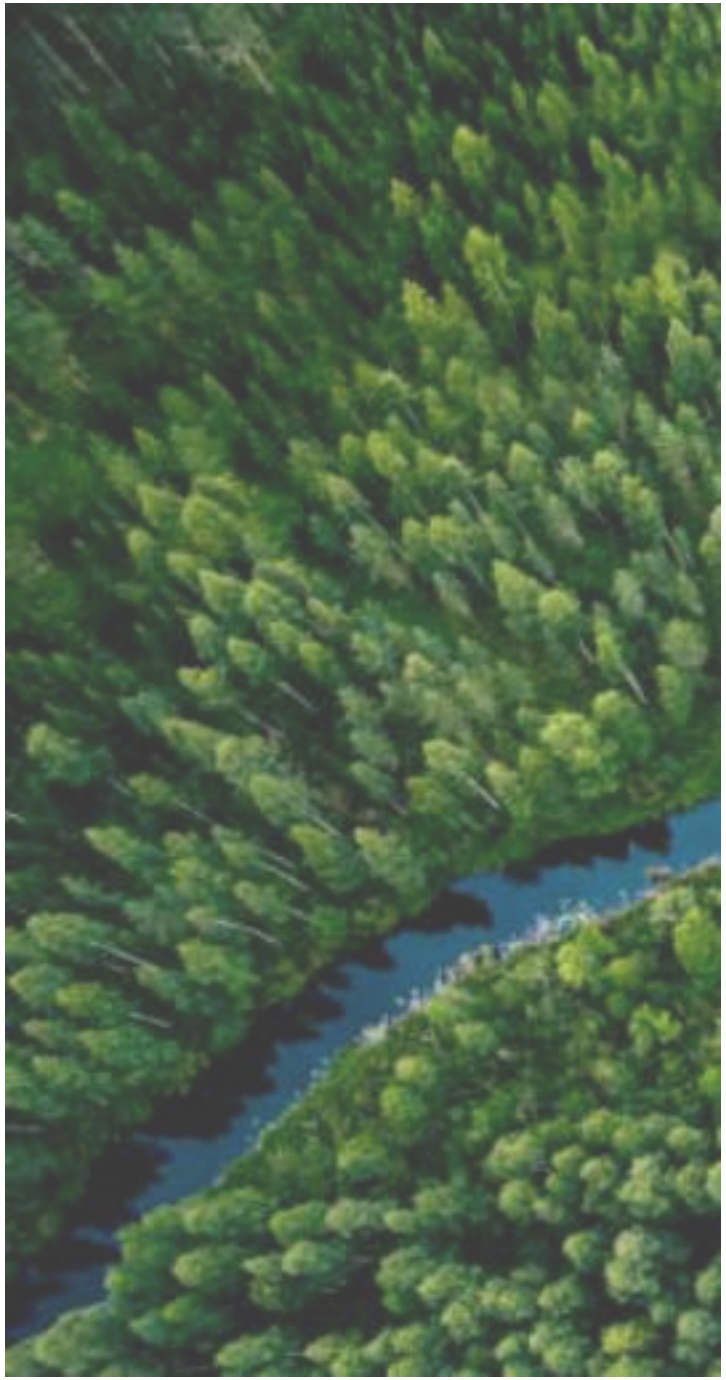
Bank Customer Churn Analysis

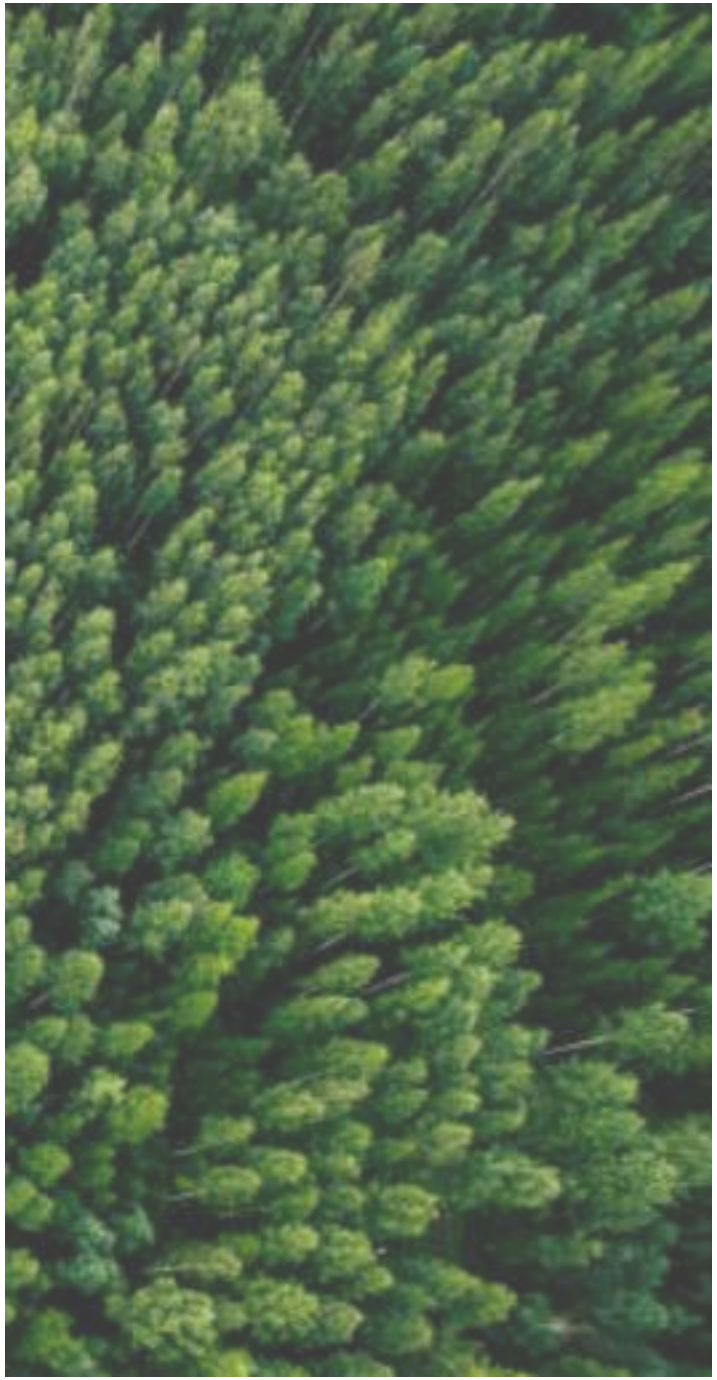


Problem Statement

What factors are associated with higher customer churn?

Identify key differences between customers who churned and those who stayed. Help the bank understand what types of customers are more likely to churn so they can take preventive actions.

Dataset Overview



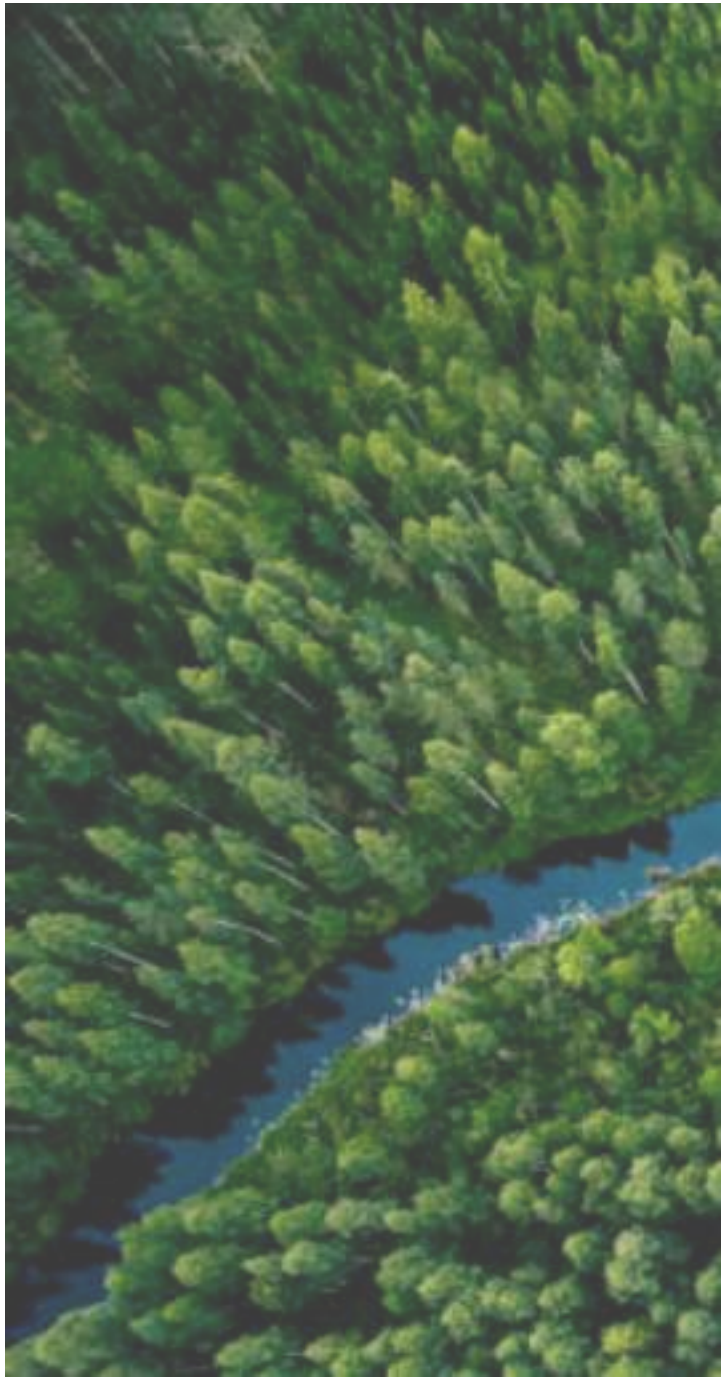
Dataset Overview

Features	Data Types	Description
CLIENTNUM	int64	Client ID
Attrition_Flag	object	If account is closed “Attrited Customer” else “Existing Customer”
Customer_Age	int64	Age of customer in years
Gender	object	Gender of customer
Dependent_count	int64	No. of dependents of customer : 0,1,2,13,4,5
Education_Level	object	High School, Graduate, Uneducated, Unknown, College, Post-Graduate, Doctorate
Marital_Status	object	Married, Single, Unknown , Divorced
Income_Category	objectcas	Less than $40K $40K - $60K, $60K - $80K, $80K - $120K, $120K +, Unknown
Card_Category	object	Blue, Silver, Gold, Platinum
Months_on_book	int64	No of months has been a customer
Total_Relationship_Count	int64	Total no. of products held by the customer
Months_Inactive_12_mon	int64	No. of months inactive in the last 12 months
Contacts_Count_12_mon	int64	No. of Contacts between the customer and bank in the last 12 months
Credit_Limit	float64	Credit limit on credit card
Total_Revolving_Bal	int64	The balance that carries over from one month to the next is the revolving balance
Avg_Open_To_Buy	float64	Open to Buy refers to the amount left on the credit card to use(Average of last 12 months)
Total_Amt_Chng_Q4_Q1	float64	Ratio of the total transaction amount in 4th quarter and the total transaction amount in 1st quarter
Total_Trans_Amt	int64	Total Transaction Amount
Total_Trans_Ct	int64	Total Transaction Count
Total_Ct_Chng_Q4_Q1	float64	Ratio of the total transaction count in 4th quarter and the total transaction count in 1st quarter
Avg_Utilization_Ratio	float64	Represents how much of the available credit the customer spent

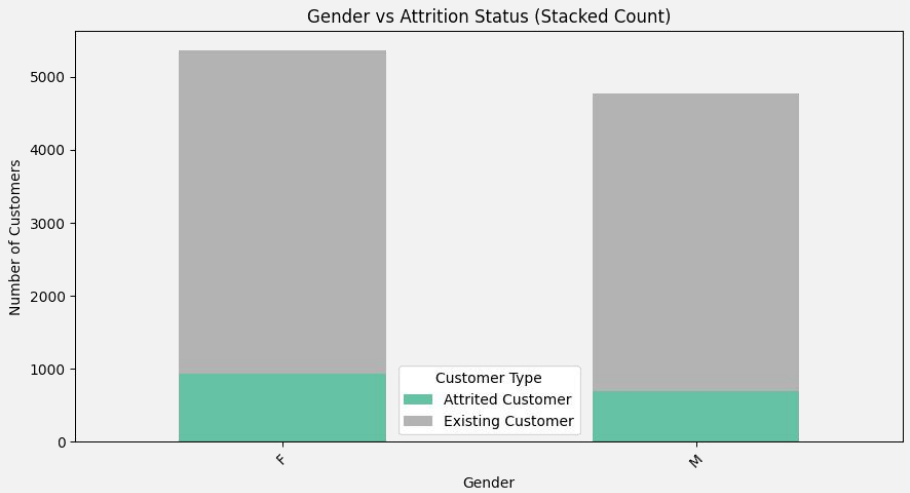
Shape of Data	10127 ,21

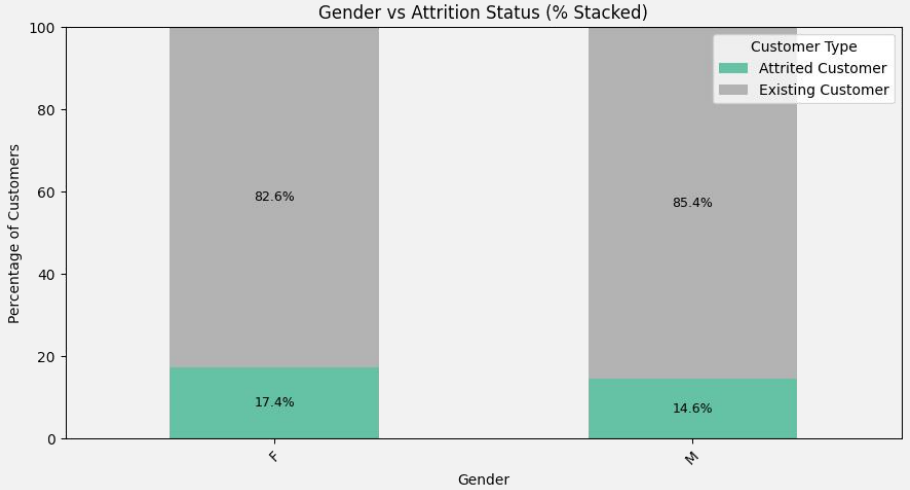
Source File Link :

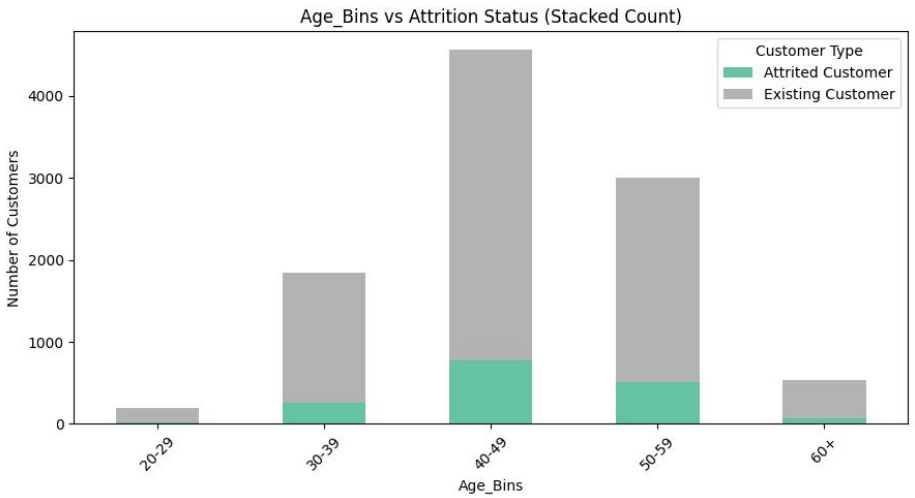
https://www.kaggle.com/datasets/teralasowmya/bankchurner

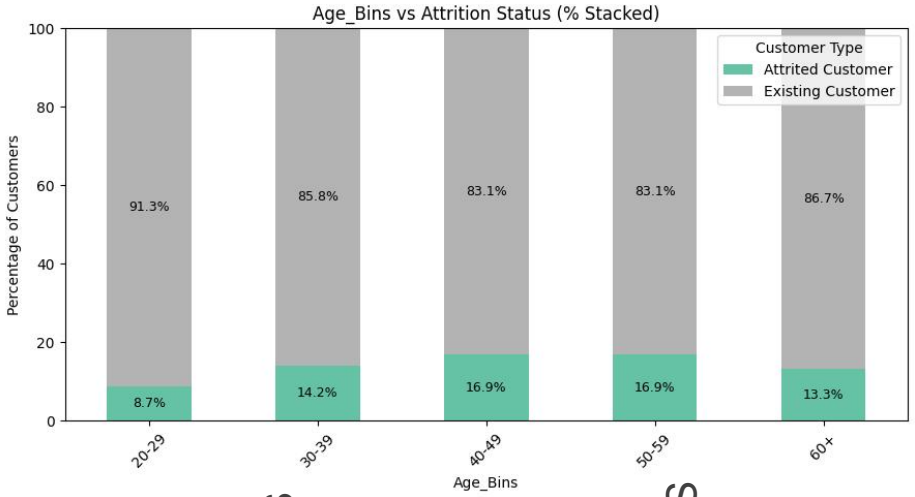


Exploratory Data Analysis









FEMALE

17.4%
ATTRITION RATE

BEFORE CHURN
5358
TOTAL CUSTOMERS

MALE

14.6%
ATTRITION RATE

4769
TOTAL CUSTOMERS

40-49 YRS

16.9%
ATTRITION RATE

BEFORE CHURN
4561
TOTAL CUSTOMERS

50-59 YRS

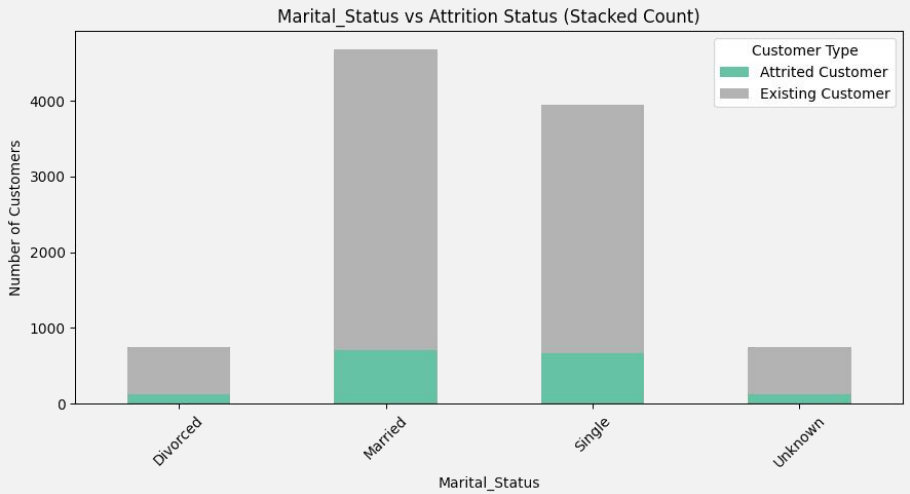
16.9%
ATTRITION RATE

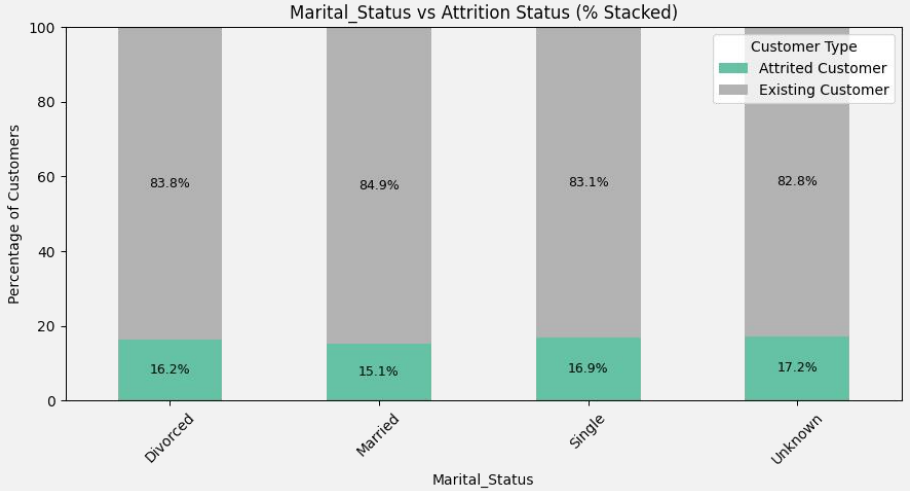
2998
TOTAL CUSTOMERS

30-39 YRS

14.2%
ATTRITION RATE

1841
TOTAL CUSTOMERS





SINGLE

16.9%
ATTRITION RATE

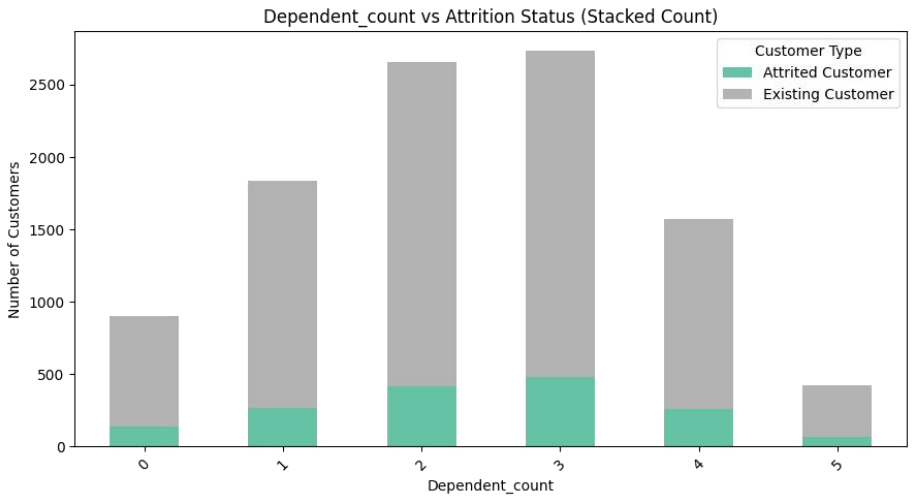
MARRIED

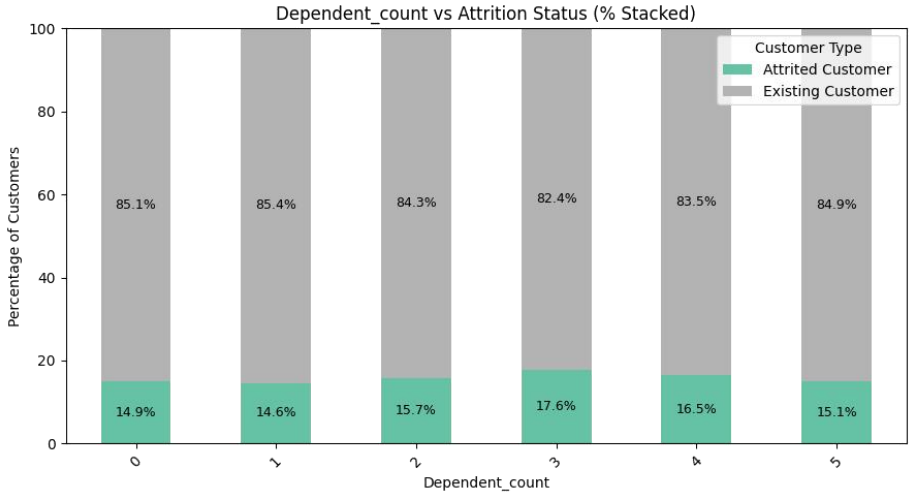
15.1%
ATTRITION RATE

BEFORE CHURN

4687
TOTAL CUSTOMERS

3943
TOTAL CUSTOMERS





DEPENDENT COUNT 3

17.6%
ATTRITION RATE

DEPENDENT COUNT 2

15.7%
ATTRITION RATE

DEPENDENT COUNT 1

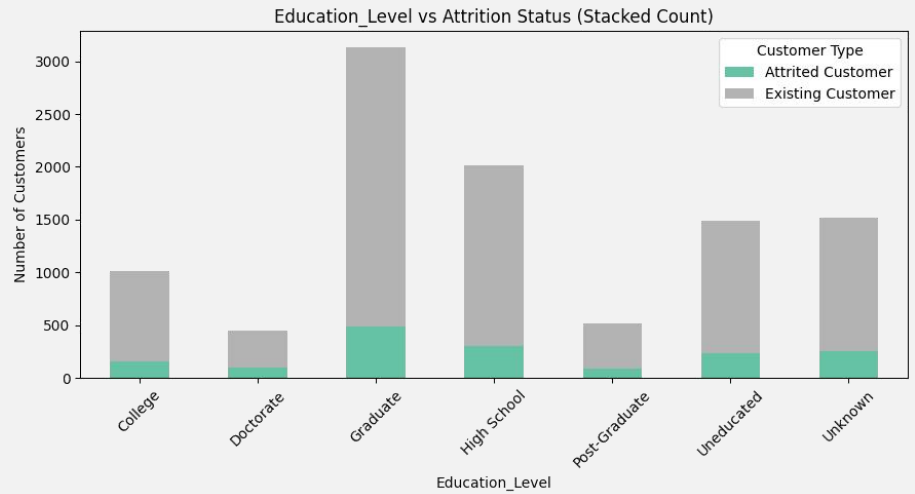
14.6%
ATTRITION RATE

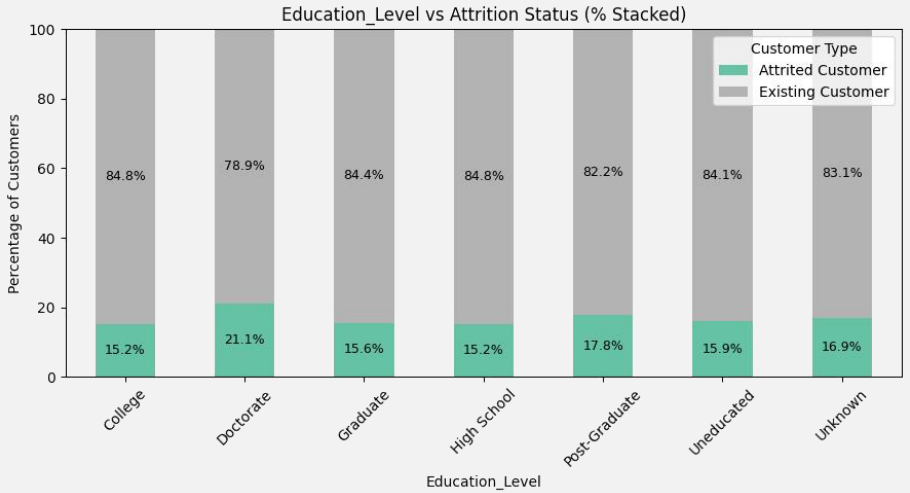
BEFORE CHURN

2732
TOTAL CUSTOMERS

2655
TOTAL CUSTOMERS

1838
TOTAL CUSTOMERS





GRADUATE

15.6%
ATTRITION RATE

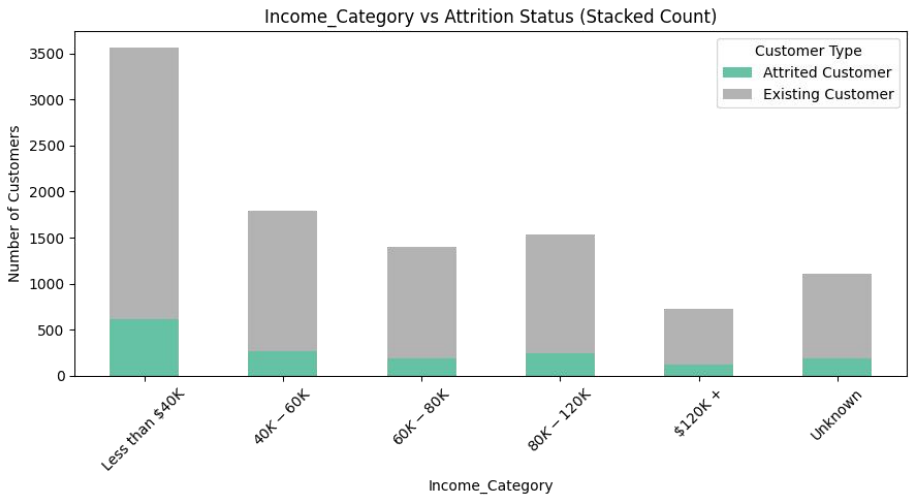
3128
TOTAL CUSTOMERS

HIGH SCHOOL

15.2%
ATTRITION RATE

2013
TOTAL CUSTOMERS

BEFORE CHURN



< $40K

17.2%
ATTRITION RATE

3561
TOTAL CUSTOMERS

$40 K- $60K

15.1%
ATTRITION RATE

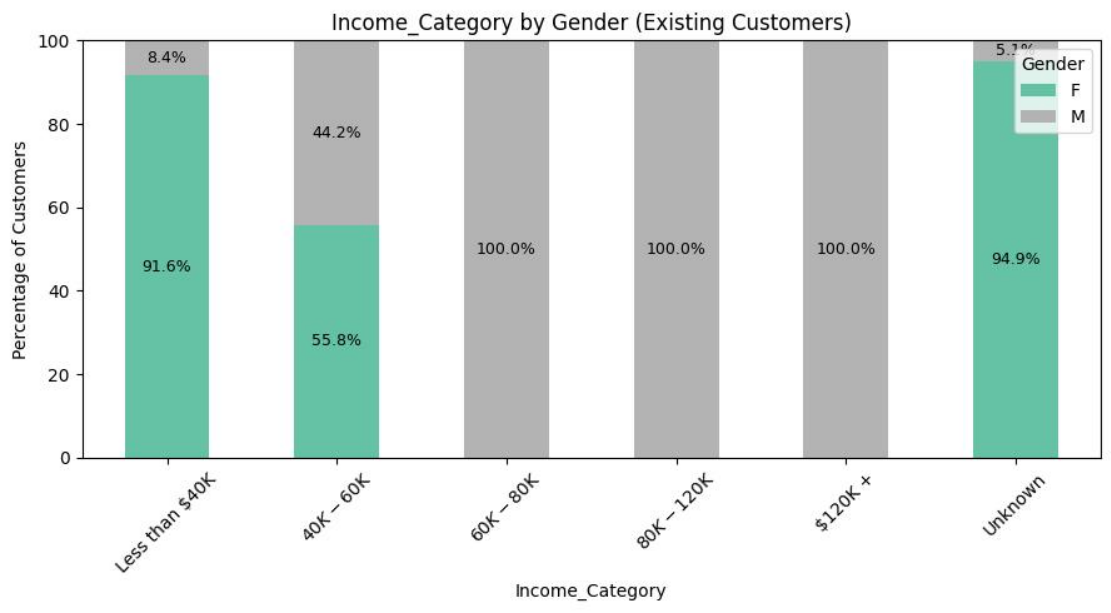
1790
TOTAL CUSTOMERS

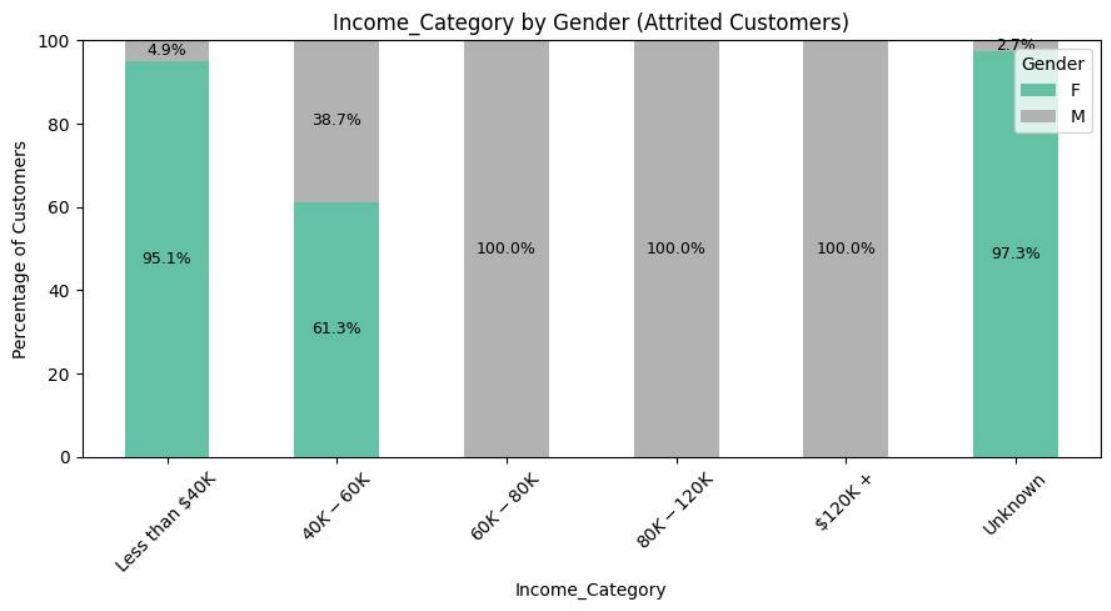
$80K - $ 20K

15.8%
ATTRITION RATE

1535
TOTAL CUSTOMERS

BEFORE CHURN





EXISTING CUSTOMERS

0 % FEMALE

$60K-$80K
$80K-$120K
$120K +

EXISTING CUSTOMERS

91.6 % FEMALE

< $40K

2702

TOTAL CUSTOMERS

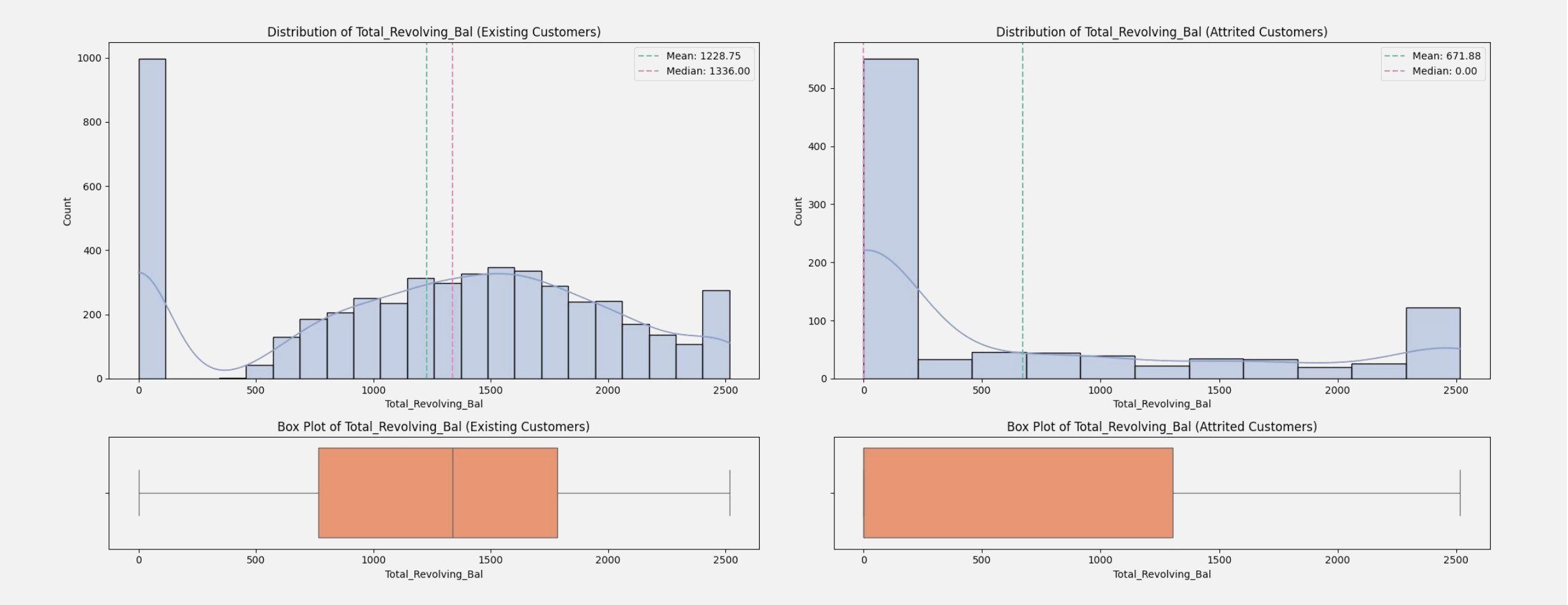
ATTRITED CUSTOMERS

91.6 % FEMALE

< $40K

582

TOTAL CUSTOMERS



EXISTING CUSTOMERS

$1228.75
MEAN

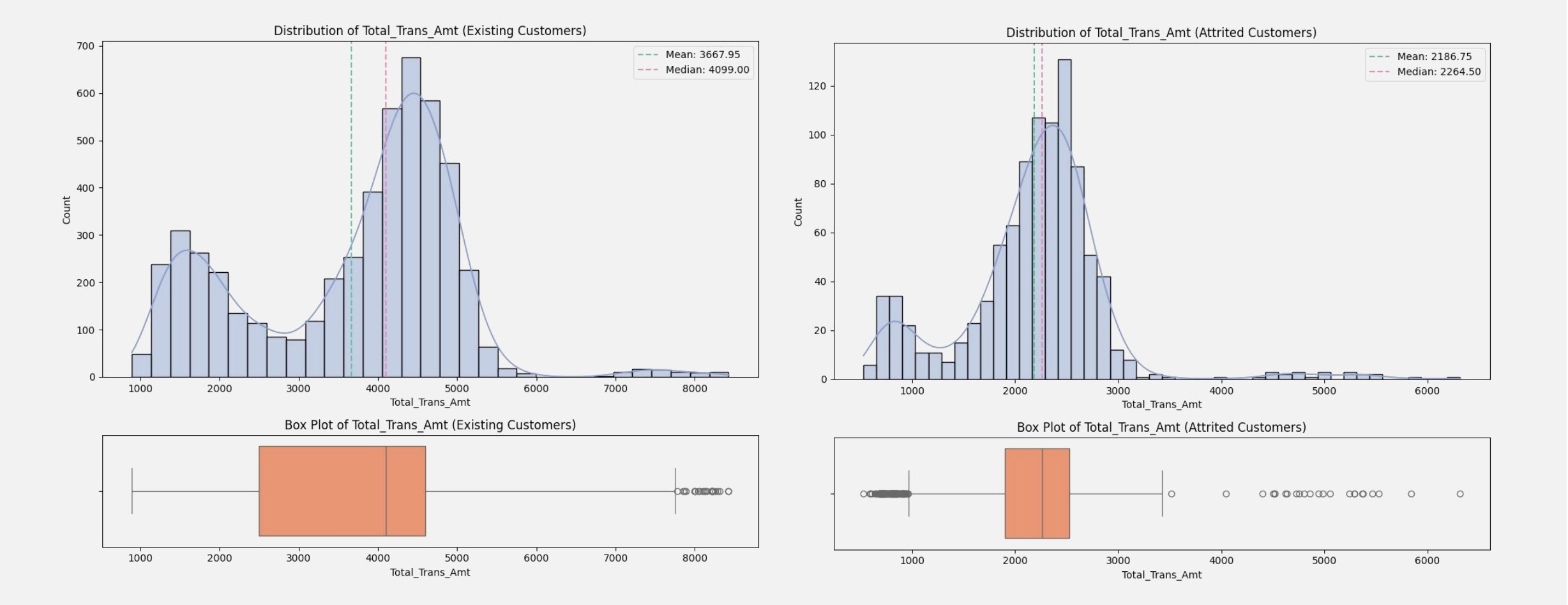
$1336.00
MEDIAN

$671.88
MEAN

$0
MEDIAN

ATTRITED CUSTOMERS

The attrited customers have significantly lower mean of $672.82 compared to existing customers of $1256.60.



EXISTING CUSTOMERS

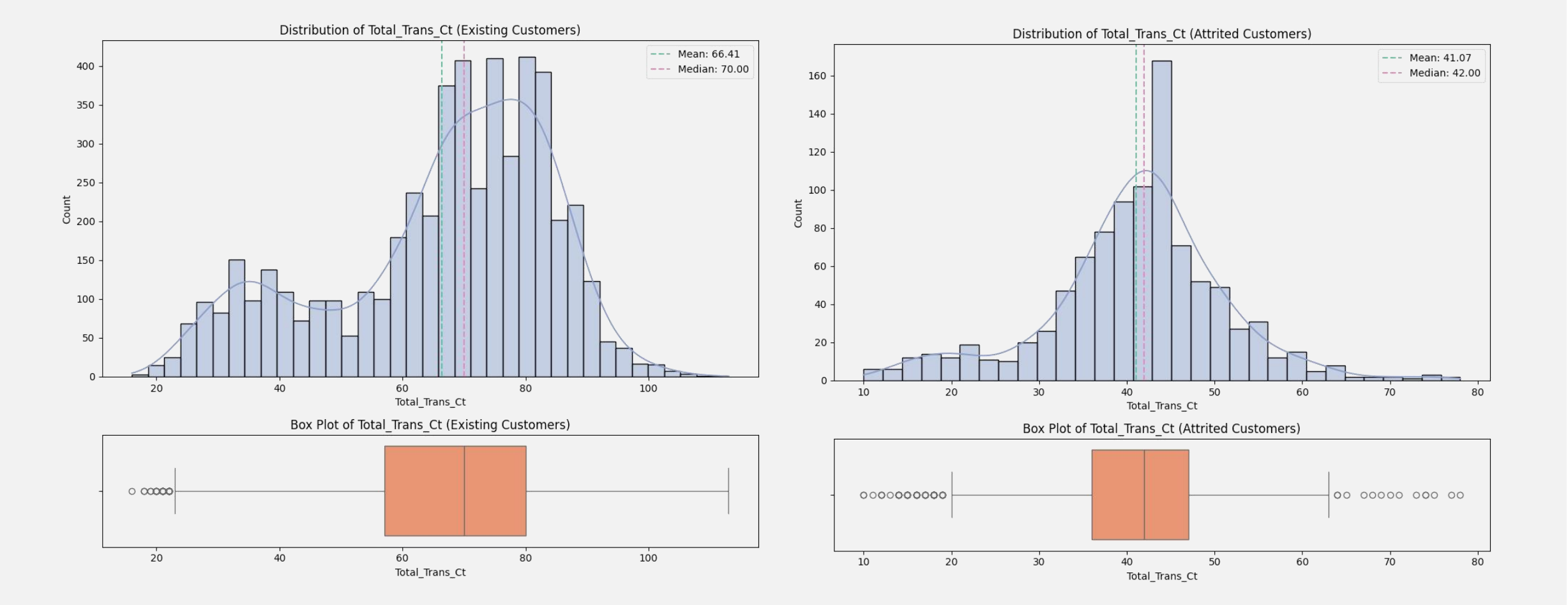
$3667.95
MEAN

$4099.00
MEDIAN

$2186.75
MEAN

$2264.50
MEDIAN

ATTRITED CUSTOMERS



EXISTING CUSTOMERS

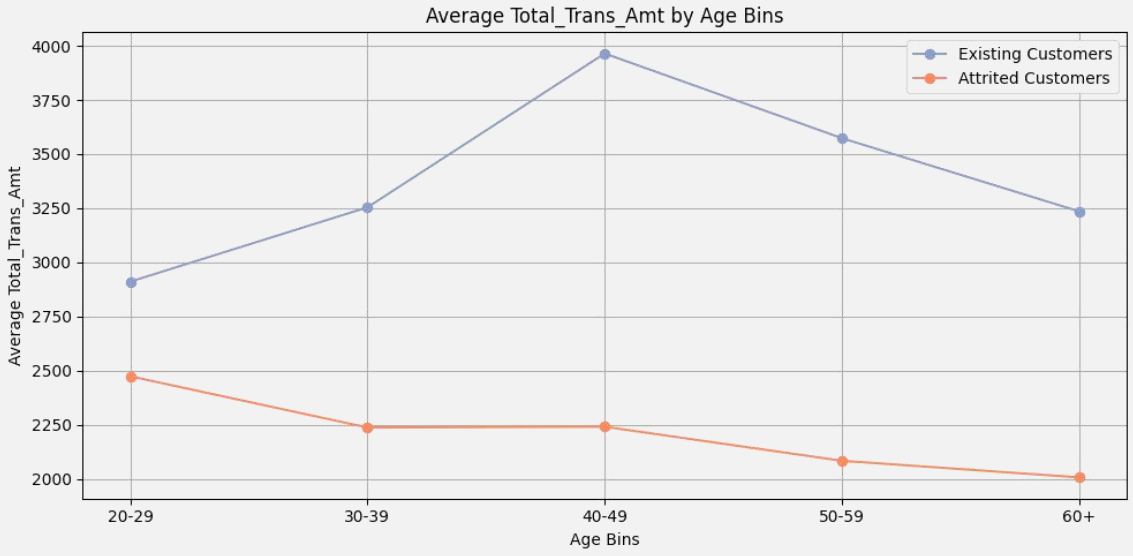
66.41
MEAN

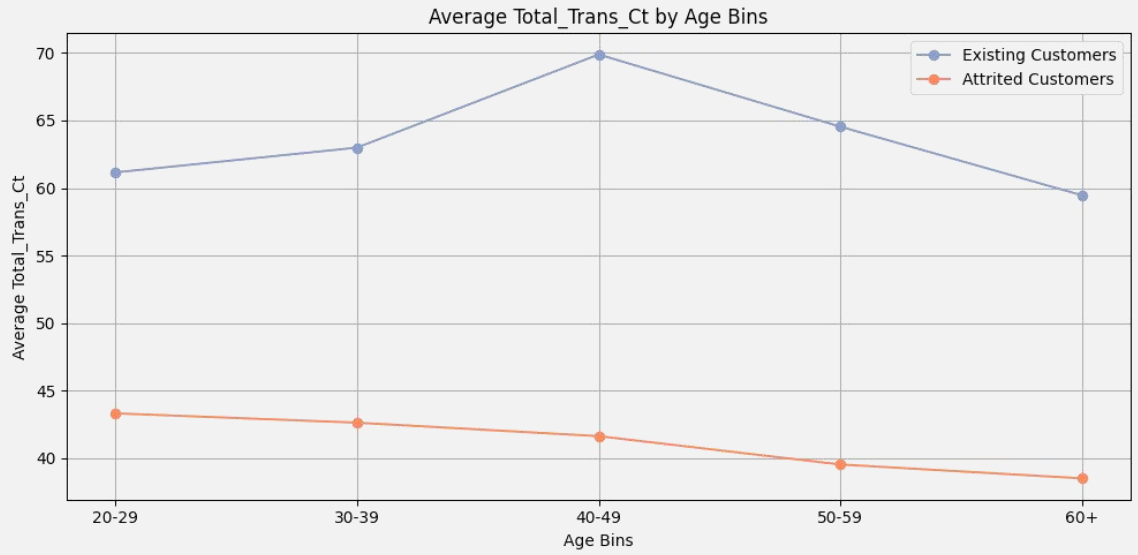
70.00
MEDIAN

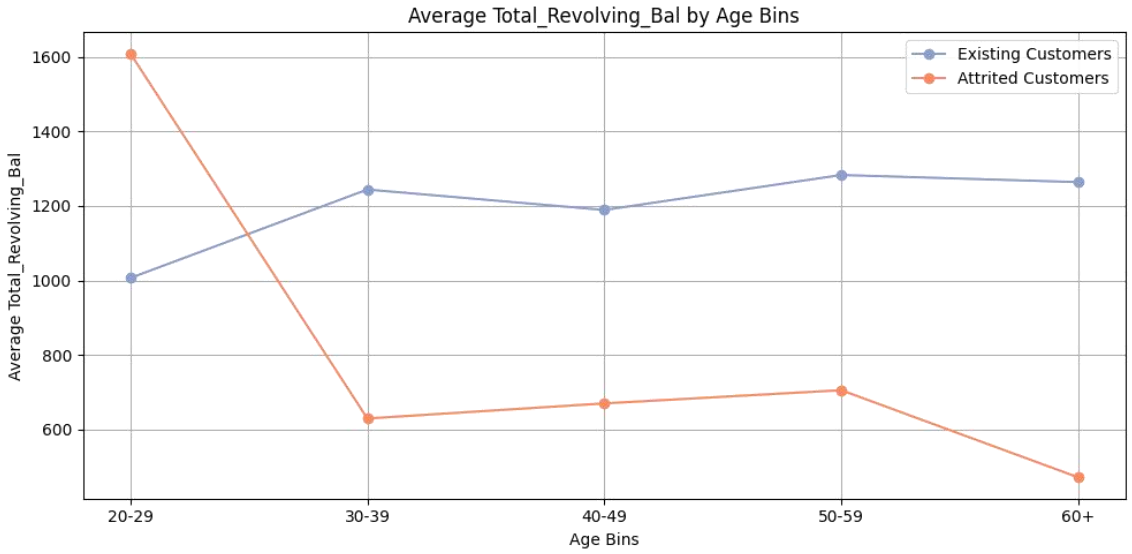
41.07
MEAN

42
MEDIAN

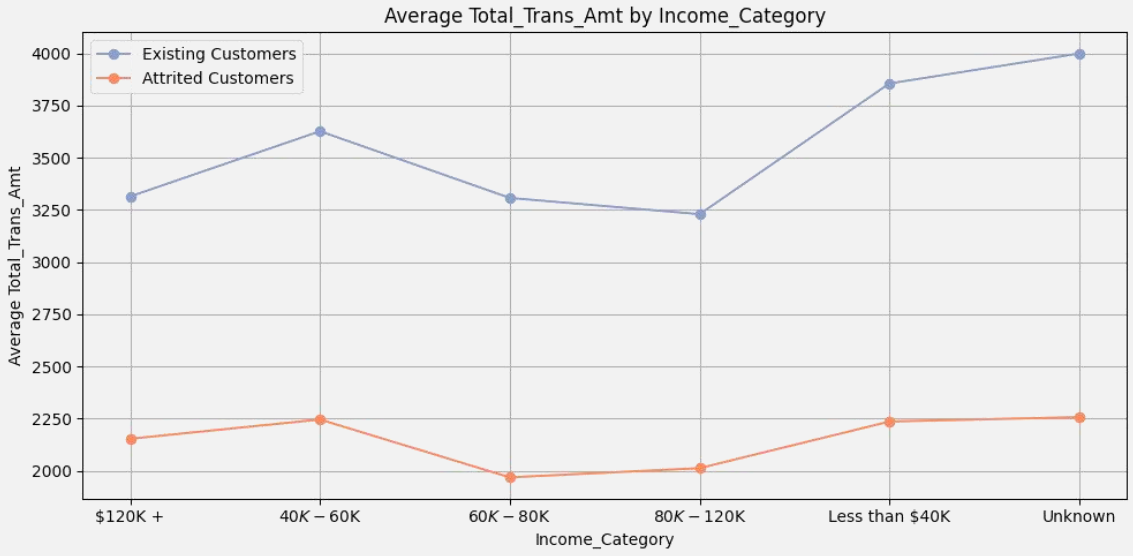
ATTRITED CUSTOMERS

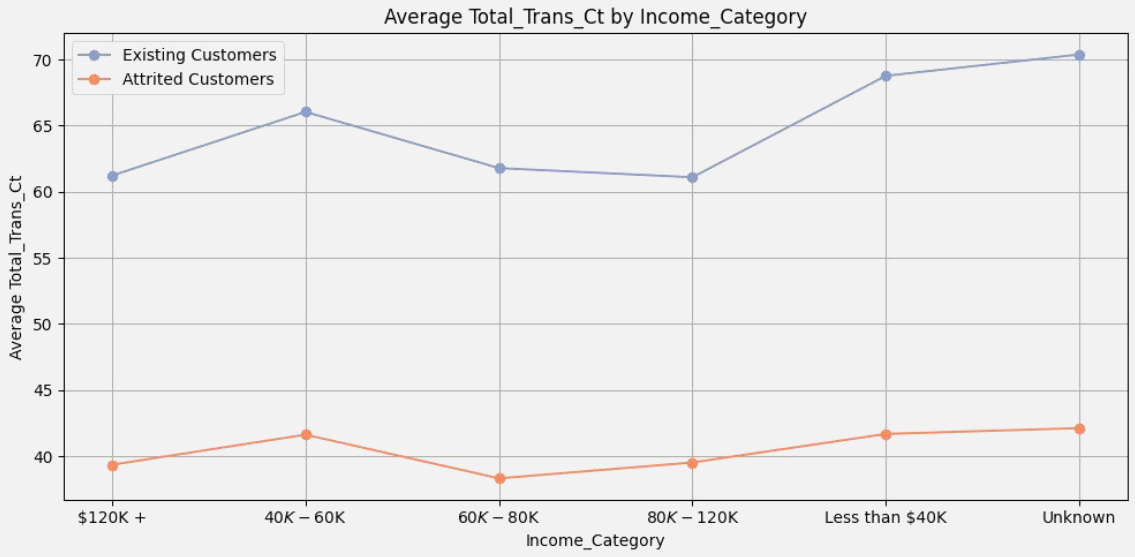


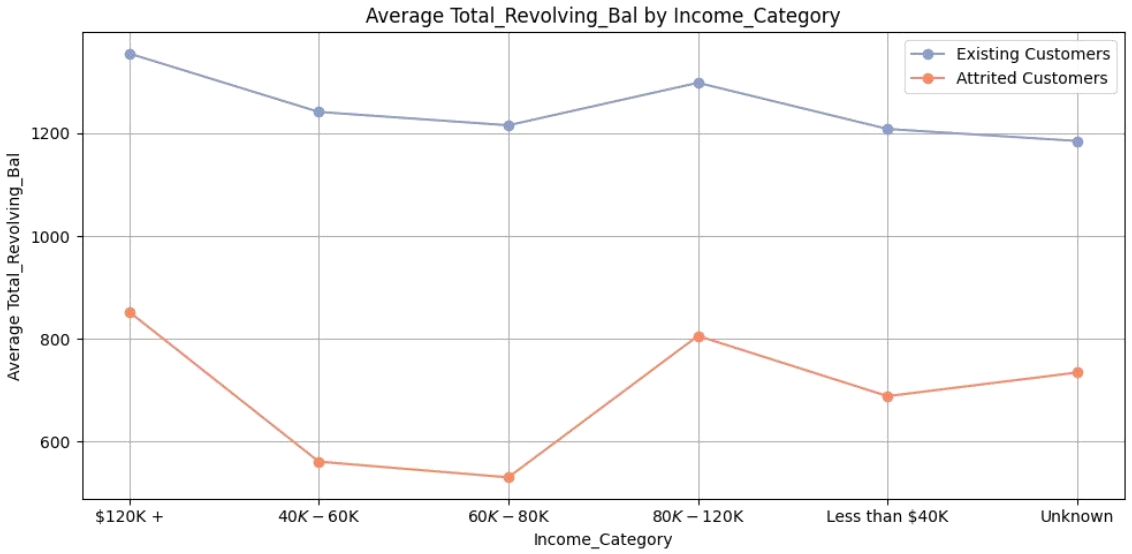




	Existing Customer	Attrited Customer
Avg Total Transaction Amount	↑	↓
Avg Total Transaction Count	↑	↓
Avg Total Revolving Balance	↑	↓

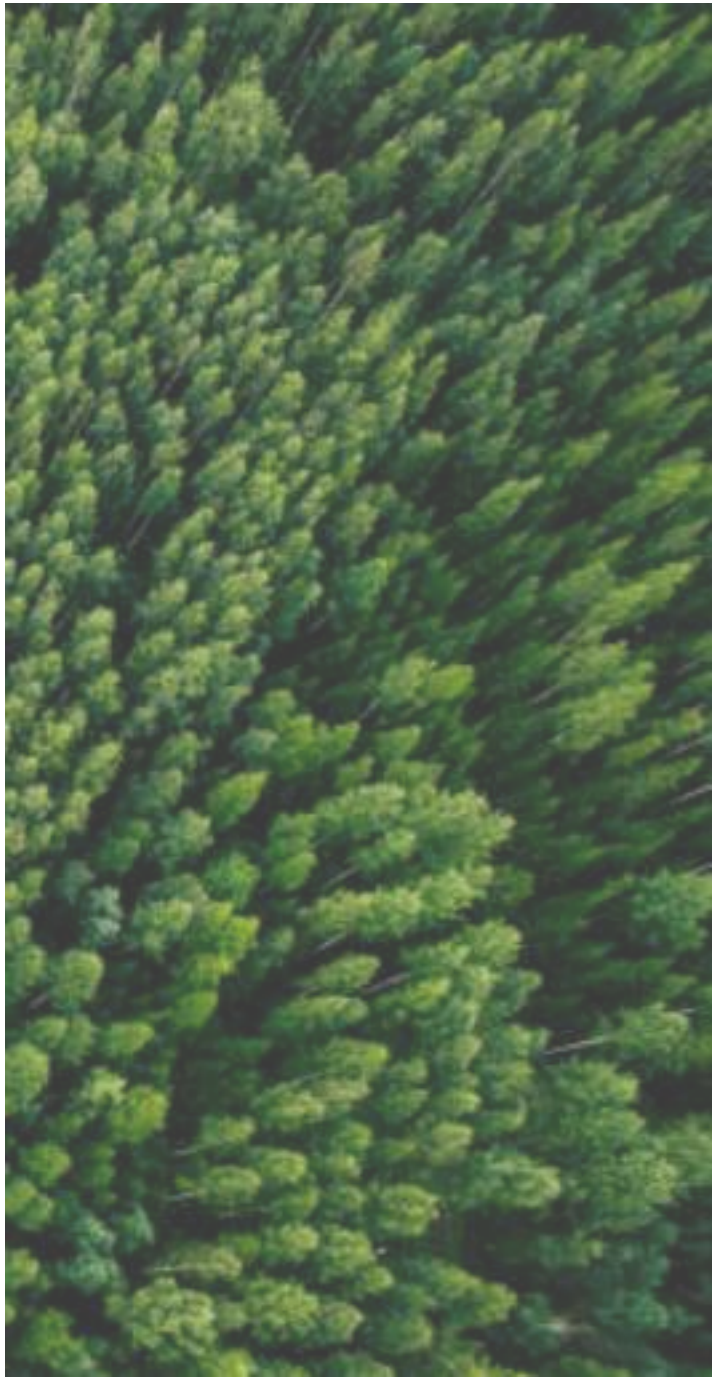






	Existing Customer	Attrited Customer
Avg Total Transaction Amount	↑	↓
Avg Total Transaction Count	↑	↓
Avg Total Revolving Balance	↑	↓

Business Insights and Recommendations



Business Insights based on Customer Attrition Analysis

1. The **overall attrition rate** in the customer dataset stands at **16%**.

2. **Female customers exhibit a higher attrition rate** at **17.4%**, compared to **14.6%** for male customers.

3. **Attrition is most prominent among customers aged 40–49 and 50–59**, both groups recording an attrition rate of **16.9%**.

4. **Single customers** have a higher attrition rate (**16.9%**) compared to their **married counterparts** (**15.1%**).

5. Customers with **three dependents** show the highest attrition at **17.6%**, followed by those with **two dependents** at **15.7%**.

6. A large portion of the customer base has education levels of **high school or graduate degrees**. Attrition is **15.6% among graduates** and **15.2% among high school graduates**.

7. Customers earning **less than $40K** represent a significant portion of the dataset and show the **highest income-based attrition rate at 17.2%**, followed by those earning **$80K–$120K** at **15.8%**.

8. There are **no female customers** in the **$60K–$80K**, **$80K–$120K**, or **$120K+** income categories. Notably, **91.6% of female customers fall in the 'Less than $40K' income bracket**.

9. Across numerical features, **attrited customers have lower mean and median values** for **Total Revolving Balance**, **Total Transaction Amount**, and **Total Transaction Count**, highlighting these metrics as key differentiators in attrition analysis.

Recommendations based on Customer Attrition Analysis

1. Targeted Retention Campaigns for At-Risk Demographics
Female customers, particularly those earning less than $40K, have a higher attrition rate.
Recommendation: Design tailored financial products, rewards, or engagement programs for this segment. Offer personalized outreach, financial literacy resources, or incentives to increase perceived value and customer loyalty.

2. Focused Interventions for Middle-Aged Customers
Customers aged 40–59 exhibit the highest attrition rates.
Recommendation: Conduct surveys or focus groups to understand their pain points. Provide mid-life financial planning tools, loyalty programs, or exclusive offers.

3. Tailored Support for Families with Dependents
Customers with two or more dependents—especially those with three—have higher attrition.
Recommendation: Offer family-oriented financial services, such as dependent-linked benefits, educational savings plans, and bundled family financial packages.

4. Reevaluate Messaging Based on Educational Background
Attrition among both graduates and high school-educated customers is notable.
Recommendation: Customize communication strategies according to educational background. Provide accessible financial education resources through gamified tools, webinars, or mobile-friendly content.

5. Reconsider Income-Based Product Positioning
Customers earning less than $40K show the highest attrition among income groups.
Recommendation: Introduce low-fee or value-based offerings. Emphasize practical benefits like budgeting assistance, overdraft protection, or cashback on essentials.

6. Implement Data-Driven Risk Scoring Models
Attrited customers tend to have lower Total Revolving Balance, Transaction Amount, and Transaction Count.
Recommendation: Build churn prediction models using these indicators to identify at-risk customers. Trigger timely retention actions such as personalized communication, rewards, or relationship manager calls.

7. Address Gender Gaps in Income Segments
There are no female customers in mid-to-high income groups, with 91.6% concentrated in the <$40K category.
Recommendation: Investigate potential data collection gaps or barriers to inclusion. Consider strategies to attract and retain high-earning female customers through tailored offerings and inclusive marketing.