**Data Cleaning & Exploration - Task 2**

**Step 3: Documentation of Potential Bias and Its Effect on Analysis**

**1. Demographic Bias**

**Columns: Gender, Senior Citizen**

**Findings:**

1. **Gender Bias:**
   * Disparities in churn rates between genders may indicate biases in service offerings, marketing strategies, or customer service interactions.
   * If one gender, for example, female customers, shows higher churn, this may reflect unmet service needs or unequal engagement efforts.
2. **Senior Citizen Bias:**
   * Higher churn rates among senior citizens may indicate challenges with digital services or preferences for more traditional customer service options.
   * Conversely, lower churn rates may stem from longer tenure or reliance on more stable, traditional services.

**Effect on Analysis:**

* **Predictive Model Bias:** Strong influence of demographic factors on churn could lead to biased models if not carefully adjusted. These models may wrongly prioritize certain groups over others.
* **Business Decision Implications:** Targeting strategies might be skewed, assuming one group is more likely to churn for reasons unrelated to service quality or experience.

**2. Financial Bias**

**Column: Payment Method**

**Findings:**

* Certain payment methods, such as automatic payments (e.g., credit card or bank transfer), may be associated with lower churn rates due to convenience or automatic renewals.
* Manual payment methods (e.g., mailed checks) may be linked to higher churn due to customer inconvenience or financial instability.

**Effect on Analysis:**

* **Predictive Model Implications:** Heavy reliance on Payment Method as a churn predictor may lead to models recommending auto-pay promotion without addressing underlying issues like financial stress or payment method access disparities.
* **Misleading Business Insights:** The relationship between payment method and churn may be purely correlative, not causal. Customers using manual payments may churn due to financial instability rather than the payment process itself.

**3. Summary of Bias Impact**

|  |  |  |  |
| --- | --- | --- | --- |
| **Bias Type** | **Column** | **Findings** | **Effect on Analysis** |
| **Demographic Bias** | Gender | One gender may have a higher churn rate, potentially due to service or marketing imbalances. | May lead to incorrect assumptions and biased predictive models. |
| **Demographic Bias** | Senior Citizen | Older customers may churn at different rates due to service usability or tenure differences. | Risk of age-based targeting without addressing real churn causes. |
| **Financial Bias** | Payment Method | Manual payment users may churn more than auto-pay users due to inconvenience or instability. | Correlation may be mistaken for causation, leading to inaccurate strategies. |

**4. Actionable Insights**

1. **Gender Bias Mitigation:**
   * Conduct customer feedback surveys or focus groups to identify specific service gaps across genders.
   * Adjust marketing and service strategies to ensure they cater equally to all gender groups.
2. **Senior Citizen Support:**
   * Provide senior-friendly services, such as simplified account interfaces or workshops for digital adoption.
   * Offer hybrid service models (e.g., combining traditional and digital services) to reduce churn among older customers.
3. **Financial Bias Mitigation:**
   * Educate customers about the benefits of auto-pay, while offering flexible payment options for those who prefer manual methods.
   * Consider financial health assessments to identify at-risk customers and offer payment reminders or grace periods to reduce involuntary churn.

By addressing these potential biases, the company can create fairer, more effective predictive models and business strategies that reflect customer needs accurately.