

# Lab 1 (Week 1 - 2)

STAT 2601 - Business Statistics (2024 Fall)

SCHOOL OF MATHEMATICS AND STATISTICS, CARLETON UNIVERSITY

Schedule: **September 16 - 20, 2024**

## Q1: Non-official Mother Tongue in Canada in 2021

The number of Canadians whose mother tongue is other than English or French hits a record high in 2021 census. English and French remain the dominant languages according to Statistics Canada, but the number of people who speak a non-dominant language at home grew to 4.6 million, or roughly 13 per cent of the population. The following table available in **Lab 1\_Data** set shows the percentage of population by provinces and territories whose mother tongue is other than English or French.

Provinces/Territories	Non-official mother tongue (%)
Quebec	13.9
Newfoundland and Labrador	2.5
Prince Edward Island	8.5
Nova Scotia	6.5
New Brunswick	4.3
Ontario	26.9
Manitoba	22.4
Saskatchewan	14.2
Alberta	21.5
British Columbia	27.9
Yukon	11.8
Northwest Territories	17.1
Nunavut	54.9

- Find the summary statistics of the percentage of population (provinces/territories) reportedly speaking non-official mother tongue in 2021 census using EXCEL.
- Draw Histogram for this data set following the instructions of EXCEL and describe the shape of the distribution.
- Draw a Box-and-Whiskers plot following the EXCEL instructions below.
- Identify  $Q_1$ ,  $Q_2$ ,  $Q_3$ , lower limit, and upper limit.
- Is there any province/territory considered unusual (i.e., outlier) in 2021 with respect to percentage of non-official mother tongue speakers? Justify.
- Can you comment on the shape of the data based on the Box-and-Whiskers plot?

### EXCEL Instructions (Summary Statistics)

- **Data > Data Analysis > Descriptive Statistics > OK.** (If you do not see the tab **Data Analysis** under the menu **Data**, you need to turn on the add-in **Data Analysis** following the instructions available in the course site at Brightspace)
- In the **Input Range** box, click on ↑ and select the column of non-official mother tongue speakers (%) (\$B\$1:\$B\$14).
- Click **Labels in First Row**.
- Click **Summary Statistics**.
- Click on **OK**.

### EXCEL Instructions (Histogram)

- Select the column of non-official mother tongue speakers (%) (B1:B14).
- **Insert > Recommended Charts > All Charts > Histogram > OK.**
- Click on top right (+ sign) > Select **Axis Title** > Edit the Axis Title (**X:** Percentage of Speakers, **Y:** frequency).
- Click on **Chart Title** and given an appropriate title **Distribution of Percentage of Provincial Non-official Mother Tongue Speakers (2021 Census)**.

### EXCEL Instructions (Box-and-Whisker Plot)

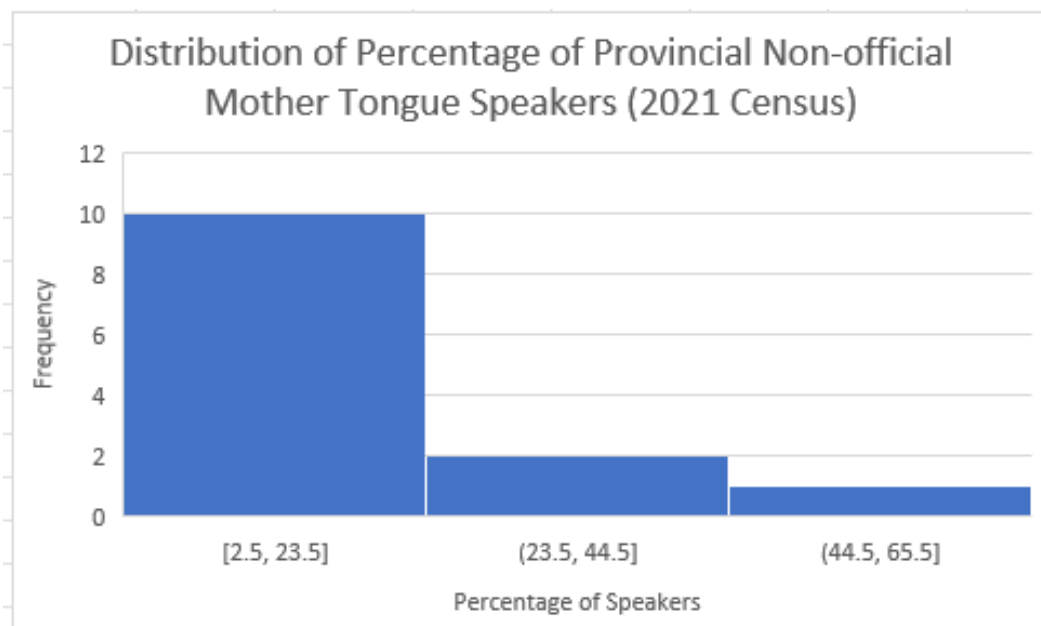
- Select the column of non-official mother tongue speakers (%) (B1:B14).
- **Insert > Recommended Charts > All Charts > Box-and-Whisker > OK.**
- Click on top right (+ sign) > Deselect **Axes** and select **Data Labels**.
- Click on **Chart Title** and given an appropriate title **Box-and-Whiskers Plot of Percentage of Provincial Non-official Mother Tongue Speakers (2021 Census)**.

Solution:

(a) Summary Statistics:

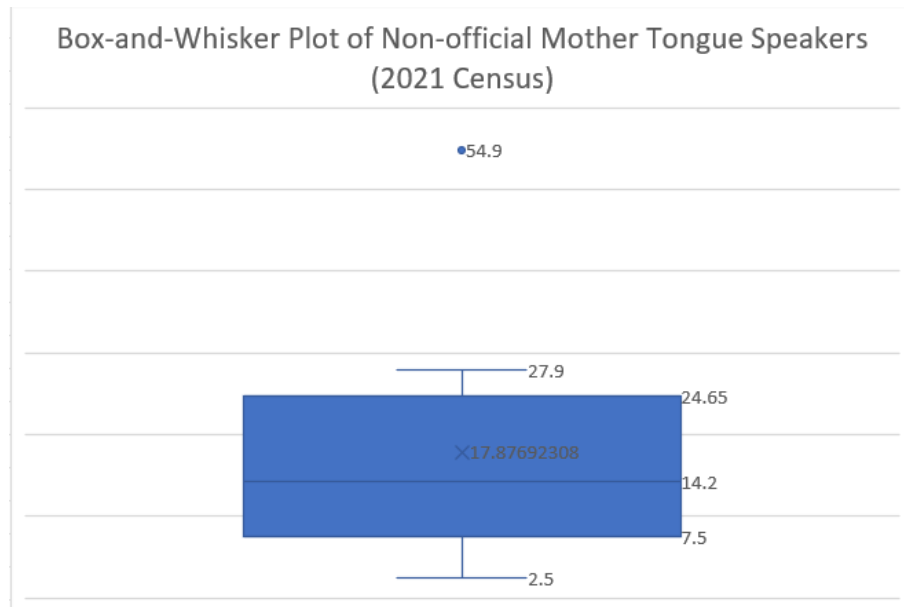
<i>Non-official Mother Tongue Speakers (%)</i>	
Mean	17.87692308
Standard Error	3.83237146
Median	14.2
Mode	#N/A
Standard Deviation	13.8178118
Sample Variance	190.9319231
Kurtosis	3.683657531
Skewness	1.637135608
Range	52.4
Minimum	2.5
Maximum	54.9
Sum	232.4
Count	13

(b) Histogram:



Shape: Right skewed distribution.

(c) **Box-and-Whiskers Plot:**



(d)  $Q_1 = 7.5$ ,  $Q_2 = 14.2$ ,  $Q_3 = 24.65$ , Lower Limit = 2.5, Upper Limit = 27.9.

(e) Nunavut as 54.9 is outside the upper and lower limit (54.9% non-official mother tongue speakers whose mother tongue is Inuktitut).

(f) Right (or positively) skewed ( $Q_3 - Q_2 > Q_2 - Q_1$ )

## Q2: Credit Card

A business was investigating the delay associated with processing credit card applications. The results are contained in the second tab, named **Credit Card**, of the assignment Excel data file.

- (a) Use EXCEL to create a Pareto chart.
- (b) Use EXCEL to create a pie chart.

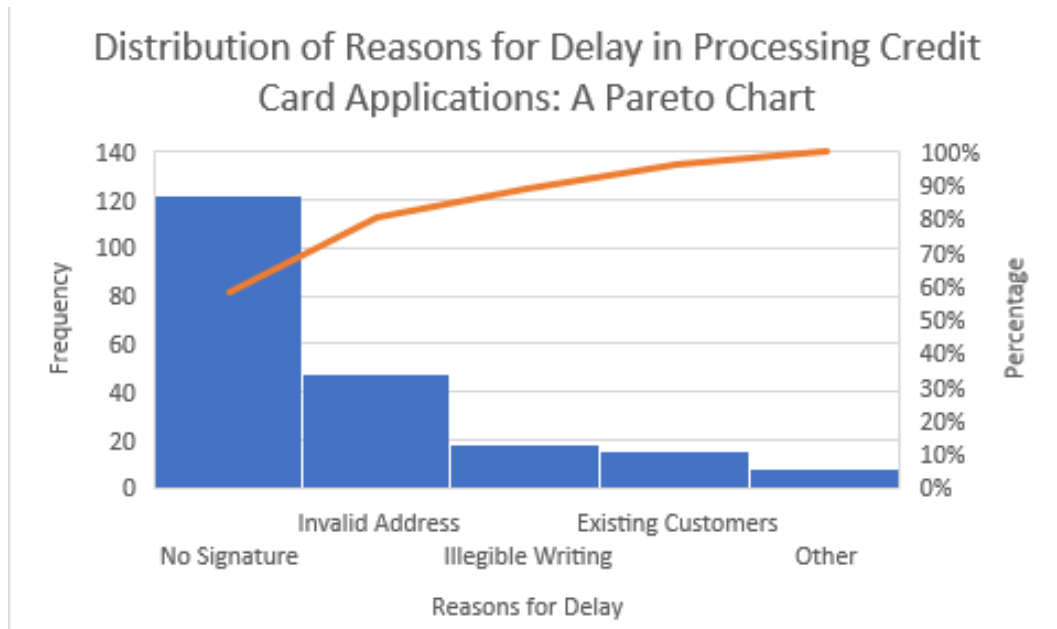
### EXCEL Instructions for Pareto Chart

- Select the data (A1:B8).
- **INSERT** > Click on **Insert Statistic Chart** (the icon in the middle that looks like a blue histogram) which is under the **Chart** group > Click on **Pareto**.
- Click on **Chart Elements** (the plus symbol icon toward the top right of the Pareto chart) > check **Axis Titles** > Edit the Axis Title (**X**: Reasons for Delay, **Y (left)**: Frequency, **Y (right)**: Percentage).
- Click on **Chart Title** and given an appropriate title **Distribution of Reasons for Delay in Processing Credit Card Applications: A Pareto Chart**.

### EXCEL Instructions for Pie Chart

- Select the data (A1:B8).
- **INSERT** > Click on **Insert Pie or Doughnut Chart** (the icon in the bottom left that looks like a blue pie chart) which is under the **Chart** group > Click on the first icon, called **Pie**, under **2-D Pie**.
- Click on **Chart Elements** (the plus symbol icon toward the top right of the pie chart) > Check **Data Labels** > Check **More Options** > Check **Percentage** and uncheck **Value** (under the label options).
- Click on **Chart Title** and given an appropriate title **Distribution of Reasons for Delay in Processing Credit Card Applications: A Pie Chart**.

Solution:



Distribution of Reasons for Delay in Processing Credit Card Applications: A Pie Chart

