

## Representation and Reporting - D210

### Task 1

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#### A1. Provide both data sets that serve as the data source for the dashboard.

My tableau dashboard utilizes both the customer churn data provided by WGU and income data by zip code provided by the US Census bureau, which is accessible via the following link:

[https://data.census.gov/map?q=ZCTA5%2044305%20Income%20and%20Poverty&tid=ACST5Y2022.S1902&layer=VT\\_2022\\_860\\_Z2\\_PY\\_D1&loc=41.0756,-81.4696,z11.4102](https://data.census.gov/map?q=ZCTA5%2044305%20Income%20and%20Poverty&tid=ACST5Y2022.S1902&layer=VT_2022_860_Z2_PY_D1&loc=41.0756,-81.4696,z11.4102)

This additional data set requires some data cleaning. The file clean.py, attached to my submission, includes the following code uses to prepare this data set for visualization:

#### Code

```
import pandas as pd

df = pd.read_csv("ACSST5Y2022.S1902-Data.csv")

df.columns = df.iloc[0]
df = df[1:]

# Renaming columns to avoid duplicate names issue
df.columns = ['GEO_ID', 'NAME'] + list(df.columns[2:])

# Formatting zip codes in column 'NAME' to remove "ZCTA5 " at the start
df['Zip'] = df['NAME'].str.replace('ZCTA5 ', '').str.zfill(5)

df.to_csv("income_census_clean.csv")
```

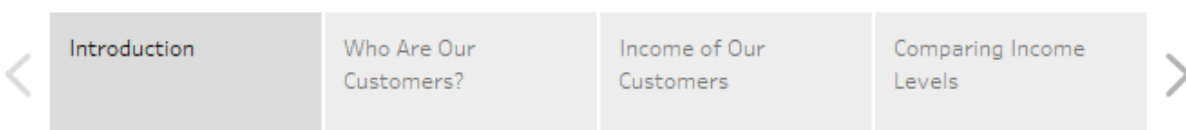
This data source and its prepared CSV file have been attached to my submission.

#### A2. Provide step-by-step instructions to guide users through the dashboard installation.

To access the dashboard, download the Tableau software onto your machine and run it. Then open the attached file D210 Churn Data 2.twb.

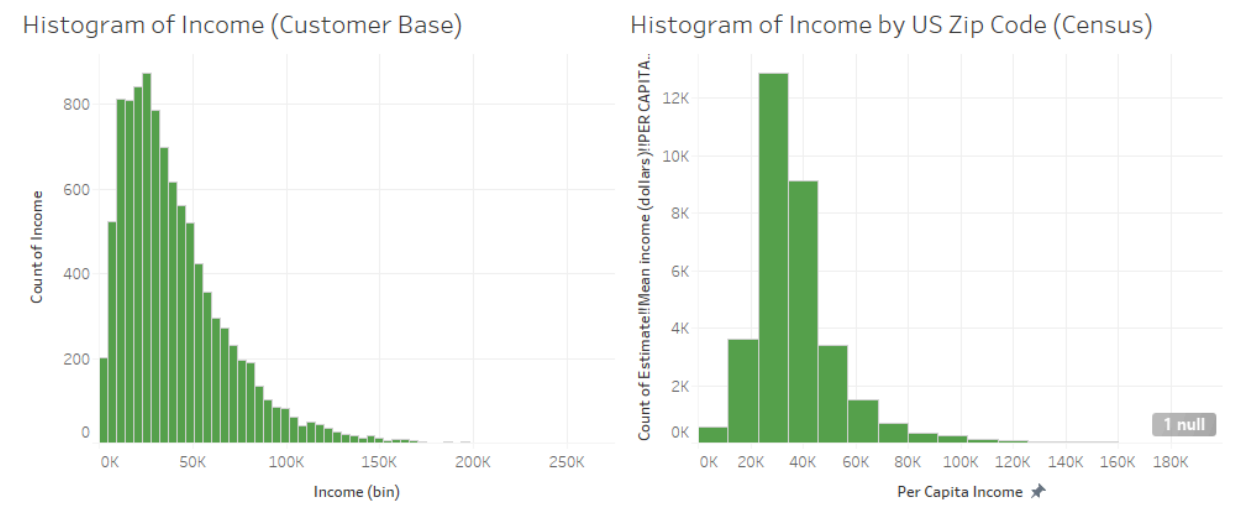
#### A3. Provide instructions to help users navigate the dashboard.

The dashboard is very intuitive. Simply navigate to the “Churn Data Presentation” story to read the dashboard introduction. Select from the story points at the top to access additional visualizations.

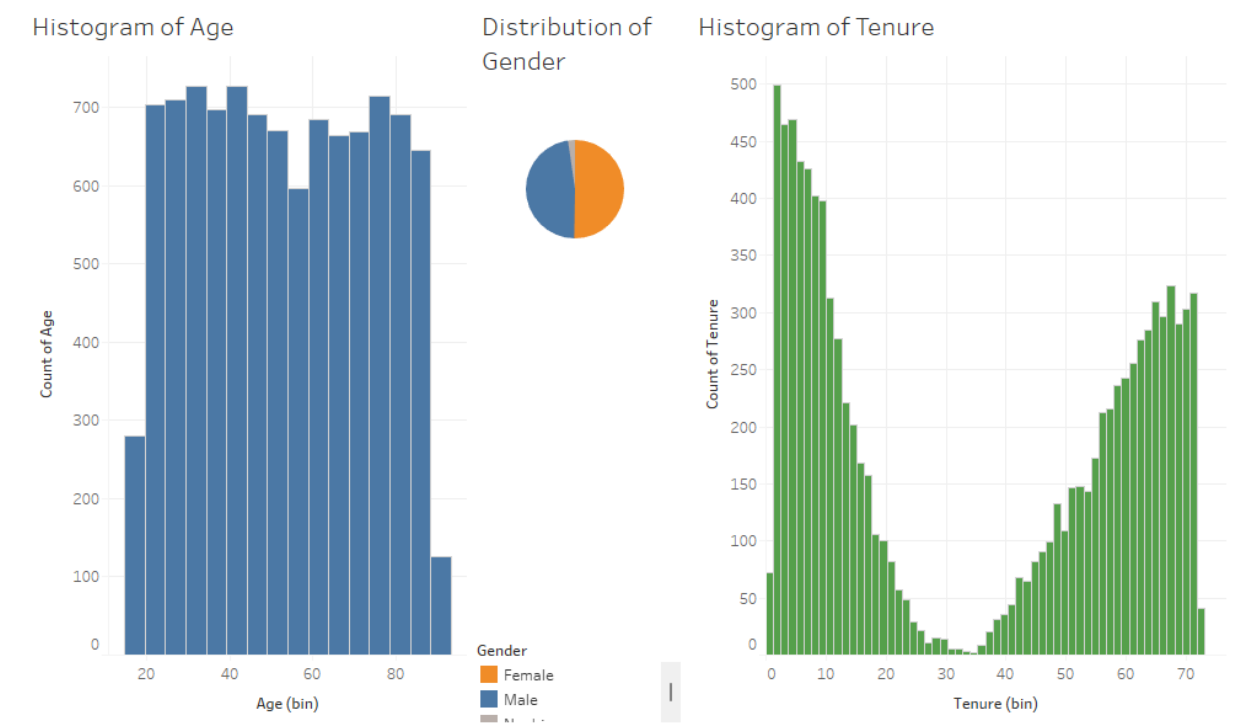


This dashboard includes the following:

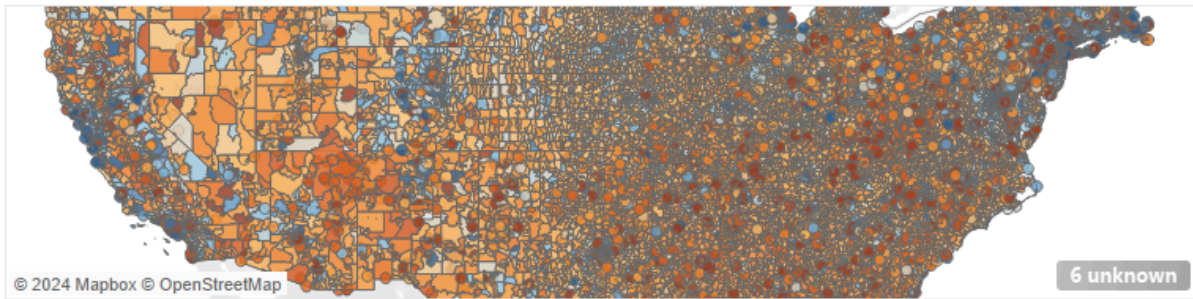
**Data integrated from both chosen data sets**



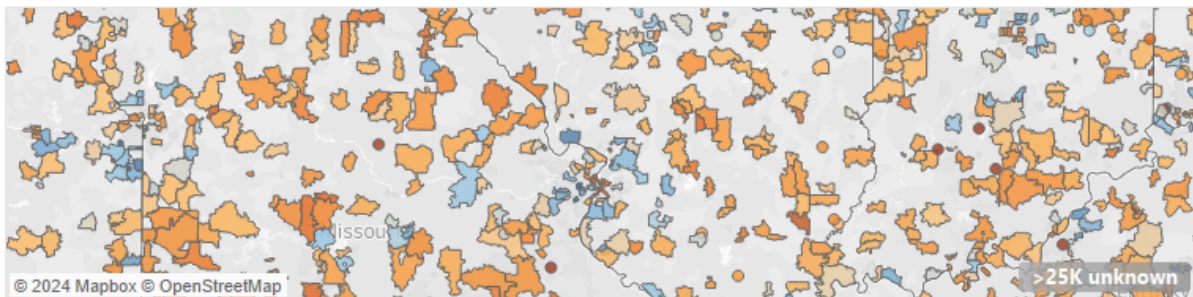
**Four different data representations to summarize the data or display trends**



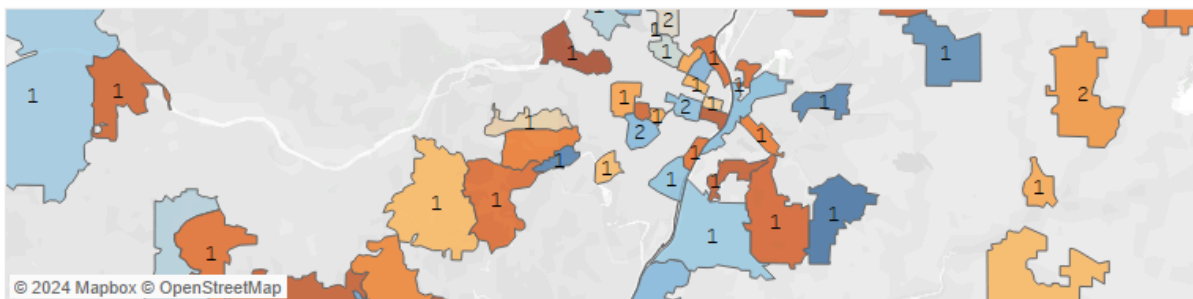
## Per Capita Income (US)



## Per Capita Income (US) for Zipcodes Operating In



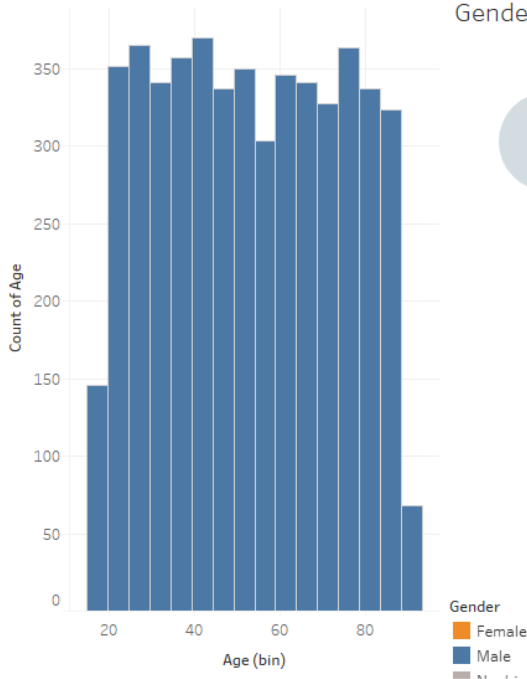
## Per Capita Income of Customers



**Two different interactive controls that allow the user to modify the presentation of data**

See the “Who Are Our Customers?” story point. Shown below is a demonstration of interactive controls used to filter the data of female customers. The user may also select any bin from the histograms for age or tenure, or a combination of all three of these interactive controls.

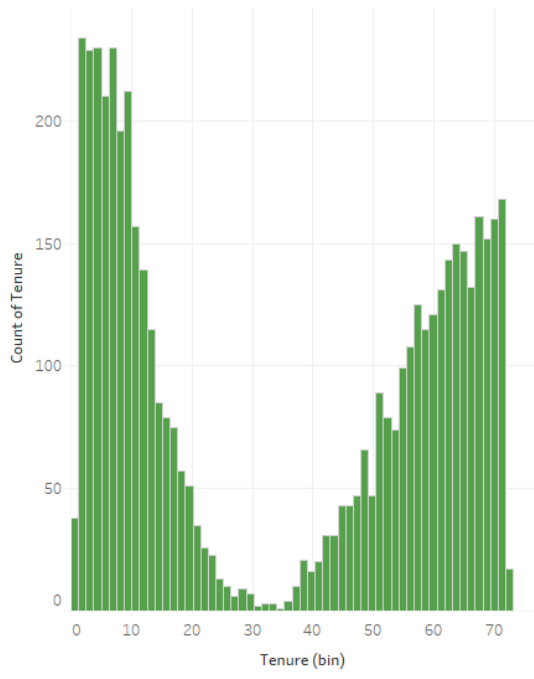
Histogram of Age



Distribution of Gender

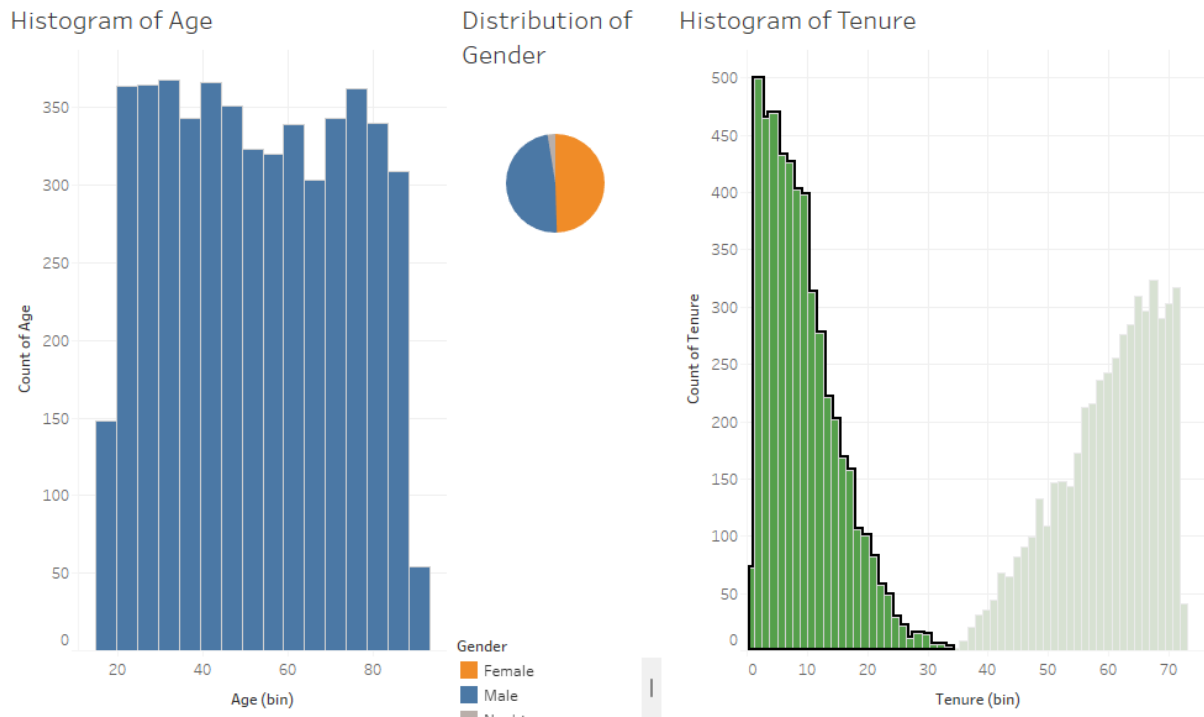


Histogram of Tenure



Firstly, it's important for decision makers to get an understanding of the customer base.

Use the interactive dashboard below by selecting on bars of a histogram or slices of a pie chart. Doing this will allow you filter the data.



**Two different metrics or key performance indicators computed using data from both chosen data sets**

Shown below are two metrics computed using the Churn dataset and US Census data.

Average (Per Capita) Income Metrics			
Median Income Metrics		Average Income (Customer Base)	Average Income (US)
Median Income (Customer Base)	33,170.6	39,807	37,286
Median Income (US)	33,668.5		

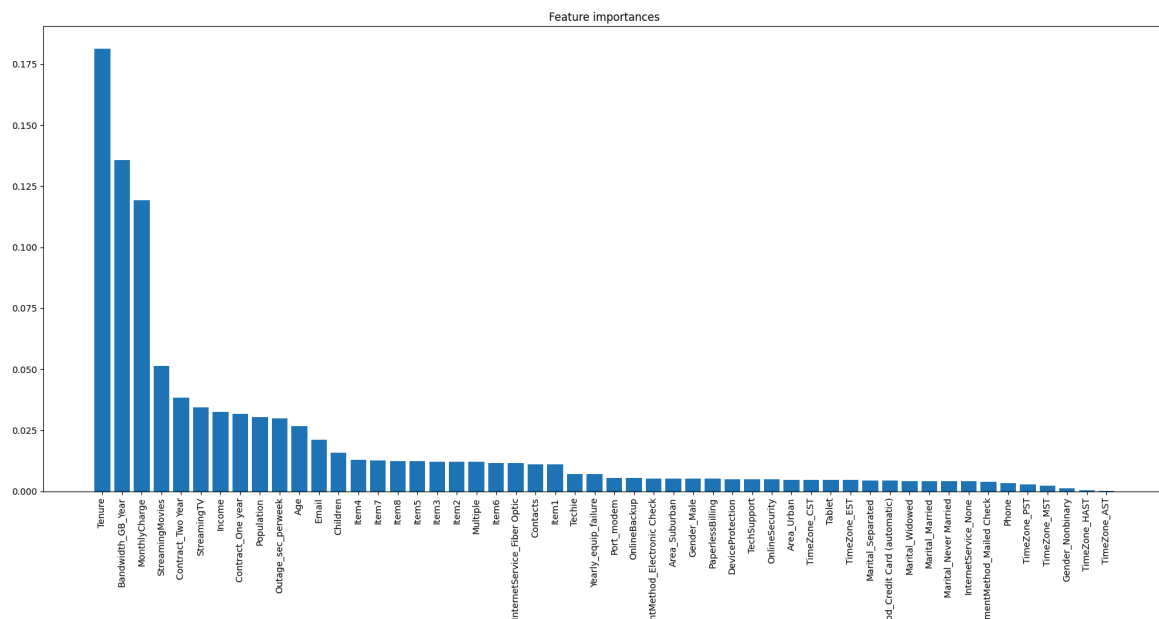
## B. Panopto Recording

See “Panopto Recording”

### C1. Explain how the purpose and function of your dashboard align with the needs outlined in the data dictionary associated with your chosen data set.

Given that the telecommunications industry involves high amounts of churn, and that it is typically more expensive to acquire a new customer than it is to retain an existing customer, it is necessary for a telecommunications company to minimize customer churn.

In D209 Task 2, I identified income at the 7th greatest predictor of customer churn (See below.) For this reason, and due to the fact that income data is widely available, I chose to focus on customer income with my dashboard. This dashboard will allow decision makers to identify trends in customer income levels across various zip codes and compare those with the national averages to identify trends to yield business insights.



### C2. Explain how the variables in the additional data set enhance the insights that can be drawn from the data set you chose from the provided options.

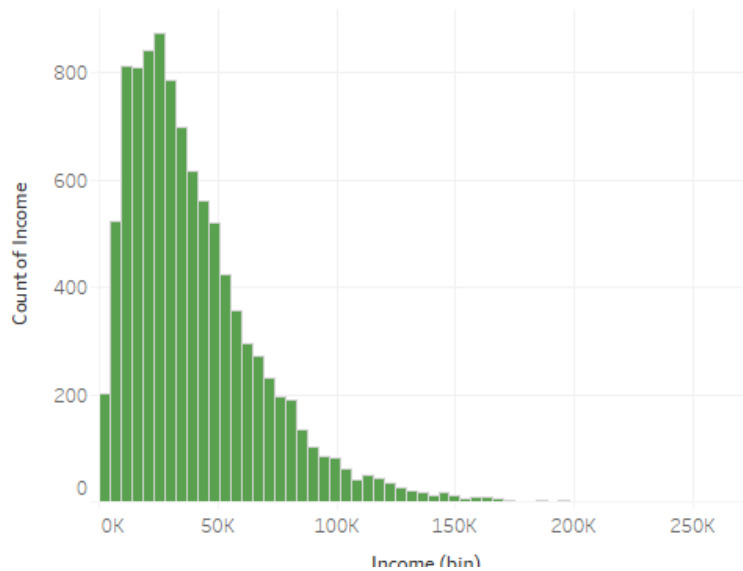
The variables in the additional data set include per capita income levels for each zip code in the United States. This information was collected by the US Census Bureau, a principal agency of the US Federal Government and is likely highly reliable.

This information was included so that decision makers can compare the income levels of their customer base across the US to the averages for each zip code. This will allow the decision makers to identify any outliers, or areas of the country where their customer base is wealthier or poorer than the general population. This should further be investigated to identify root causes which can provide strategies for marketing material.

### C3. Explain two different data representations from your dashboard and how executive leaders can use them to support decision-making.

Firstly, executive leaders can use the histogram of income for the customer base to develop a pricing strategy for service offerings. By identifying how income is distributed among their customer base, an organization can estimate which services a customer is likely to be able to afford.

Histogram of Income (Customer Base)

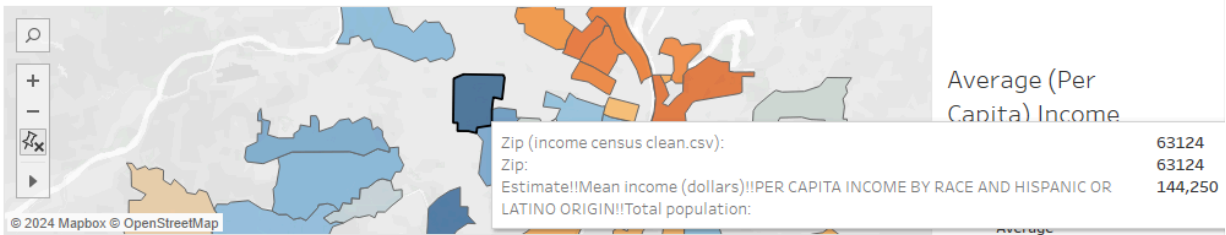


Executive leaders may also use the maps located in the “Comparing Income Levels” story which includes 3 maps showing:

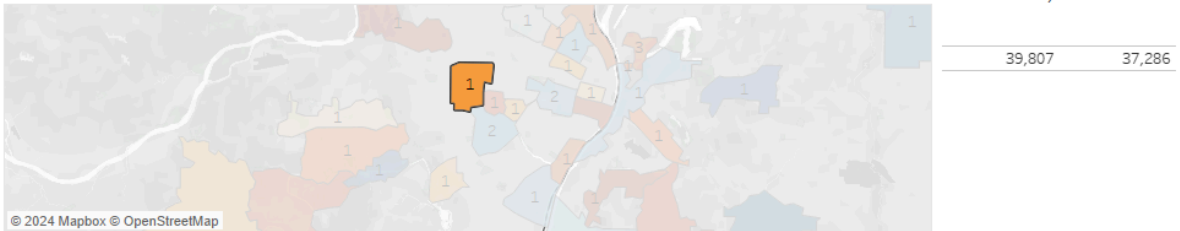
1. The per capita income of all zip codes in the US,
2. The per capita income of all zip codes in which the telecommunications company operates, and
3. The average income and the count of customers living in that zip code.

This story allows decision makers to identify zip codes in which the average income of the customer base differs from the per capita income of the general population. This may be due to marketing campaigns that target specifically wealthy/poor customers. For example, the zip code 63124 (Ladue, MO) has a respectable per capita income of \$144,250, however, the 1 customer living in this area has an income of just \$28,938. This may be indicative of marketing campaigns targeting lower-earning customers, which could be corrected in order for the company to generate more revenue. Additionally, if regulations allow, an organization may wish to charge higher prices for telecommunications services in zip codes with a higher per capita income as these customers are likely to be able to afford higher prices.

#### Per Capita Income (US) for Zipcodes Operating In



#### Per Capita Income of Customers

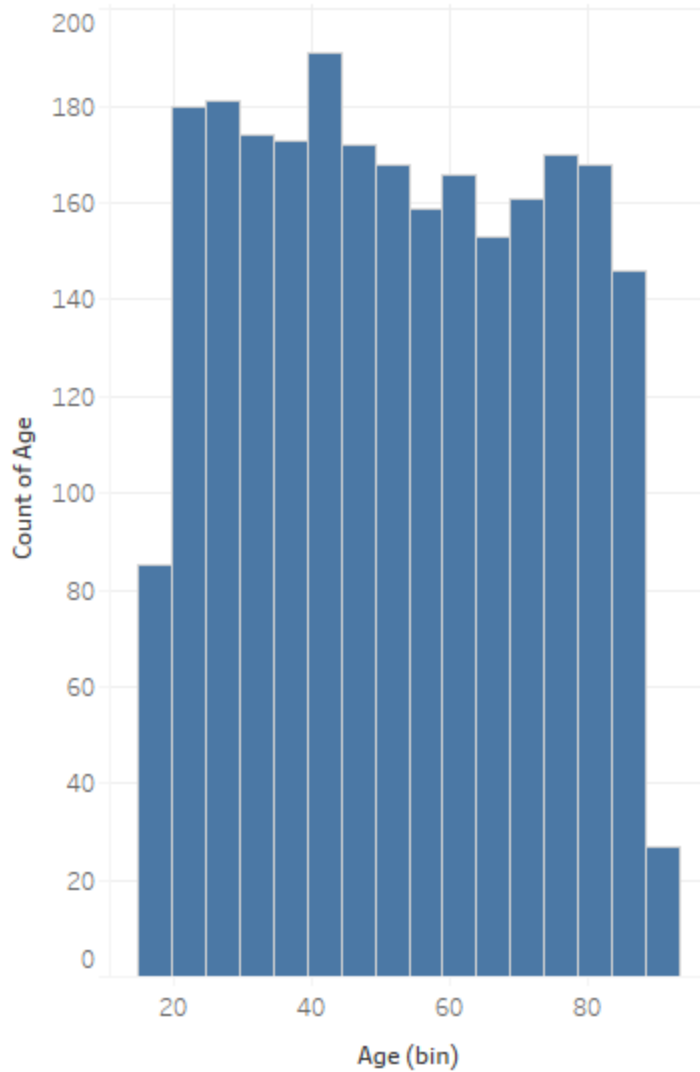


#### C4. Explain two interactive controls in your dashboard and how each enables the user to modify the presentation of the data.

Executive leaders can use the “Who Are Our Customers?” story for market segmentation purposes. By selecting one of the filters on this interactive dashboard, these decision makers can identify patterns between demographic segments. For example, decision makers may find that one gender tends to be older or younger, or that the distribution of tenure for a specific age range is more uniform.



### Histogram of Age



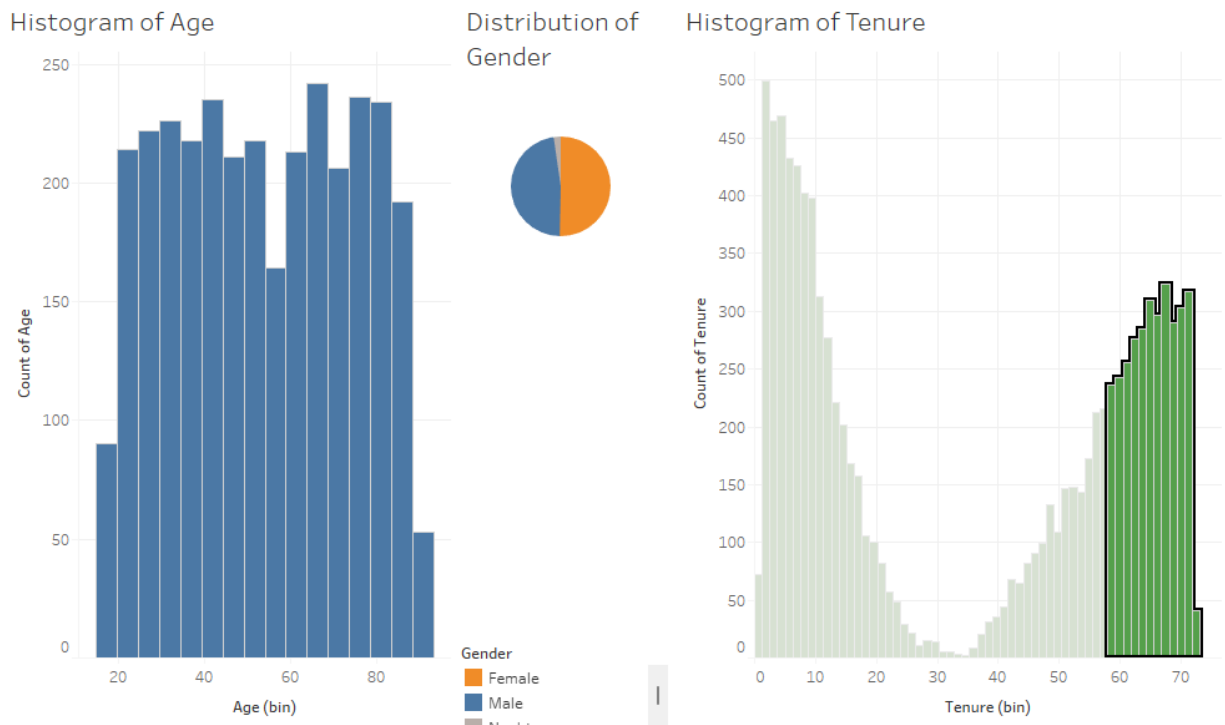
### Distribution of Gender



Gender

- Female
- Male

Additionally, decision makers may wish to select a portion of the tenure histogram to identify the features of customers who have the longest tenure with the company. By selecting specific bins in the “Histogram of Tenure” graph, one may accomplish this.



**C5. Describe how you built your dashboard to be accessible for individuals with colorblindness.**

I designed my dashboard to be accessible for individuals with colorblindness by avoiding using red and green together. Approximately 8% of men and 0.5% of women have color vision deficiency (CVD) and this mostly impairs their red/green diction. All maps within my dashboard use an orange/blue color distinction instead to accommodate for individuals with color blindness and color deficiency.

**C6. Explain how two data representations in your presentation support the story you wanted to tell.**

Storytelling is an essential aspect of communication in business as people tend to remember stories better than abstract information and stories are more persuasive than raw information.

Firstly, the “Who Are Our Customers?” story item gives decision makers an interactive dashboard to explore the demographics of the customer base. One obvious feature of this story item is that the distribution of tenure as shown on its histogram is bi-modal. This means that customers tend to have either low or high tenure, with few customers in the middle. Decision makers can further investigate this story by selecting portions of any of the 3 visualizations on this story item.

Secondly, the “Comparing Income Levels” story item allows decision makers to investigate the income levels of zip codes where the telecommunications company currently has customers. They can then cross-reference this information with the average income of their customer base in that zip code as described in Part C3. This helps in understanding the economic profile of their customers. Understanding income levels helps in tailoring products, services, and marketing messages to fit the financial capability and preferences of different customer segments. For example, premium services might be marketed in higher-income areas, while budget-friendly options could be emphasized in lower-income regions. This information is crucial for strategic planning, allowing the company to forecast demand, plan for infrastructure investments, and develop localized business strategies.

**C7. Explain how you used audience analysis to adapt the message in your presentation.**

My intended audience includes executive decision makers within the telecommunications company. Therefore, I have aimed to give a high-level overview of customer demographics without getting too granular. However, by using interactive dashboards, these decision makers can yield more granular information.

For example, the “Who Are Our Customers?” story item allows for interaction with the data, giving decision makers more detailed information if they wish. However, even without interaction, the dashboards on this story item still craft a compelling narrative which shows the distribution of tenure, age, and gender among the customer base.

**C8. Describe how you designed your presentation for universal access by all audiences.**

Firstly, my dashboard is designed for individuals with colorblindness by avoiding color pairings which are difficult to distinguish by color-blind and color-deficient individuals. Secondly, I avoided using too much industry jargon which may be difficult for non-technical audiences to understand. Lastly, I added captions to several of the story items which allows the user to understand the purpose of the dashboards and the item within the context of the storyboard.

**C9. Explain two elements of effective storytelling that you implemented in your presentation and how each element was intended to engage the audience.**

One key element of storytelling is the use of clear and compelling visual data narratives. This includes the use of data visualizations such as maps, bar charts, and metrics to tell the story of income levels and customer distributions across different zip codes. The visuals were designed to be intuitive and easily interpretable, with annotations highlighting key insights and trends. Visual narratives help the audience grasp complex data quickly and maintain their interest. By presenting data visually, the story becomes more interactive and engaging, allowing the audience to follow along with the narrative flow without getting lost in numbers. This method enhances comprehension and retention of information, ensuring that the key messages are conveyed effectively. Moreover, visual aids serve as focal points during the presentation, keeping the audience engaged and attentive.

Additionally, I used captions to enhance my storytelling. Captions offer additional context that helps the audience understand the visual elements of a presentation. They can describe what is happening in an image, explain data points on a graph, or summarize key information. By providing context, captions ensure that the audience can easily grasp the significance of the visuals without needing extensive explanation. This helps maintain the flow of the presentation and keeps the audience engaged by quickly conveying the essential information. Clarification through captions prevents misunderstandings and ensures that the audience fully comprehends the information being presented. This is especially important when dealing with complex data or technical content, as it makes the presentation more accessible to all audience members.

**D. Sources**

2022: ACS 5-Year Estimates Subject Tables, US Census Bureau –  
[https://data.census.gov/map?q=ZCTA5%2044305%20Income%20and%20Poverty&tid=ACSST5Y2022.S1902&layer=VT\\_2022\\_860\\_Z2\\_PY\\_D1&loc=41.0756,-81.4696,z11.4102](https://data.census.gov/map?q=ZCTA5%2044305%20Income%20and%20Poverty&tid=ACSST5Y2022.S1902&layer=VT_2022_860_Z2_PY_D1&loc=41.0756,-81.4696,z11.4102)

5 Tips on Designing Colorblind-Friendly Visualizations –  
<https://www.tableau.com/blog/examining-data-viz-rules-dont-use-red-green-together>