

Dist Members and %GT Dist Members by State Name

Member Overview

6,340	Dist Members
58,078	Average Income
74	Average Age

Education by Ethnicity and Age Range

Education	Female	Male	Total
Associates Degree	3.93%	3.12%	7.05%
Bachelor Degree	3.83%	3.04%	6.88%
High School	24.12%	17.98%	42.10%
Less Than HS	0.22%	0.08%	0.30%
Some College	25.22%	18.38%	43.60%
Unknown	0.03%	0.05%	0.08%
Total	57.35%	42.65%	100.00%

Dist Members by Age Range

75 - 84	2,697
65 - 74	2,635
Under 65	747
85 +	261

Dist Members by Tenure Years

10+ Years	2 Years	3 Years
4 Years	6 Years	9 Years
5 Years	7 Years	1 Year
8 Years		

Filter by Age Range

Filter by Tenure Years

Filter by Education

Filter by LOB

LONGITUDINAL ANALYSIS
Power BI Report

Event Count by State Name

Events Overview

99,952	Event Count
6,581	Dist Event Count
36	Events Per Day

%GT Dist Event Count by Event Group 1

Interactions	3...
Clinical	3...
1...	1...

Filter by Age Range

Filter by State

Filter by LOB

PRAGMATIC WORKS

Configuration Instructions

Requirements:

To run this lab, you must have Power BI Desktop installed and a Power BI account. Go to

<https://powerbi.microsoft.com/en-us/downloads/> to download the Desktop version of Power BI.

Setup and Preparation:

To prepare the student's machine:

1. Download **Humana Power BI.zip** onto your (C:) drive or your OneDrive. The folder will contain three folders:
 - a. Completed Labs
 - b. Data
 - c. Theme and Images.
2. The folder will also contain two PDF files.
 - a. Humana Power BI Labs.pdf
 - b. Human Power BI Slides.pdf
3. Open Power BI on your machine and sign in using your work account. If you don't have an account, create one.

Revision History:

Version	Date	Comments
1.0	3/31/2020	Initial Draft
1.1	4/27/2020	Small lab adjustments
1.2	5/26/2020	Added times, renamed labs, small lab adjustments
1.3	6/8/2020	Small lab adjustments

Module 1: Accessing Data & Data Cleansing (15-25 Minutes)

You've been tasked with creating a Power BI report for the company you work for, Humana. Your boss wants you create an overview of data relating to members and events related to them. In this module you will load data into Power BI and learn some simple data cleansing techniques.

Module Requirements:

1. Have installed Power BI Desktop onto your machine
2. Import tables Date, Events and Members from **Humana Data.xlsx** file.
 - Remove all columns from the Events table except the following and rename:
 - mbr_uqid - Member Unique ID
 - event_uqid - Event Unique ID
 - Event Description
 - Event Group 1
 - Full Date
 - LOB
3. Update the data type for Event Unique_ID to Text.
4. Rename the column **mbr_uqid** in the Members table to **Member Unique ID**.
5. Remove the columns **NHI** and **Contactable** from the **Members** table.
6. Create a new column on the Members table called County, State.

Hints:

1. Use the transform **Choose Columns** to remove and add columns.
2. Use the transform **Column From Examples**
3. Rename columns by selecting the column and hitting F2.

The screenshot illustrates a step-by-step process for adding columns in the Power BI Data Editor:

- Step 1:** The "Queries [3]" pane shows three tables: Date, Events, and Members. The "Members" table is selected, indicated by a red circle with the number 1.
- Step 2:** A "Choose Columns" dialog is open, showing the "Events" table selected in the left pane. The right pane lists various columns from the "Events" table, with "Event Description" and "Event Group" checked. A red circle with the number 2 is on the dialog.
- Step 3:** Another "Choose Columns" dialog is open, showing the "Members" table selected in the left pane. The right pane lists many columns from the "Members" table, with most checked. A red circle with the number 3 is on the dialog.
- Step 4:** The main Power BI Data Editor interface shows the "Add Column" ribbon tab selected. The "General" section of the ribbon contains several options: Column From Examples, Custom Column, Invoke Function, Conditional Column, Index Column, Duplicate Column, and a "From" dropdown. A red circle with the number 4 is on the ribbon.

Step-by-Step Instructions

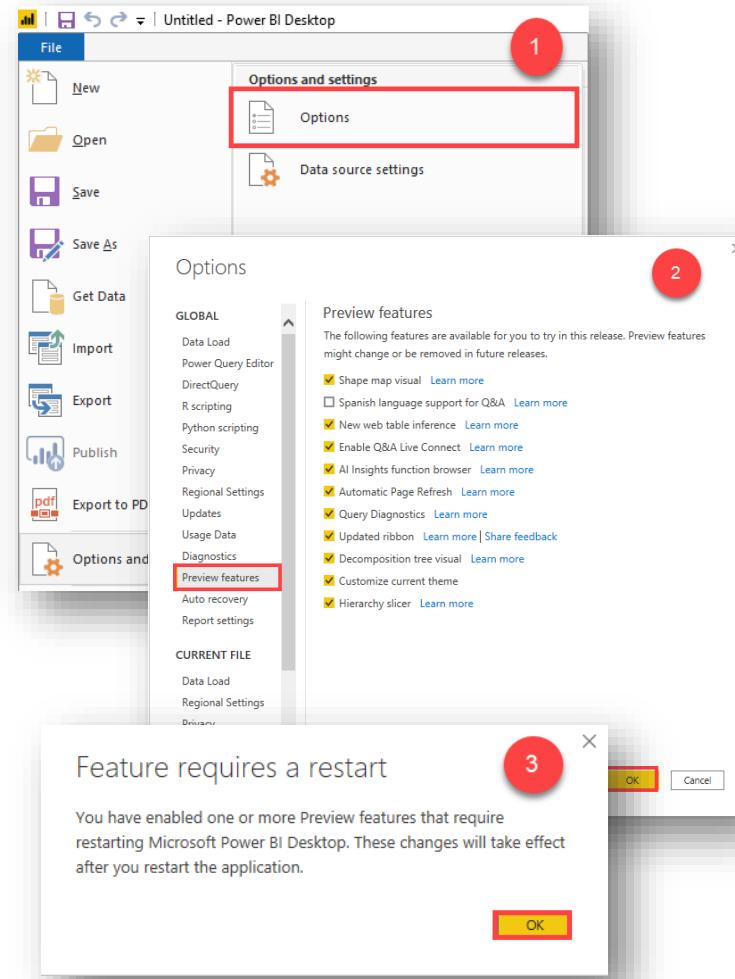
Click Steps

1. On the ribbon at the top of the screen select **File**.
2. Select **Options and Settings**.
3. Under the Global options select **Preview features**. Select all the preview features then select **OK**.
4. Select **OK** on the pop up that notifies you to restart Power BI.
5. Close Power BI and open it again so you have access to preview features.

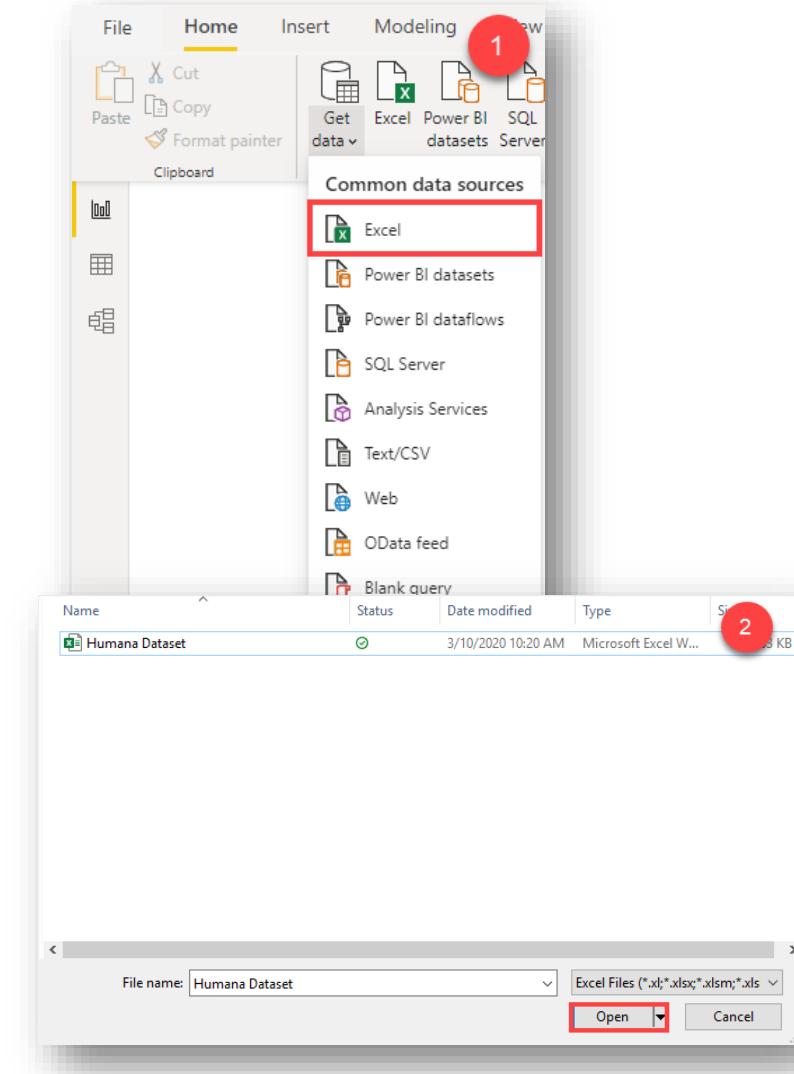
Explanation:

Preview features encompass improvements and new functionalities. Preview features may need some continued testing and development.

Screen Shots



6. Under the **Home** ribbon's Data section, select **Get Data**.
7. Select **Excel**.
8. Locate the folder, **Humana Power BI**, you extracted onto your machine. Open **Data** and choose **Humana Dataset** as the source to open into Power BI. Select **Open**.

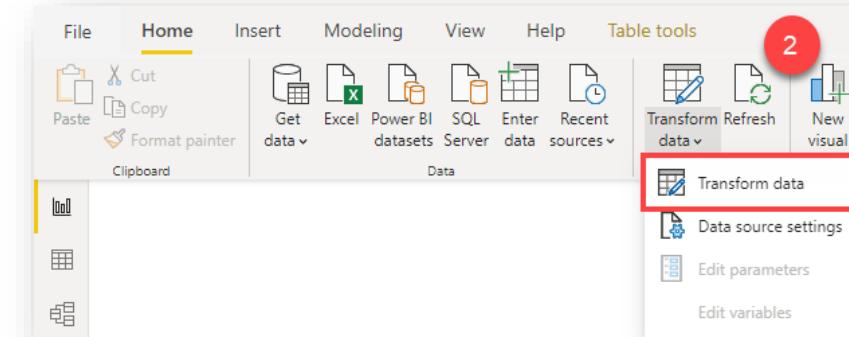


- Select the **Date**, **Events**, and **Members** excel worksheets. Select **Load**.
- On the **Home** ribbon under the Queries section, select **Transform data**.
- Select **Transform data**.

Explanation:

You can also select Transform Data from the Navigator, but it is also useful to know how to enter the Power Query Editor from the Home Ribbon in case you need to make changes while developing a report. Most of the time you will want and/or need to edit your queries. Queries are just a call to your data source. Changes to a query do not edit your data source in any way.

mbr_uid	State Name	Age	Tenure Months (2018)	Total Tenu
27dc4de6f0c698eb	Missouri	72	12	12
27d252ccad07b7e	Ohio	80	12	12
27db85c3422a363a	Washington	83	12	12
27d6672184064300	Wisconsin	65	12	12
27d7ac5def1fc6bc3	Florida	78	12	12
27d793e2a935e8f2	Texas	75	12	12
27d9a071a0b4c506	Florida	65	12	12
27ca3fd032cd3b36	Arizona	79	12	12
27d336c6a17f1b0	North Carolina	67	12	12
27e441090882de16	South Carolina	77	12	12
27c55537a2c45ea2	West Virginia	78	12	12
27d3a5c252195e08	Illinois	72	12	12
27dd6df349de680f	North Carolina	71	12	12
27c7bb049fc3c49	South Dakota	67	12	12
27e188e9243da46d	Florida	62	12	12
27d994e63c4f7573	Florida	65	12	12
27c7b7f74728b7f7c	Texas	79	12	12
27d298c3a2c6f10	Pennsylvania	80	12	12
27d7889e311121e89	Ohio	70	12	12
27d8687f687cf9	Virginia	67	12	12
27d1de4a00c0e057	Louisiana	71	12	12
27c547dca5bc14b8	Indiana	68	12	12
27db8b14e5b9f538	Florida	71	12	12



12. For the **Events** query, select the **Home** ribbon and select **Choose Columns**. First, *unselect all columns* by clicking **(Select All Columns)** and then *select* only the following columns:

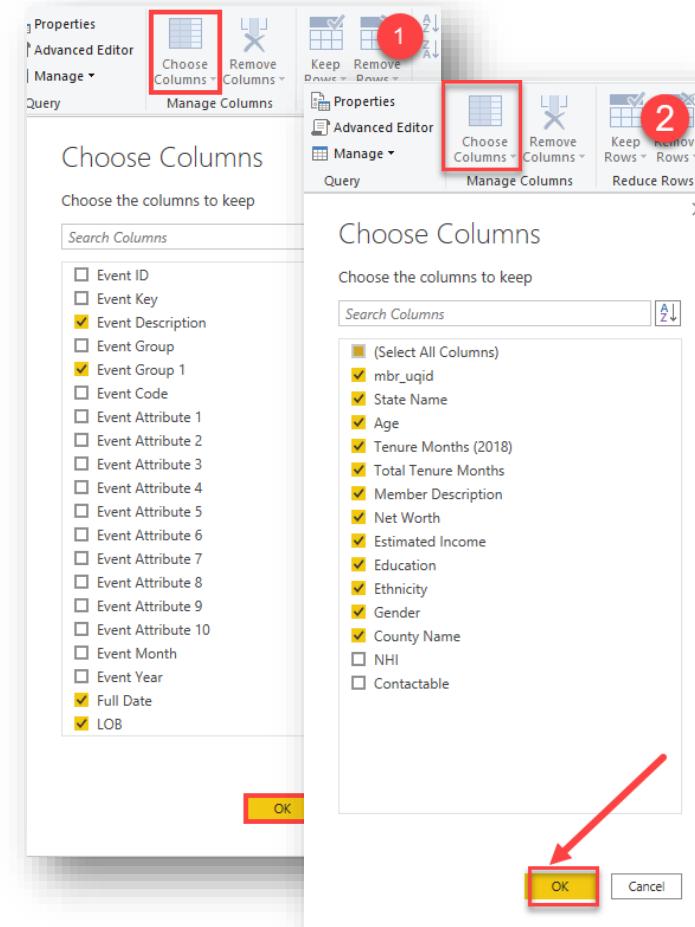
7. mbr_uqid
8. event_uqid
9. Event Description
10. Event Group 1
11. Full Date
12. LOB
Select **OK**.

13. Next, remove the following two columns from the **Members** Query by using the choose columns option:

13. NHI
14. Contactable
Select **OK**.

Explanation:

You will not always need every column in a query. Choose only columns required for reporting, this will help to save space and will help make reports faster.



In this section you will learn how to change data types in the Power Query Editor, keep in mind, there are many ways to accomplish this task.

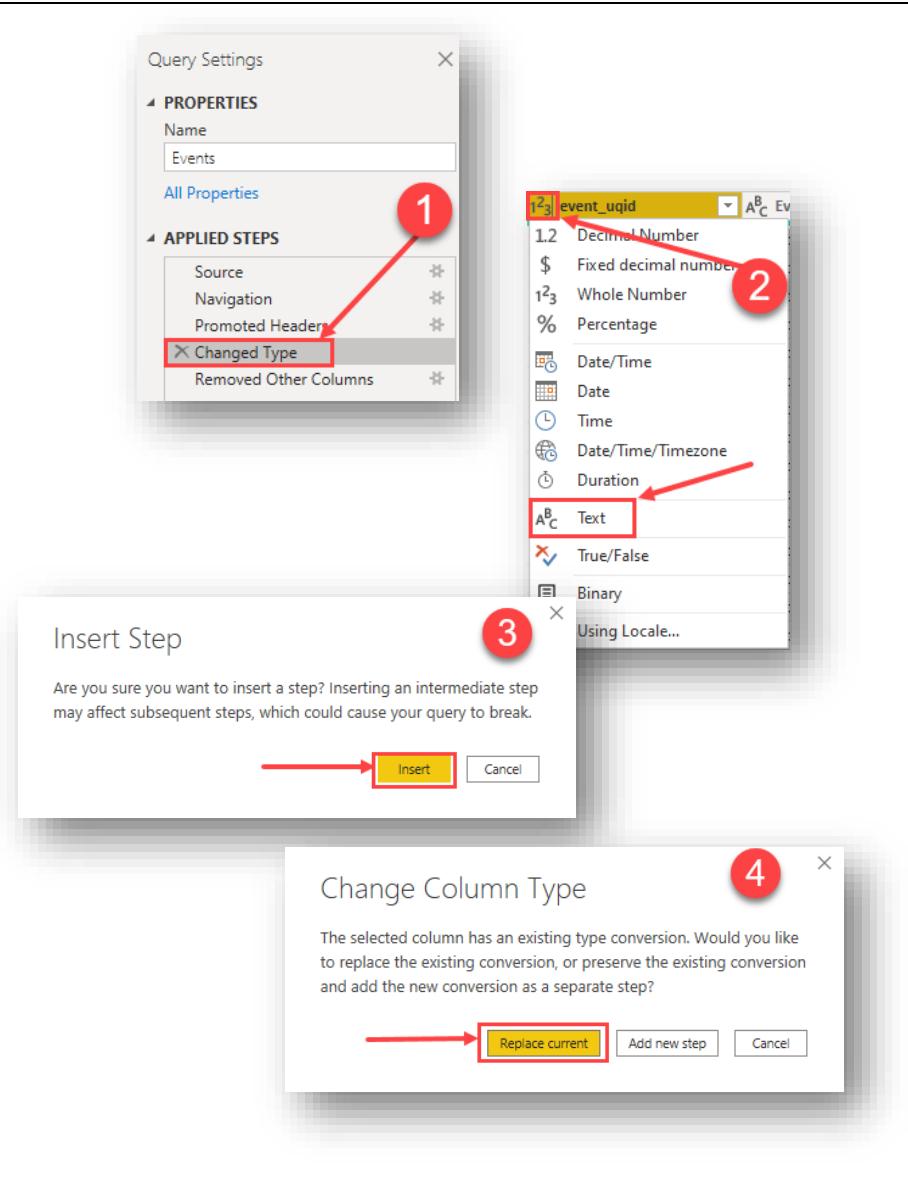
14. Make sure you have the **Events** query selected.

Note: The Power Query editor has performed some data type conversions automatically. This step can be found in the Applied steps section. Usually, these automatic changes are extremely helpful, but they should also be validated.

15. Select the step “Changed Type” from the Applied Steps section. See image in Step 1 to the right.
16. Change the data type for the column event_uqid from numeric to text. See Step 2.
17. In this demo, you are inserting an intermediate step and, in some instances, this can cause a query to break. Click Insert.
18. For the final step, click ‘Replace Current’. This is replacing the data type conversion that automatically occurred with the data type conversion you specified.

Explanation:

The Applied Steps section records every change made in the Power Query editor, these steps will be repeated in the future upon a data refresh and are also great for data validation purposes.



Note: There are a few ways to update a column name. First, a name can be updated by right clicking a column name selecting Rename from the drop down. Secondly, a column can be renamed by simply double clicking on the column name or selecting the column and hitting the F2 key.

19. First, make sure that the last step in the Applied steps section has been selected. This will prevent you from inserting intermediate steps. See Step 1.

20. Change the following Column Names

Events

- 15.**mbr_uqid: Member Unique ID
- 16.**event_uqid: Event Unique ID

Members

- 17.**mbr_uqid: Member Unique ID

Explanation:

As a best practice names of tables and columns should be renamed to names that are most recognizable and understandable to the consumers of reports.

The screenshot shows the Power BI Query Editor's 'Query Settings' pane at the top. In the 'APPLIED STEPS' section, the 'Removed Other Columns' step is highlighted with a red box and a red arrow pointing to it. Below the pane, a table is displayed with two columns: 'Member Unique ID' and 'Event Unique ID'. The 'Event Unique ID' column header is circled in red and labeled '2'.

	A ^B C Member Unique ID	A ^B C Event Unique ID
1	27ce4de6f0c698eb	17180025385
2	27d2252ccac07b7e	5930000000000
3	27d8b5c3422a363a	1680000000000
4	27d6d72184064300	1480000000000

The screenshot shows the Power BI Query Editor's 'Queries [3]' pane at the top. The 'Members' query is highlighted with a red box and a red arrow pointing to a table view below. The table has two columns: 'Date' and 'Member Unique ID'. The 'Member Unique ID' column header is circled in red and labeled '3'.

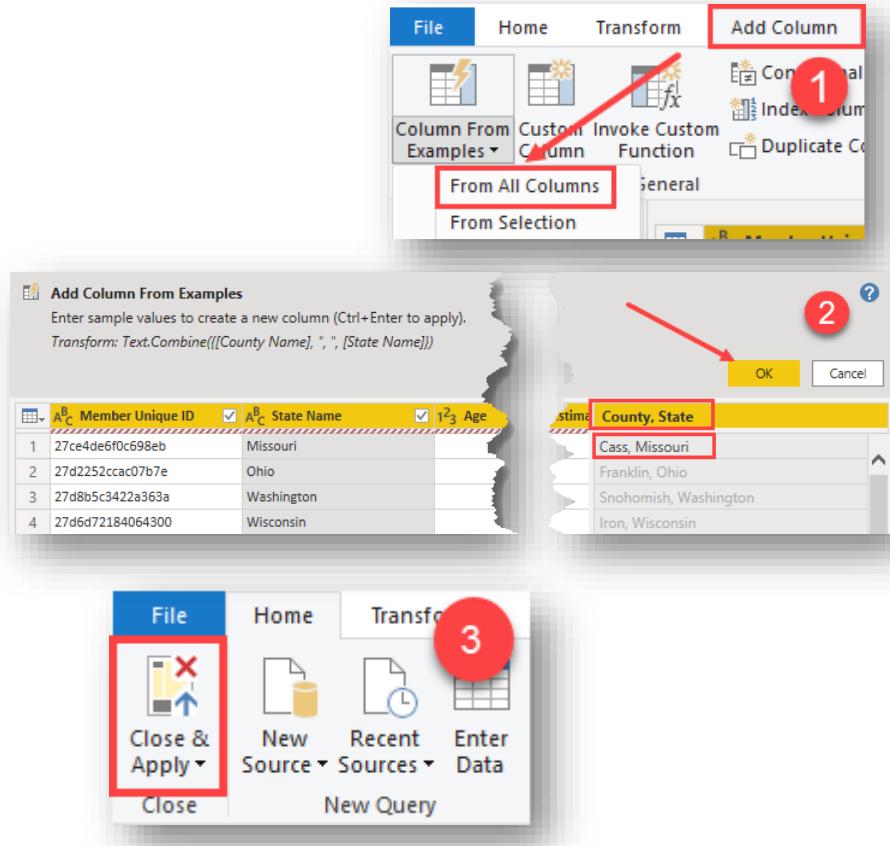
	A ^B C Member Unique ID
1	27ce4de6f0c698eb
2	27d2252ccac07b7e
3	27d8b5c3422a363a
4	27d6d72184064300

21. Next, you are going to learn how to add new columns using the built-in code generator.
22. Select the **Members** query from the **Queries** pane.
23. Choose the **Add Column** ribbon. Next, select **Column From Examples**. Select **From All Columns**.
24. Type the corresponding county name and state for the first row into the blank text box and hit enter, each field should auto fill. See step 2 to the right.
25. Rename the column to **County, State**. Select **OK**.

Explanation:

Combining locations help to reduce ambiguity when creating map visualizations. Counties and cities can exist in multiple states and therefore adding the state adds clarity.

26. Finally, Select **Close & Apply** from the Home Ribbon. The Power Query Editor be closed and the data will be loaded into Power BI Desktop.
27. Select **File** and **Save**. Save the file as Module 01.



Module 1 (Advanced Lab): Data Cleansing and Preparation (10-15 Minutes)

In this section, more advanced data cleansing can be performed from the Power Query Editor. This section is for users who already have experience working with Power BI. This section is optional and can be completed during class, after class, or not at all!

Module Requirements:

- Create a new column called **Tenure Years (Sort)**
- This column is a conditional column, the output is based on the following criteria:

```
If Total Tenure Months Is less than 12 THEN 0
If Total Tenure Months Is less than 24 THEN 1
If Total Tenure Months Is less than 36 THEN 2
If Total Tenure Months Is less than 48 THEN 3
If Total Tenure Months Is less than 60 THEN 4
If Total Tenure Months Is less than 72 THEN 5
If Total Tenure Months Is less than 84 THEN 6
If Total Tenure Months Is less than 96 THEN 7
If Total Tenure Months Is less than 108 THEN 8
If Total Tenure Months Is less than 120 THEN 9
ELSE 10
```

Explanation: As a best practice, it's better to create calculated columns in the Power Query Editor rather than in Power BI Desktop (DAX). This provides compression and performance benefits, as well as eliminates scenarios where circular dependencies may exist.

*****The next page contains instructions, try to attempt prior to moving on*****

Module 1: Advanced Lab

This lab's intended purpose is to challenge the student; as a result, there will be far less step by step instructions! The completed example can be found in the **Completed Labs** folder and **Appendix 2** at end of the lab book.

Lab Instructions

- 1) If you are not in the Power Query Editor, select **Transform Data** ribbon from the options across the top.
- 2) Select the **Members table** from the **Queries pane**.
- 3) Click on the **Add Column** tab from the ribbon at the top. Then click **Conditional Column**.
- 4) Input all the parameters as mentioned in the Module requirements on the previous page. A screenshot of this can be seen in **Appendix 2**.
- 5) Change the Data Type to Whole Number.
- 6) Click **Close & Apply** from the Home Ribbon.
- 7) Save the file as **Module 01 – Advanced.pbix** to your class files.

Note: If you completed this example, this will be your starting point for the next lab. This column will be used later in the course for another advanced lab.

Module 2A: Data Modeling (15-20 Minutes)

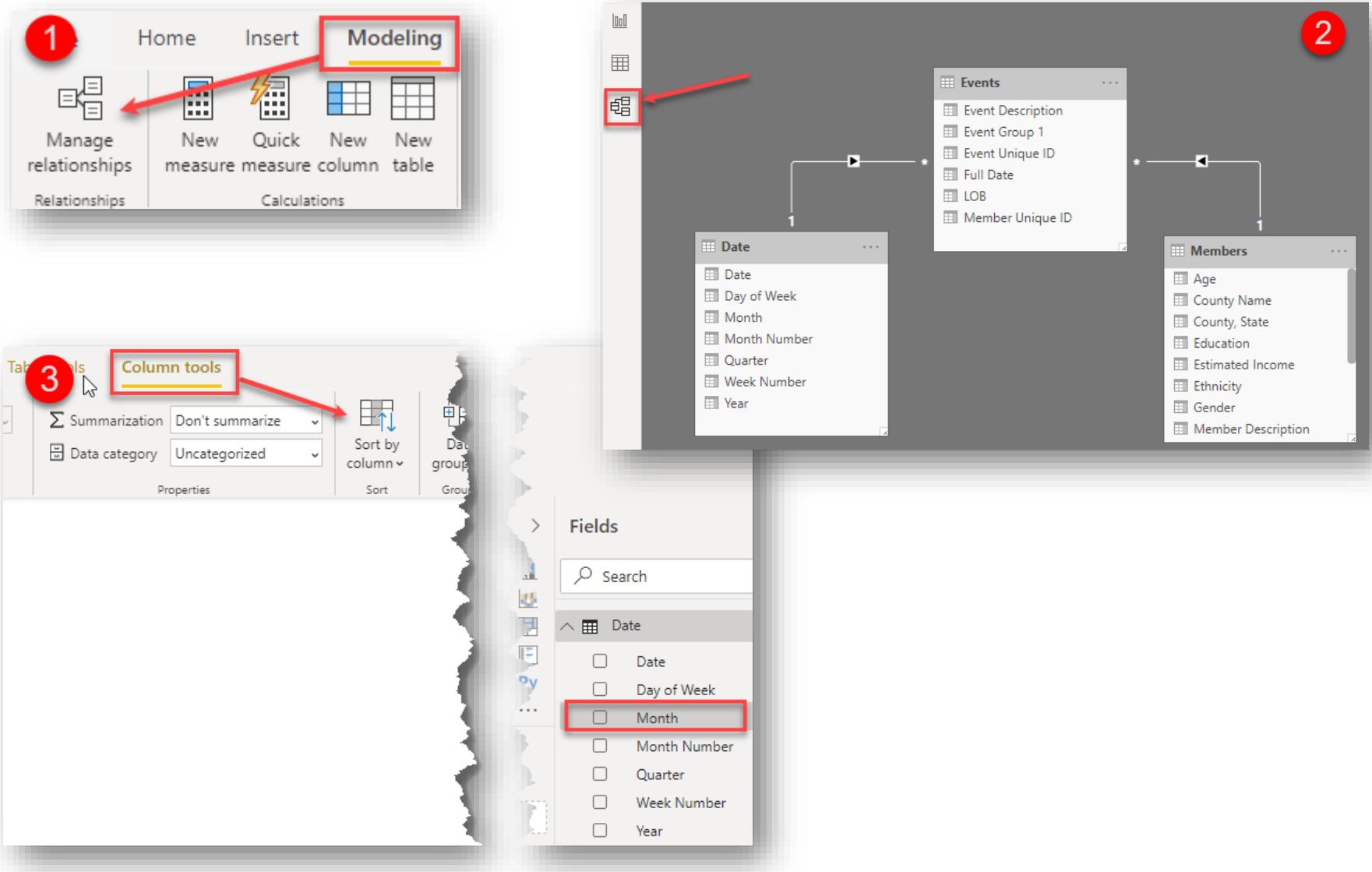
You've been tasked with creating a Power BI report for the company you work for, Humana. Create relationships between the three tables in your data modeling so that filtering will automatically occur in the data model. In this module, you will complete these tasks in either modeling ribbon or the Model view of Power BI Desktop. You will learn how to create relationships between tables.

Module Requirements:

1. Create a relationship between Events and Members.
2. Create a relationship between Date and Events.
3. Evaluate and verify the relationships from the model view.
4. Hide columns from the report view
5. Sort the Month by the Month number

Hints:

1. Relationships can be created from **Manage Relationships**, found on the **Modeling** ribbon.
2. Hiding columns will only hide columns from the report view, they are still available in the data and model views.
Right click on a column to hide it.
3. The **Sort by Column** option can be found in the **Column Tools** ribbon, which only appears when a column has been selected.



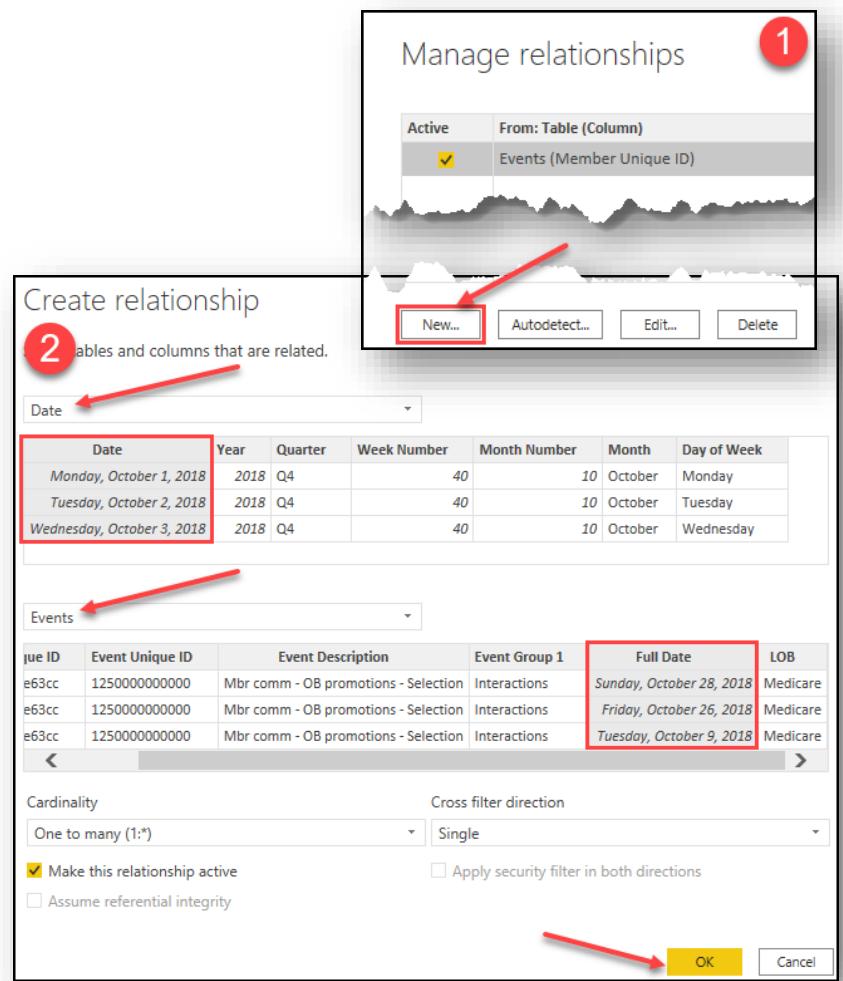
Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none">1. Select the Modeling ribbon from the toolbar across the top and then select Manage Relationships. See Step 1.2. This launches the Manage Relationship Editor. Power BI Desktop has detected a relationship and already created that relationship between the Events table and the Members table. See Step 2. <p>Note: Often times the Power BI Desktop will detect and create relationships automatically, it's very important to verify and validate that these relationships are correct!</p>	 <p>The screenshot shows the Power BI Desktop ribbon with the 'Modeling' tab highlighted (Step 1). Below the ribbon, the 'Manage relationships' button is highlighted in the 'Relationships' group. The 'Manage relationships' dialog box is open, displaying a detected relationship between the 'Events' table (From: Table (Column)) and the 'Members' table (To: Table (Column)). The 'Events (Member Unique ID)' column is selected as the active column.</p>

3. Click on 'New...' to create a new relationship in the data model. This relationship will be from the Date table to the Events table.
4. Select the **Date** table from the first drop down and then select the column 'Date'.
5. Next, select the **Events** table from the second drop down and then select the column 'Full Date'. See the visual representation of this relationship in Step 2 to the right.

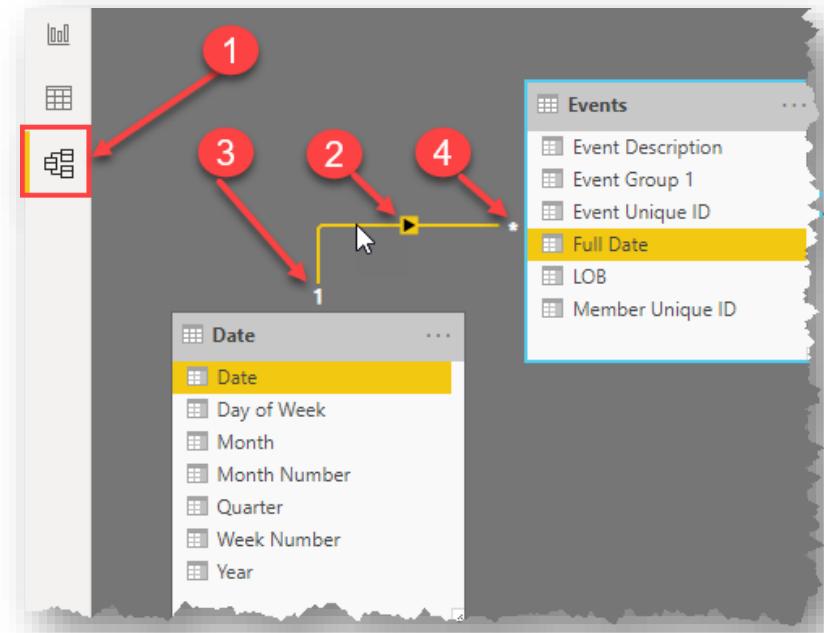
Explanation:

Relationships in the data model allow automatic filtering to occur between tables when building visualizations. Incorrect results or duplicate values are displayed when relationships don't exist or have not been defined correctly.



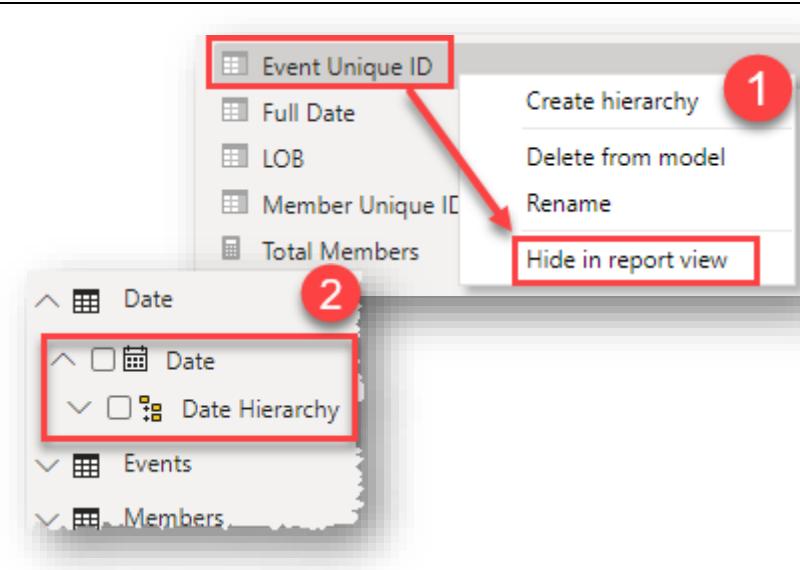
6. To view a visual representation of the current relationships, navigate to the **Model** view.
7. From this view you can see existing relationships and validating those relationships by simply hovering over an existing relationship.
8. Below is a breakdown and explanation of the different pieces that exist within the model view.

- Model View
- This is the direction that the filter current flows. The Date table filters the Events table.
- This **1** represented here specifies that the Date table is the one side of the relationship.
- The ***** specifies that the Events table is the many side of this relationship.



Note: When Designing a data model, it's also important to hide columns and tables that will not be used for reporting. This will improve the user experience and the understandability of the data model.

9. Hiding a column or table can be accomplished in any of the three views (Report, Data or Model view). Simply right click on the item and then select (Hide or Hide in Report View).
10. First, hide the following columns on the Events table:
 - Event Unique ID
 - Member Unique ID
 - Full Date
11. Repeating the same steps as above, hide the following columns from the **Members** table:
 - Member Unique ID
 - Tenure Months (2018)
 - County Name
12. Navigate to the report view. For the date table, hide everything except for the column Date and the corresponding date hierarchy that was automatically created by Power BI.
 - See Step 2 to the right.



Note: Some columns need to be sorted very specifically. For example, the column **Month** should be sorted chronologically not alphabetically.

13. Observe how the Month is being sorted incorrectly, alphabetically, in step 1:
14. Next, select the **Month** column from the **Date** table. Don't see the Month? See note below:

Important: If you are in the report view, the Month column is hidden from previous steps. You can right click on the table and 'View Hidden' or you can navigate to the Data view and make the change there.

15. Under **Column Tools**, click the dropdown for **Sort by column** and select **Month Number** from the list. See step 2.
16. In step 3, the correctly sorted months can be seen after making this adjustment.

The screenshot illustrates the steps to sort the Month column correctly. Step 1 shows the 'Month' column in the data view, listed alphabetically from December at the top to October at the bottom. Step 2 shows the 'Column tools' ribbon tab selected, with the 'Sort by column' dropdown open. A red circle highlights the 'Month Number' option in the dropdown menu. Step 3 shows the 'Month' column in the data view, now sorted chronologically from January at the top to December at the bottom.

1

2

3

Month

December
February
January
March
November
October

Month tools

Sort by column

Month Number

Month

January
February
March
October
November
December

Fields

Date
Day of Week
Month Number
Quarter
Week Number
Year

Month

Module 2B: Data Analysis Expressions (DAX) (25-35 Minutes)

The data has been cleaned and now relationships have been built. Before you create any reports, you will first need to create some additional columns and measures using the data analysis expressions language. These columns and measures will add significant analytical value to the data model!

Module Requirements:

1. Create the following calculated column with the following groupings.
 - a. Age Range
 - Under 65
 - 65 – 74
 - 75 – 84
 - 85+
 - b. Tenure Years
 - Create 11 groupings ranging from **less than 1 year – 10+ years**.
2. Create the following measures:
 - a. Member Count
 - b. Dist Members
 - c. Event Count
 - d. Dist Event Count
 - e. Event Per Day
 - f. Average Age
 - g. Average Income
3. Store all the calculated measures in a folder called **Measures**.

Hints:

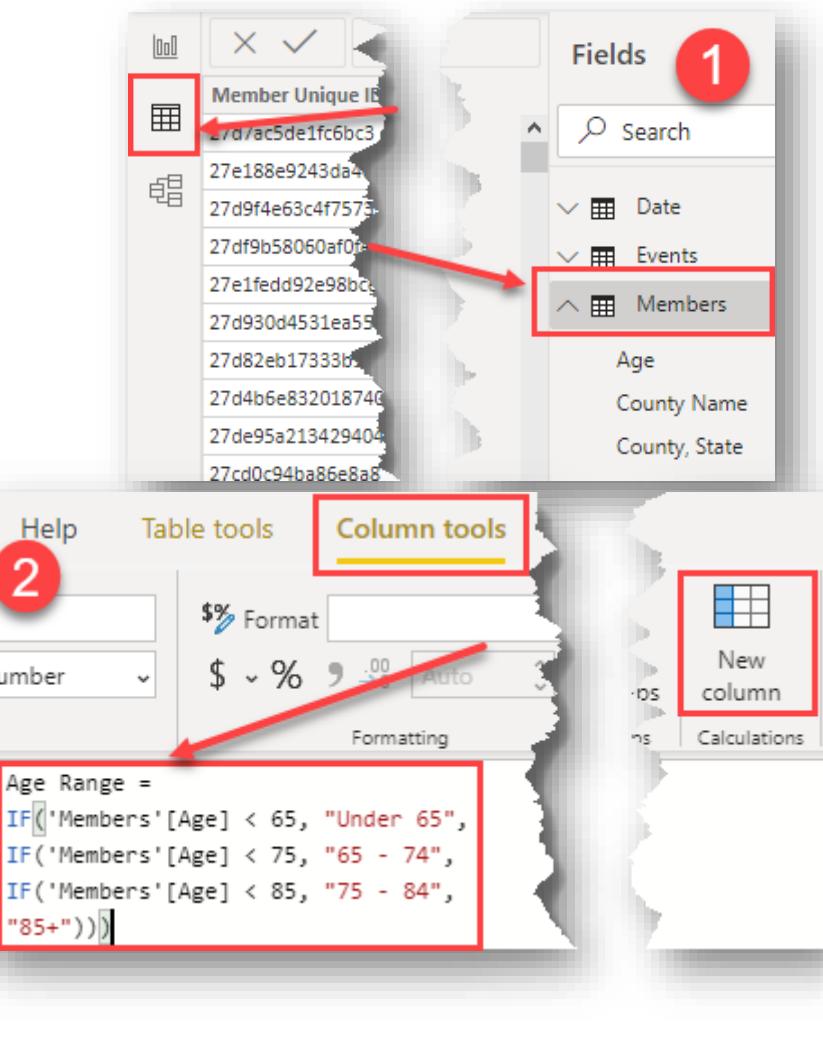
1. The completed code for all the DAX calculations can be found in the following location:
 - a. *Humana Power BI|Completed Labs|Module 02B_Calculations.docx*
2. Determine Tenure Years from **Total Tenure Months** column.
3. <https://docs.microsoft.com/en-us/power-bi/guided-learning/introductiontodax>

!Be Careful!: Be careful copying and pasting code from this document. The single quotation marks are often copied incorrectly and will generate errors, if this happens, make sure to delete and replace each quotation mark!

Explanation: **Calculated columns** are created with DAX and are generally used for adding additional columns to a table that will be used as descriptive attributes or as a composite key (*a composite key is a combination of multiple fields to be used for defining a relationship*). Calculated columns are only processed when the model is refreshed and unlike Measures, they will take up valuable space in memory, so keep this in mind! ☺

Explanation: **Calculated measures** are created with DAX and are most commonly used for creating aggregations, ratios and time series analysis calculations (Year to Date, Year over Year, Prior Year, ect..). Measures are dynamic and updated anytime a filter on a report changes. Measures are quite a bit different than columns. First of all, measures do not take up valuable space in memory. Secondly, to validate the results of a measure it must be added to a visualization, the values of measures do not appear in the table it has been assigned to. Although rare, poorly written calculations can cause performance issues which cause visualizations in reports to return results slower.

Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none"> 1. First, create the two calculated columns. These calculated columns will help describe the data better. Select the Data view. 2. From the data view, select the Members table. See Step 1. 3. Once the Members table has been selected, select New column. 4. Next, type the following expression into the formula bar: 	 <p>Age Range =</p> <pre>IF('Members'[Age] < 65, "Under 65", IF('Members'[Age] < 75, "65 - 74", IF('Members'[Age] < 85, "75 - 84", "85+")))</pre>

Explanation: An IF statement has three parameters (A logical test, result for true, result if else). Also, If statements can be nested one inside another, as in this example.

Calculated columns are very regularly used to add descriptive fields which help to define and explain metrics within data.

5. Next, create another calculated column on the Members table by repeating steps 2 and 3.
6. Next, type the following expression into the formula bar:

```
Tenure Years =
SWITCH(TRUE(),
'Members'[Total Tenure Months] < 12, "Less than a Year",
'Members'[Total Tenure Months] < 24, "1 Year",
'Members'[Total Tenure Months] < 36, "2 Years",
'Members'[Total Tenure Months] < 48, "3 Years",
'Members'[Total Tenure Months] < 60, "4 Years",
'Members'[Total Tenure Months] < 72, "5 Years",
'Members'[Total Tenure Months] < 84, "6 Years",
'Members'[Total Tenure Months] < 96, "7 Years",
'Members'[Total Tenure Months] < 108, "8 Years",
'Members'[Total Tenure Months] < 120, "9 Years",
"10+ Years")
```

Note: The combination of **SWITCH(TRUE())** can be used rather than nested if statements when many if conditions exist. The primary reason for using **SWITCH** rather than **IF** is to generate code that is easier to read and maintain.

1

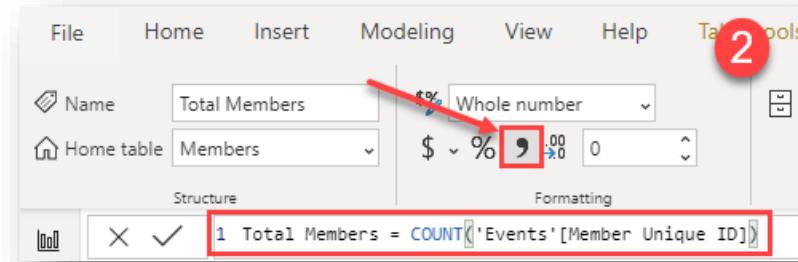
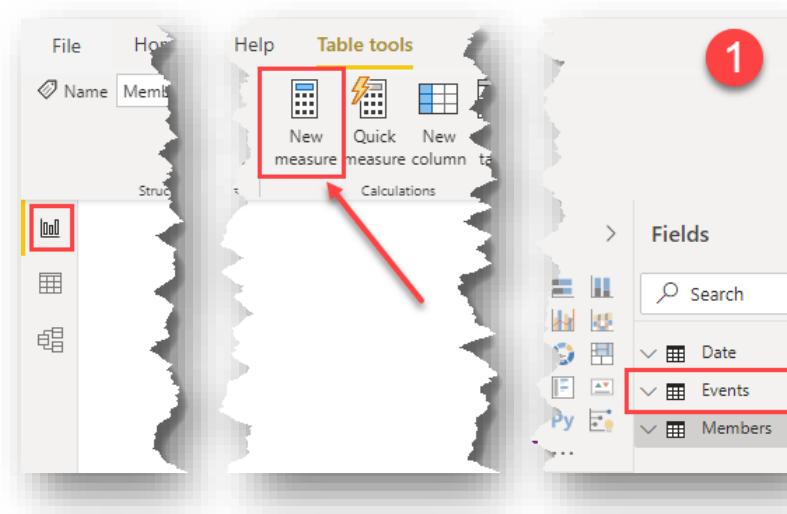
```
1 Tenure Years =
2 SWITCH(TRUE(),
3 'Members'[Total Tenure Months] < 12, "Less than a Year",
4 'Members'[Total Tenure Months] < 24, "1 Year",
5 'Members'[Total Tenure Months] < 36, "2 Years",
6 'Members'[Total Tenure Months] < 48, "3 Years",
7 'Members'[Total Tenure Months] < 60, "4 Years",
8 'Members'[Total Tenure Months] < 72, "5 Years",
9 'Members'[Total Tenure Months] < 84, "6 Years",
10 'Members'[Total Tenure Months] < 96, "7 Years",
11 'Members'[Total Tenure Months] < 108, "8 Years",
12 'Members'[Total Tenure Months] < 120, "9 Years",
13 "10+ Years")
```

7. Now it's time to create some calculated measures.
8. Navigate back to the **Report** View. Select the **Events** table and then select **New measure** from Table Tools. For reference, see step 1.
9. Next, type the following expression into the formula bar and hit enter:

Total Members = COUNT('Events'[Member Unique ID])

10. Finally, format the measure by clicking the thousands separator.

Note: When first writing calculated measures it's easy to forget to format the measures. Each measure should be formatted after completing the expression and hitting the enter key.



11. Now to create additional measures. Create the following measures by repeating steps 8 and 9 above.

Dist Members = DISTINCTCOUNT(Events[Member Unique ID])

Event Count = COUNT(Events[Event Unique ID])

Dist Event Count = DISTINCTCOUNT(Events[Event Unique ID])

Event Per Day =
DIVIDE([Dist Event Count], COUNTROWS('DATE'))

Average Age = AVERAGE('Members'[Age])

Average Income = AVERAGE('Members'[Estimated Income])

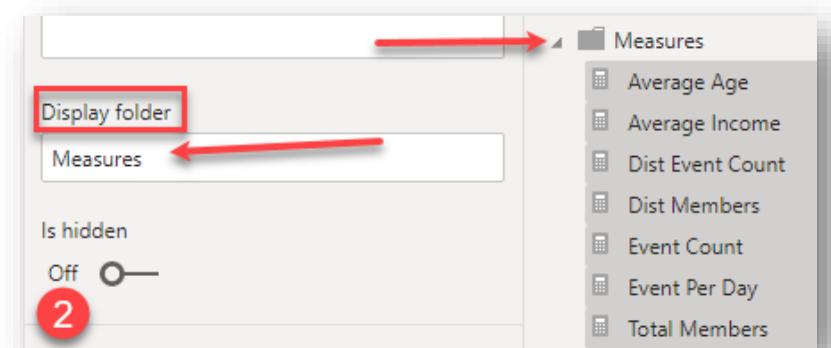
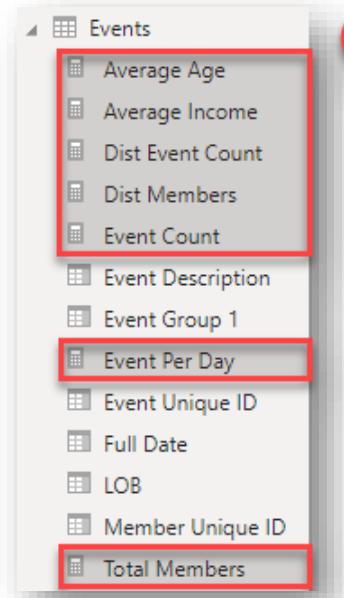
```
1 Dist Members = DISTINCTCOUNT('Events'[Member Unique ID])
1 Event Count = COUNT('Events'[Event Unique ID])
1 Dist Event Count = DISTINCTCOUNT('Events'[Event Unique ID])
1 Event Per Day =
2 | DIVIDE([Dist Event Count], COUNTROWS('Date'))
1 Average Age = AVERAGE('Members'[Age])
1 Average Income = AVERAGE('Members'[Estimated Income])
```

1

Explanation: Measures can be organized and grouped into folders. This makes it easier to find the calculations and easier to manage large numbers of calculations. In this section, the measures created thus far will be added to a measures folder.

12. Navigate to the **Model View**

13. Expand the **Events** table and multi select each of the calculated measures that have been created thus far. To multi-select hold down the **CTRL** key while click each measure. See Step 1.
14. Once a measure or multiple measures have been selected, expand the **Properties** pane.
15. Find the property **Display Folder** and type '**Measures**' into the text box. See Step 2.



Module 2 (Advanced Lab): Data Analysis Expressions (DAX) (15-25 Minutes)

This is an advanced lab, designed to challenge students who have been previously exposed to Power BI and DAX. In this module you will create three new measures. These measures will explain the count of events by a specified filter that is coming from the attribute **Event Group 1**.

Module Requirements:

- Use the CALCULATE function to apply the necessary filters for the three required measures.
- Create three new measures applying the required filters.
 - Interactions Events Count *(Event count filtered by Interactions from Event Group 1)*
 - Clinical Events Count *(Event count filtered by Clinical from Event Group 1)*
 - All Other Groups Events Count *(Event count filtered by all other event groups from Event Group 1)*

Explanation: CALCULATE: Evaluates an expression in a context that is **modified by the specified filters**. In other words, the filters you add when using the calculate function will change the current filter context. CALCULATE is the only function in the DAX language that can remove filters that have been applied and redefine a new filter context. This might not mean much to you now, but as your journey with Power BI continues, learning the Calculate function will be pivotal to authoring more advanced calculated measures.

Official Microsoft Documentation: <https://docs.microsoft.com/en-us/dax/calculate-function-dax>

*****The next page contains instructions, try to attempt prior to moving on*****

Module 2: Advanced Lab

This lab's intended purpose is to challenge the student; as a result, there will be far less step by step instructions! The completed DAX code can be found in the **Completed Labs** folder and **Appendix 3** at end of the lab book.

Event Group 1	Event Count	Interactions Events Count	Clinical Events Count	All Other Groups Events Count
Clinical	38,697	59,729	38,697	1,526
Demographics	624	59,729	38,697	1,526
EOC	218	59,729	38,697	1,526
Interactions	59,729	59,729	38,697	1,526
Product	684	59,729	38,697	1,526
Total	99,952	59,729	38,697	1,526

Lab Instructions

- 1) Create a new calculated measure called **Interactions Events Count**, use the calculate function to apply a filter to only return event counts where **Event Group 1** is equal to **Interactions**.
- 2) Format the measure with the **Thousands Separator**.
- 3) Create a new calculated measure called **Clinical Events Count**, use the calculate function to apply a filter to only return event counts where **Event Group 1** is equal to **Clinical**.
- 4) Format the measure with the **Thousands Separator**.
- 5) Create a new calculated measure called **All Other Groups Events Count**, use the calculate function to apply a filter to only return event counts where **Event Group 1** is not equal to Clinical or Interactions.
- 6) Format the measure with the **Thousands Separator**.
- 7) Save the file as **Module 02 – Advanced.pbix** to your class files.

Note: If you completed this example, this will be your starting point for the next lab.

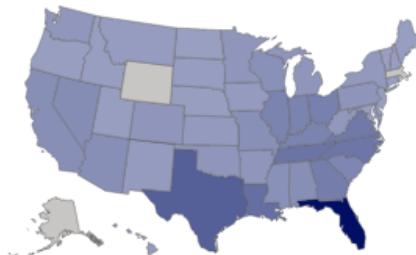
Module 3A: Data Visualizations (25-35 Minutes)

Now that the data has been imported, the data model designed and DAX calculations created, it's time to build reports! In this module you will learn how to create and format visualizations, tooltips, buttons, and how to add images and themes to your report.

Module Requirements:

1. Add the custom Humana theme to the report. Found in folder ***Theme and Images***.
2. Rename the report page to **Demographics**
3. Create three **Card** visuals and format them accordingly
 - a. Dist Members
 - b. Average Income
 - c. Average Age
4. Create a **Shape Map** visual that represents Distinct Members as a % of grand total by State.
5. Create a **Matrix** visual populated with the following fields.
 - a. Rows: Education, Age Range, Ethnicity
 - b. Columns: Gender
 - c. Values: % of Grand Total Dist Members
6. Create a **Tree Map** visual that displays Distinct Members by Tenure Years
7. Create a funnel chart that displays Distinct Members by Age Range

Member Distinct Count and %GT Member Distinct Count by State Name



6340

Member Distinct Count

\$58,078

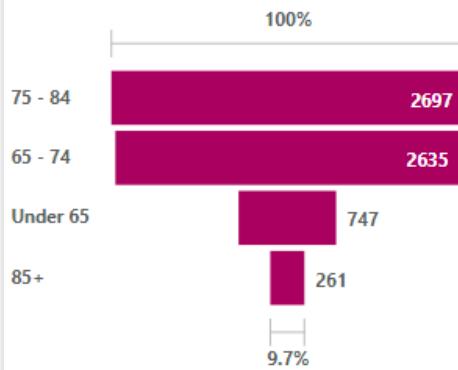
Average Income

Education	Female	Male	Total
Associates Degree	3.93%	3.12%	7.05%
Bachelors Degree	3.83%	3.04%	6.88%
High School	24.12%	17.98%	42.10%
Less Than HS	0.22%	0.08%	0.30%
Some College	25.22%	18.38%	43.60%
Unknown	0.03%	0.05%	0.08%
Total	57.35%	42.65%	100.00%

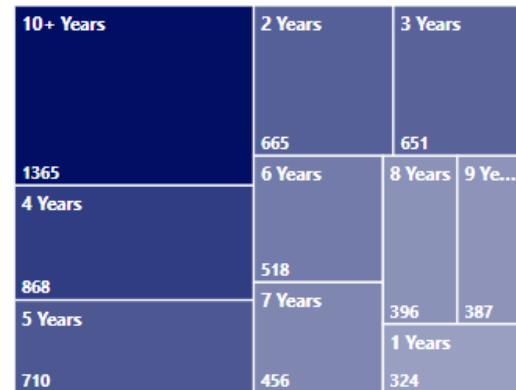
74

Average Age

Member Distinct Count by Age Range



Member Distinct Count by Tenure Years



Demographics

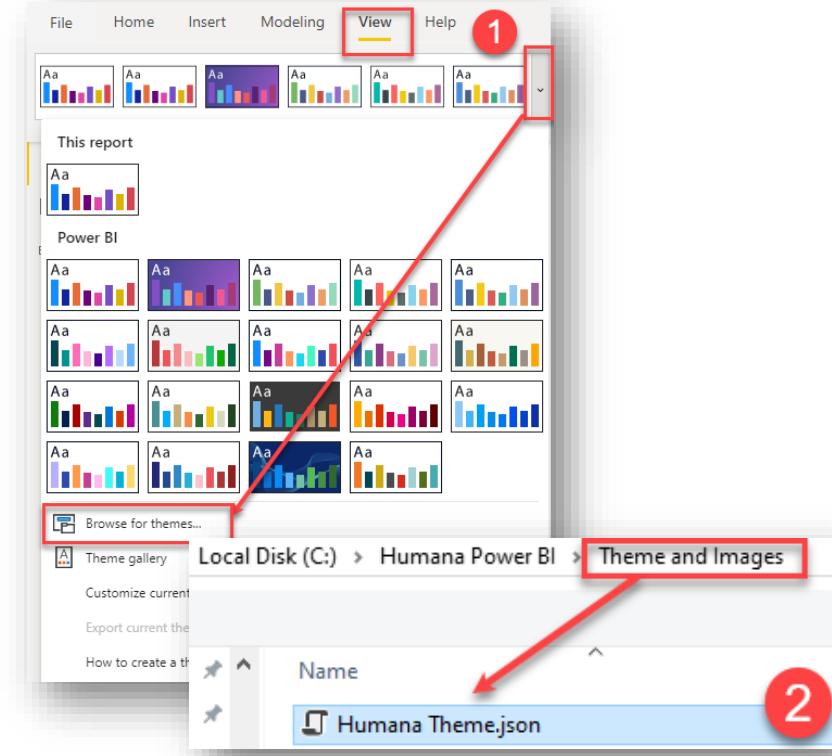


Step-by-Step Instructions

Click Steps

1. Select the **View** ribbon and click the drop down for **Themes**.
2. Select **Browse for themes...**
3. Find **Humana Power BI -> Theme and Images -> Humana Theme.json**.
4. Select **Open**.

Screen Shots

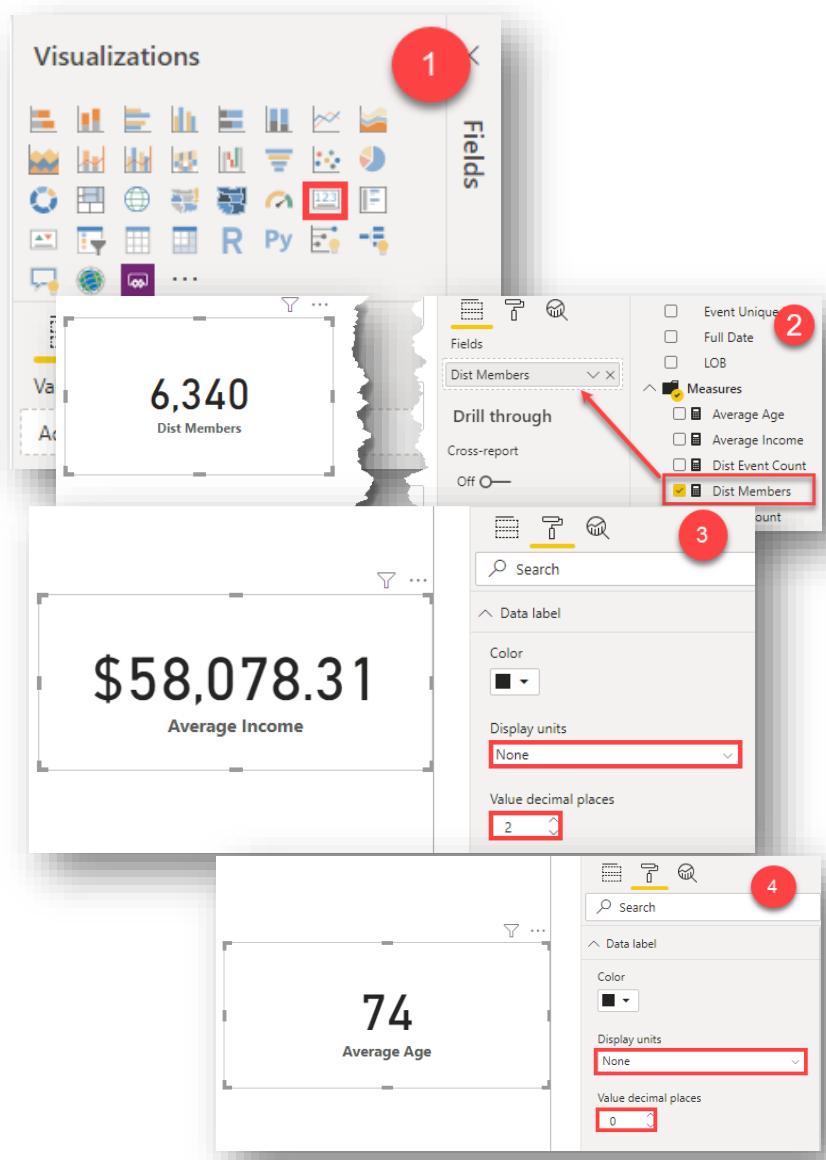


Now to create some visualizations:

5. Navigate to the **Report** view.
6. Select the **Card** visual from the **Visualizations** pane. Step 1.
7. Add **Dist Members** to the Fields section of the visual, see step 2:

Important: When creating **new visuals**, make sure you do not have any visuals currently selected. Click in the background of the report prior to the next step:

8. Add another **Card** visual and add **Average Income** to the fields section of the visual:
9. While selected on the Average Income card, select **Format** (paint roller icon) on the **Visualizations** pane.
10. Expand **Data Label** category. Change the **Display units** to **None**. Change **Value decimal places** to **2**.
11. Add another **Card** visual and add **Average Age** to the fields section of the visual:
12. Select the **Format** icon and expand the **Data label** category and change **Display units** to **None** and **Value Decimal places** to **0**.



Note: As a best practice it's a good idea to name each page in your Power BI Report. In this section you will name this first page Demographics.

13. **Deselect all visuals** by clicking in the background of the report.
14. On the **Visualizations** pane, select the **Format** icon. Expand **Page information**. Change **Name** to Demographics. Notice how other properties can be configured at the page level here.
15. On the **Visualizations** pane, select the **Matrix** visual. A visual will appear on the designer.

16. Expand the **Fields** pane. Add the following fields in the order listed, Tables included for clarity (Also see Step 3):

Rows

Members → Education

Members → Age Range

Members → Ethnicity

Columns

Members → Gender

Values

Measures Folder → Dist Members

17. Under the **Values** section for the visual, expand **Member Distinct Count**. Select **Show value as** and then select **Percent of grand total**. (See Step 4)

The screenshot shows the Power BI desktop application. The left side has a 'Visualizations' pane with various chart icons. The right side has a 'Fields' pane where fields like 'Education', 'Age Range', 'Ethnicity', and 'Gender' are listed under 'Rows' and 'Columns'. A 'Values' section contains 'Dist Members'. A context menu is open over 'Dist Members' with options like 'No calculation', 'Percent of grand total' (which is highlighted with a red box), 'Percent of column total', 'Percent of row total', and 'Show value as' (also highlighted with a red box). The main area shows a matrix visual with data for education levels and gender counts.

Education	Female	Male	Total
Associates Degree	249	198	447
Bachelors Degree	243	193	436
High School	1,529	1,140	2,669
Less Than HS	14	5	19
Some College	1,599	1,165	2,764
Unknown	2	3	5
Total	3,636	2,704	6,340

18. On the **Visualizations** pane, select the **Funnel** visual as seen in Step 1.

19. Add the following fields to the visual:

Group

Members → Age Range

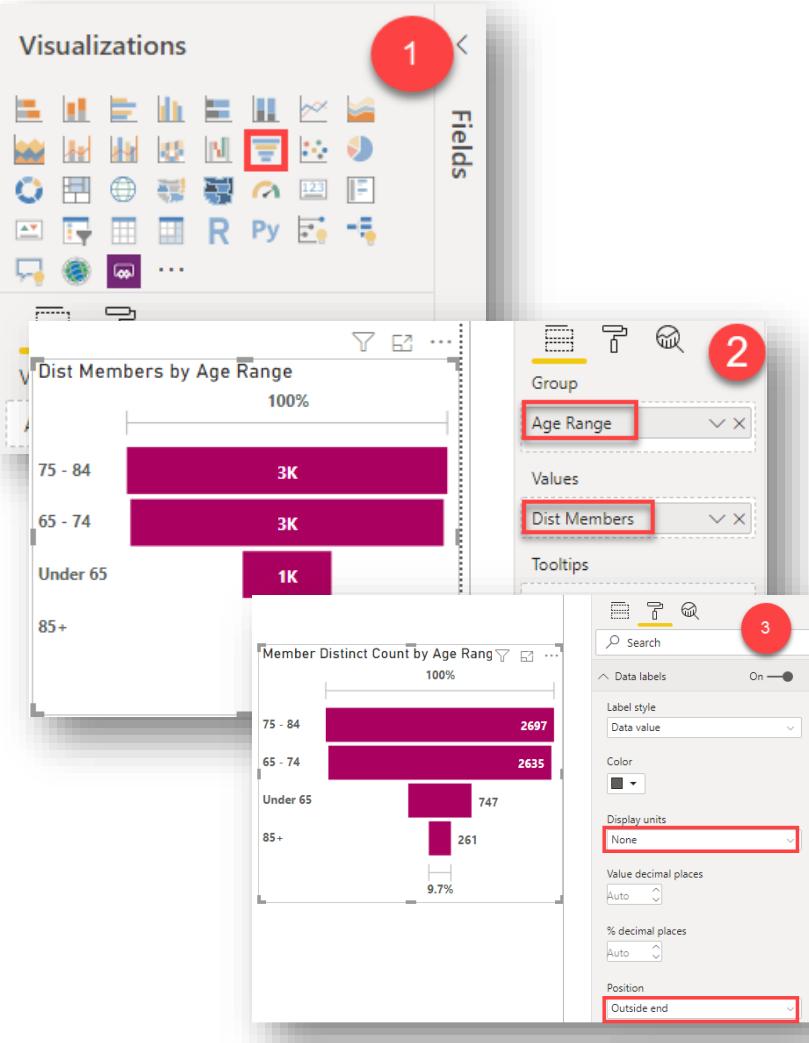
Values

Measures Folder → Dist Members

20. Select the **Format** icon. Expand **Data labels**. Change **Display units** to **None**. See *Screenshot 3*.

21. Change the **Position** to **Outside end**. Feel free to experiment with different options!

22. Place this visual in the Bottom left corner of the report.



Progress Check!

23. Currently your Report should be similar to Figure 3-1. We will be building an additional three visualizations on this page.

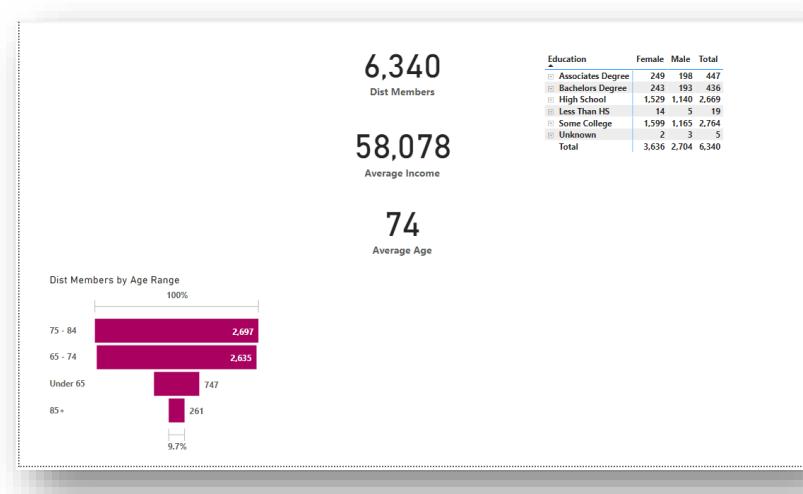


Figure 3-1

24. On the **Visualizations** pane select the **Treemap** visual. Add the following fields to the visual:

Values

Measures Folder → Dist Members

Group

Members → Tenure Years

25. Select the **Format** icon and turn the **Data labels'** toggle **On**. Change Display **units** to **None**.

26. Under **Data Colors** category, select **Advanced controls**. See Step 3.

27. Select the check box for **Diverging** and change the following properties:

Based on field → Dist Members

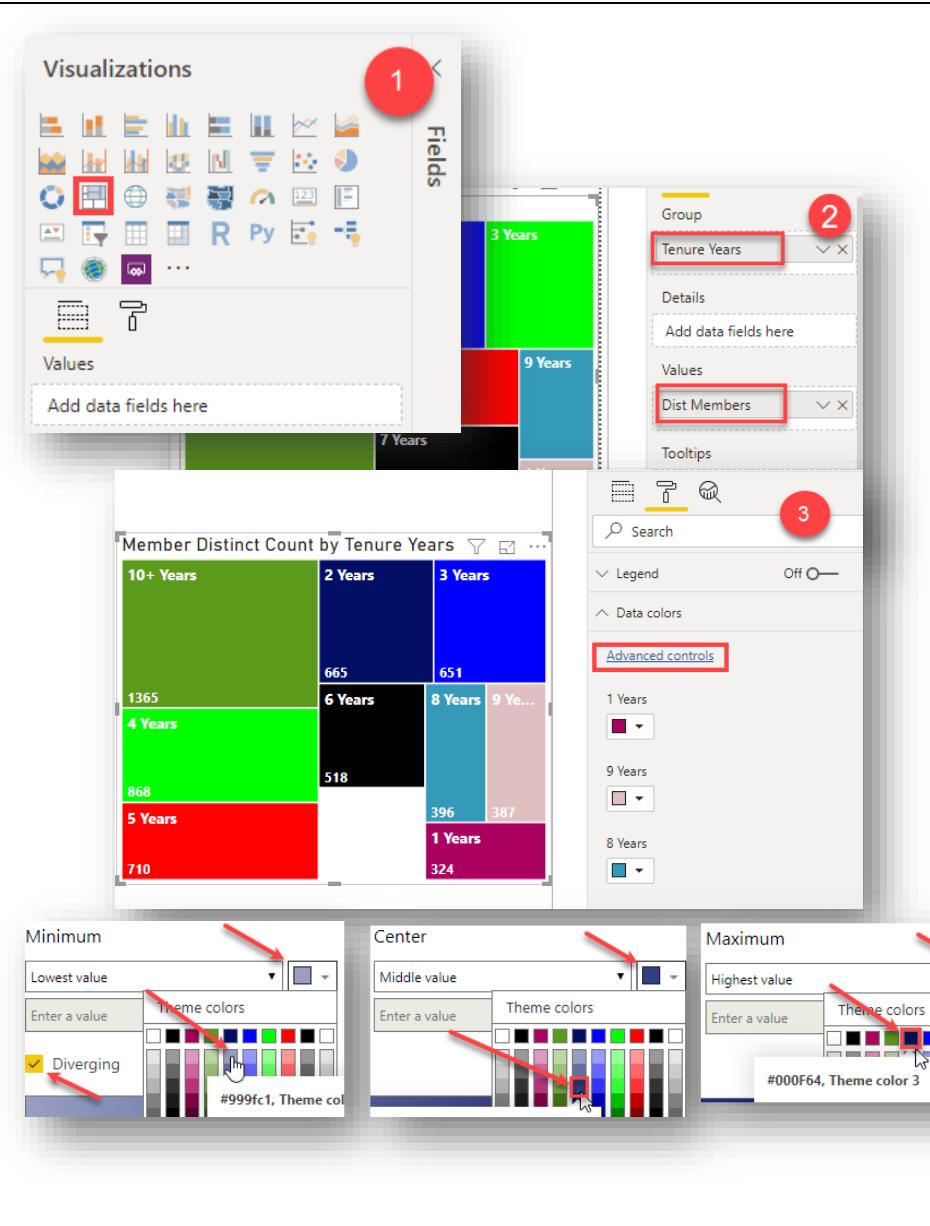
Minimum (Color): Theme Color 3, 60% lighter

Center (Color): Theme Color 3, 20% lighter

Maximum (Color): Theme Color 3

Place this chart in the bottom right corner.

Note: The theme colors start at the third color. The color, going down, is 60% lighter, 40% lighter, 20% lighter, 25% darker, 50% darker.



28. For the next visual, select the **Shape map** visual.
Add the following fields to the visual:

- Color Saturation → Dist Members
- ToolTips → Dist Members
- Location → State Name (Location)

29. Select the **Format** icon (paint roller), found under the visualizations pane.

30. Under **Data colors category** turn the **Diverging** toggle **On**.

31. Change the color settings to the below:

32. Change the following properties:

Minimum

Theme color 3, 60% lighter

Center

Theme color 3, 20% lighter

Maximum

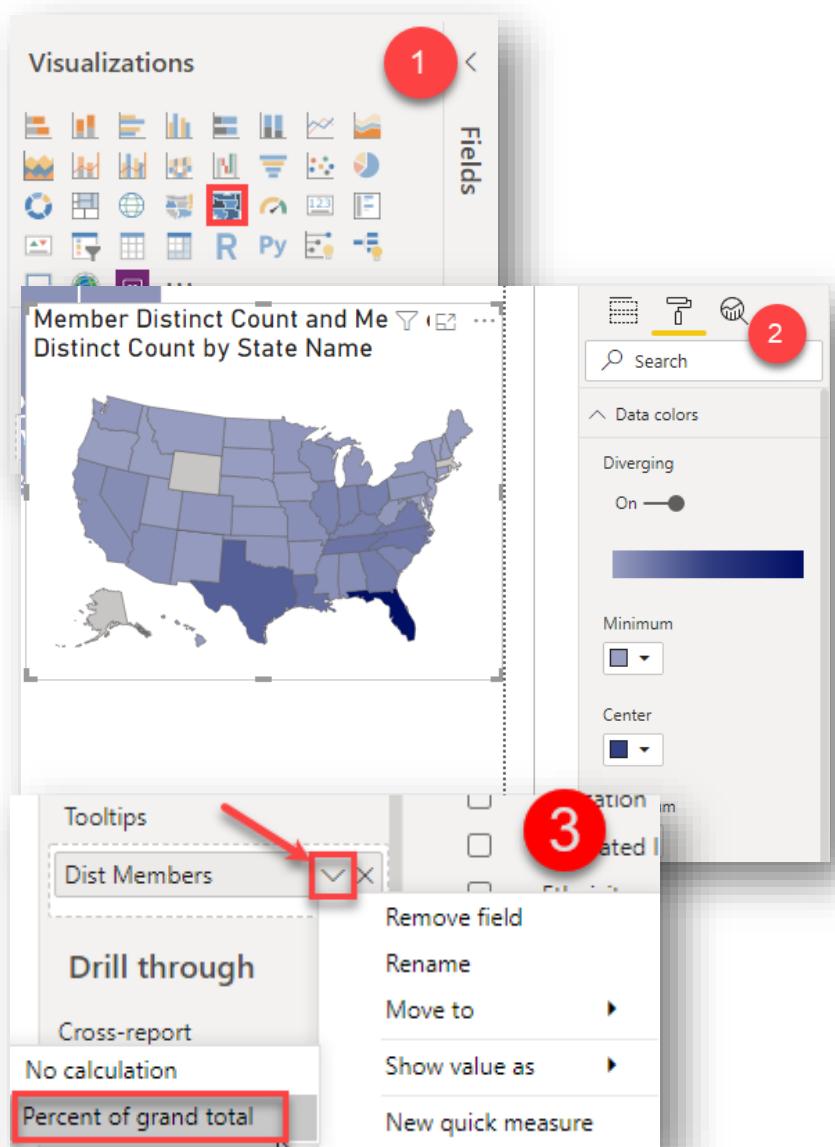
Theme color 3

Also see step 27 above for reference.

33. Find **Tooltips** in the fields section.

34. Click the drop down for Dist Members and select **Show value as → Percent of grand total**.

Note: A tooltip will now appear when a user hovers over any state in the map. This tooltip will represent that individual state's contribution to total members.



Module 3B: Data Visualizations (15-25 Minutes)

Now that the first report page has been completed, create a second report page named Longitudinal with some additional visualizations of the data.

Module Requirements:

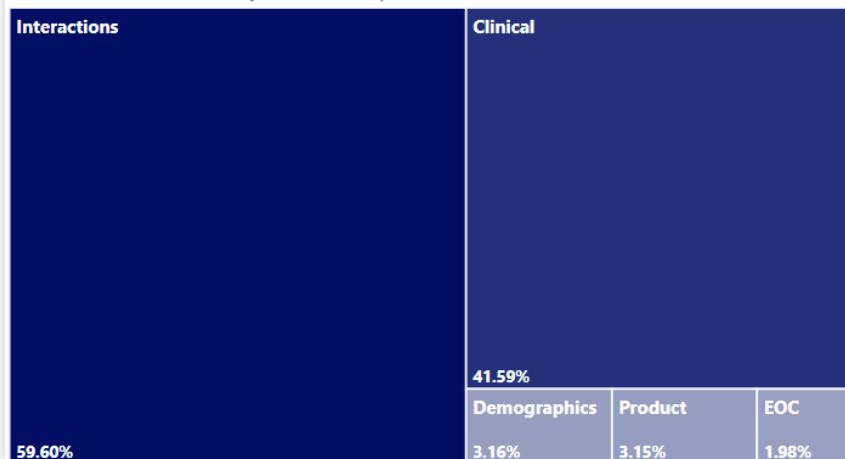
1. Create a new report page and name the page Longitudinal.
2. Create a new **Matrix visual** to analyze **Event Count** by Member Description and Event Group 1.
3. Create a treemap visual to represent Distinct Event Counts by Event Group 1.
 - a. The distinct event counts will be a % of Grand Total.
4. Create three new card visuals
 - a. Event Count
 - b. Dist Event Count
 - c. Events per Day
5. Add a Shape Map to visualize Event Count by State.

Hints:

1. See Completed Example below.
2. Don't forget to add diverging formatting with the Humana themes.
3. Remember to use Show Value As → Percent of Grand Total.

Member Description	Clinical	Demographics	EOC	Interactions	Product	Total
Autopilot Participator	24.87%	24.20%	25.69%	25.61%	21.20%	25.28%
Eager Engager	0.03%			0.01%		0.02%
Engaged Rationalizer	0.02%	0.16%		0.11%	0.15%	0.08%
Health Services Maximizer	6.38%	4.49%	5.50%	6.13%	4.82%	6.20%
Healthy self Sustainer	2.32%	2.08%	1.83%	2.47%	2.92%	2.41%
Independent Invincible	0.03%			0.03%	0.15%	0.03%
Intentional Maintainer	0.02%	0.16%		0.00%		0.01%
Overwhelm Reluctant Reactor	2.48%	2.56%	1.83%	2.20%	1.32%	2.31%
Overwhelmed Guidance Seeker	0.05%			0.06%		0.06%
Self Engaged Optimist	23.94%	23.56%	22.48%	24.98%	25.15%	24.56%
Selfless Support Seeker	0.09%			0.05%		0.06%
Simplicity Seeking Follower	9.60%	10.58%	6.88%	9.11%	12.13%	9.32%
Skeptical Control Seeker	29.91%	31.41%	35.32%	28.87%	31.58%	29.32%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

%GT Dist Event Count by Event Group 1



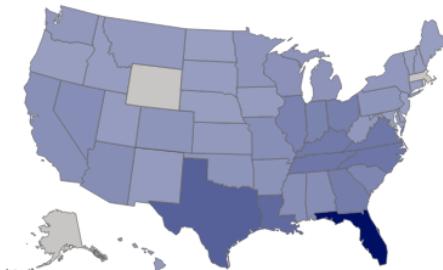
Event Count by State Name

99,952

Event Count

6,581

Dist Event Count



36

Events Per Day

Step-by-Step Instructions

Click Steps	Screen Shots
<p>1. At the bottom of the screen, add another page by selecting the addition (plus) icon. Name the page Longitudinal.</p> <p>Renaming a page can be accomplished in the formatting section by updating the Page information section. A second way to rename a page is to simply right click on the page tab across the bottom and then select rename.</p> <p>2. Select the Matrix visual and add the following fields to the visual:</p> <p>Values Event → Event Count Full (Values)</p> <p>Columns Event → Event Group 1(COLUMNS)</p> <p>Rows Member → Member Description (Rows)</p> <p>3. Find the Values field and then select the drop down for Event Count and select Show value as and then select Percent of column total. See step 3.</p> <p>4. Move the Matrix to the top left corner of the report.</p>	

5. Next, add a new visual to the report. Select the **Treemap** visual and add the following fields to the visual:

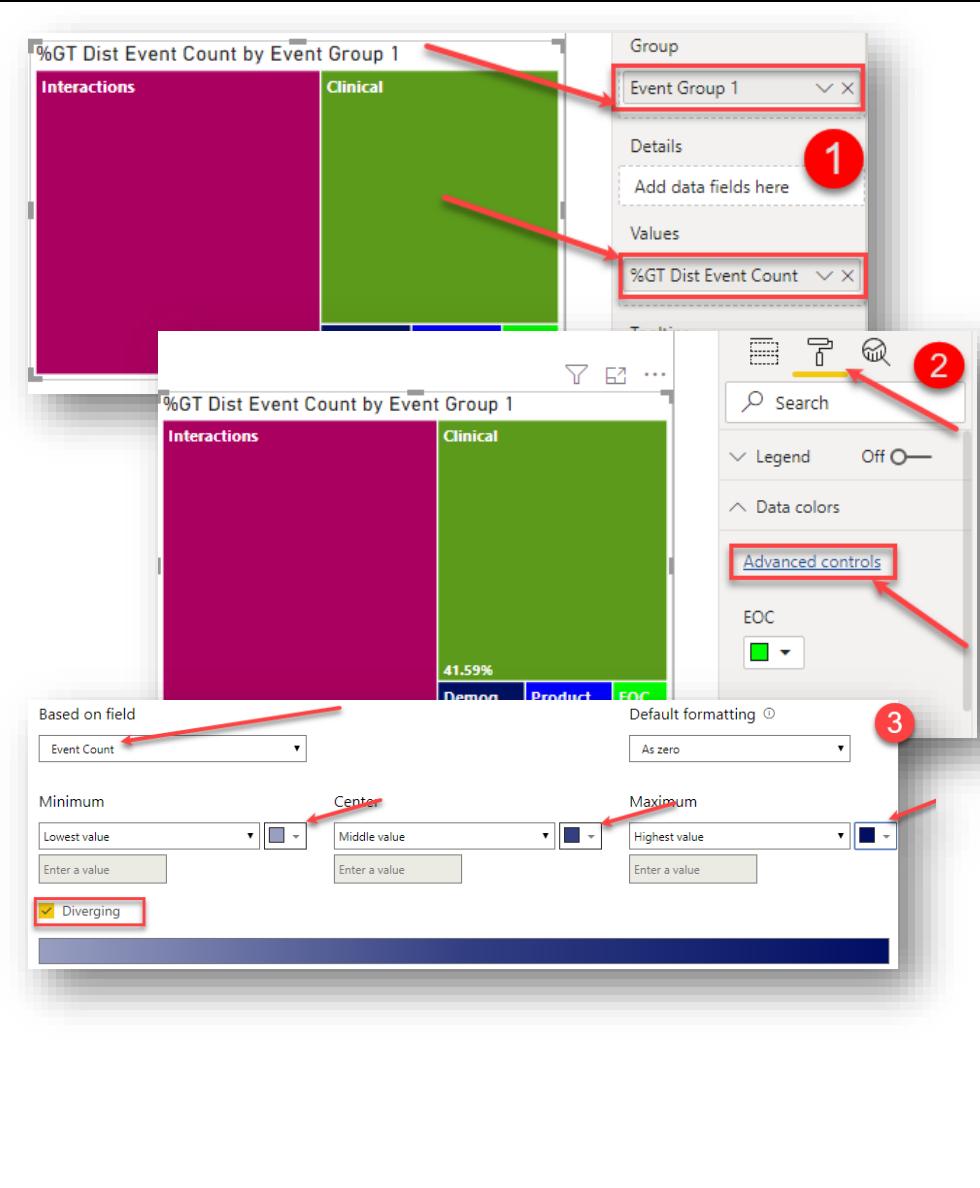
Group

Event → Event Group 1

Values

Measures Folder → Dist Event Count

6. Change **Dist Event Count** value type to a **Percent of grand total**. Remember to click the dropdown and then show value as property.
7. Select the **Format** icon and turn on the **Data labels** toggle. Change **Display units** to **None**.
8. Under **Data Colors** select **Advanced controls**. Change the following properties:
- Based on field**
My Measures: Event Count
 - Minimum**
Theme color 3, 60% lighter
 - Center**
Theme color 3, 20% lighter
 - Maximum**
Theme color 3
9. Place the visual in the bottom left.



10. Add three new card visuals to the report.
Add the following fields to these cards:

Event Count
Dist Event Count
Event Per Day

See completed card visuals in Step 1, to the right.

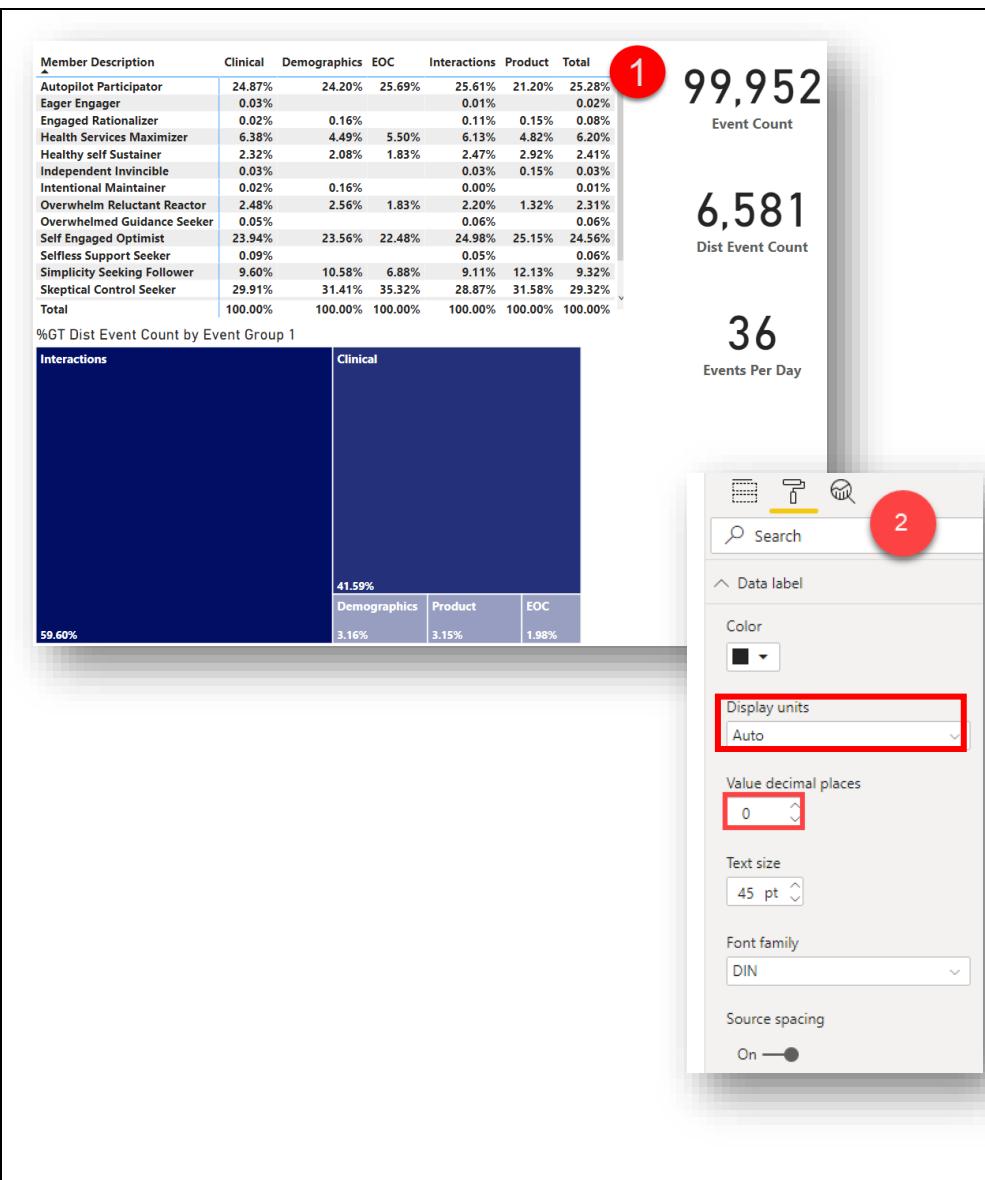
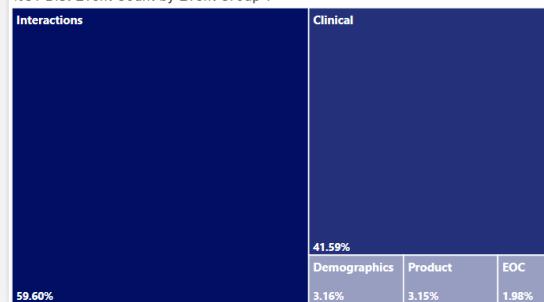
11. Change the formatting cards on each of the visuals:

Display Units: **None**
Value decimal places: **0**

12. See Step 2 for formatting settings.

Member Description	Clinical	Demographics	EOC	Interactions	Product	Total
Autopilot Participator	24.87%	24.20%	25.69%	25.61%	21.20%	25.28%
Eager Engager	0.03%			0.01%		0.02%
Engaged Rationalizer	0.02%	0.16%		0.11%	0.15%	0.08%
Health Services Maximizer	6.38%	4.49%	5.50%	6.13%	4.82%	6.20%
Healthy self Sustainer	2.32%	2.08%	1.83%	2.47%	2.92%	2.41%
Independent Invincible	0.03%			0.03%	0.15%	0.03%
Intentional Maintainer	0.02%	0.16%		0.00%		0.01%
Overwhelmed Reluctant Reactor	2.48%	2.56%	1.83%	2.20%	1.32%	2.31%
Overwhelmed Guidance Seeker	0.05%			0.06%		0.06%
Self Engaged Optimist	23.94%	23.56%	22.48%	24.98%	25.15%	24.56%
Selfless Support Seeker	0.09%			0.05%		0.06%
Simplicity Seeking Follower	9.60%	10.58%	6.88%	9.11%	12.13%	9.32%
Skeptical Control Seeker	29.91%	31.41%	35.32%	28.87%	31.58%	29.32%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

%GT Dist Event Count by Event Group 1



13. Add a **Shape map** visual to the report.
Add the following fields to the visual:

Location

Members → State Name

Color Saturation

Measures Folder → Event Count

14. Select the **Format** icon and turn on **Diverging**.

15. Update the following properties:

Minimum

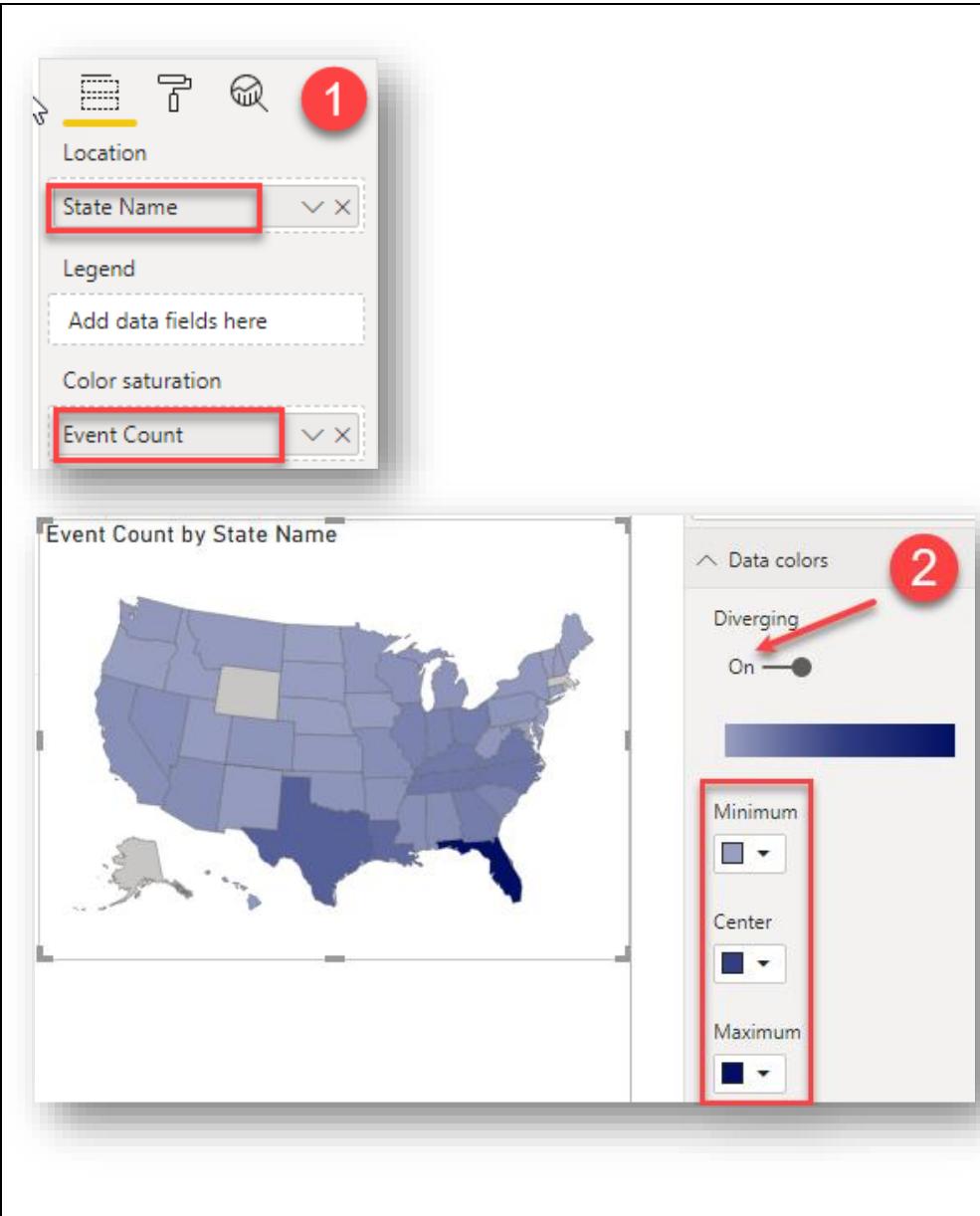
Theme color 3, 60% lighter

Center

Theme color 3, 20% lighter

Maximum

Theme color 3



Module 3C: Data Visualizations – Tooltips (10–20 Minutes)

The main report pages are now complete. The next step is to add additional analytical value to the existing reports through the use of Report Page Tooltips. Your boss wants you create an overview of data relating to members and events related to them. In this module you will learn how to create tooltips. In the last section, you worked with adding the default tooltips functionality to a report visual, but in this section, you will create custom tooltips.

Module Requirements:

1. Create a new report page called Tooltip 1 and hide the page. This page will contain a donut visual illustrating Distinct Members by Ethnicity.
 - a. Configure the tooltip to be used by the treemap visual on the Demographics Page.
 - b. See *Figure 3C-1* on the next page.
2. Create a new report page called Tooltip 2 and hide the page. This page will contain a stacked chart visual illustrating Event Count by LOB.
 - a. Configure the tooltip to be used by the shape map visual on the Longitudinal page.
 - b. See *Figure 3C-2* on the next page.

Hints:

1. Remember, each report page created here should be configured as a tooltip.
2. Remember, each report page created here should have a page size of tooltip.
3. To configure a visual to use a specific tooltip, update the tooltip section in the formatting section.

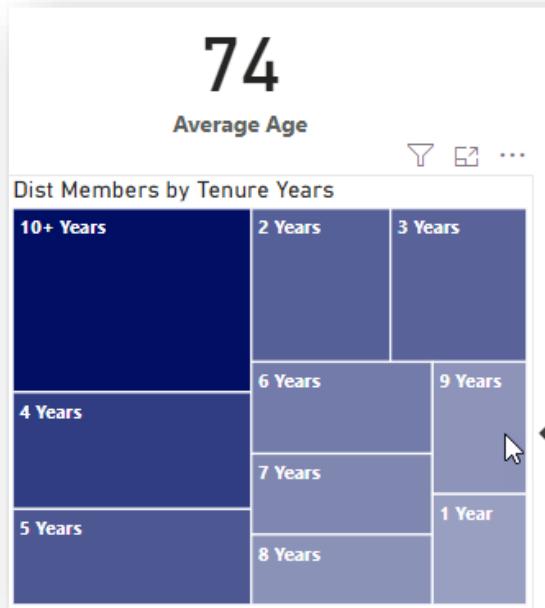


Figure 3C-1

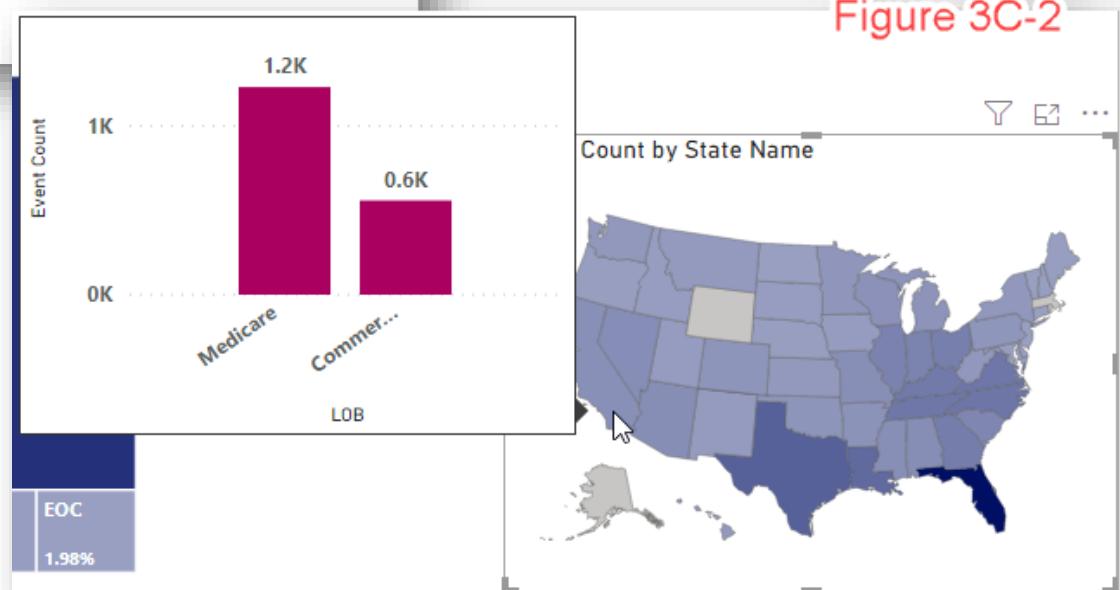
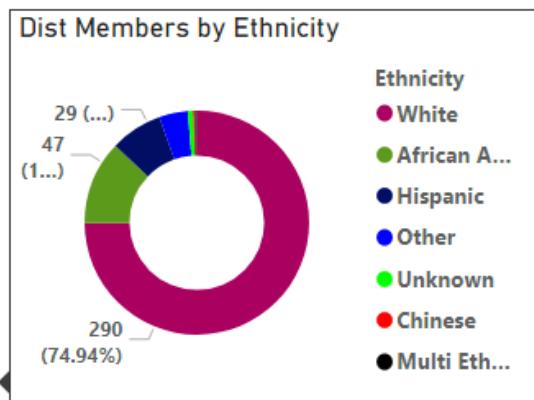
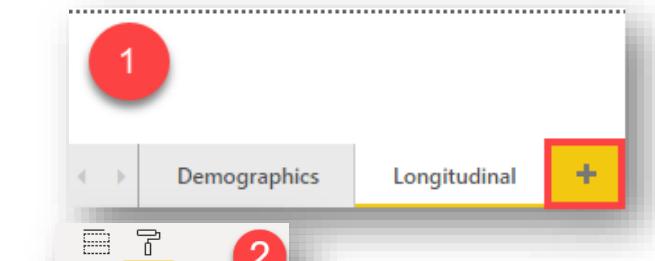
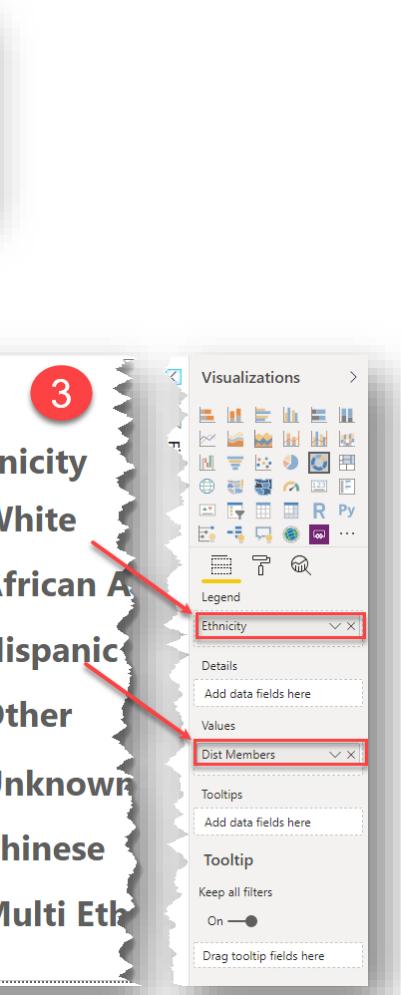


Figure 3C-2

Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none"> 1. At the bottom of the screen, add a new page. 2. Name the page, Tooltip 1. 3. On the Visualizations menu, select the Format icon. 4. Under Page information turn on the Tooltip toggle. 	 <p data-bbox="819 600 1474 1171">Donut by Ethnicity</p> <p data-bbox="819 1171 1474 1334">4K (65.91%)</p>  <p data-bbox="1474 1334 1875 1431">Drag tooltip fields here</p>

Explanation

This makes the report page into a tooltip that is will appear when hovering over other visuals within the report.

5. Under **Page size**, change **Type** to Tooltip.

Note: This step is necessary to make the tooltip size appropriate to the report size.

6. Add a **donut chart** visual with the following settings:

Legend

Measures Folder → Ethnicity

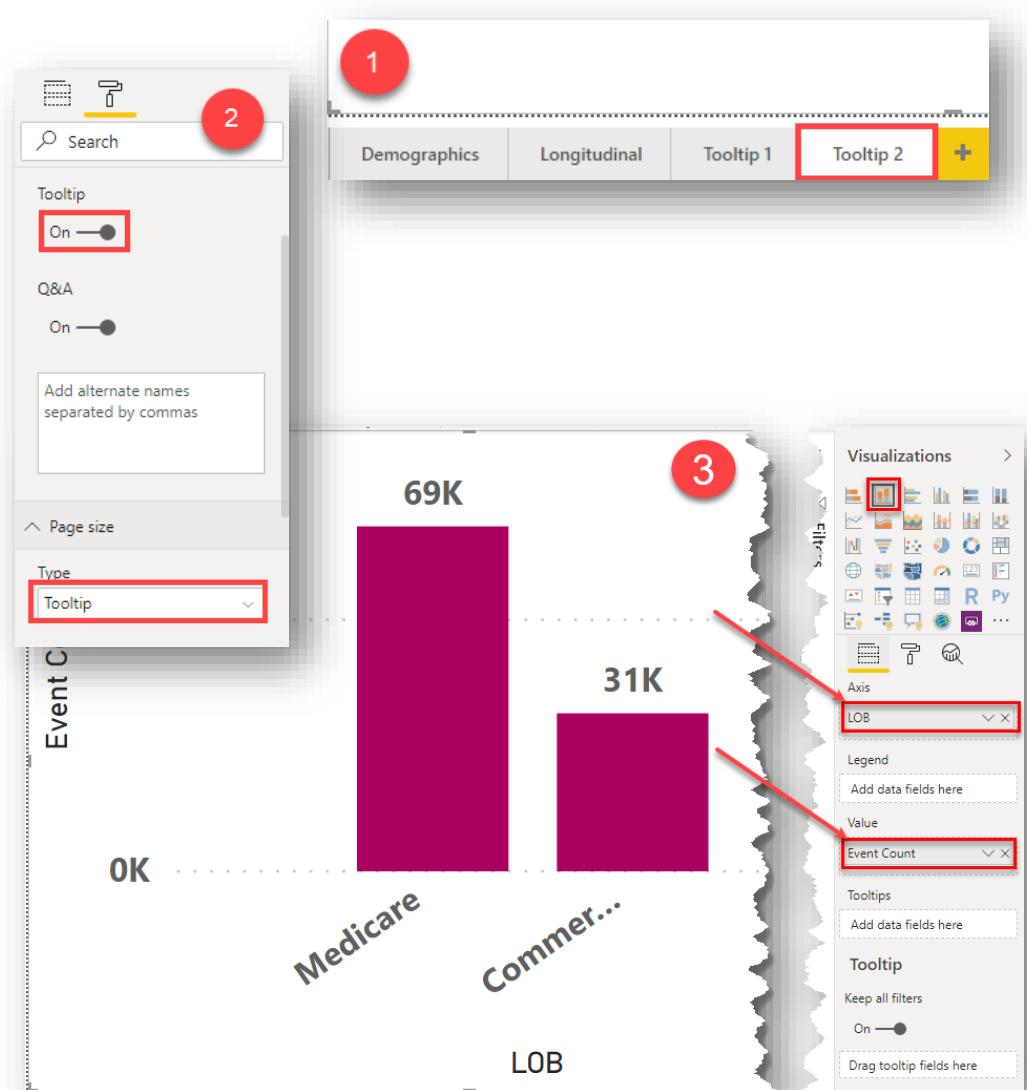
Values

Members → Dist Members

7. Resize the visual as necessary.

8. At the bottom of the screen, add a new page.
9. Name the page **Tooltip 2**.
10. On the **Visualization** menu under **Page information**, turn on the **Tooltip** toggle.
11. Under **Page size** change the **Type** to **Tooltip**.
12. Add a **Stacked Column chart** and add the following fields to the visual:
 - Axis**
Measures Folder → LOB
 - Value**
Events → Event Count
13. Under formatting, turn on **Data Labels**.

Explanation: After creating Report Page Tooltips, you can configure which visualizations will leverage these tooltips rather than the default tooltips that display in text.



14. Navigate back to the **Demographics** page. Select the Treemap visual on the designer.

15. With the visual selected, select the **Format** icon and expand **Tooltip**.

16. Change the **Type** to **Report page**. Change **Page** to **Tooltip 1**. See Step 1.

By mousing over the treemap visual you will now get the tooltip that is representative of the report in **Tooltip 1**.

17. Next, navigate to the **Longitudinal** page. Select the shape map visual on the designer.

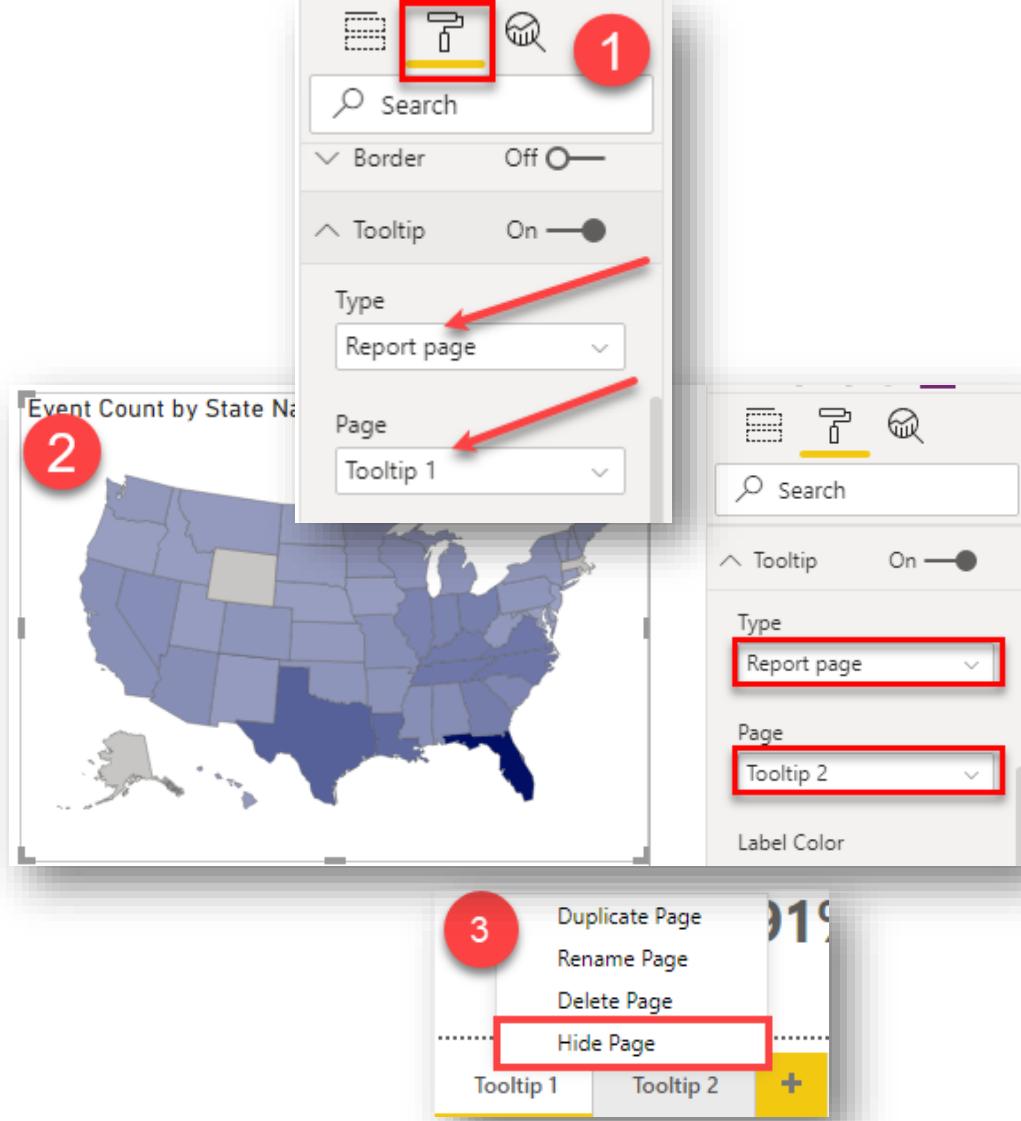
18. Select the **Format** icon and expand **Tooltip**.

19. Change the **Type** to **Report page**. Change **Page** to **Tooltip 2**.

20. For each tooltip page right click and select **Hide Page**.

Explanation

Pages that are not directly accessed for viewing reports are hidden from end users with read only access. This improves the user experience.



Module 3D: Data Visualizations – Filters (10-20 Minutes)

Filtering in Power BI Desktop is accomplished through either the Filters Pane or with the use of slicers. Add filters and slicers to so that the data is more applicable to the end user consuming the report.

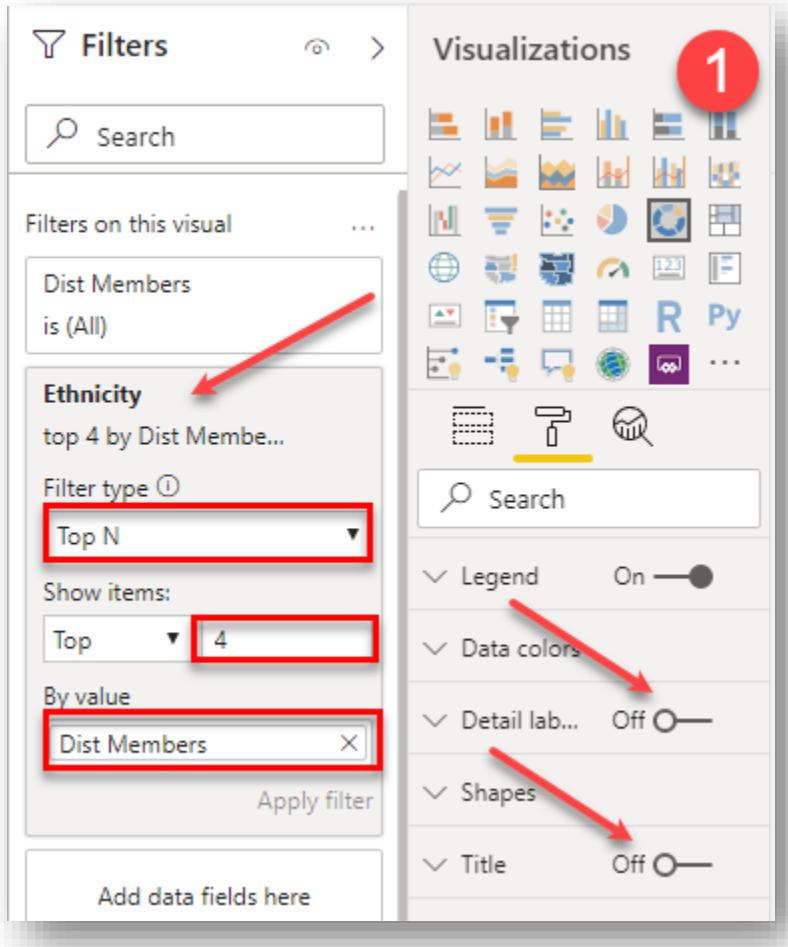
Module Requirements:

1. Add a filter to the **Donut** chart to only show the **Top 4 Ethnicities** by Distinct Members.
2. Add three **dropdown slicers** to the Demographics page with the following fields:
 - a. Age Range
 - b. Tenure Years
 - c. Education
3. Add three **dropdown slicers** to the Longitudinal page with the following fields:
 - a. Age Range
 - b. State Name
 - c. Age

Hints:

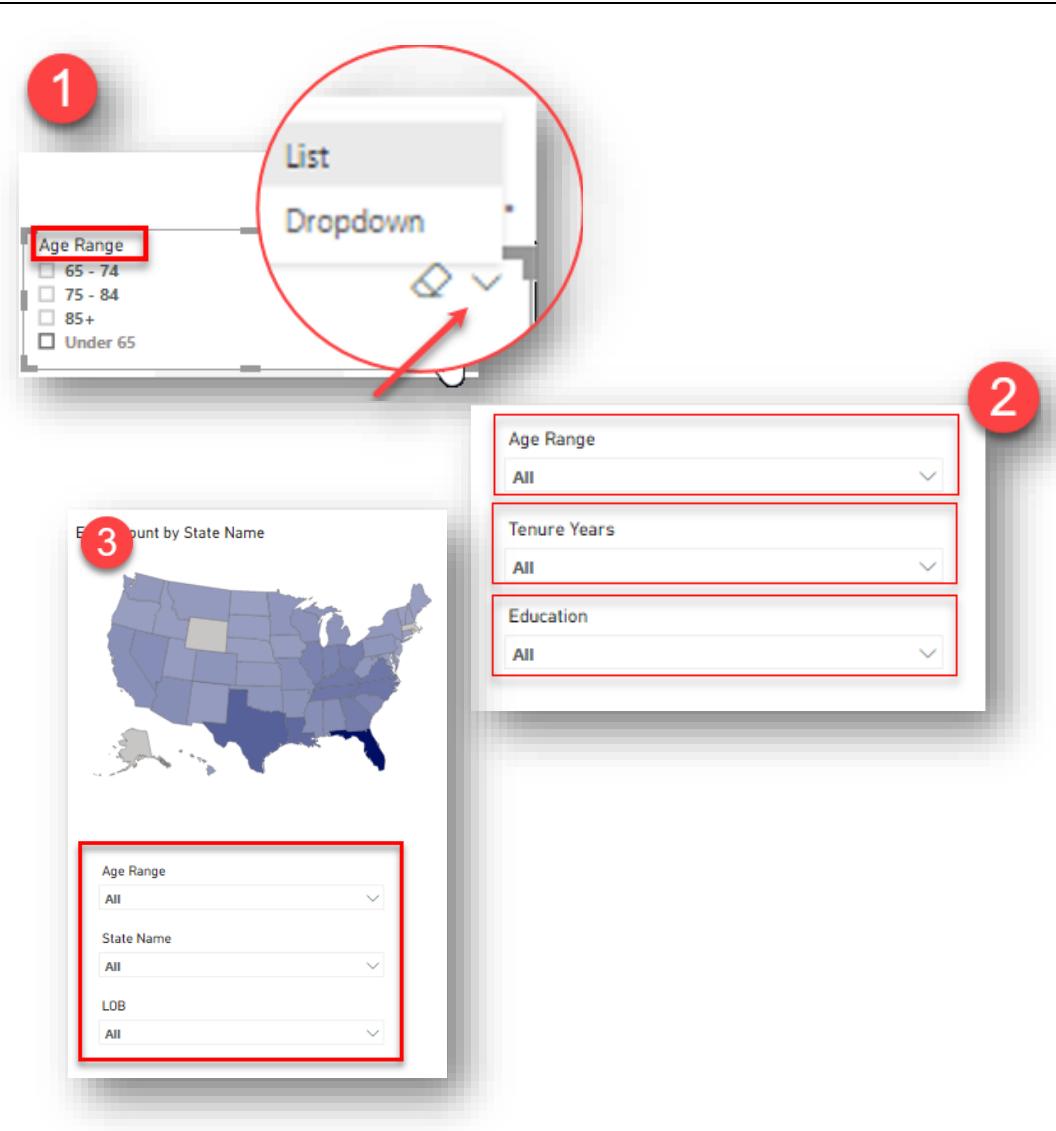
1. Filter types in the filters pane can be basic, advanced or Top N.
2. Slicers for text fields can be either lists or dropdowns, the default is list.

Step-by-Step Instructions

Click Steps	Screen Shots
<p>1. On the Tooltip 1 page, expand the Filters pane. Select the visual. Notice how the Filters pane changes.</p> <p>2. Select the Ethnicity is (All) Filter.</p> <p>3. Change Filter type to Top N.</p> <p>4. Under Show Items enter in the value 4 in the empty box.</p> <p>5. Add the following measure to the By Value text box:</p> <p>Dist Members</p> <p>6. Select Apply Filter.</p> <p>7. Turn off the Title Toggle and Data labels</p> <p>Explanation Pie charts and donut charts should only be used to show large disparities in data and where there are generally few categories.</p>	

Now you will be adding three **Dropdown** slicers to the Demographics page.

8. Go to the **Demographics** page.
9. Insert a **Slicer** visual to the report. Add the following field to the slicer:
 - a. Age Range
10. While hovering over the visual a small drop down  will appear in the upper right corner. Click this arrow and select **Dropdown**. See Step 1.
11. Next, add two additional slicers repeating steps 10 and 11 for the following fields:
 - a. Tenure Years
 - b. Education
12. Go to the **Longitudinal** page.
13. Insert three **Slicer** visuals on this report page. Each slicer will be a dropdown.
14. Repeat steps 10 and 11 for the following fields:
 - Members → Age Range
 - Members → State Name
 - Events → LOB



Module 3 (Advanced Lab): Data Visualizations – Formatting and Design – Optional (45 Minutes)

In this section, more advanced visualizations and formatting options are achieved. This section is for users who already have experience working with Power BI. This section is optional and can be completed during class, after class, or not at all!

Module Requirements:

1. This lab includes a lot of formatting and visualization touch ups. Follow the step by step guidance.

DEMOGRAPHICS ANALYSIS

Power BI Report

Dist Members and %GT Dist Members by State Name

Member Overview		
6,340	Dist Members	
58,078	Average Income	
74	Average Age	

Education by Ethnicity and Age Range			
Education	Female	Male	Total
Associates Degree	3.93%	3.12%	7.05%
Bachelors Degree	3.89%	3.04%	6.88%
High School	24.12%	17.98%	42.10%
Less Than HS	0.22%	0.08%	0.30%
Some College	25.22%	18.38%	43.60%
Unknown	0.03%	0.05%	0.08%
Total	57.35%	42.65%	100.00%

Filter by Age Range

All

Filter by Tenure Years

All

Dist Members by Age Range

Age Range	Count
75 - 84	2,697
65 - 74	2,635
Under 65	747
85+	261

Dist Members by Tenure Years

Tenure Years	Count
10+ Years	2,697
2 Years	2,635
3 Years	747
4 Years	261
5 Years	9.7%
6 Years	9.7%
7 Years	9.7%
8 Years	9.7%
9 Years	9.7%
1 Year	9.7%

LONGITUDINAL ANALYSIS

Power BI Report

Event Count by State Name

Events Overview		
99,952	Event Count	
6,581	Dist Event Count	
36	Events Per Day	

Filter by Age Range

All

Filter by State

All

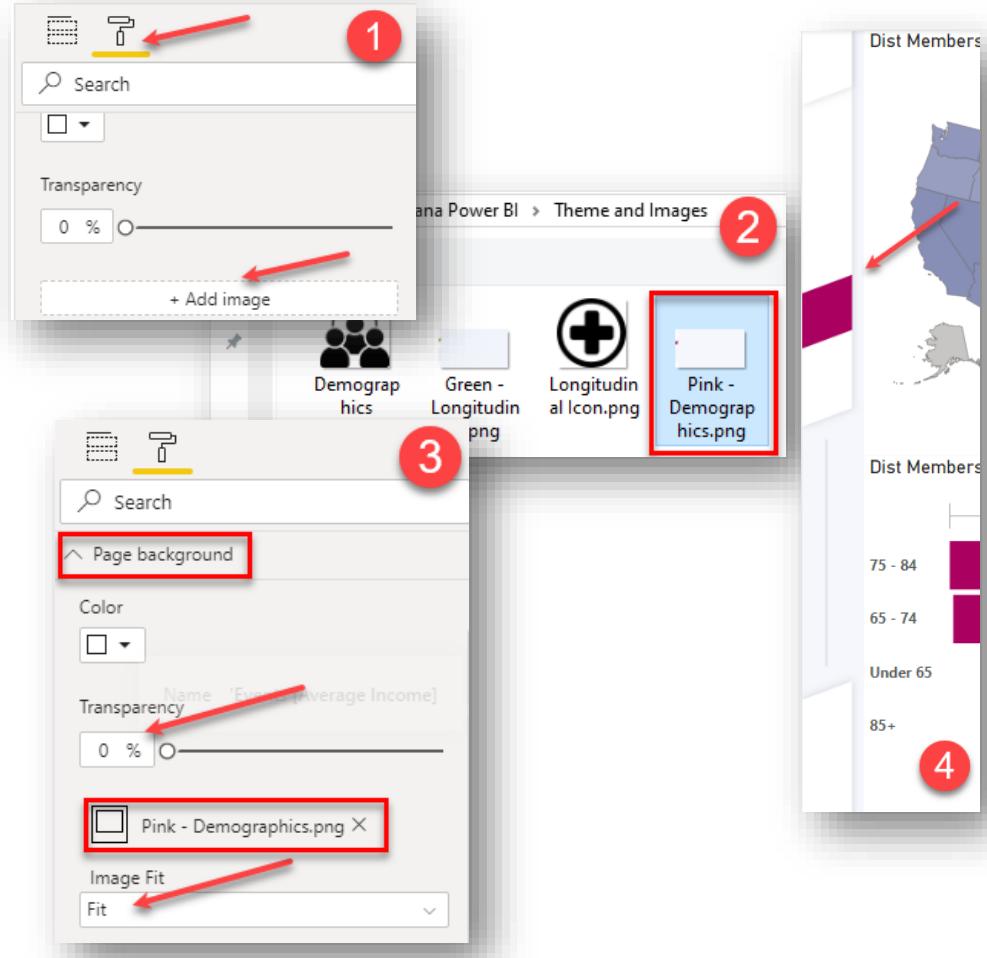
Filter by LOB

All

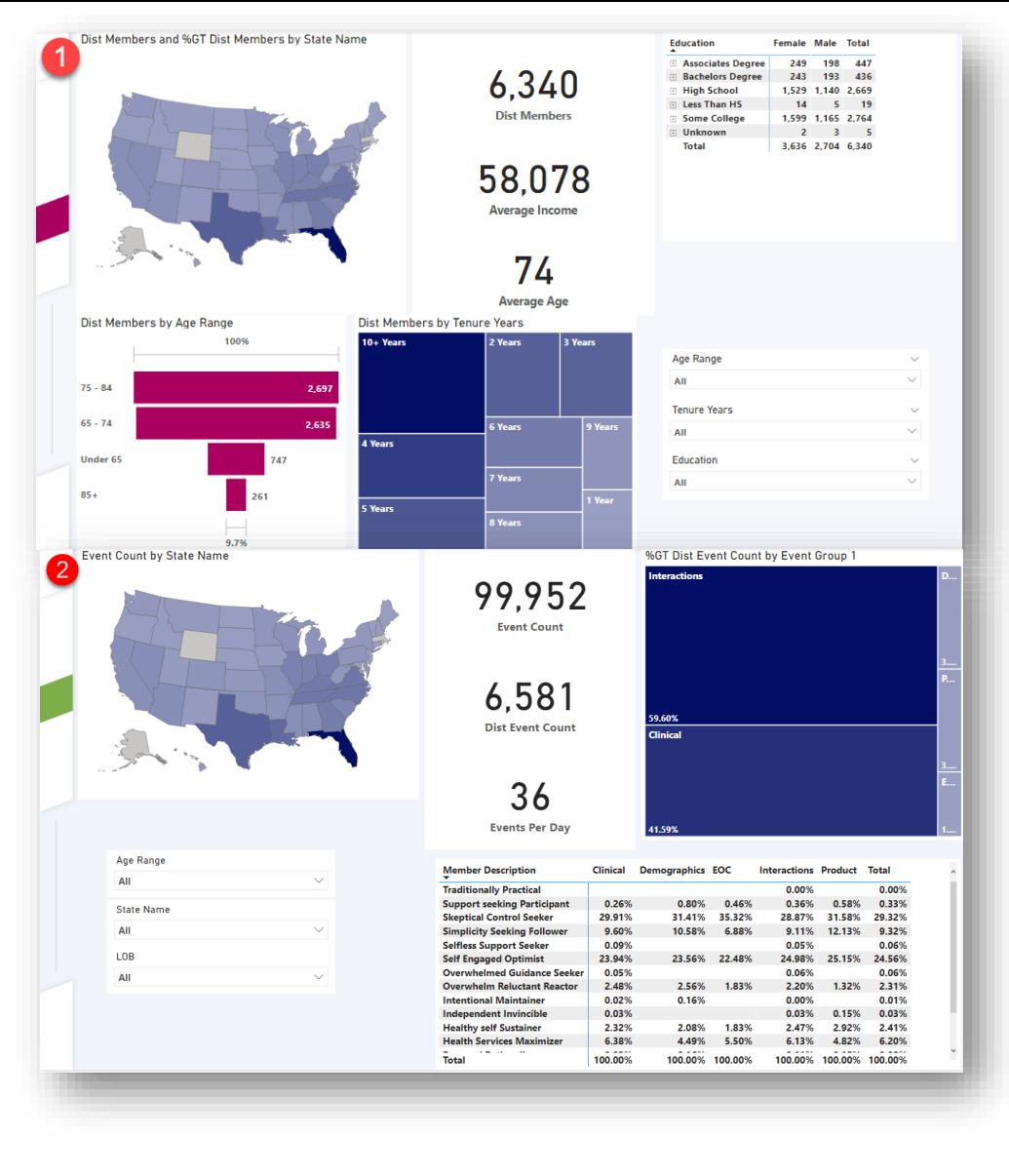
Events by Member Description						
Member Description	Clinical	Demographics	EOC	Interactions	Product	Total
Traditionally Practical	0.26%	0.80%	0.46%	0.36%	0.58%	0.33%
Support seeking Participant	29.91%	31.41%	35.32%	28.87%	31.58%	29.32%
Skeptical Control Seeker	9.66%	10.38%	6.88%	9.11%	12.13%	9.32%
Simplicity Seeking Follower	0.09%					0.06%
Selfless Support Seeker	23.34%	23.56%	22.48%	24.98%	25.15%	24.56%
Self Engaged Optimist	0.09%					0.06%
Overwhelmed Guidance Seeker	2.48%	2.36%	1.81%	2.20%	1.12%	2.31%
Overwhelm Reluctant Reactor	0.02%	0.16%				0.01%
Intentional Maintainer	0.01%					0.01%
Independent Invincible	2.32%	2.08%	1.83%	2.47%	2.02%	2.41%
Healthy self Sustainer	6.36%	4.49%	5.50%	6.13%	4.82%	6.20%
Health Services Maximizer	0.02%	0.16%				0.08%
Engaged Rationalizer	0.01%					0.01%
Eager Engager						0.02%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Event Group	Percentage
Interactions	59.60%
Clinical	41.59%

Step-by-Step Instructions

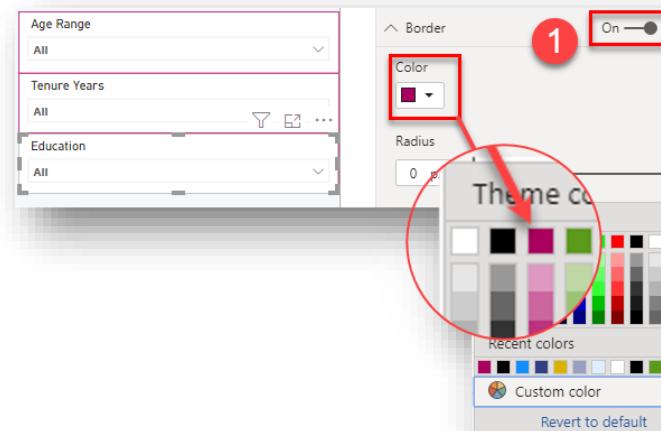
Click Steps	Screen Shots
<ol style="list-style-type: none"> 1. While on the Demographics page, make sure <u>no images are selected</u> and go to formatting found under the visualizations. 2. Under the category Page Background, click on + Add Image and navigate to your Humana Power BI folder and open the Theme and Images folder. Select the image Pink – Demographics. Click Open. 3. Change the following properties: <ul style="list-style-type: none"> • Transparency → 0% • Image Fit → Fit 4. Adjust the images as necessary, the left side of the screen will now have a visible bar. This will be used for navigation purposes later. 5. An image also needs to be added to the Longitudinal page. 6. Repeat steps 1-5 above. Add the image Green – Longitudinal file. 	 <p>The screenshot illustrates the process of applying a background image to a Power BI page. It shows the 'Formatting' tab selected in the ribbon. Step 1 highlights the 'Formatting' tab. Step 2 shows the 'Theme and Images' folder with the 'Pink - Demographics.png' file selected. Step 3 shows the 'Page background' settings with transparency set to 0% and image fit set to 'Fit'. Step 4 shows the final result with the pink image applied to the page background.</p>

7. Reorganize the images to fit the screen and leave room for the new navigation bars. See screenshots for reference.



The following changes are for the **Demographics** page:

8. These steps are for **each** visual on the Demographics page.
9. Select the **Format** icon on the **Visualizations** pane. Turn on the **Border** toggle. Change the **Color** to Theme color 1.



10. For the three slicers change the following properties:

ProTip: You can multi-select all three slicers by holding the CTRL key while clicking. Update the width and height of each slicer to the following properties:

General Category:

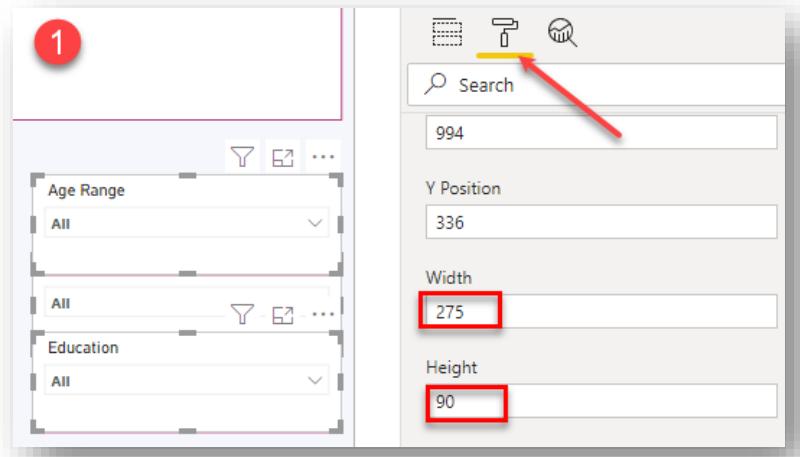
Width: 275

Height: 80

Also, while all three slicers are selected, turn off the slicer header:

Slicer header

Turn toggle off



Next, turn on the title for each of the slicers and change the title text:

Title text:

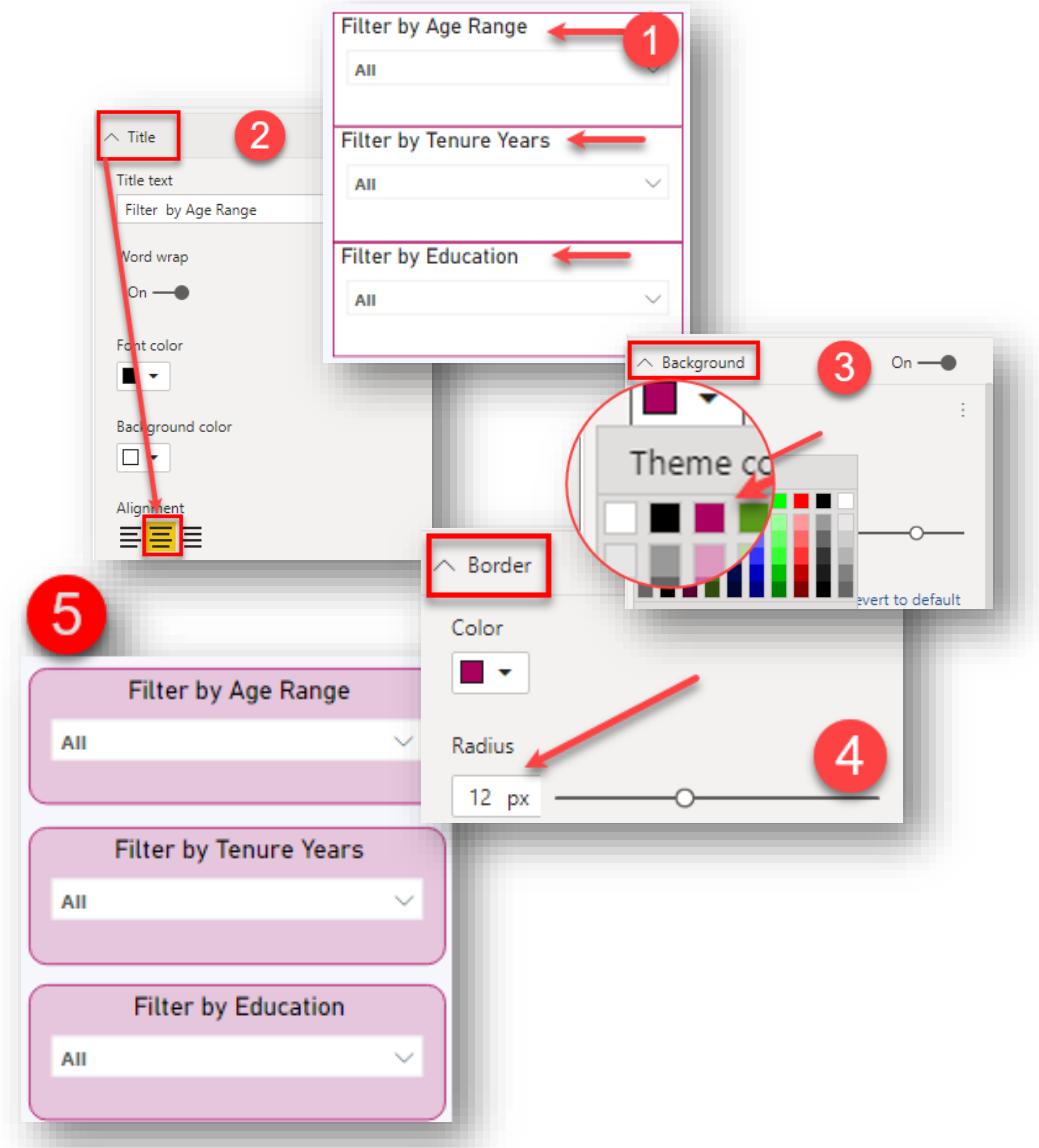
- Filter by Age Range
- Filter by Tenure Years
- Filter by Education

Title Alignment: Center (*See step 2*)

11. For the visual background:
 - Color: Theme color 1
 - Transparency: 80%
12. For the items background
 - Background: White
13. Also, change the border to be more rounded. Find the Border category and set the radius:
 - Radius: 12 px
14. The completed example can be seen visually in step 5 to the right:

Explanation: Each visual in Power BI is extremely configurable and can be modified to greatly improve the visualization aesthetics.

Advanced: If you click the dropdown for the Filter by Tenure Years, you will notice that the order is not what you would expect. An optional lab will be provided later to solve this issue.



Configure the title for following visuals: The shape map, matrix, funnel, and treemap:

Title

Font Color: White

Background_color: Theme color 1

Alignment: Center

15. Next, update the formatting on the matrix visual (Step 2):

Background

Color: Theme color 3, 20% lighter

Column headers

Font color: White

Background_color: Theme color 3, 20% lighter

Row headers

Font color: White

Background_color: Theme color 3, 20% lighter

Values

Font color: White

Background_color: Theme color 3, 20% lighter

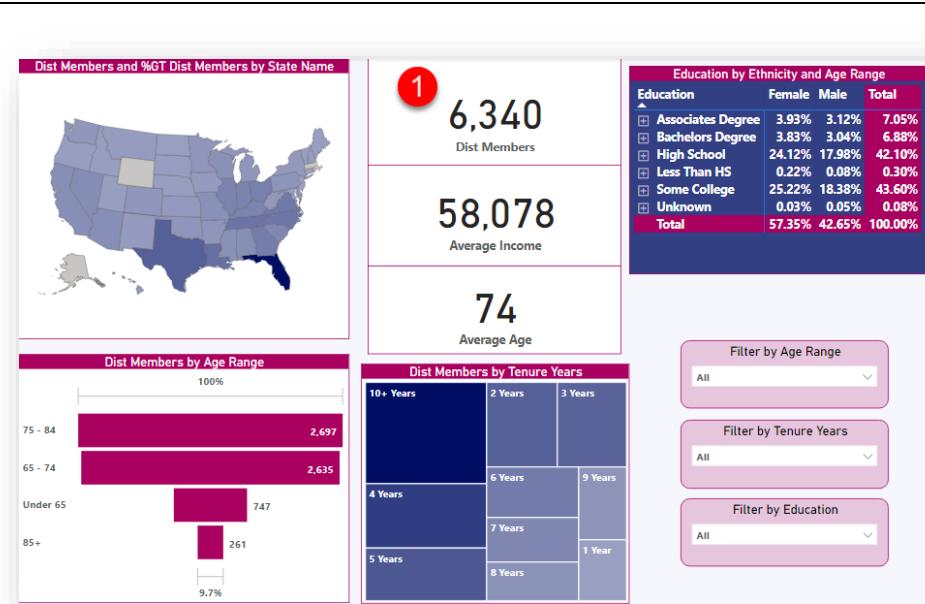
Alternate_background_color: Theme color 3, 20% lighter

Grand total

Font color: White

Background color: Theme color 1

Apply to labels: Turn toggle on



Education by Ethnicity and Age Range

Education	Female	Male	Total
Associates Degree	249	198	447
Bachelors Degree	243	193	436
High School	1,529	1,140	2,669
Less Than HS	14	5	19
Some College	1,599	1,165	2,764
Unknown	2	3	5
Total	3,636	2,704	6,340

2

Note: Conditional formatting can be set on many properties within visualizations. Conditional formatting helps quickly diagnose and differentiate between values.

In this step, set up **Conditional formatting** on the **matrix** visual.

16. Select the matrix visual and the find the **Conditional Format** category.

Font_color: Turn the toggle on

17. Select **Advanced controls**. Step 1

18. A new editor will appear. Configure the following properties:

Based on field → Dist Members
Minimum → Theme color 6
Maximum → Theme color 5

19. Select **OK**.

The screenshot shows the Power BI interface with two open dialog boxes. The top dialog, labeled '1', is titled 'Education by Ethnicity and Age Range' and displays a matrix visual with columns for Education Level (Associate's Degree, Bachelor's Degree, High School, Less Than HS, Some College, Unknown) and rows for Gender (Female, Male, Total). The bottom dialog, labeled '2', is titled 'Font color - %GT Dist Members' and shows the configuration for conditional formatting based on the 'Dist Members' field. It includes settings for Minimum (Lowest value, red square) and Maximum (Highest value, green square), both set to 'Enter a value'. A color scale gradient at the bottom transitions from red to green. Red arrows point from the 'Theme Color 6' and 'Theme Color 5' labels to their respective color swatches in the dialog. The 'Advanced controls' button in the main dialog is also highlighted with a red arrow.

Education Level	Female	Male	Total
Associate's Degree	3.93%	3.12%	7.05%
Bachelor's Degree	3.83%	3.04%	6.88%
High School	24.12%	17.98%	42.10%
Less Than HS	0.22%	0.08%	0.30%
Some College	25.22%	18.38%	43.60%
Unknown	0.03%	0.05%	0.08%
Total	57.35%	42.65%	100.00%

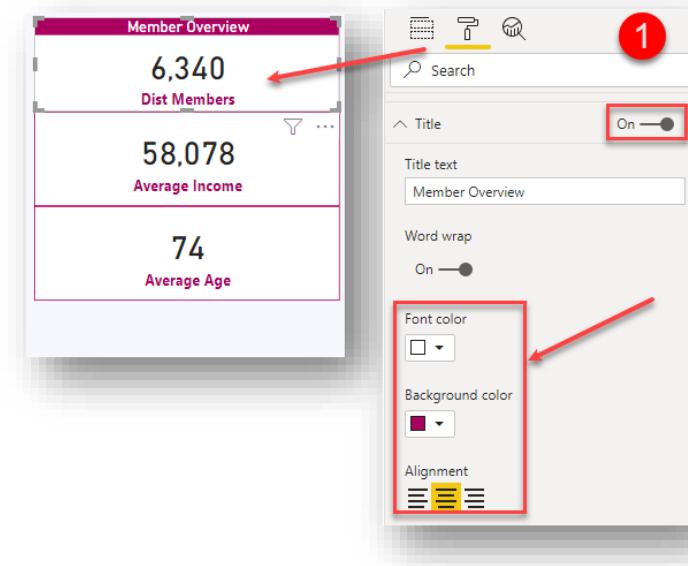
Finally, time to format the card visuals.
For the top card visual **Dist Members**, update
the following formatting properties:

Title: Turn toggle on
Title_Text: Member Overview
Font_color: White
Background_color: Theme color 1
Alignment: Center

Multi-select all three card visuals and set the
following properties:

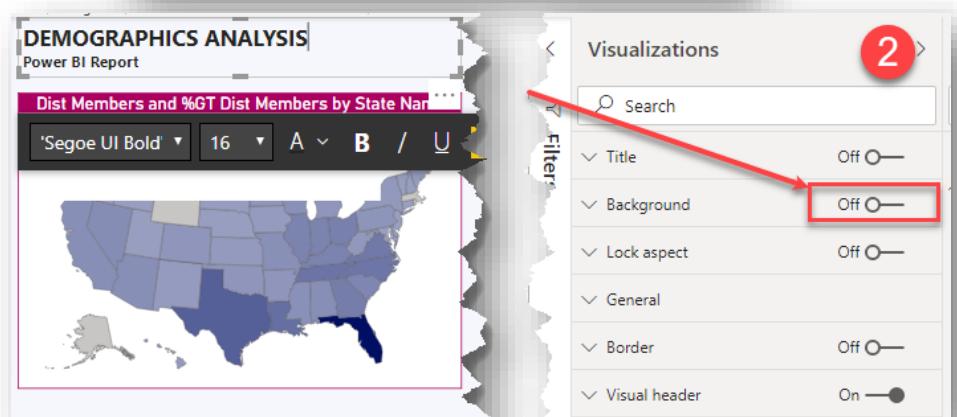
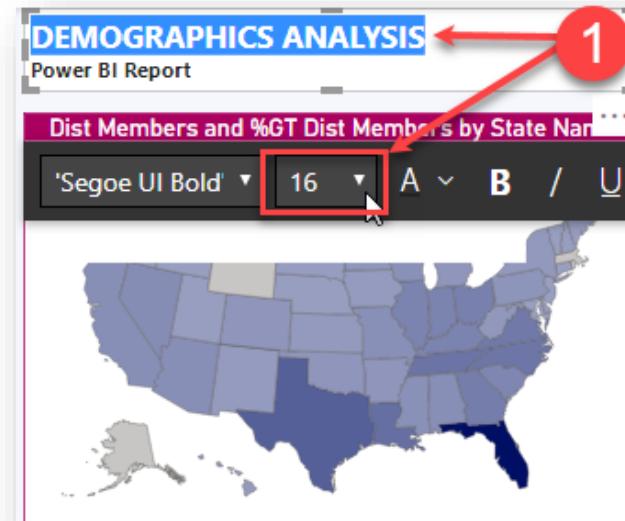
Width: 340
Height: 105
Data label → Text size: 30
Category label → Color: Theme color 1

20. Reposition the labels as necessary to
look similar to Step 1.



Next, let's add a simple text box that contains the name of the report across the top.

21. On the **Insert** ribbon, select **Text box**. Add the text: "DEMOGRAPHICS ANALYSIS Power BI Report"
22. While the text box is still selected, change the font size of "DEMOGRAPHICS ANALYSIS" to 16
23. Change the font size of "Power BI Report" to 11.
24. While still selected on the Text box, go to the **Visualizations** pane and turn off the **Background** toggle.



The next step is to format the visuals on the **Longitudinal** page.

25. For each visual, turn on the border then change **Color** property to **Theme color 2**.

Next, turn on the title for each of the slicers and change the title text:

Turn the **slicer header** off

Title text:

- Filter by Age Range
- Filter by State
- Filter by LOB

Title Alignment: Center (*See step 2*)

26. For the **Slicer background:**

- Color: Theme color 2
- Transparency: 80%

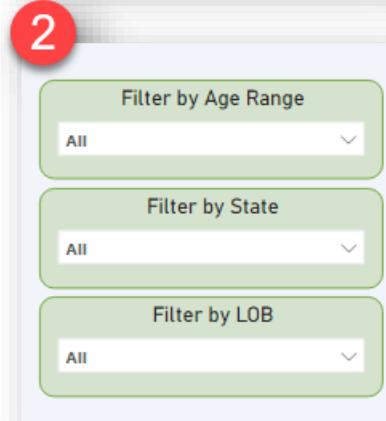
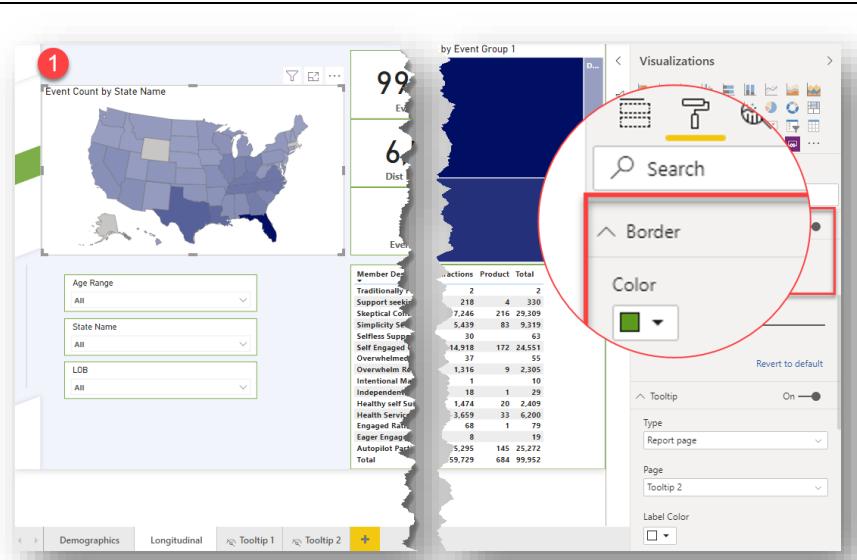
27. For the **Items** background

- Background: White

28. Also, change the border to be more rounded. Find the Border category and set the radius:
- Radius: 12 px

Width: 275

Height: 80



Configure the title for following visuals: The shape map, matrix, and treemap:

Title

Font Color: White

Background_color: Theme color 2

Alignment: Center

29. Matrix Title:

Events by Member Description

30. Matrix Formatting Settings:

Background

Color: Theme color 3, 20% lighter

Column headers

Font color: White

Background_color: Theme color 3, 20% lighter

Row headers

Font_color: White

Background_color: Theme color 3, 20% lighter

Values

Font color: White

Background_color: Theme color 3, 20% lighter

Alternate_background_color: Theme color 3, 20% lighter

Grand total

Font color: White

Background color: Theme color 2

31. Apply to labels: Turn toggle on



32. Still on the Matrix visual. Expand the category **Conditional formatting** and turn the **toggle on** for **Font Color**.

33. Select **Advanced controls**

34. A new editor will appear. Configure the following properties:

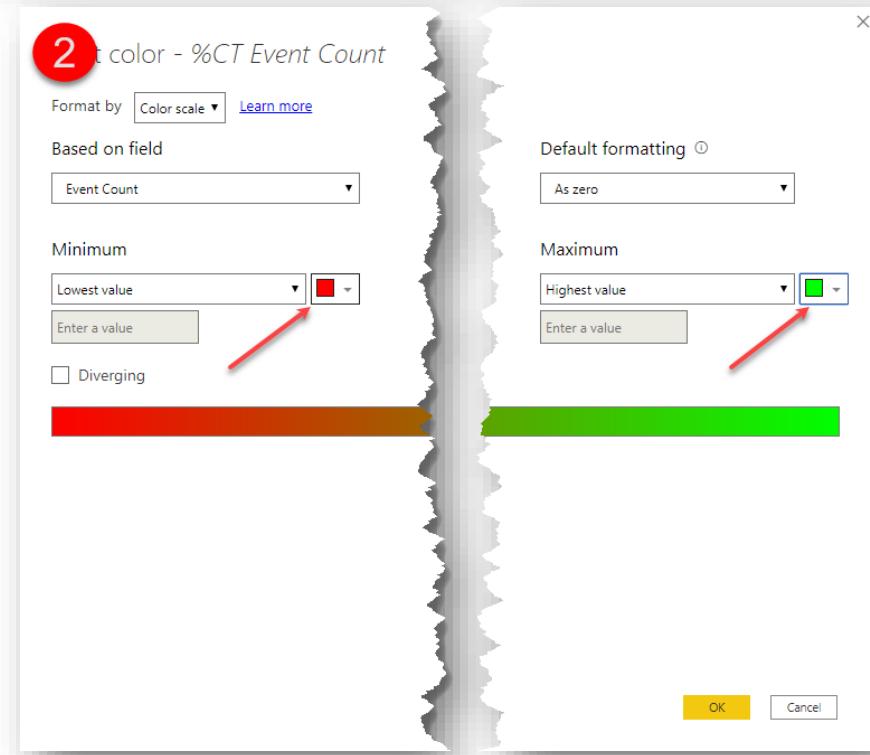
Based on field → Event Count

Minimum → Theme color 6

Maximum → Theme color 5

35. Select **OK**.

The screenshot shows a 'Events by Member Description' matrix visual. To its right is a 'Conditional formatting' pane. At the top of the pane, a red circle labeled '1' highlights the 'Conditional formatting' button. Below it, a dropdown menu is open, showing 'Font color - %CT Event Count'. Under the 'Font color' section, a red box highlights the 'On' toggle switch, which is turned on. A red arrow points from the 'Font color' section towards the 'Advanced controls' link at the bottom right of the pane.



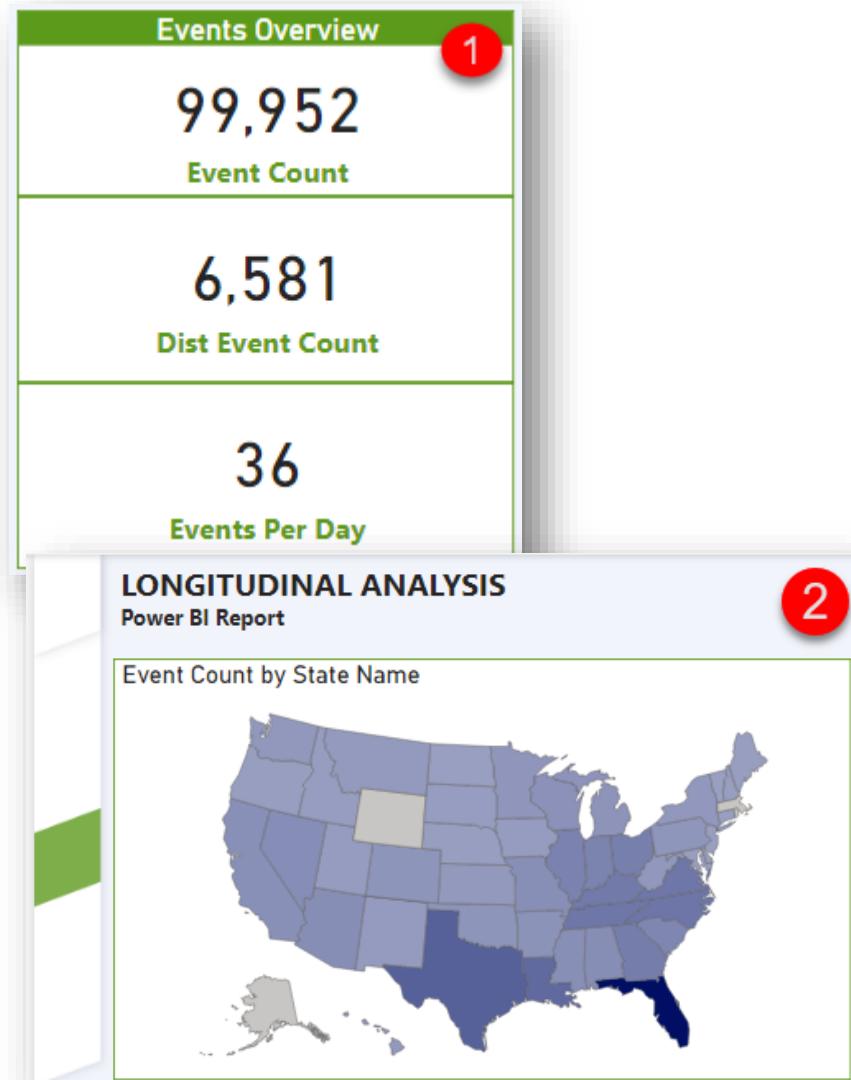
Finally, time to format the card visuals.
For the top card visual **Event Count**, update
the following formatting properties:

Title: Turn toggle on
Title_Text: Events Overview
Font_color: White
Background_color: Theme color 2
Alignment: Center

Multi-select all three card visuals and set the
following properties:

Width: 280
Height: 105
Data label → Text size: 30
Category label → Color: Theme color 2

36. Reposition the card visuals as necessary.
See Step 1.
37. On the **Insert** ribbon, select **Text box**.
Add the text: "LONGITUDINAL
ANALYSIS Power BI Report"
38. While the text box is still selected,
change the font size of "LONGITUDINAL
ANALYSIS" to 16.
39. Change the font size of "Power BI
Report" to 11.
40. While still selected on the Text box, go
to the **Visualizations** pane and turn off
the **Background** toggle



Module 4A: Publishing and the Power BI Service (5-10 Minutes)

Sharing and collaboration is accomplished by first publishing the completed Power BI Desktop file (PBIX) to the Power BI Service found at <https://powerbi.com>. PBIX files are published to what is called a workspace, for now, you can think of a workspace as being similar to a directory location on your laptop. The workspace is where your files are saved and then shared.

Module Requirements:

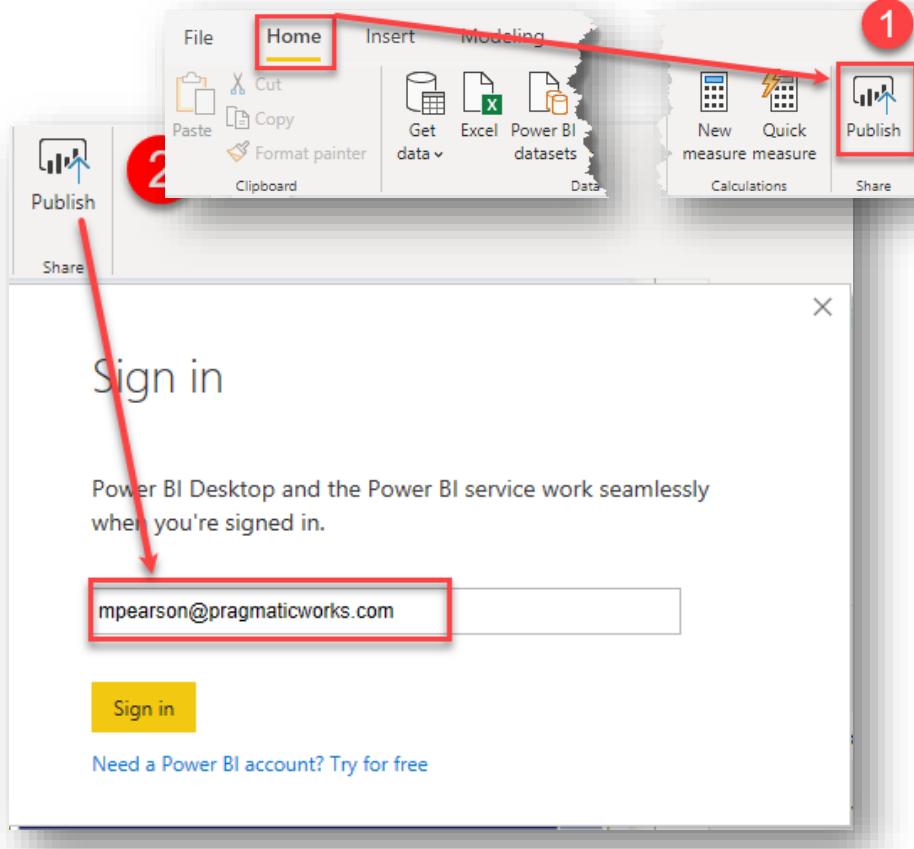
1. Rename your existing Power BI Report to include your initials. For example, "Module 04 – MGP".
2. You will require Power BI Pro access to publish to a shared workspace, or you can publish to your own personal workspace (My Workspace).
3. Publish your Power BI Report to the workspace: ~~Humana Training~~: **My Workspace**

Important: From an administrative and management perspective it is best to have all the students publish to their own personal workspace. Every user has their own personal workspace titled "My Workspace", this workspace does lack some of the capabilities of a shared App Workspace and should be used very sparingly, for example, testing or training purposes. The biggest limitations are that personal workspaces can not be used for collaboration with other developers and can not create Power BI Apps for sharing.

Hints:

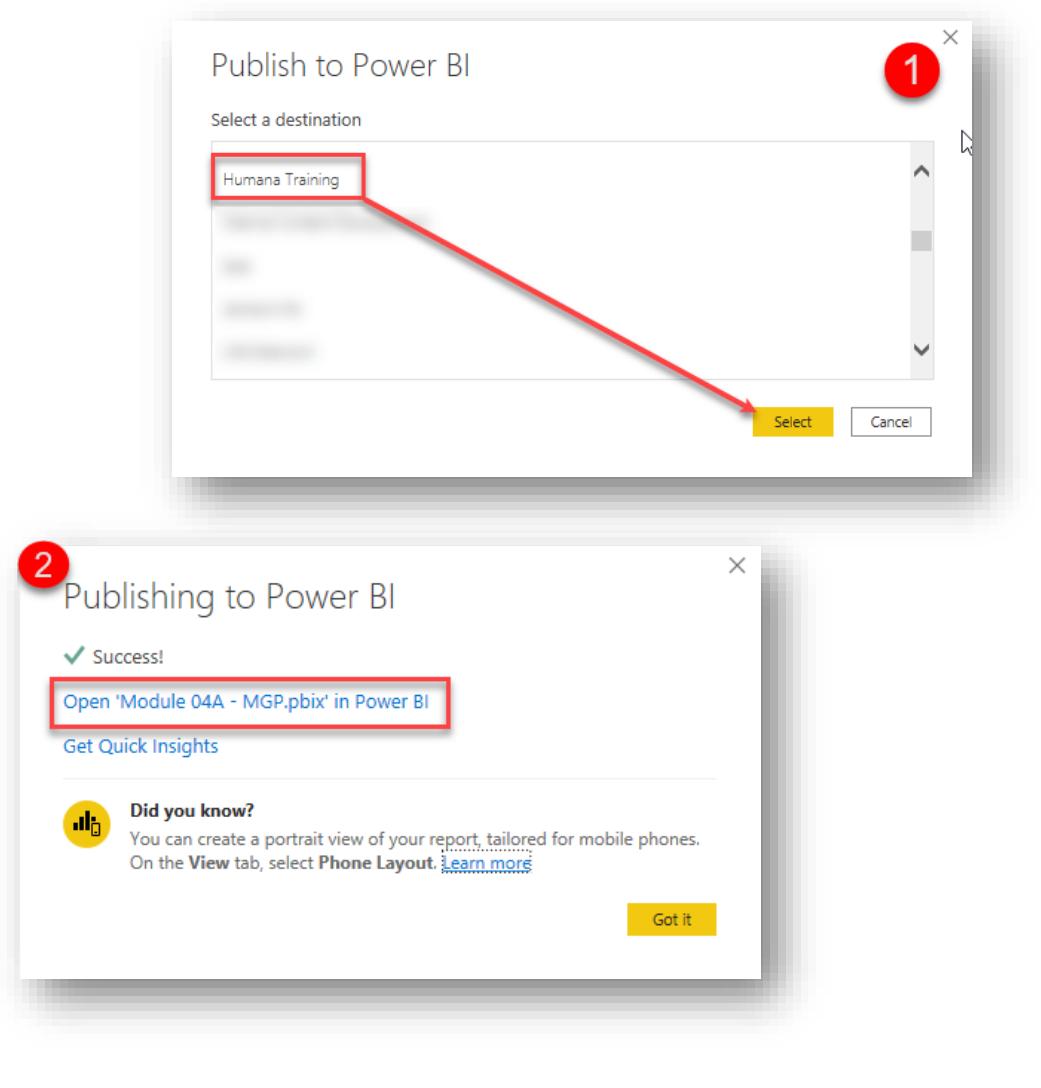
- When using your personal workspace, you do not have to rename your Power BI report and add your initials as mentioned in the step for step instructions below.

Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none">1. Publishing a report is easily done directly from the Power BI Desktop application.2. Click on Publish, found on the home ribbon. <p>Explanation: Clicking publish will prompt you to login if you are not already logged in. Once logged in, you will see all workspaces that you have created or that have been shared with you. If you only see My Workspace, then you are more than likely using the Power BI Free Trial version.</p> <ol style="list-style-type: none">3. Once prompted to Sign In, provide your Office 365 credentials. For example, your email address and password.	

4. Once signed in, you will see a list of all available workspaces. Choose **Humana Training** and the click **Select**.
5. A pop up will inform you that your Power BI Report has been published successfully.
6. A hyperlink is also provided, see step 2. This link will take you directly to that report in the Power BI Service.
7. Click on the following link provided:

"Open 'Module 04A – MGP.pbix' in Power BI

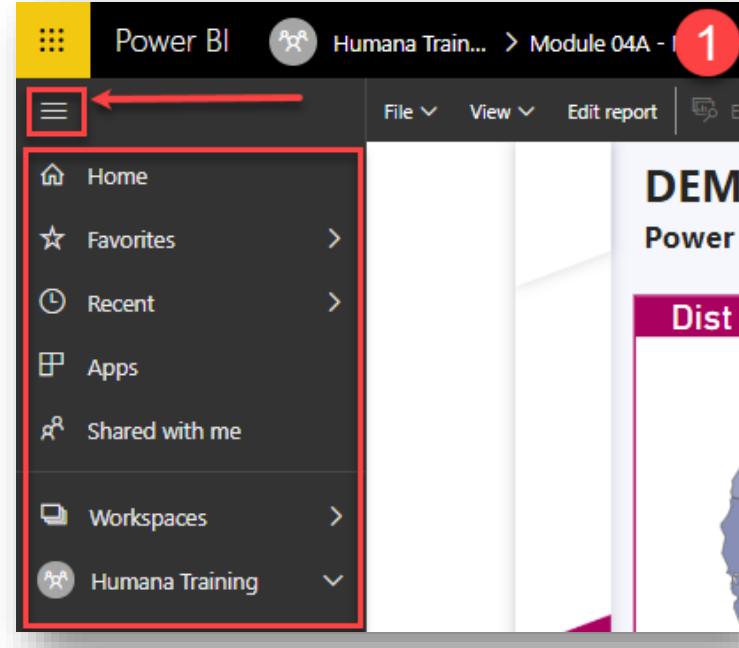


Explanation: The link, takes you to the workspace where the report was deployed. It's important to understand that workspaces are for development purposes. Sharing of reports will be discussed shortly.

Once in the service you can interact with the Power BI report just like in Power BI Desktop. You can also edit the report.

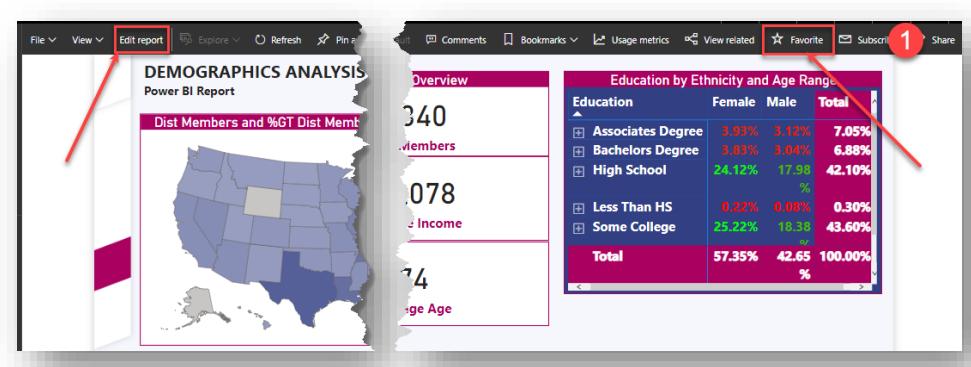
8. On the left side of the screen is a navigation screen that can be expanded and collapsed by clicking on the navigation pane icon: ☰
9. Within the navigation pane there are a few categories, most self-explanatory:

Home
Favorites
Recent
Apps
Shared with Me
Workspaces



Note: Reports and Dashboards can be added to your Favorites by clicking the  icon., this makes finding specific reports much easier on both your mobile device and the web browser.

10. When viewing a published Power BI Report, there are many options available within the Power BI Service.
11. To add this report to your favorites, click on  Favorite.



The screenshot shows a published Power BI report titled "DEMOGRAPHICS ANALYSIS". The interface includes a top navigation bar with "Edit report", "View", "Explore", "Comments", "Bookmarks", "Usage metrics", "View related", "Favorite" (marked with a red circle and number 1), and "Share". The main content area displays a map of the United States, a card with summary statistics (340 Members, 0.078 Income, 74 Average Age), and a table titled "Education by Ethnicity and Age Range". The table data is as follows:

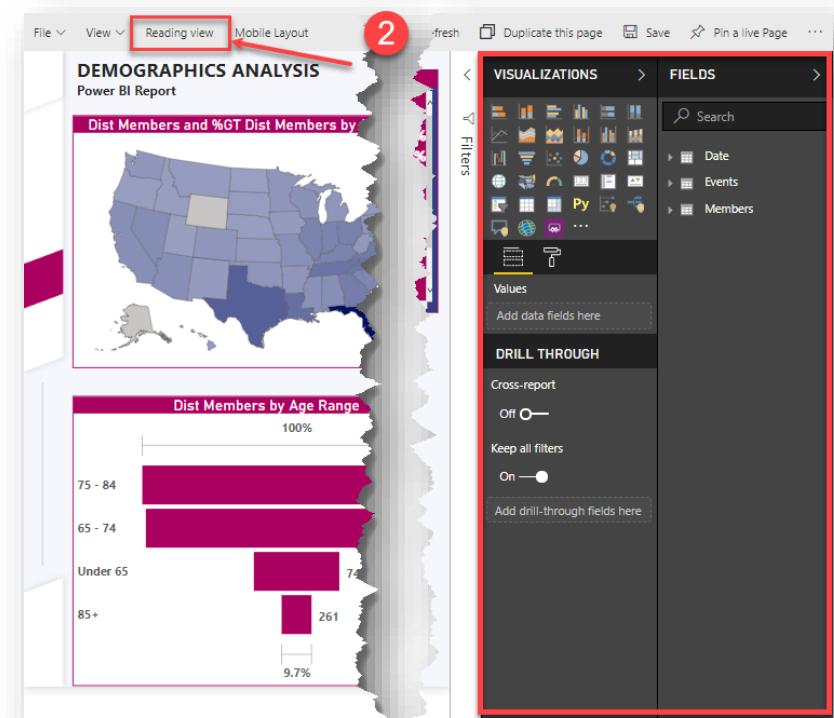
Education	Female	Male	Total
Associates Degree	3.93%	3.12%	7.05%
Bachelors Degree	5.63%	3.04%	6.88%
High School	24.12%	17.98%	42.10%
Less Than HS	0.22%	0.08%	0.30%
Some College	25.22%	18.38%	43.60%
Total	57.35%	42.65%	100.00%

12. Note, you can also edit reports directly in the portal.
13. To edit a report, click on **Edit Report**. Here you will see a very familiar experience, where you have all your visualizations, formatting and fields available over to the right.

Caution: The Power BI Service does not keep a version history of reports. Changes made in the service can easily be changed by others and then changes can be lost.

The recommendation is to make report changes via Power BI Desktop and only make changes in the Power BI Service once a well-defined process for making changes has been implemented!

14. Click on Reading view to go back to the read only view of the report.



The screenshot shows the "Edit Report" mode in the Power BI Service. The top navigation bar includes "Edit report", "Reading view" (marked with a red circle and number 2), "Mobile Layout", and other options. The main content area displays the same demographic report as the previous screenshot. On the right side, there are two large panes: "VISUALIZATIONS" and "FIELDS". The "VISUALIZATIONS" pane contains various chart and table icons. The "FIELDS" pane lists fields such as Date, Events, and Members.

Module 4B: Creating Dashboards (10-15 Minutes)

So far, we have been building reports in Power BI Desktop. Some users will naturally refer to these reports as dashboards, due to the fact that reports in Power BI use a lot of charts and graphs rather than just data dumps. However, a dashboard in the Power BI Service is usually a combination of individual and specific visualizations from many different reports. This provides a macro view of the different metrics and then the user can click on a visual and that will drill down into the underlying report page.

Module Requirements:

1. Create a dashboard called **Humana Dashboard** that contains the following visualizations.
 - a. Demographics → Matrix Visual → Education by Ethnicity and Age Range
 - b. Demographics → Shape Map → District Members by State Name
 - c. Longitudinal → Matrix Visual → Dist Event by Event Group
 - d. Longitudinal → Shape Map → Event Count by State Name
2. Use Q&A to add a visual to an existing Dashboard.
 - a. Use Q&A to create a column chart representing event count by event group.

Hints:

Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none">1. Login to the Power BI Service at https://powerbi.com2. Click the dropdown for Workspaces and select the Humana Training workspace.3. Click on Reports and then click on your report created in previous labs.	<p>The screenshot shows the Power BI Service interface. At the top, there's a navigation bar with options like Home, Favorites, Recent, Apps, and Shared with me. A red circle labeled '1' highlights the 'Workspaces' dropdown menu. Below it, another red circle labeled '2' highlights the 'Reports' tab in the main content area. A red arrow points from the 'Reports' tab to a specific report card below it. The report card shows a star icon, the name 'Module 04A - MGP', and a small chart icon.</p>

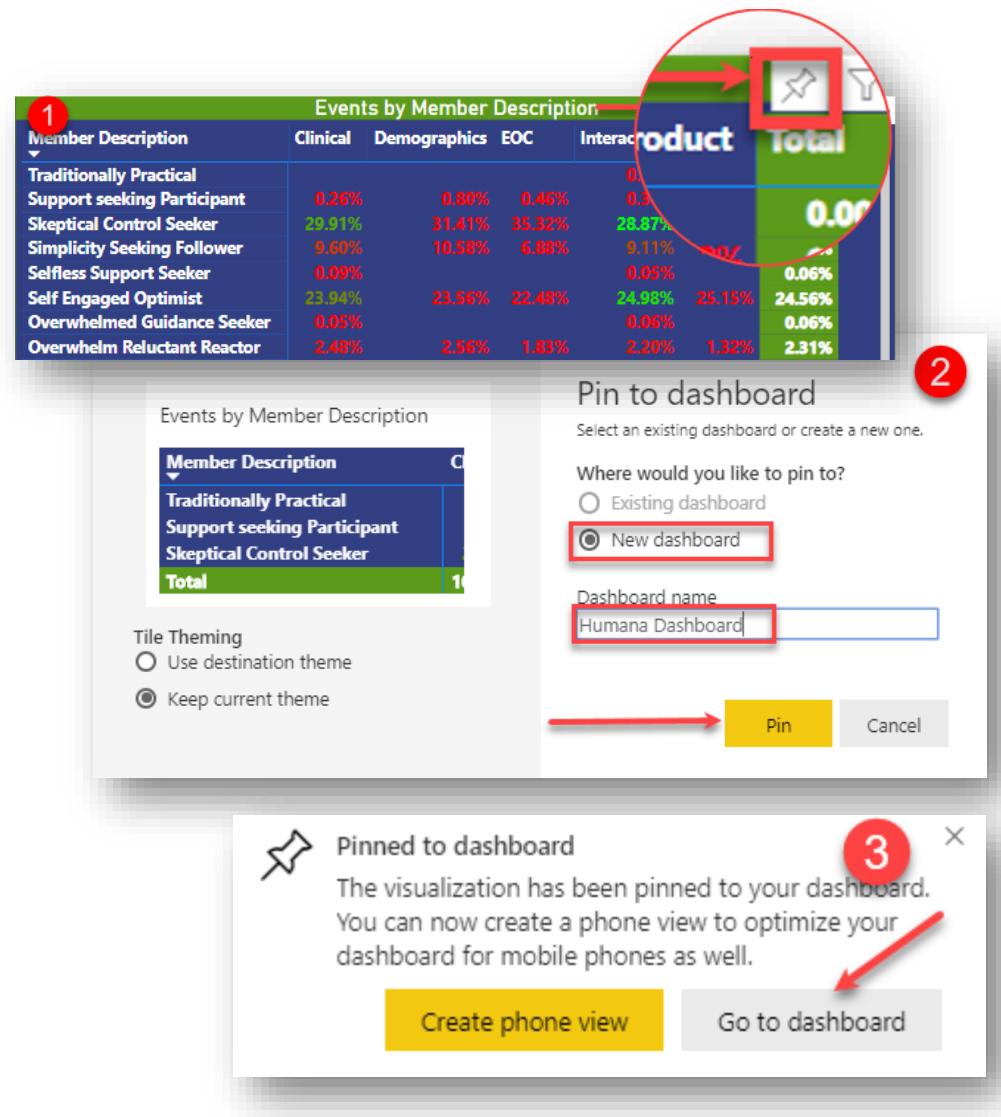
4. Next, hover over **Matrix visual** found on the **Longitudinal** page.
5. When hovering over a visual a PIN icon will appear() , clicking on the PIN icon will open up a new popup window.
6. The new window will allow you to add visualizations to either new dashboards or existing dashboards.
7. Type in **Humana Dashboard AAA**, where AAA is your 3 digit initials, for the **Dashboard Name**.

Note: Since multiple students will be creating these dashboards at the same time, in the same workspace, make sure to add your 3 digit initials to the end of the dashboard name: **Humana Dashboard MGP**

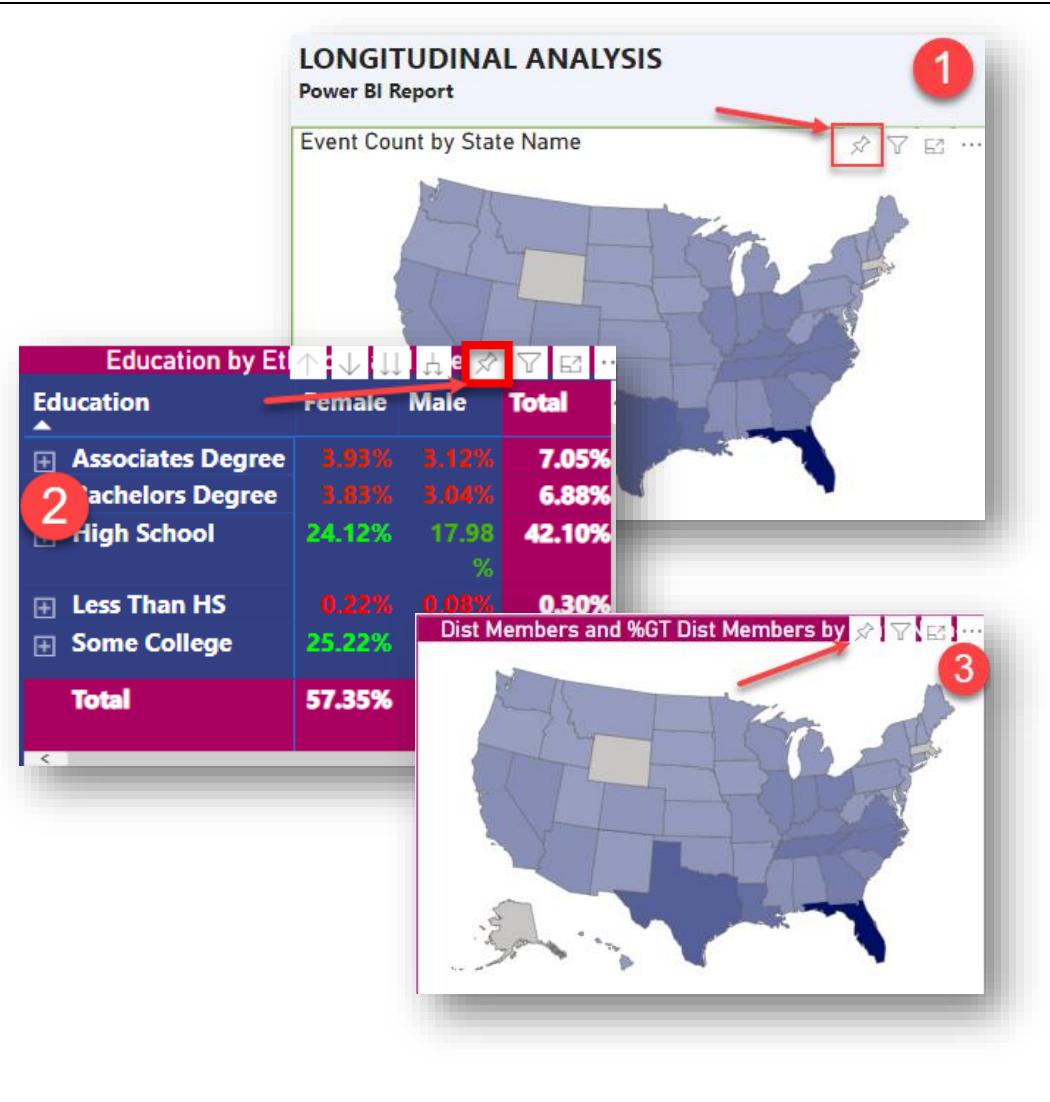
8. Click **Pin**.

Note: When you pin an item to a dashboard you will receive a popup notification with a button that will take you directly to your Dashboard.

In this example, we will navigate to the dashboard later, once we add additional items.



9. Next, add the other four visualizations to the dashboard.
10. Next, hover over the **Shape map visual** found on the **Longitudinal** page.
11. Click on the PIN () icon.
12. A new window will appear, choose **Existing dashboard** and then select **Humana Dashboard MGP** from the dropdown.
13. Click **Pin**.
14. Next, hover over the **Matrix visual** found on the **Demographic** page.
15. Click on the PIN () icon. Add to Existing Dashboard.
16. Next, hover over **Shape Map visual** found on the **Demographic** page.
17. Click on the PIN () icon. Add to Existing Dashboard.



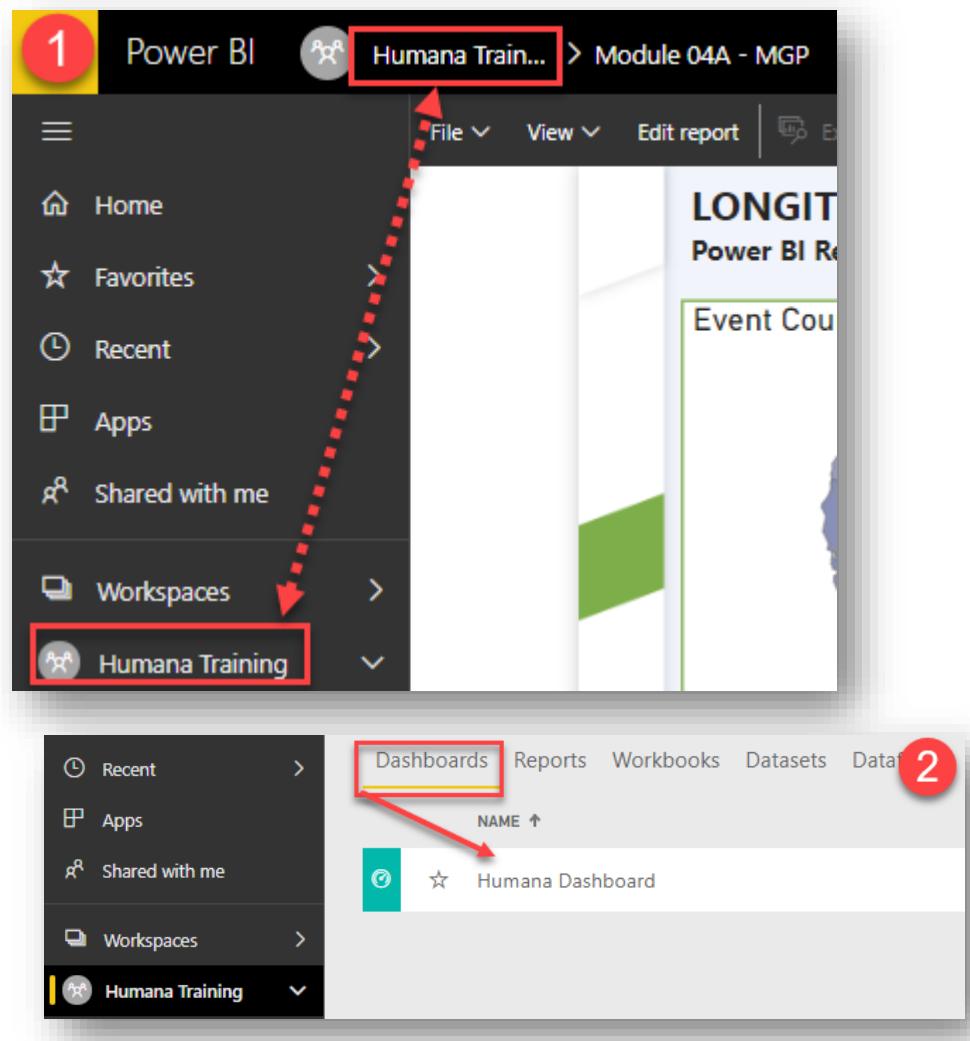
18. There are two ways to get back to the root of the workspace as seen in Step 1 to the right.

19. The first option is to click **Humana Training** from the **breadcrumb menu** at the top left of the report.

20. The second option is to click on **Humana Training**, found under **Workspaces**.

21. Click either of these options and you will arrive back at the home page / root page for the workspace.

22. Under the Dashboards tab, click on Humana Dashboard. This will redirect you to the newly created Dashboard.



23. Your Dashboard will look something like the screenshot in step 1 to the right.
24. By default, the visualizations in a dashboard are not interactive like a Power BI Report. Instead, when you click on a visual it will actually drill down into the underlying report.
25. Click on the Shape Map visual for Event Count by State. This will drill down into the Longitudinal report page.
26. Navigate back to the Dashboard.

Events by Member Description

Member Description	Clinical	Demographics	EOC	Interactions	Product	Total
Traditionally Practical	0.26%	0.80%	0.40%	0.30%	0.50%	0.35%
Support seeking Participant	29.91%	31.41%	35.32%	28.87%	31.50%	29.32%
Skeptical Control Seeker	9.50%	10.50%	6.80%	9.11%	12.18%	9.32%
Simplicity Seeking Follower	0.09%	0.00%	0.00%	0.05%	0.00%	0.06%
Selfless Support Seeker	23.94%	23.56%	22.40%	24.98%	25.15%	24.50%
Self Engaged Optimist	2.48%	2.56%	1.83%	2.20%	1.32%	2.31%
Overwhelmed Guidance Seeker	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%
Overwhelmed Reluctant Reactor	2.48%	2.56%	1.83%	2.20%	1.32%	2.31%
Intentional Maintainer	0.02%	0.11%	0.00%	0.00%	0.00%	0.01%
Independent Invincible	0.03%	0.00%	0.00%	0.03%	0.15%	0.03%
Healthy self Sustainer	2.32%	2.08%	1.83%	2.47%	2.92%	2.41%
Health Services Maximizer	6.38%	4.49%	5.50%	6.13%	4.82%	6.20%
Engaged Rationalizer	0.02%	0.11%	0.00%	0.11%	0.15%	0.08%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Event Count BY STATE NAME

Education by Ethnicity and Age Range

Education	Female	Male	Total
Associates Degree	3.93%	3.12%	7.05%
Bachelors Degree	3.83%	3.04%	6.88%
High School	24.12%	17.90%	42.10%
Less Than HS	0.22%	0.08%	0.30%
Some College	25.22%	19.38%	43.60%
Unknown	0.03%	0.05%	0.08%
Total	57.35%	42.65%	100.00%

Dist Members: %GT Dist Members BY STATE NAME

LONGITUDINAL ANALYSIS Power BI Report

Events Overview

- 99,952 Event Count
- 6,581 Dist Event Count
- 36 Events Per Day

%GT Dist Event Count by Event Group 1

Event Group	Count
Interactions	59.60%
Clinical	41.59%

Events by Member Description

Member Description	Clinical	Demographics	EOC	Interactions	Product	Total
Traditionally Practical	0.26%	0.80%	0.40%	0.30%	0.50%	0.35%
Support seeking Participant	29.91%	31.41%	35.32%	28.87%	31.50%	29.32%
Skeptical Control Seeker	9.50%	10.50%	6.80%	9.11%	12.18%	9.32%
Simplicity Seeking Follower	0.09%	0.00%	0.00%	0.05%	0.00%	0.06%
Selfless Support Seeker	23.94%	23.56%	22.40%	24.98%	25.15%	24.50%
Self Engaged Optimist	2.48%	2.56%	1.83%	2.20%	1.32%	2.31%
Overwhelmed Guidance Seeker	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%
Overwhelmed Reluctant Reactor	2.48%	2.56%	1.83%	2.20%	1.32%	2.31%
Intentional Maintainer	0.02%	0.11%	0.00%	0.00%	0.00%	0.01%
Independent Invincible	0.03%	0.00%	0.00%	0.03%	0.15%	0.03%
Healthy self Sustainer	2.32%	2.08%	1.83%	2.47%	2.92%	2.41%
Health Services Maximizer	6.38%	4.49%	5.50%	6.13%	4.82%	6.20%
Engaged Rationalizer	0.02%	0.11%	0.00%	0.11%	0.15%	0.08%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Filter by Age Range: All

Filter by State: All

Filter by LOB: All

Power BI Uses the same natural query engine that is used by BING to allow users to ask questions of their data. This feature is called **Q&A** and is immediately observed at the top when working with Dashboards.

27. From the dashboard, type the following into the Q&A text box.

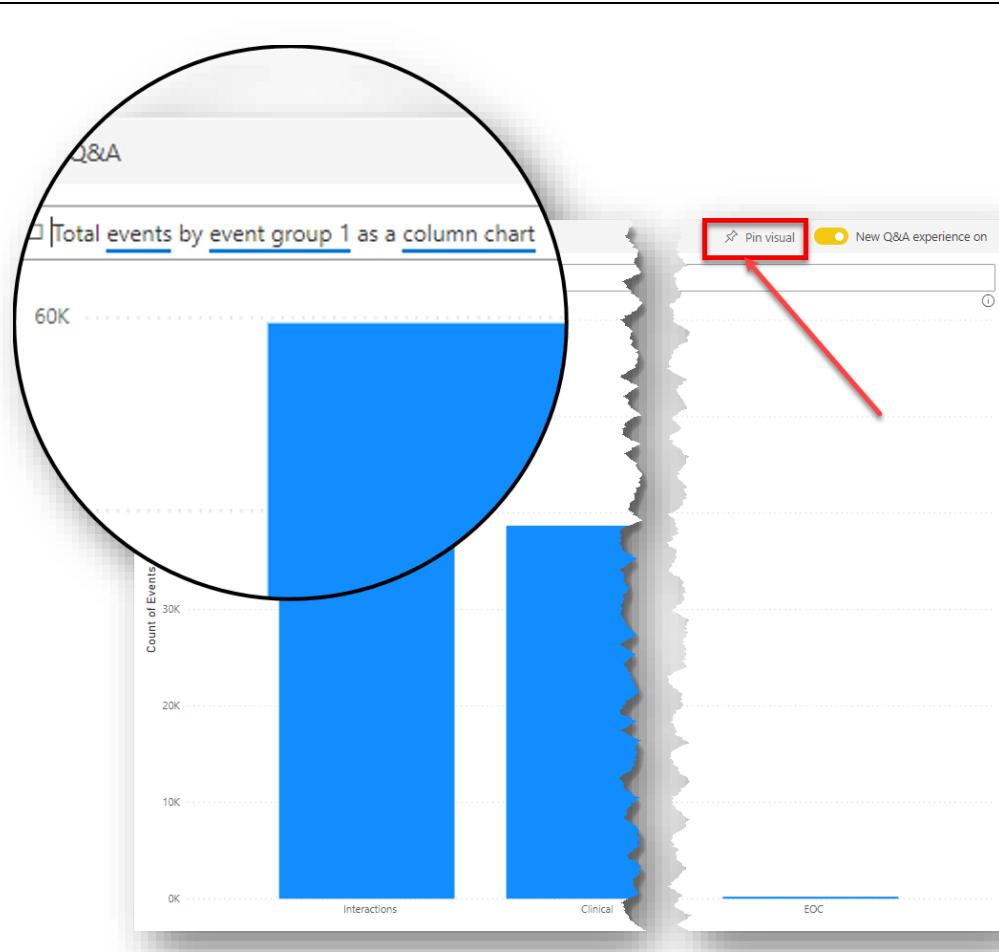
Total Events by Event Group 1 as a column chart

Note: As you type a drop down menu will appear to help you select the exact fields and measures you're looking for.

28. Q&A allows users to quickly ask questions and diagnose situations. However, you can also take these visualizations and then pin them to your dashboard!

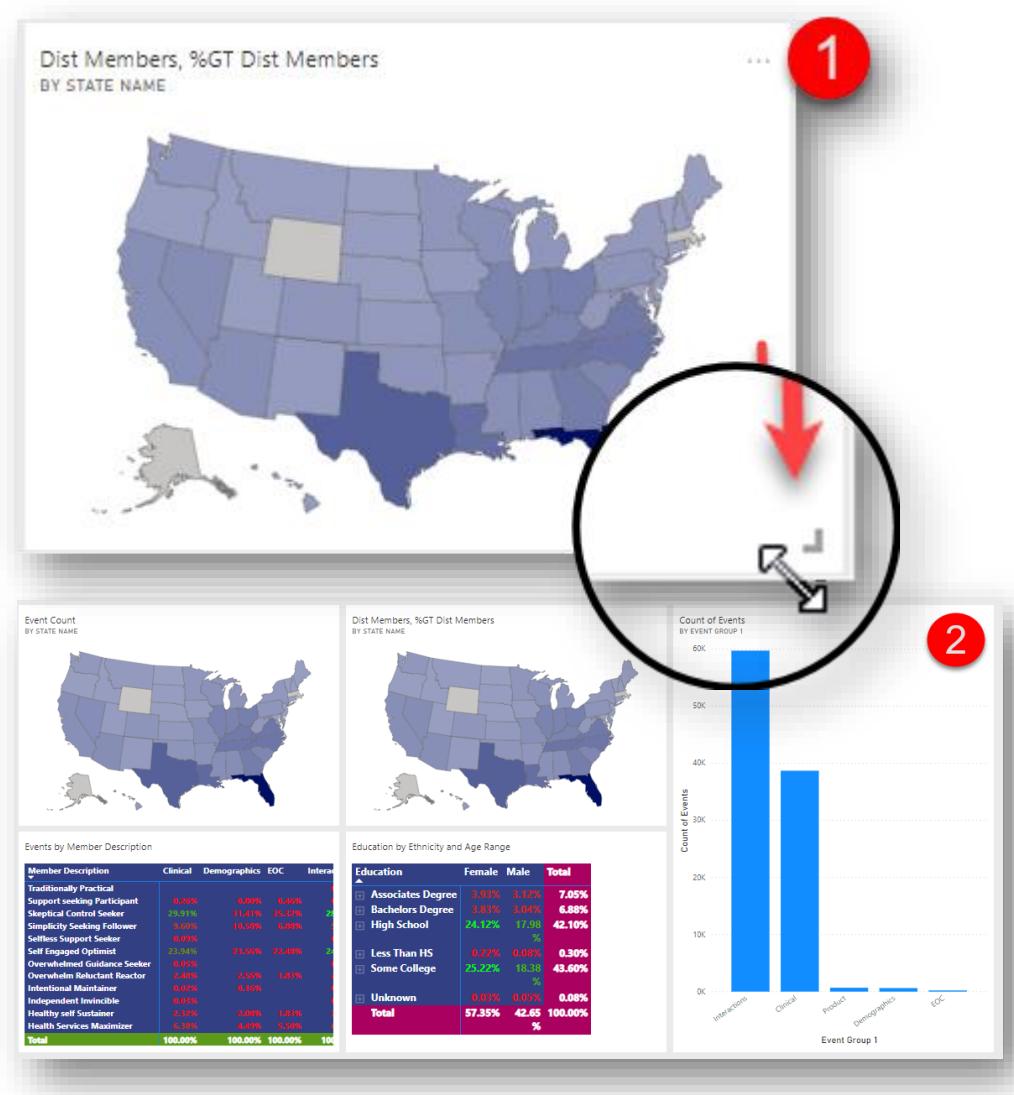
29. Click on  Pin visual, found in the upper right of the screen.

30. Choose **Existing Dashboard** and then **Humana Dashboard MGP**.



- 31. Items on a dashboard can be easily moved around and resized.
- 32. To resize and image, hover over the visualization and a small carrot symbol will appear in the bottom right. Grabbing that corner and moving the image will resize it.
- 33. Also, Visuals can be simply moved by selecting them and dragging them around.

Adjust your Dashboard tiles to your liking. See the final dashboard in screenshot 2 to the right.



Module 4C: Sharing in Power BI (Optional) (5-10 Minutes)

There are a few different ways to share reports and dashboards from the Power BI Service. The primary method for sharing is through Power BI Apps and this is the recommended method by Microsoft. A Power BI App is a collection of **completed** reports and dashboards. Reports and dashboards shared through a PowerBI App are **read** only.

Module Requirements:

1. Create a new Power BI App named **Humana Training AAA**, where AAA is your initials.
2. The Power BI App should include the Report and Dashboard you developed.

Note: Only one Power BI App can be created per individual workspace. If you are sharing a workspace with others, then only one person can complete this lab.

Hints:

1. Filter types in the filters pane can be basic, advanced or Top N.
2. Slicers for text fields can be either lists or dropdowns, the default is list.

Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none"> 1. Login to the Power BI Service at https://powerbi.com 2. Click the dropdown for Workspaces and select the Humana Training workspace. 3. Validate that Included in App is set to Yes for your dashboard and report. <p>Note: Each dashboard and report has a separate toggle button available for including that particular item in the App.</p> <ol style="list-style-type: none"> 4. Once the items that will be included in the app have been selected. Click on Publish App, found in the top right corner. <p>Explanation: The Include in App feature allows developers to only share reports or items that have been completed. Therefore, reports that are not complete or validated can be excluded from the app temporarily and added later.</p>	

5. Next, give your app a name, by default the App will have the same name as the Workspace.
6. Leave your App name the same as your workspace.
7. The description is a required field. Give your app a good description that explains what information is being visualized.

Note: *The description is a required filled. As Power BI adoption increases, the number of apps will increase, and the description helps users to identify which apps will best help them analyze the business metrics.*

8. You can provide a support site; this is a site where users can go to find help.
9. You can also assign a logo to your app, once again this can make it easy for users to discover your app.

Humana Training

1

Setup Navigation Permissions

Build your app

App name *

Humana Training

Description *

The description is required and needs to be specific.

Support site

Share where your users can find help

App logo

Upload Delete

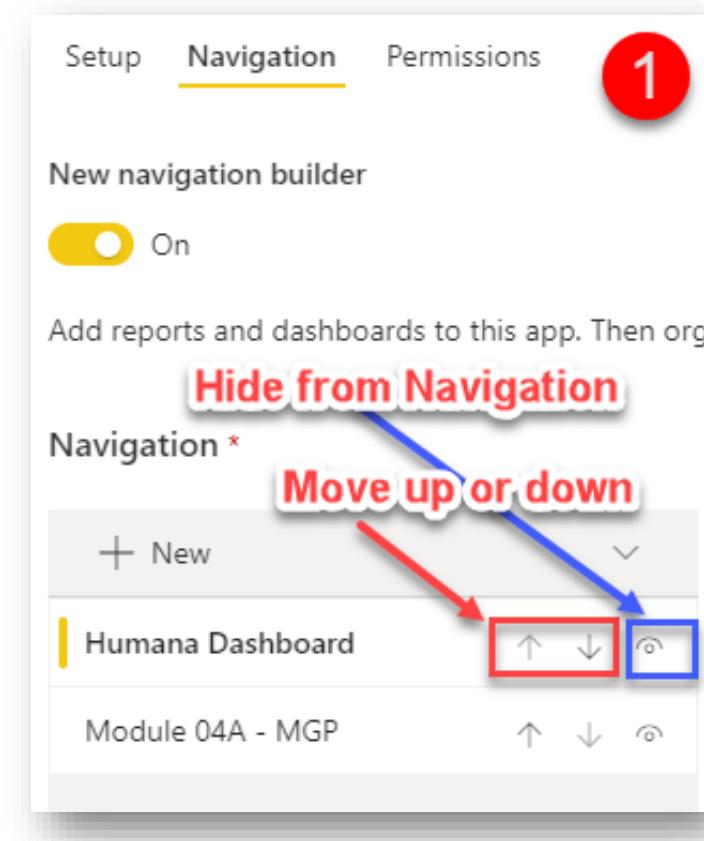
App theme color

10. Next, click on the Navigation tab across the top.

11. On the left side of the screen is a navigation pane. In this pane you can move items up or down and you can also hide items from the navigation pane.

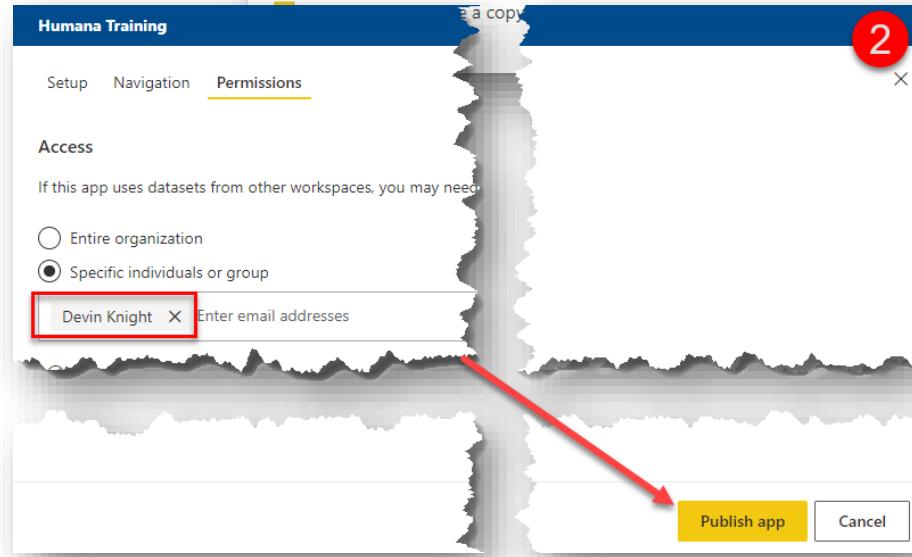
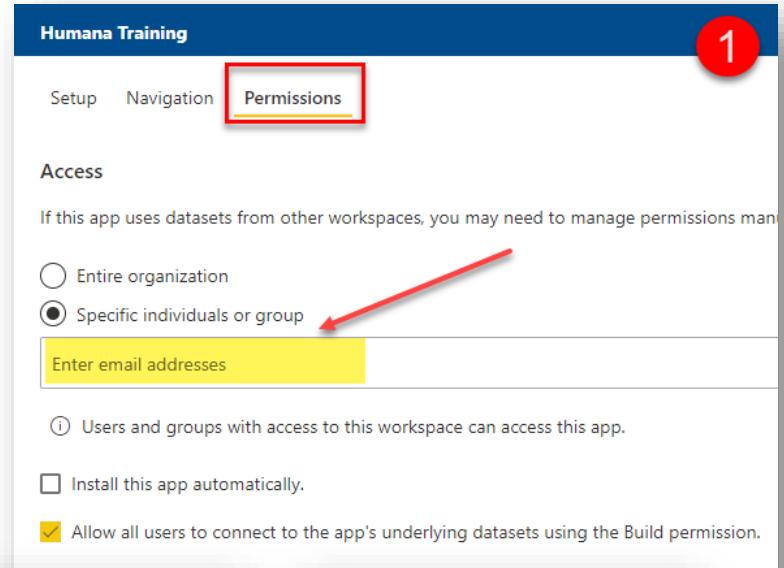
Important: Hiding items from the navigation pane does **NOT** prevent users from accessing those reports or dashboards. This is not meant to be a mechanism for security.

Explanation: The navigation tab is a newer feature to the Power BI Service and allows users to have an easy to access navigation pane. This makes it very easy to move between dashboards and reports that have been included in the app.



The final step in publishing an app is choosing who to share the app with. It's important to be selective here. Sharing an app will give users access to all items and data within the app. Row level security is discussed in an optional lab later on.

12. Click the Permissions tab from the top menu. Here you can share with the entire organization or with specific **individuals or groups**.
13. To add an individual simply add their email. Likewise, to add a group just add the group email and all members of the group will be given access to the App.
14. Once all users have been added to the app, click **Publish app**.



Every user has an App section in Power BI. This App section has a list of saved Apps and allows users to explore new Apps that have been shared with them.

15. Expand the Navigation pane on the left and then click on **Apps**.
16. Next, click on the button that says **Get more apps from Microsoft AppSource**. See Screenshot 1 to the right.
17. In the search bar at the top right, **search for Humana**.
18. Clicking **Get it Now** will add the app to your personal app section for easy access at a later time!

Explanation: Remember that these Apps are read only versions of the Power BI Reports and Dashboards. Therefore, end users cannot modify these reports.

Also, it's important to point out that Apps are updated whenever a refresh occurs and is updated anytime the developer updates a published app!

The screenshot shows the Power BI application interface. A red circle labeled '1' is positioned in the top right corner of the main content area, which displays a grid of saved apps. One app, 'DIAD' (JAN 14, 2020), is highlighted with a red box. Another app, 'Memphis, TN' (OCT 13, 2017), is also visible. Below this, a red box labeled 'Discover new Apps' points to a button. A red circle labeled '2' is placed over this button. The interface then transitions to a Microsoft AppSource search results page. A red box labeled 'Search Bar' points to the search input field. The search term 'Humana' is entered. A red box labeled 'Humana' points to the search result entry. The result for 'Humana Training' by Mitchell Pearson (Power BI) is shown, with a red box labeled 'Get it now' pointing to the download button. At the bottom of the screen, a blue banner reads 'Find more apps and consulting services at AppSource'.

Module 4D: Power BI Data Refresh (Optional) (10 Minutes)

In order to properly leverage reports and dashboards to make good data business decisions, the data needs to be up to date and current. Once a report has been published to the Power BI Service, the data can be refreshed on a schedule.

Data Gateway

The Enterprise Data Gateway is used for scheduling data when accessing on-premises data sources. This is applicable for all connections to on-prem data which includes direct query, live connection and imported datasets. Humana has already installed and configured a Data Gateway.

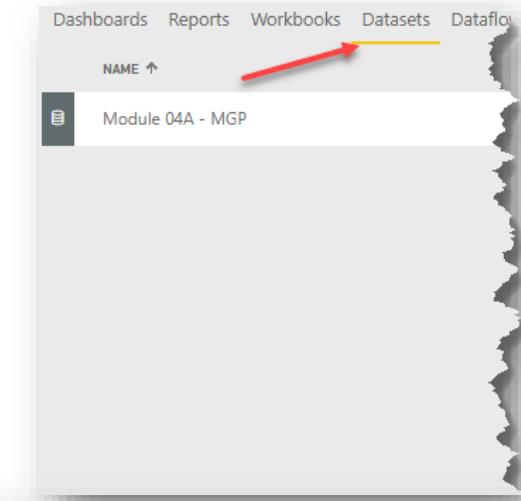
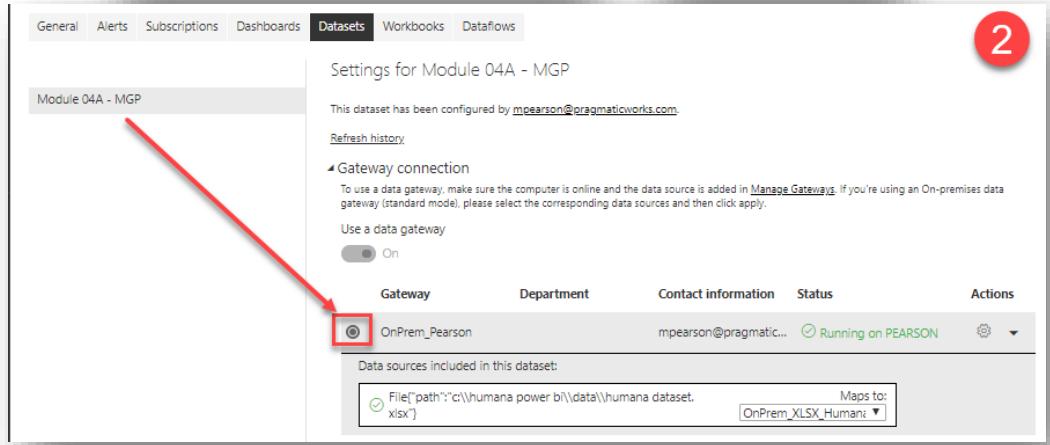
Module Requirements:

1. Schedule Module 04A – MGP to refresh every day at 8am.

Hints:

1. All on-prem data sources must be added to a Data Gateway prior to scheduling refresh.
2. The person scheduling the data refresh must be assigned as a user on each applicable data source in the data gateway.
3. Data Sources should not be stored on personal laptops where the machine may not be on during a refresh.

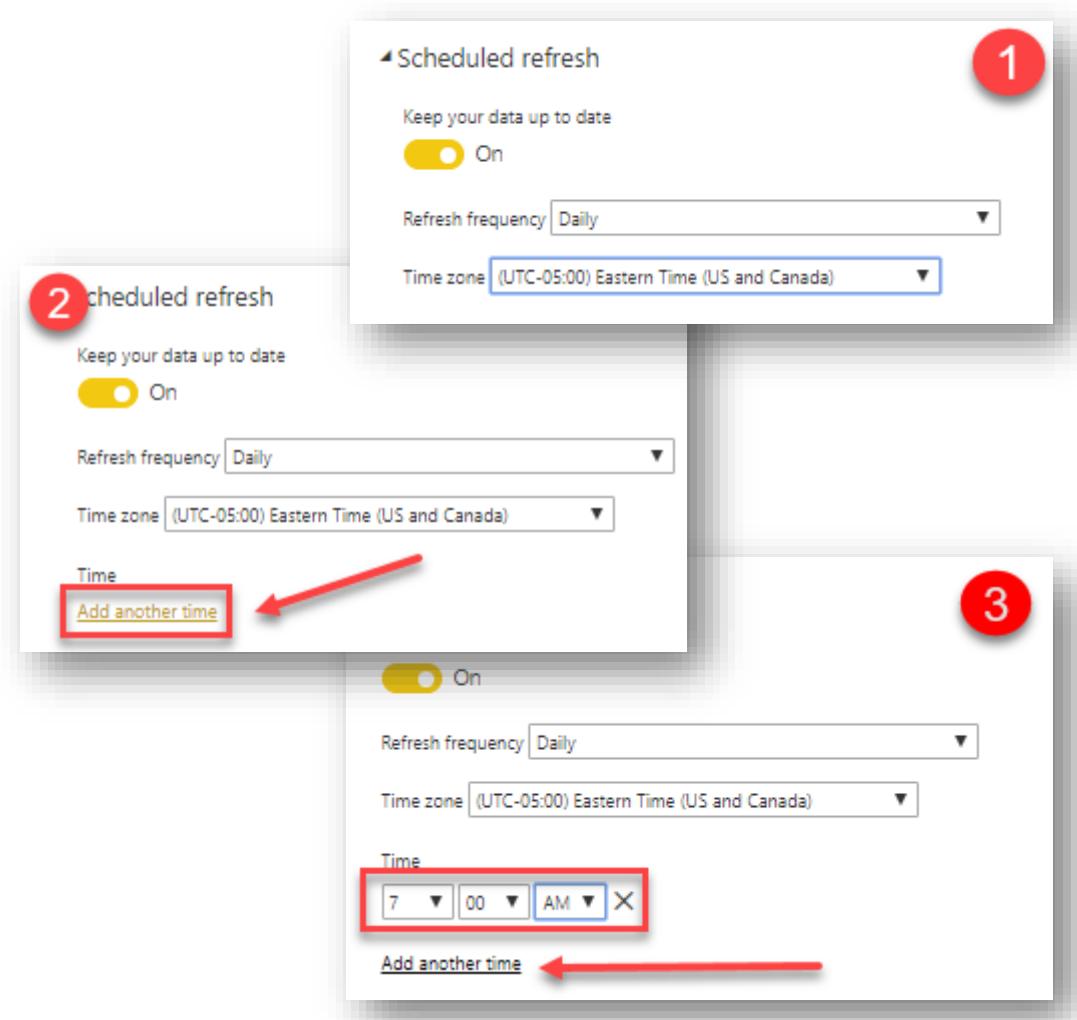
Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none"> 1. Login to the Power BI Service at https://powerbi.com 2. Click the dropdown for Workspaces and select the Humana Training workspace. Select Datasets. 3. Next, find your Power BI Report from the list and click the ellipsis (...). 4. From the drop down, select Settings. 5. Clicking on settings will redirect you to another page where you can now schedule a data refresh. 6. If your dataset has any on-prem connections, then you will need to select a valid data gateway that has been configured with the data source connection information. See Screenshot 2 to the right. <p>Explanation: If a Data Gateway does not appear or is not configured correctly, then a Data Gateway admin will need to be notified. The admin can add additional data sources and add users to those data sources.</p>	 

7. The next step is to schedule a refresh.
8. Expand **Schedule Refresh** category.
9. **Toggle On** "Keep your data up to date"
10. Choose **Daily** for refresh frequency.
11. Choose your desired time zone from the drop down menu.
12. Next, click on the hyperlink **Add Another Time**.
13. This will open up a new menu where you can choose a time for the dataset to refresh.
14. Click **Apply** to save changes.

Explanation: Multiple data refreshes can be scheduled per dataset per day. How many depends on your companies currently licensing structure.

For example, companies that have the standard Power BI Pro licensing structure are limited to 8 schedule refreshes per dataset. Whereas companies using the Power BI Premium model can schedule up to 48 refreshes per dataset per day.



Module 4E: Power BI Security – Row Level Security (Optional) (10 Minutes)

Security and protecting data is a very important aspect of Power BI. When importing data into Power BI, there are two security models available: Object Security (*sharing the app*) and Row Level Security (RLS). In this section you will learn about row level security.

Creating Roles

The process of implementing Row Level Security (RLS) involves a two-step process. The first step is creating Roles, which are created in Power BI Desktop. These Roles restrict access to what **rows** of data can be viewed by users assigned to that role.

Assigning Users

Assigning users is the second part in the process. Unlike, Roles, assignment of users does not occur in the Power BI desktop application. Instead, role assignment is performed in the Power BI Service.

Dynamic Role Level Security (Advanced)

Dynamic Role Level Security is a more complex implementation of RLS, however, it's also a cleaner and more manageable implementation. When a Power BI Report will require many separate and distinct roles, then dynamic role level security is probably the better choice. Dynamic Role Level Security is not covered in this workshop, however, the following 1-hour webinar on YouTube provides a great in-depth breakdown.

https://www.youtube.com/watch?v=8d_YQKRpJYE&feature=youtu.be

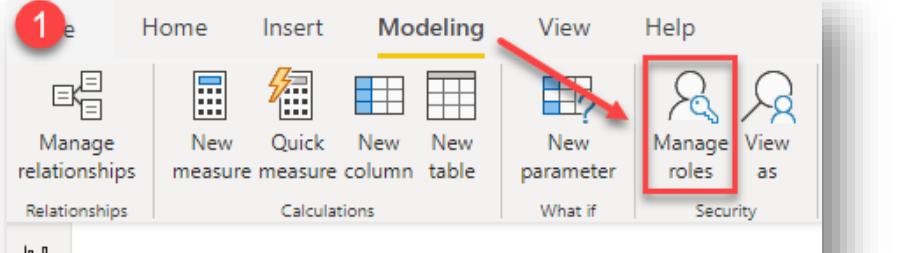
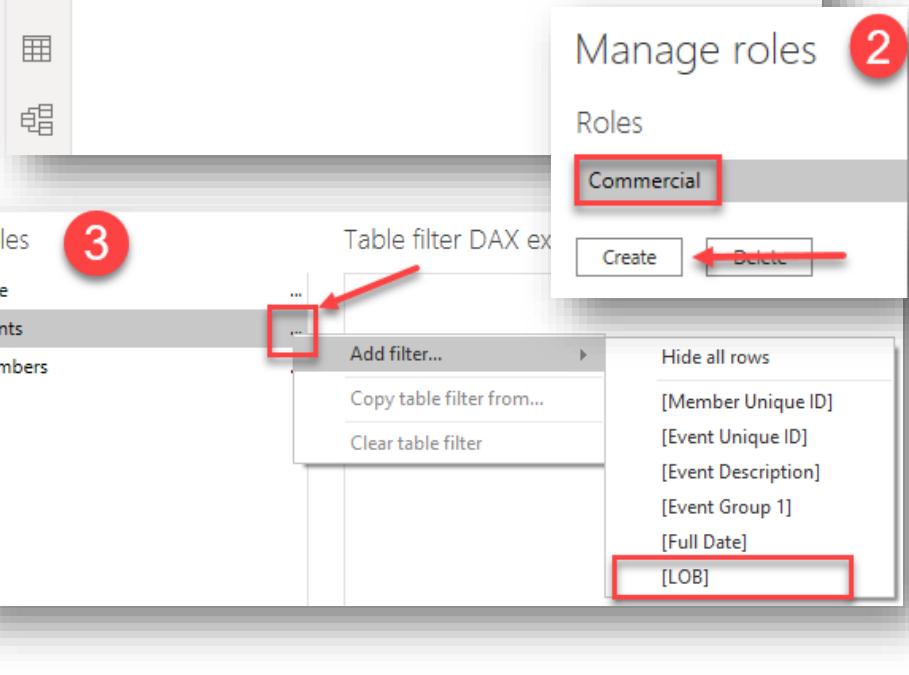
Module Requirements:

1. Create two new roles based on LOB:
 - a. Commercial
 - b. Medicare
2. Validate that each role is working correctly.
3. Assign a user within your organization to a role that has been created.

Hints:

1. View as role can be used for impersonation.
2. Roles are created in Power BI Desktop.
3. Role assignment is accomplished from the Power BI Service.

Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none"> 1. Find the security category on the Modeling ribbon and select Manage Roles. 2. A new window will open for editing and managing roles. 3. Click Create. Then give the new role a name of Commercial and hit Ok on your keyboard. <p>Explanation: Creating roles allows the developer to restrict row level access to that role. The next step is to add a filter. Anyone assigned to this role will only be able to view data that matches the filter criteria.</p>	 

6. The next part is to write an expression to filter the rows. This can actually be quite complex and include conditional logic.
7. You will observe that a template has been provided with a placeholder.
8. Replace “**Value**” with “**Commercial**”.
9. Next, create another role called **Medicare** by repeating steps 3 and 4 above.
10. This time the “**Value**” will be replaced with “**Medicare**”.

Explanation: The LOB category only contains two members which are Medicare and Commercial. Generally speaking, you would need to create a role for each member within a category and this could include additional roles for various combinations. of members.

Note: If many members exist, then the dynamic security solution mentioned at the beginning of this lab is probably the better choice!

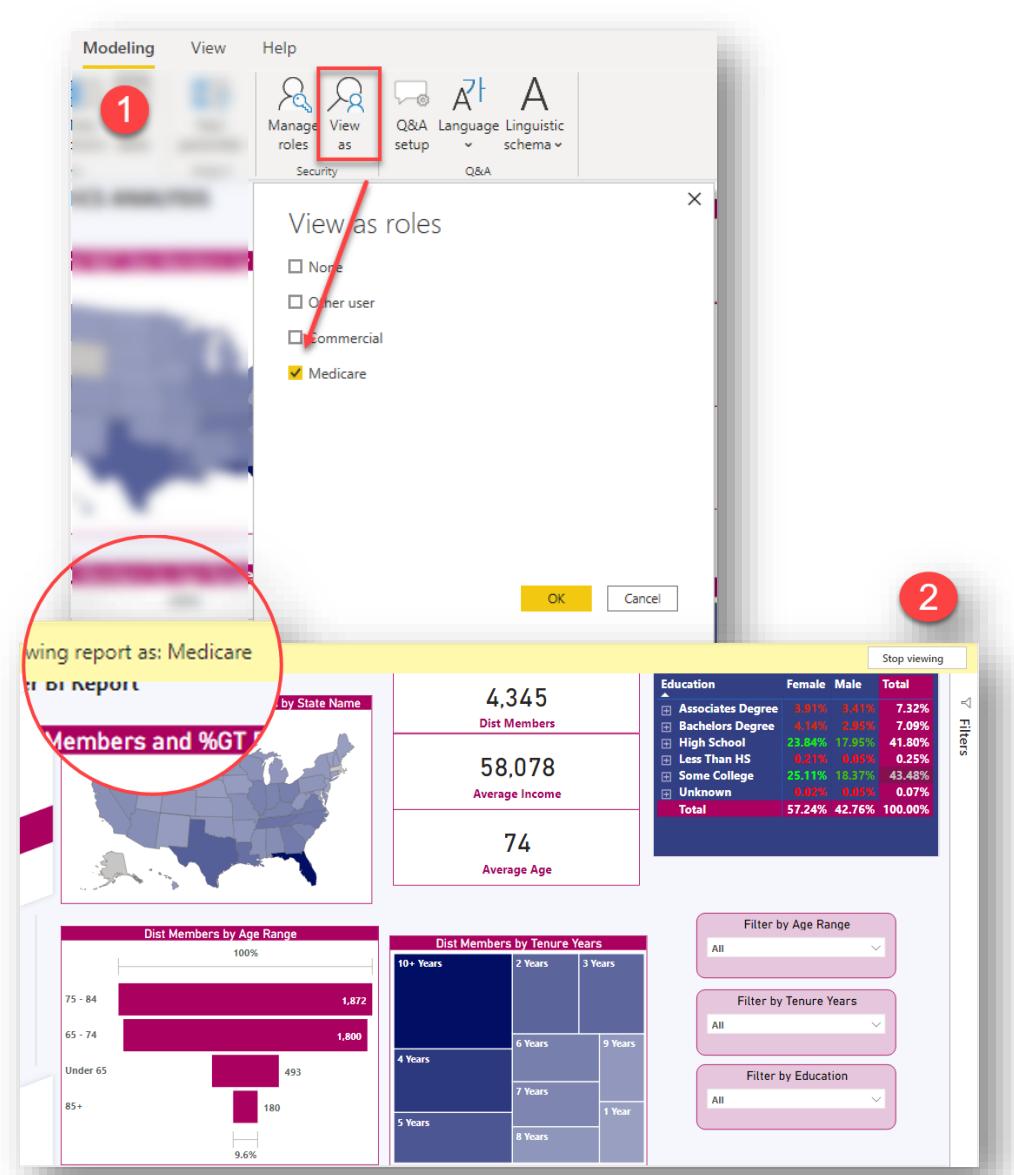
The image consists of three vertically stacked screenshots from the Microsoft Power BI 'Manage role' interface.

- Screenshot 1:** Shows the 'Tables' pane with 'Events' selected (highlighted in yellow). A red circle with the number '1' is positioned over the 'Events' table. To the right, the 'Table filter DAX expression' field contains the formula `[LOB] = "Value"`.
- Screenshot 2:** Shows the same interface after the value has been changed. A red arrow points from the 'Value' placeholder in Screenshot 1 to the 'LOB' field in Screenshot 2. The 'LOB' field now contains the value `"Commercial"`, which is highlighted with a red box. A red circle with the number '2' is positioned over the 'LOB' field.
- Screenshot 3:** Shows the 'Tables' pane with 'Events' selected again. The 'Table filter DAX expression' field now contains the formula `[LOB] = "Medicare"`, which is also highlighted with a red box. A red circle with the number '2' is positioned over the 'LOB' field.

11. Next, it's time to test out the new roles that have been created and verify that they are working correctly and as intended.
12. Find the security category on the **Modeling** ribbon and select **View as**.
13. Choose the **Medicare** Role from the list of options.
14. Immediately, the numbers on the report will change. This change represents that the data has been filtered by Medicare.

Note: A bar now appears across the top of the screen, this bar is there to show you that you are currently viewing the report as the Medicare role. This bar only appears in Power BI Desktop when developing and testing a role. This will not appear to end users once the report is shared in the Power BI Service.

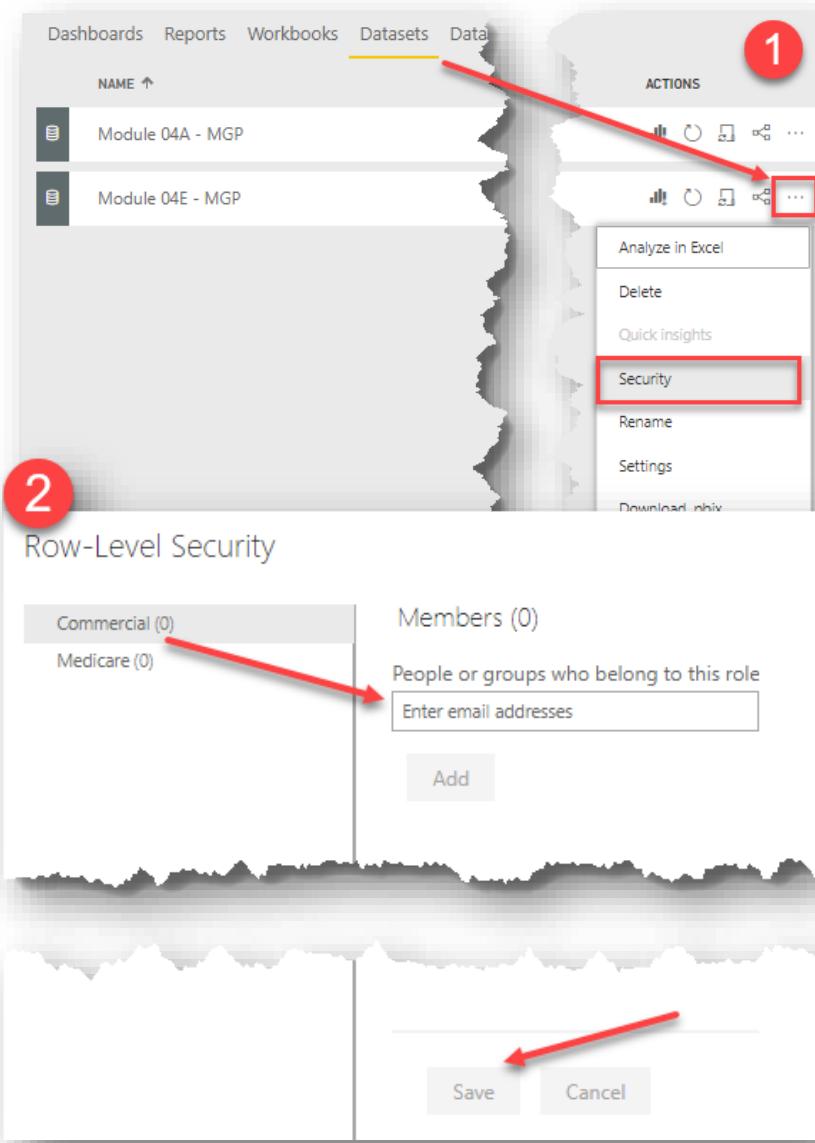
15. Once all roles have been tested and validated, the report can be published, and users can be assigned to the newly created roles.



16. Save this report as **Module 04E – AAA**, where AAA is your initials.
17. **Publish** the report to your Humana Training Workspace.
18. Once Published, users can be assigned to roles.
19. Like data refresh, assignment of roles occurs from the **Datasets** tab. Click on Datasets, then click on the ellipsis (...) for the **Module 04E – AAA** dataset.
20. Select Security from the drop down.
21. From this new view, you can add users or groups. Notice that role assignment is achieved my using email addresses.
22. Add users and then click Save.

Important! Security will not be applied until the Power BI App is updated! If you are adding row level security to an existing report, then you want to make sure to republish your app once the security roles have been created and updated!

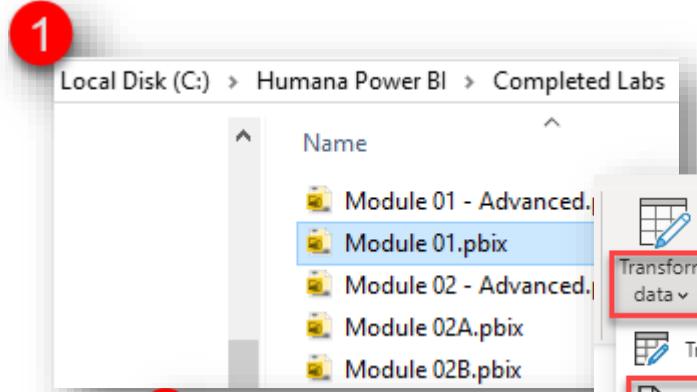
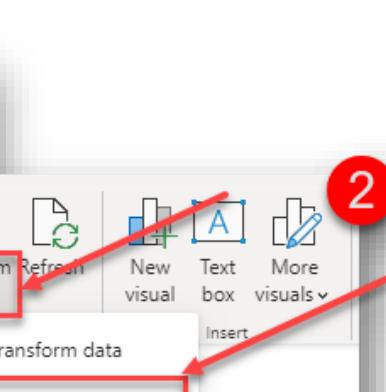
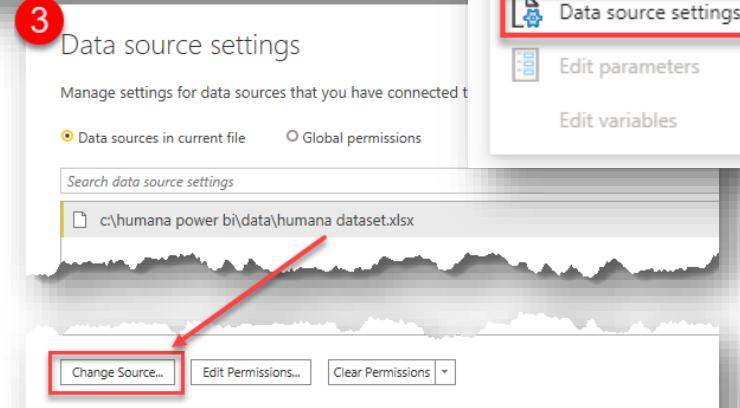
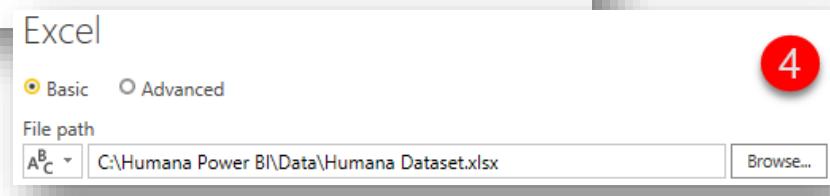
Explanation: Users are assigned from the Power BI Service because the Power BI Services is able to access the Office 365 users and groups that have been defined.



Appendix 1: Data Source Linking

If you start from a completed lab, you will want to update your data source connections. This will ensure that the PBIX file is pointing the location of where files have been stored on your machine

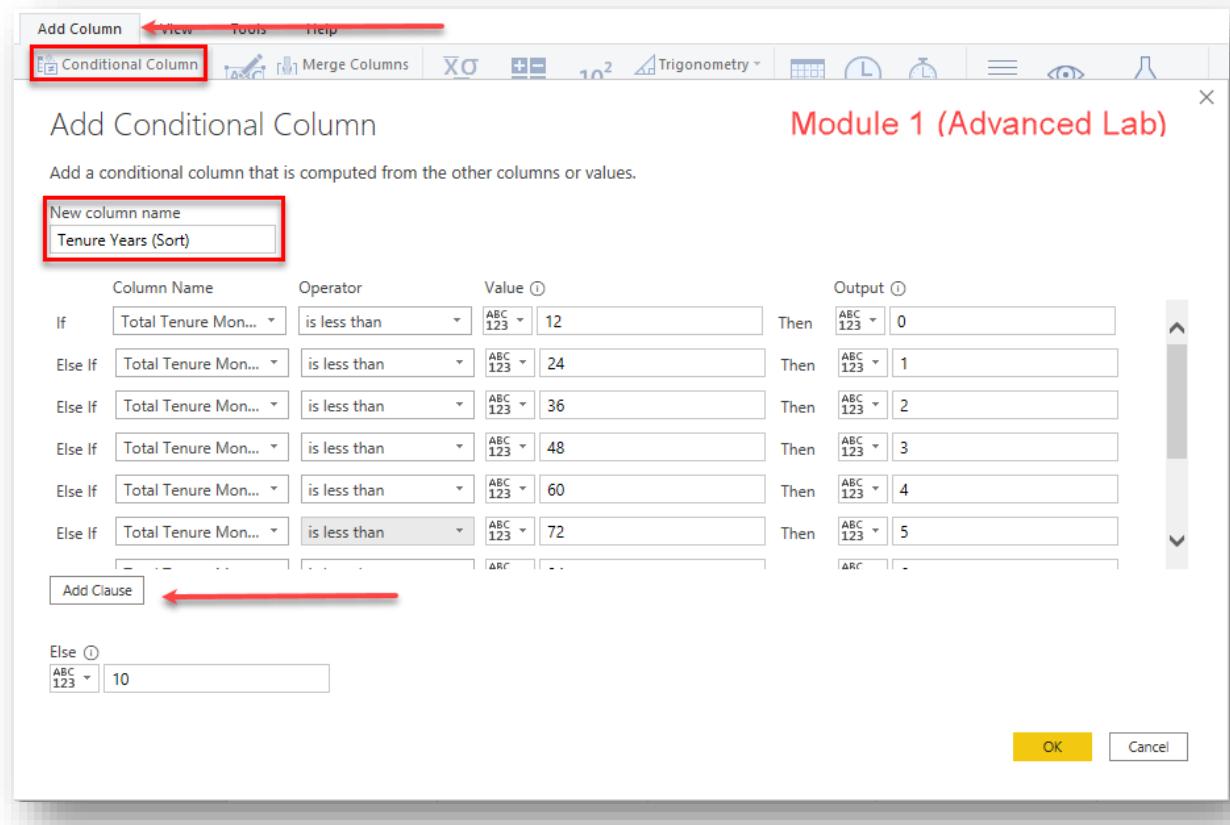
Step-by-Step Instructions

Click Steps	Screen Shots
<ol style="list-style-type: none"> 1. Completed Labs can be found in your class files in the Completed Labs folder. Open a completed lab to start with. 2. From the home ribbon, find Transform data and click the dropdown. (See <i>Screenshot 2</i> to the right.) 3. Select Data source settings from the dropdown. 4. This will open a new editor where you will see all existing data source settings in your data model. 5. This model only has one data source. Click Change Source... 6. Use the browse button to navigate to where the Humana Dataset has been stored on your machine. 	   

Appendix 2: Module 01 (Advanced Lab)

The completed lab can be found at:

Humana Power BI\Completed Labs\Module 01 - Advanced.pbix



Appendix 3: Module 02 (Advanced Lab)

The completed expressions can be found below, and the completed lab can be found at:

Humana Power BI\Completed Labs\Module 02 - Advanced.pbix

Interactions Events Count =

```
CALCULATE(  
    [Event Count],  
    'Events'[Event Group 1] = "Interactions")
```

Clinical Events Count =

```
CALCULATE(  
    [Event Count],  
    'Events'[Event Group 1] = "Clinical")
```

All Other Groups Events Count =

```
CALCULATE(  
    [Event Count],  
    FILTER(  
        ALL('Events'),  
        NOT 'Events'[Event Group 1] IN {"Interactions", "Clinical"}))
```

Event Group 1	Event Count	Interactions Events Count	Clinical Events Count	All Other Groups Events Count
Interactions	59,729	59,729	38,697	1,526
Clinical	38,697	59,729	38,697	1,526
Product	684	59,729	38,697	1,526
Demographics	624	59,729	38,697	1,526
FOC	218	59,729	38,697	1,526
Total	99,952	59,729	38,697	1,526