DATA ANALYSIS REPORT

1. Data Sources:

The dataset EV_Data.csv was used, which contains survey responses regarding preferences and perceptions about EVs.

2. Questions:

- What is the demand for electric vehicles among various individuals in India?
- What is the family size of the people wanting to buy electric vehicles?
- How much are people willing to pay for electric vehicles?
- What cars do individuals currently drive, and do they want to switch to electric vehicles in the future?

3. Approach:

3.1. Data Pre-processing

In the data pre-processing phase, several steps and libraries were utilized to prepare the dataset for analysis and clustering. Essential libraries such as NumPy, pandas, seaborn, matplotlib, sklearn, and statsmodels were imported to handle various data manipulation and visualization tasks. The initial step involved addressing missing values, ensuring that the dataset was complete and free from any null entries. Column names were standardized to maintain consistency and readability. Additionally, any inconsistent data entries were removed to ensure data integrity.

Categorical variables were encoded to numerical values using techniques such as one-hot encoding, while numerical features were scaled to bring them to a comparable range. This was crucial for clustering algorithms to perform effectively. The libraries primarily used for these tasks included pandas for data manipulation, and sklearn's preprocessing, compose, and pipeline modules for encoding and scaling. Seaborn and matplotlib were utilized for data visualization to better understand the distributions and relationships within the data.

3.2. Segment Extraction

To segment the dataset into distinct groups, machine learning techniques were applied. Specifically, the K-Means clustering algorithm was used to partition the data into five clusters based on selected features. This method was chosen for its efficiency and effectiveness in handling large datasets and identifying natural groupings. Preprocessing steps involved the use of StandardScaler to standardize the features and OneHotEncoder to encode categorical variables. These preprocessing tools were crucial in ensuring that the clustering algorithm performed optimally by treating all features on a similar scale and format.

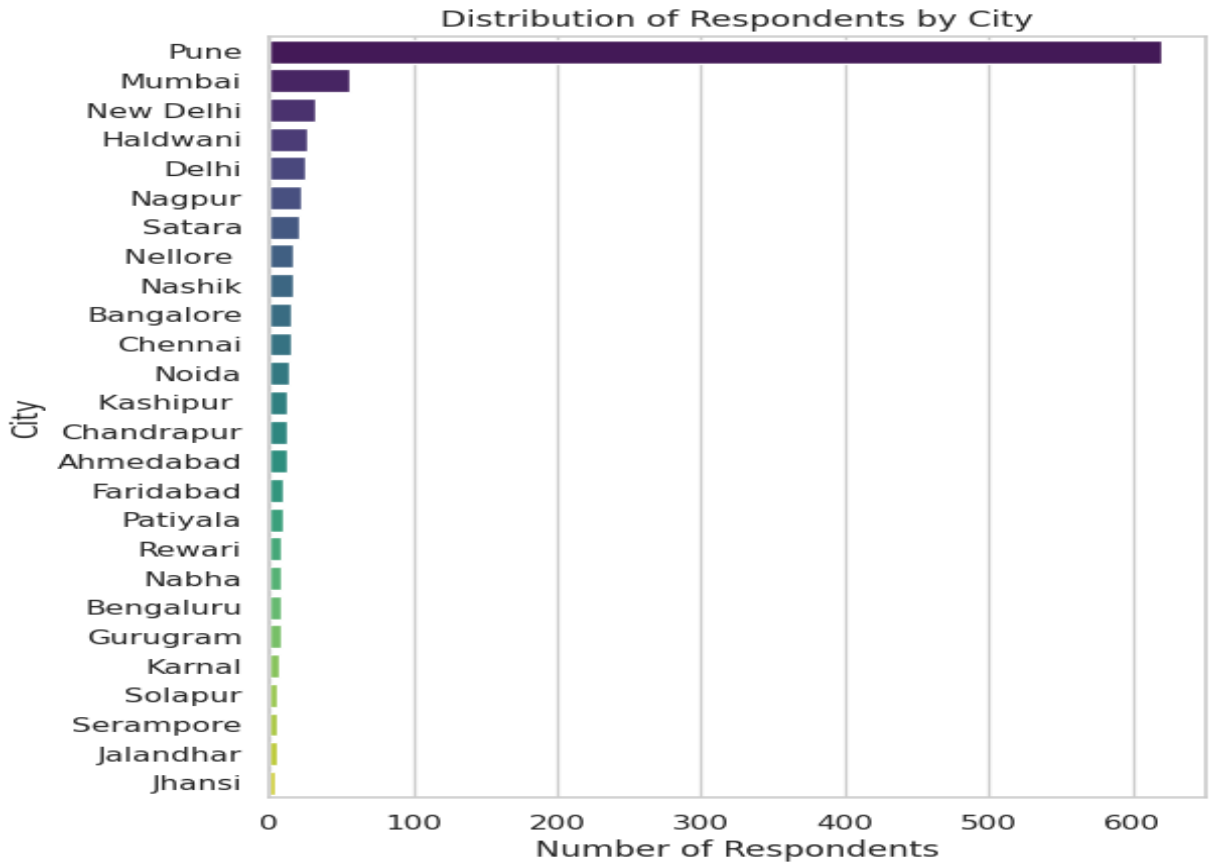
4. Analysis and Segmentation:

Based on the clustering results, five distinct profiles emerged, each representing a unique segment of individuals with specific characteristics and preferences regarding electric vehicles (EVs).

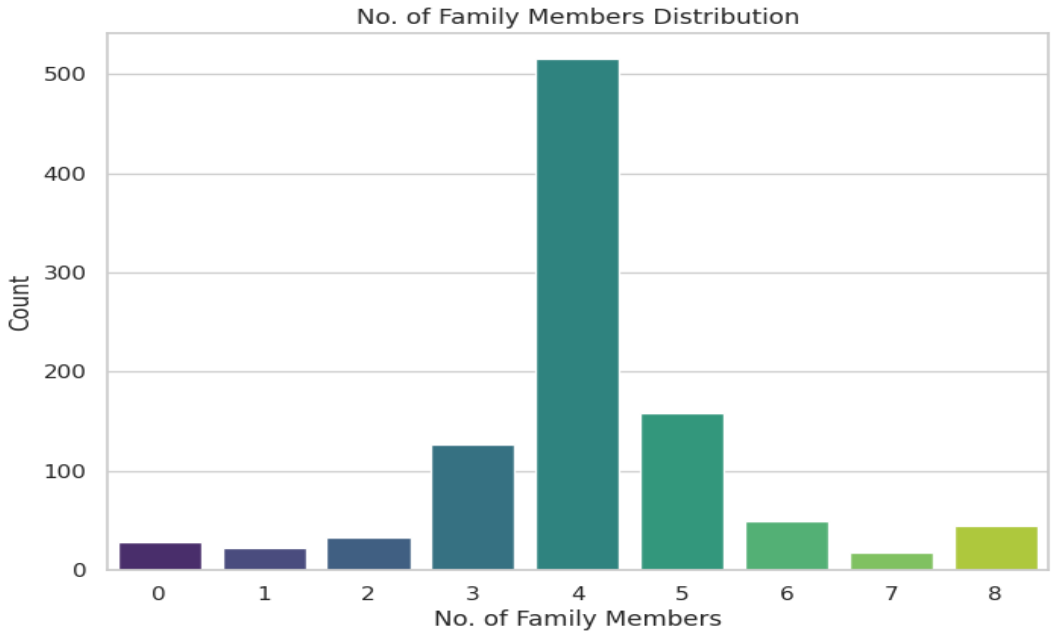
1. **Young Urban Professionals:** This segment is characterized by individuals with a moderate family size, averaging around four members. They are mostly single and hold graduate degrees. These individuals show a strong preference for electric vehicles and typically own Hyundai cars. They are willing to spend less than 15 lakhs on an electric vehicle, reflecting a significant interest in affordable EV options.
2. **Affluent Urban Singles:** Individuals in this segment generally have a larger family size, averaging about seven members. Despite their larger families, they are mostly single and graduates. Like the first segment, they prefer electric vehicles and predominantly own Hyundai cars. Their willingness to spend less than 15 lakhs on an electric vehicle indicates a demand for reasonably priced EVs even among more affluent singles.
3. **Tech-Savvy Postgraduates:** This group consists of individuals with a moderate family size, similar to the first segment, averaging around four members. They are mostly single but possess postgraduate degrees, indicating a higher level of education. They prefer electric vehicles and typically own Tata cars. Their budget for an electric vehicle is also less than 15 lakhs, suggesting that even highly educated individuals are looking for cost-effective EV solutions.
4. **Young Urban Singles with Limited Budget:** Characterized by a small family size, averaging around one member, this segment comprises mostly single individuals who are graduates. They prefer electric vehicles and usually own Tata cars. Their willingness to spend less than 15 lakhs on an electric vehicle highlights their budget-conscious nature, emphasizing the need for affordable EV options for this demographic.
5. **Mixed Urban Families:** This segment features individuals with a moderate family size, averaging around four members. They are mostly married and hold graduate degrees. Similar to the other segments, they prefer electric vehicles and typically own Tata cars. They are willing to spend less than 15 lakhs on an electric vehicle, indicating a significant demand for budget-friendly EVs among urban families.

5. Data Visualizations:

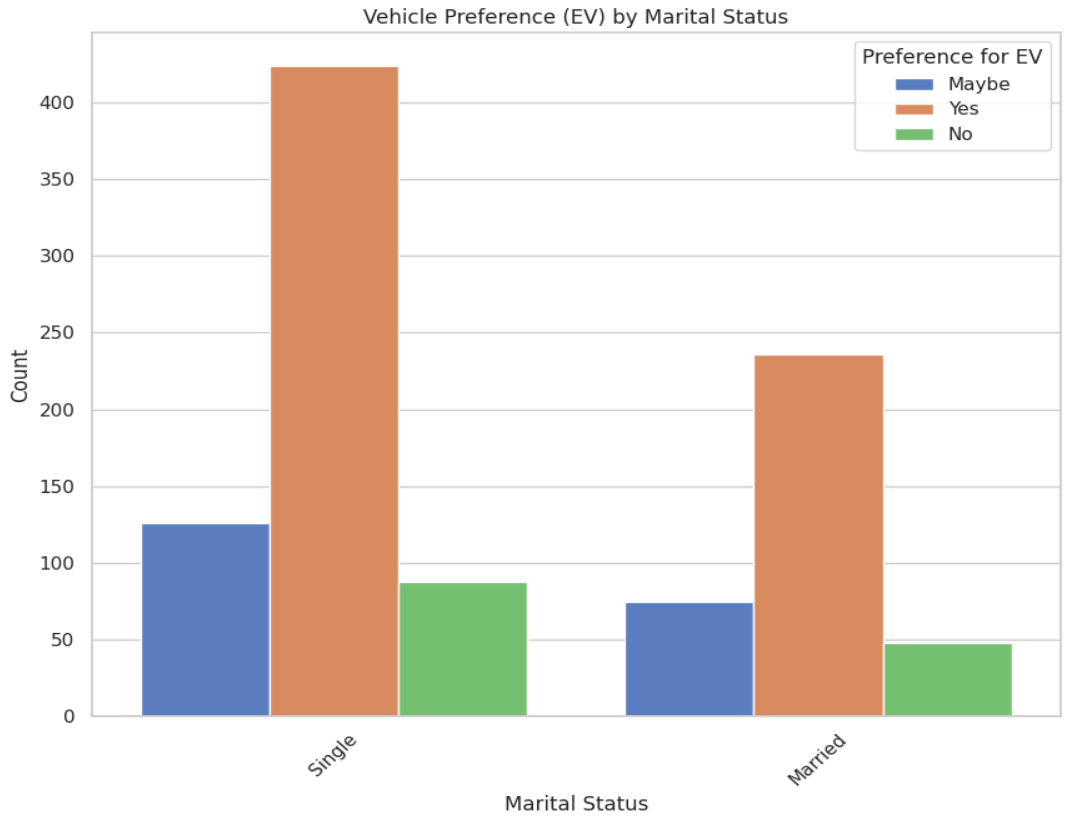
5.1. City Distribution:

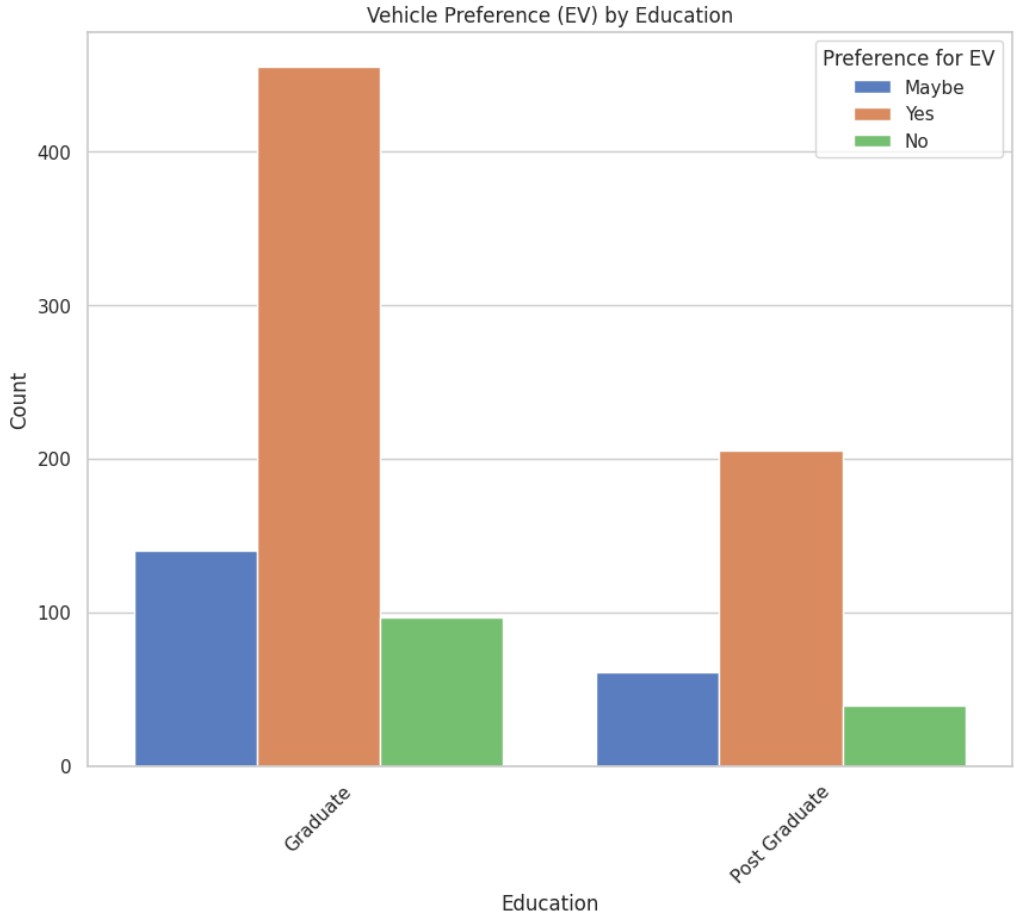


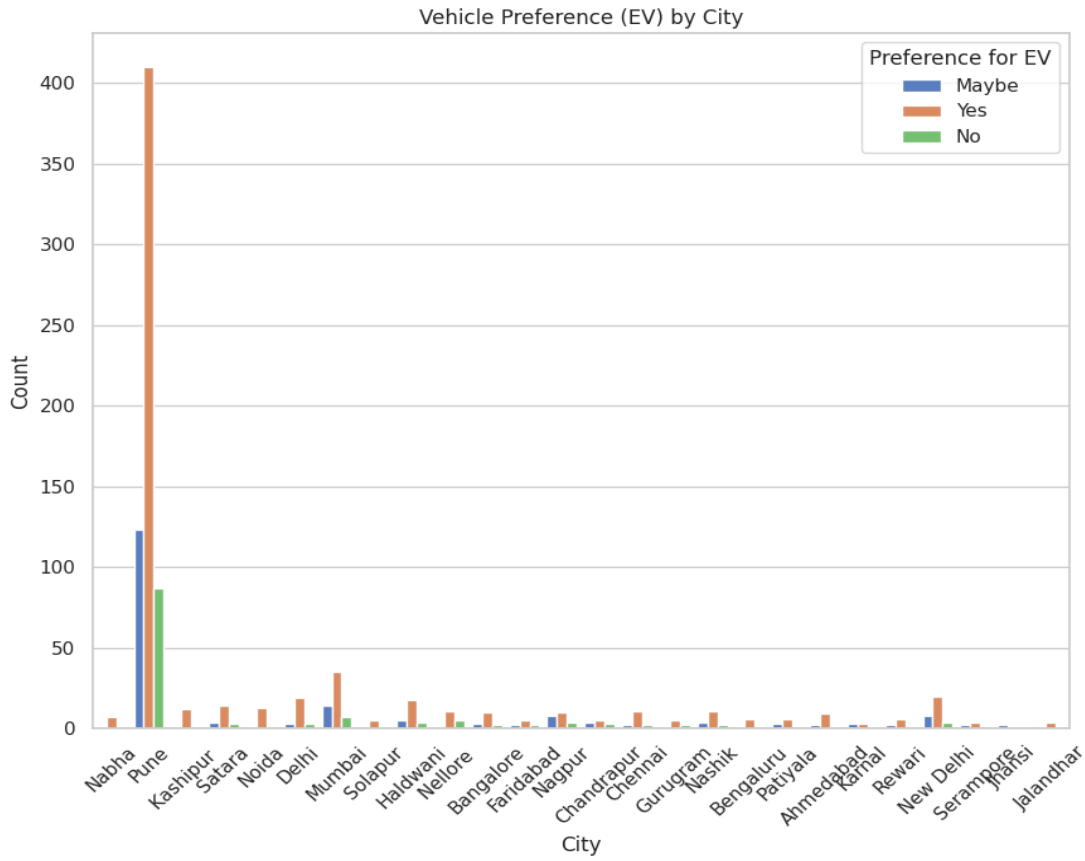
5.2. Number of family members:



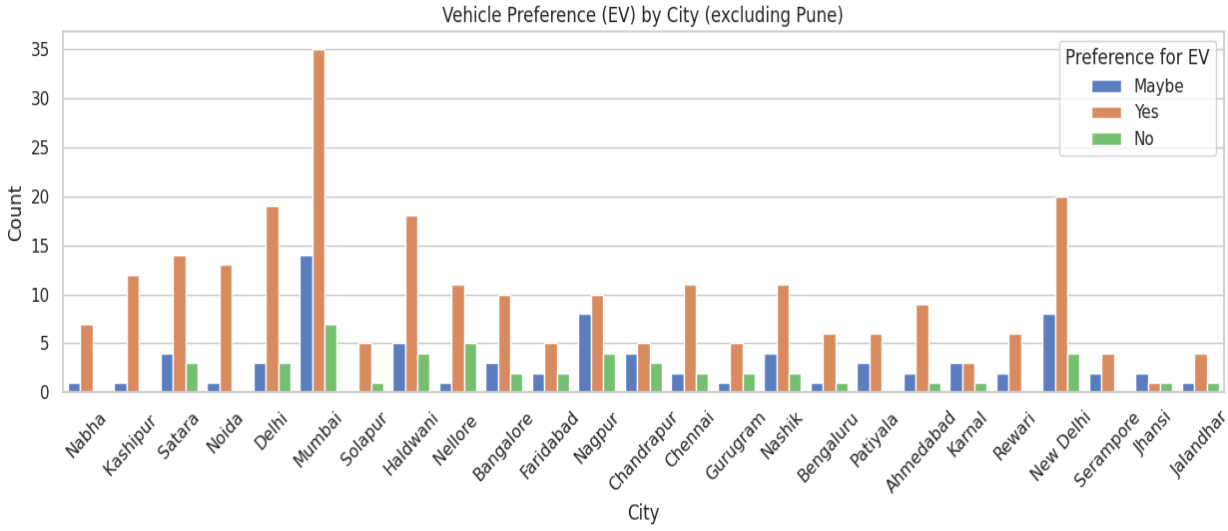
5.3. Vehicle Preference Analysis:



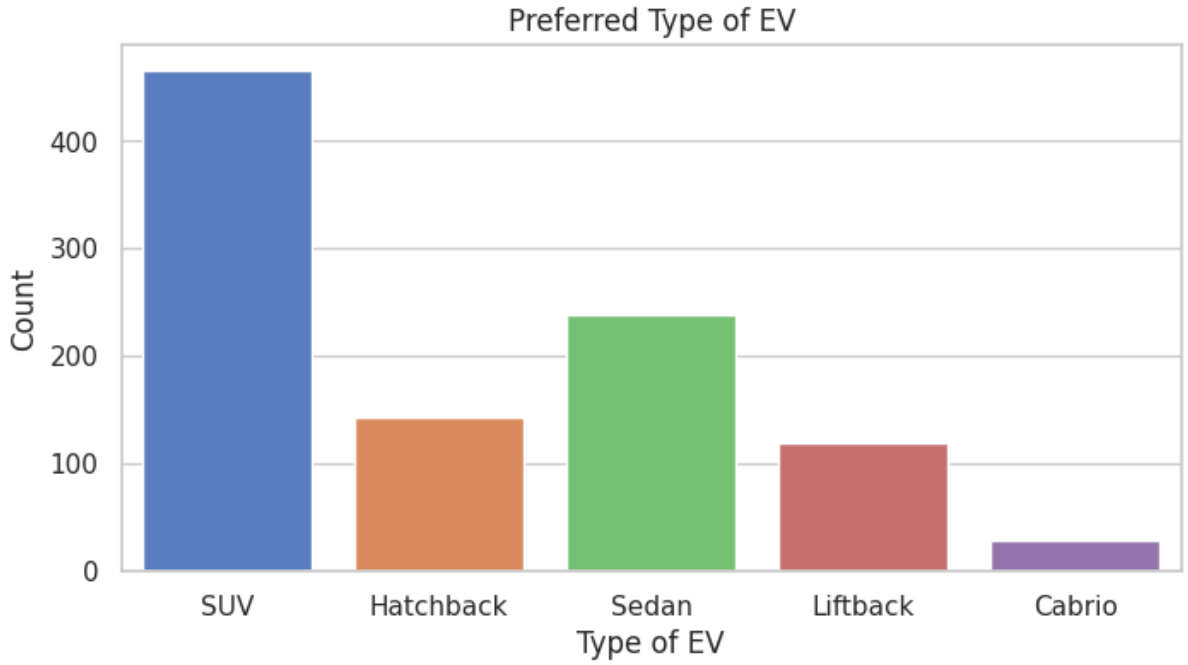




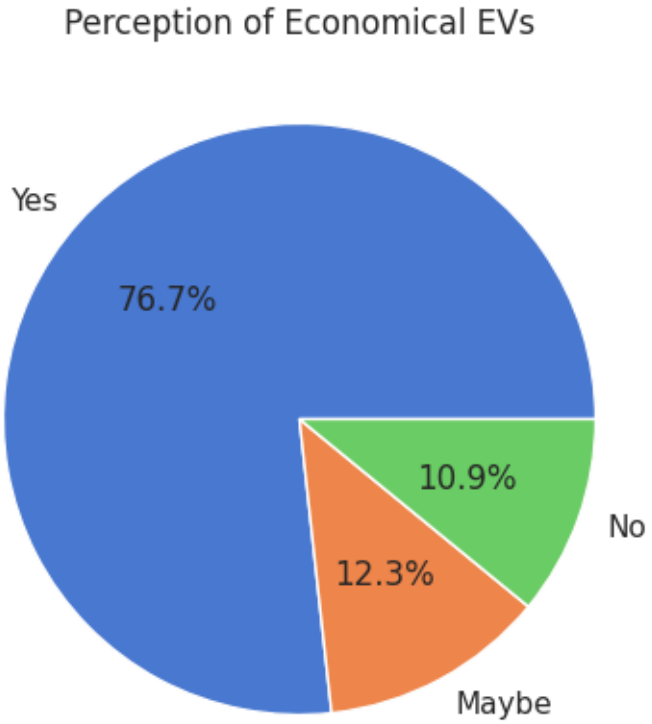
Excluding Pune:



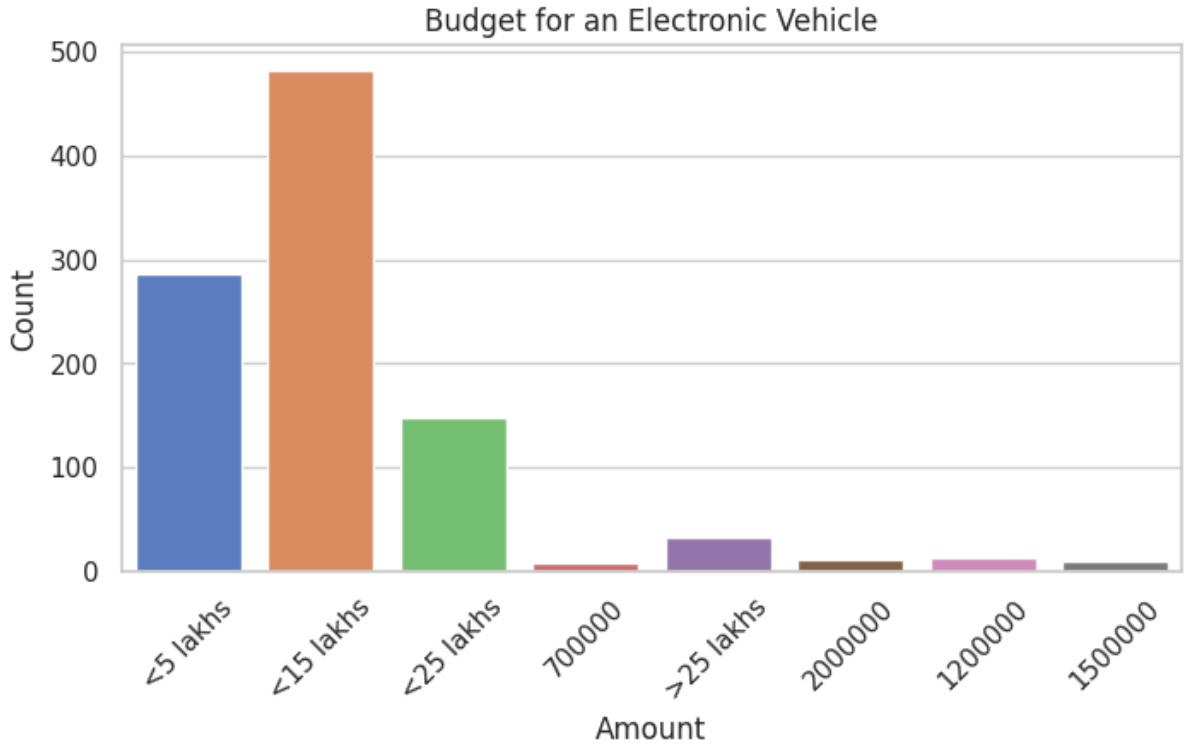
5.4. Preferred Type of EV:



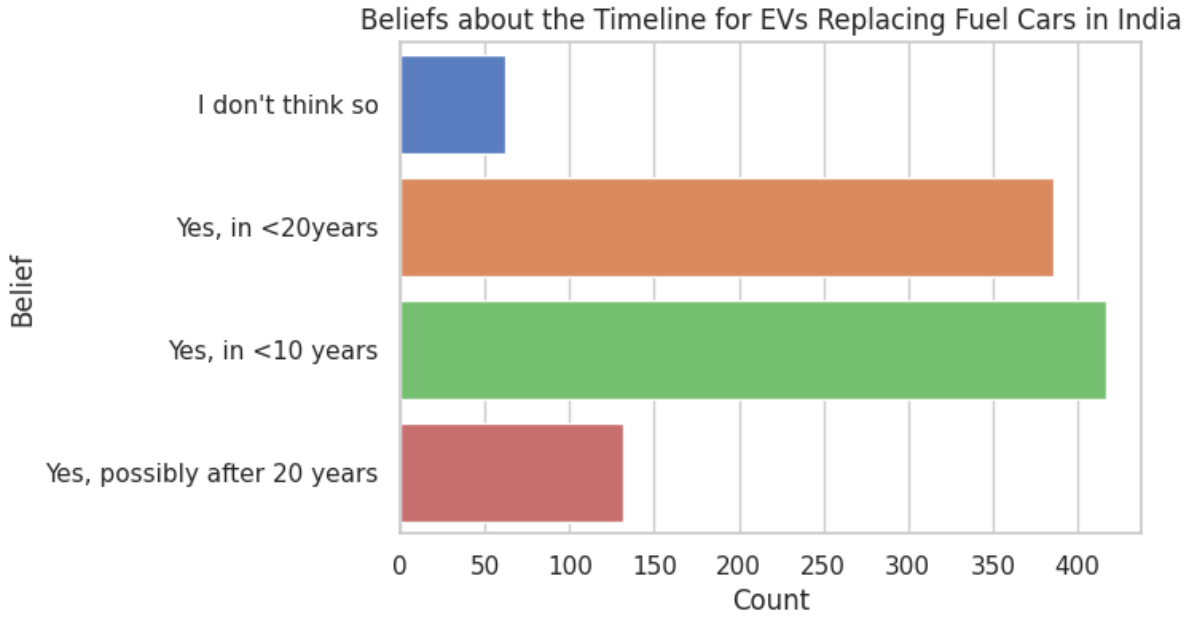
5.5. Perception of Economical EVs:



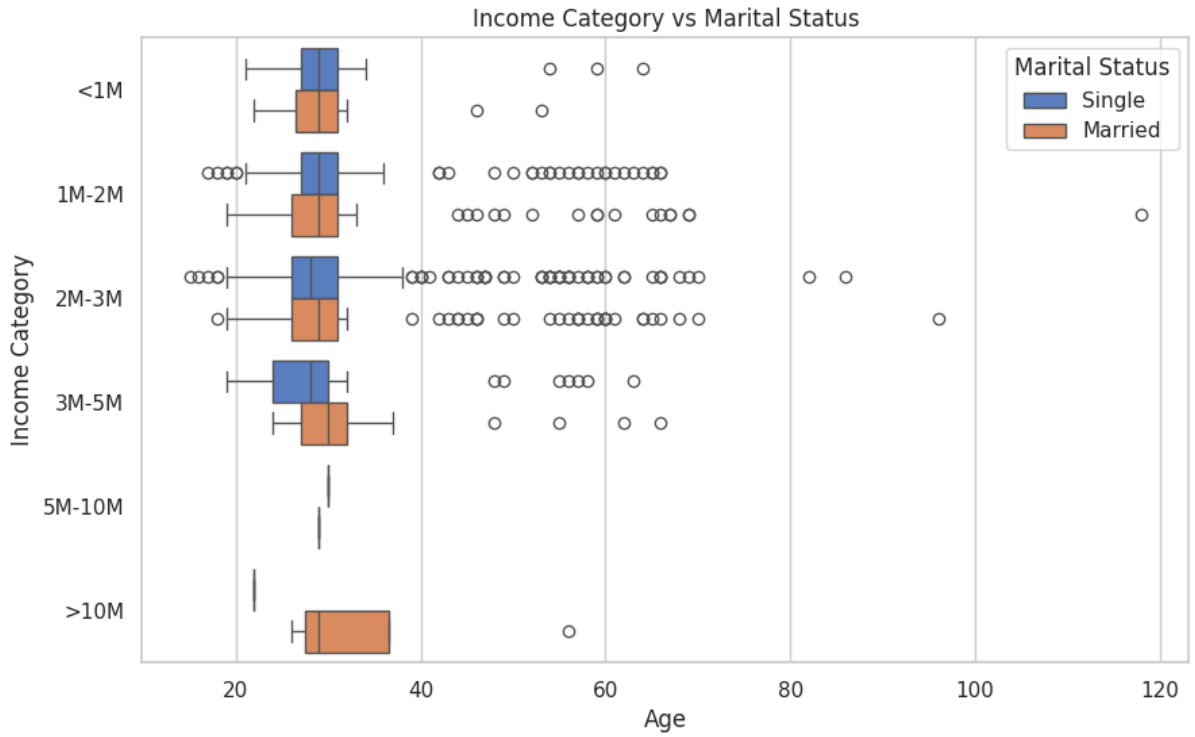
5.6. Budget for an EV:

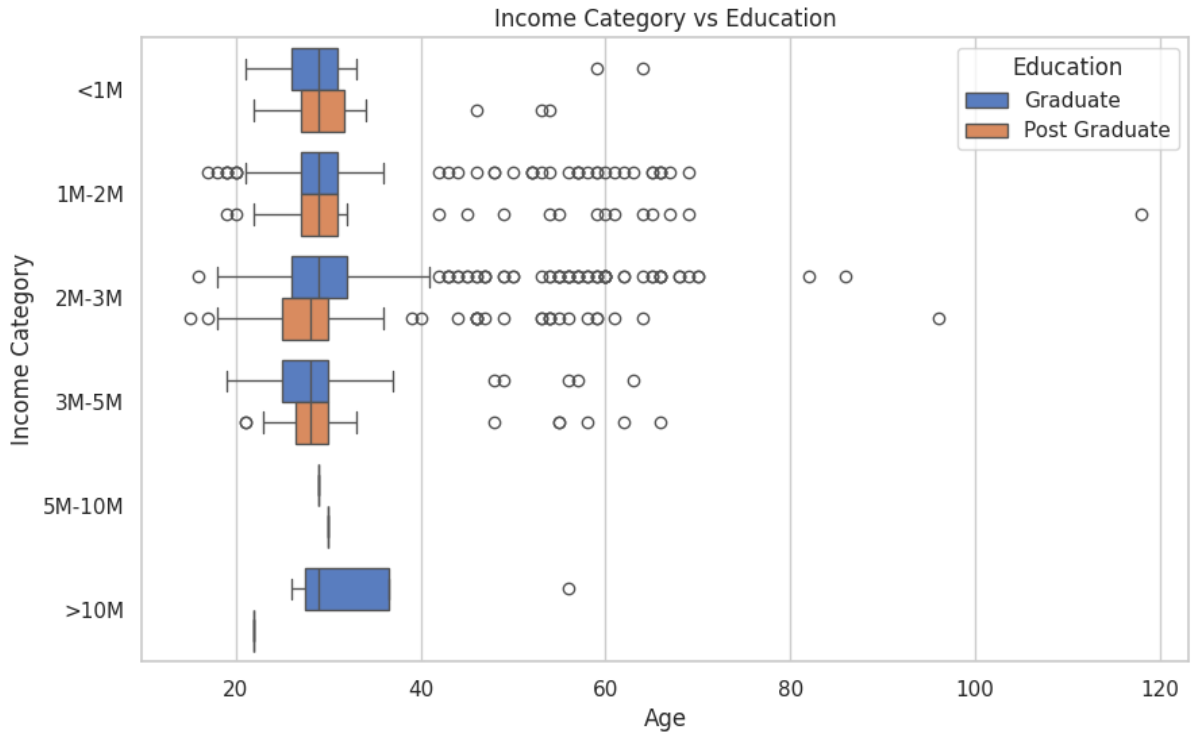


5.7. Future of EVs:

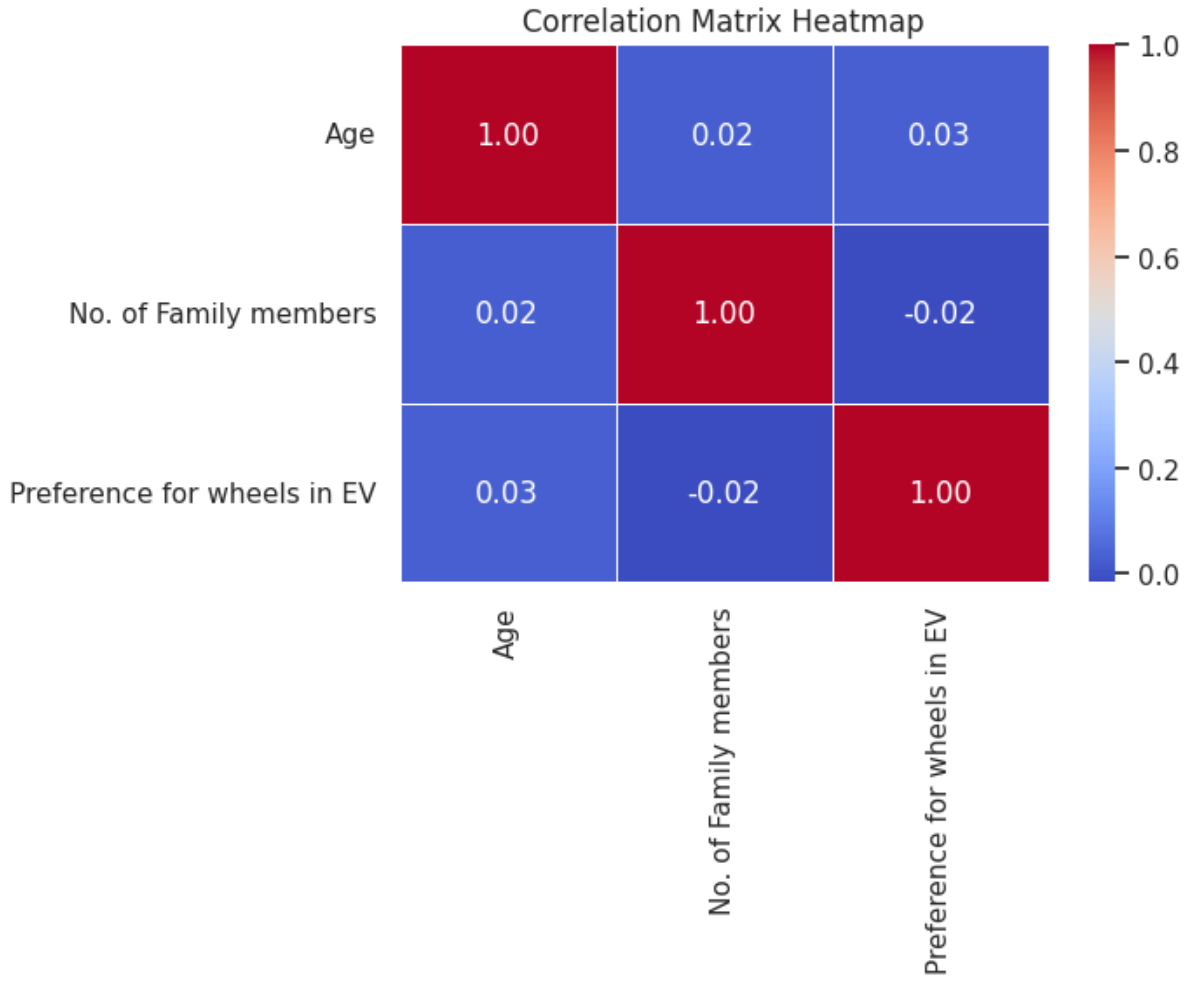


5.8. Income Category Analysis:





5.9. Correlation Matrix:



Conclusion

1. What is the demand for electric vehicles among various individuals in India?

Across all clusters, individuals show a strong preference for replacing their current vehicles with electric vehicles. This indicates a high demand for electric vehicles among different groups in India.

2. What is the family size of the people wanting to buy electric vehicles?

- **Urban Young Professionals (Cluster 0):** Moderate family size, averaging around 4 members.
- **Wealthy Urban Singles (Cluster 1):** Larger family size, averaging around 7 members.
- **Tech-Savvy Postgraduates (Cluster 2):** Moderate family size, averaging around 4 members.
- **Budget-Conscious Young Urban Singles (Cluster 3):** Small family size, averaging around 1 member.
- **Diverse Urban Families (Cluster 4):** Moderate family size, averaging around 4 members.

3. How much are people willing to pay for electric vehicles?

Individuals in all clusters are willing to spend less than 15 lakhs on an electric vehicle.

4. What cars do individuals currently drive, and do they want to switch to electric vehicles in the future?

Current Vehicles and Willingness to Switch to Electric Vehicles:

- **Urban Young Professionals (Cluster 0):** Currently own Hyundai vehicles and are keen to switch to electric vehicles.
- **Wealthy Urban Singles (Cluster 1):** Currently own Hyundai vehicles and are likely to prefer electric vehicles.
- **Tech-Savvy Postgraduates (Cluster 2):** Currently own Tata vehicles and prefer electric vehicles.
- **Budget-Conscious Young Urban Singles (Cluster 3):** Currently own Tata vehicles and are likely to switch to electric vehicles.
- **Diverse Urban Families (Cluster 4):** Currently own Tata vehicles and prefer switching to electric vehicles.

The demand for electric vehicles is strong among various groups in India, with individuals showing a consistent willingness to switch from their current vehicles (mainly Hyundai and Tata) to electric ones. The family sizes of potential buyers range from single-member

households to larger families, and all are willing to spend under 15 lakhs on an electric vehicle. This indicates a significant market potential for affordable electric vehicles in India.

Link to GitHub Profile:

Link: https://github.com/DeeshaP26/Feynn-Labs-Internship-2024/blob/main/Project%202.1/EV_Market_Analysis.ipynb

This report should provide a comprehensive overview of the data analysis process, segment profiling, and strategic recommendations for targeting specific customer segments in the EV market.