Summary & Recommendation: Customer Churn Analysis

This report presents a structured analysis of telecom customer churn, examining key factors driving customer retention and attrition. The analysis uses exploratory data analysis (EDA) techniques, data preprocessing, and compelling visualizations to uncover patterns and behaviors from the dataset.

🔧 Data Cleaning & Preparation

- Missing values in the `TotalCharges` column were addressed by replacing blanks with `0` and casting the column to float.

- The dataset was checked for null values and found to be clean post-processing.

- There were no duplicate entries in the `customerID` column.

- The `SeniorCitizen` column was converted from numeric (`0/1`) to categorical (`No/Yes`) for better readability.

📊 Churn Distribution

- A pie chart and countplot revealed that **26.54%** of customers have churned, while **73.46%** are retained.

- This relatively high churn rate suggests a need for stronger customer engagement and loyalty strategies.

👤 Demographic-Based Analysis

- **Gender**:

  - Churn was nearly equal across male and female customers.

○ No significant difference in churn behavior based on gender.

- **Senior Citizens**:

  ○ Senior citizens form a smaller portion of the customer base.

  ○ **41%** of senior customers churned, compared to **24%** of non-senior customers.

  ○ Indicates that **senior customers are at higher churn risk**.

🛠️ Service Subscription Insights

Visualizations were created for multiple service-related features, including:

- `PhoneService`, `MultipleLines`, `InternetService`

- `OnlineSecurity`, `OnlineBackup`, `DeviceProtection`

- `TechSupport`, `StreamingTV`, `StreamingMovies`

Key Findings:

- **Online Security & Tech Support**:

  ○ Customers **without these services** showed a **significantly higher churn rate**.

  ○ For example, nearly **30%** of customers who lacked tech support ended up churning.

- **Internet Service Type**:

  ○ **Fiber Optic** users exhibited the **highest churn rate** (**~35%**), compared to DSL users and those with no internet.

- **Streaming Services & Multiple Lines**:

  ○ Weak correlation with churn. These services did not significantly influence churn behavior.

📊 Stacked Bar Charts (Percentage View)

- Used stacked bar charts with percentage labels to display churn across customer groups.

- This approach clarified **relative churn risk** within groups.

- Example: Clear comparison of churn between senior and non-senior customers by proportion.

🧠 Summary of Key Findings

- 🔺 **Senior citizens** churn more than non-seniors (**41% vs 24%**).

- 🔒 Lack of **Online Security** and **Tech Support** increases churn likelihood.

- 🌐 **Fiber Optic users** have the highest churn rates.

- 📺 Streaming services and line types have **minimal impact** on churn.

- 📉 Overall churn rate is **26.54%**, indicating a pressing need for action.

📌 Recommendations

- Implement **targeted retention campaigns** focused on senior citizens and high-risk service segments.

- Introduce **bundled packages** that include Online Security and Tech Support.

- Investigate potential service quality or pricing issues related to **Fiber Optic plans**.