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CP301

(Development Engineering Project)

End Sem Report

Travel Behavior Analysis

Supervisor :- Dr. Rahul T M

Approval Signature :-

Beneficiary :- Transport Department, IIT Ropar

Team Members:-

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TRAVEL BEHAVIOR ANALYSIS

INTRODUCTION:-

The “Travel Behavior Analysis” elucidates the physical movements of people outside their reference locations for a determined purpose and how these travels are affected due to the incorporation of numerous physio-socio demographic factors. The reference locations mentioned are the places to which a person returns at the end of the day. The purpose of the travels may include anything from short work related trips to long distance trips.Key directions of inquiry within research and technology are theory building, modeling and simulation, and enabling technologies.Transportation modeling and simulation aims at the design of an efficient infrastructure and service to meet our needs for accessibility and mobility. The report will commence by defining the various objectives that our group is hoping to achieve in this project, followed by the work that our group has accomplished and ending with a conclusion analyzed from data collected.Key directions of inquiry within research and technology are theory building, modeling and simulation, and enabling technologies.

Methodology:

The purpose of the project is to analyze the travel behavior of people across different areas. The steps that we followed for getting to the conclusion for this project contain majorly research about the people and their travel needs and behavior, collection of data, analysis and visualization of collected data through different tools. We have designed a questionnaire for data collection. The questionnaire is in a form of google form. We have collected a number of data before proceeding with the analysis and visualization. For the next part of analysis and visualization, we have taken help from different tools and software like MS Excel, Power BI, etc. These tools are widely used for the purpose of data analysis and data visualization. We have analyzed, compared, and represented data in the form of different charts for better understanding. Through the represented charts, we have gone to the conclusion for the project.

- **Research**

  Our team has been able to successfully accomplish the research component of the project and learned about numerous basic elements, some of which are Purpose of the Travel , Duration of the Travel, and Participants in the Travel.

  In addition to these basic elements, the physio-socio demographic factors that are necessary for the further development of the project, including the development of the questionnaire needed for the collection of data has also been successfully grasped by our team, some of which are Condition of the roads , Nature of the Traffic , Economic Condition of the Traveler/Respondent

  After considering these basic elements of the travel we developed a questionnaire that is necessary to gather adequate information from the respondents, keeping in mind the various factors that can drastically affect the travel behavior of an individual. In addition to the above mentioned factors, we have also paid attention to numerous other factors that might affect the travel behavior of our respondents, for instance The region that the respondent belong to , Gender and Age Factor , Occupation Status , Ownership of Vehicle

QUESTIONNAIRE LINK:

https://docs.google.com/forms/d/e/1FAIpQLScD5njVjtlXD3EQdu79JNGRG7TFXHCJQcc-vz5yw_yolCUgbA/viewform?usp=sf_link

- **Data Collection:**

The successful completion of our project “Travel Behavior Analysis” inculcates numerous components and among those, one of the most imperative ones is the Data Collection. The Data Collection can be considered as the building block for the analysis of the travel behavior of numerous individuals and the various socio-physio-demographic factors that affect that behavior. The analysis of the data collected in the aftermath would then result in the derivation of an appropriate conclusion that would become a crucial component for the advancement of our transportation infrastructure.

There are numerous steps involved in the process of data collection of our project, which are enlisted below:

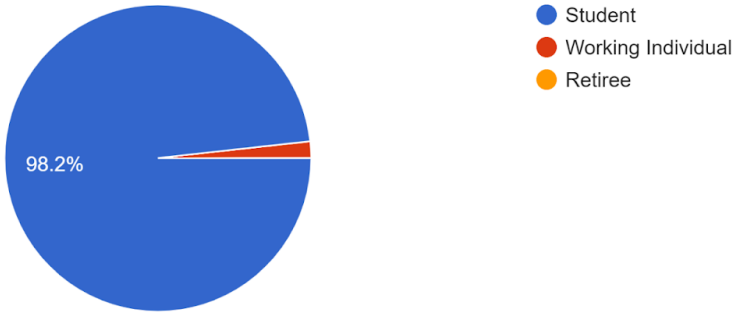
1. Our team came up with a decision to begin the data collection process in the form of a survey floated through Google Forms, within which we developed a questionnaire keeping in mind the numerous and imperative socio-physio-economic factors that can affect an individuals’ travel behavior.

2. In addition to the above mentioned factors, we have also paid attention to numerous other factors that might affect the travel behavior of our respondents, for instance:
    a) The region that the respondent belong to
    b) Gender and Age Factor
    c) Occupation Status
    d) Ownership of Vehicle

3. Through this form, we have successfully been able to receive a variety of responses from people from various walks of lives that would help in the derivation of the result showcasing their travel behavior and the ways in which it is affected. Some of the responses received are attached below for illustration:

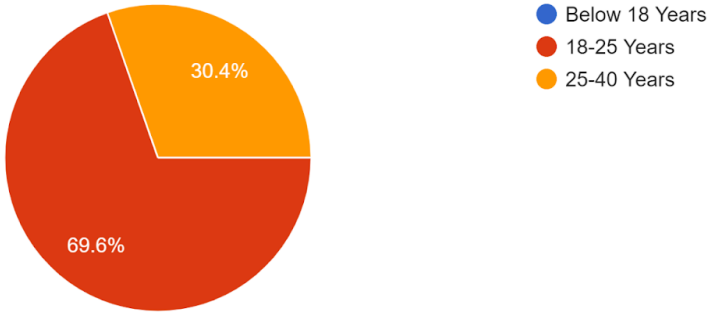
Nature of Respondent?

57 responses



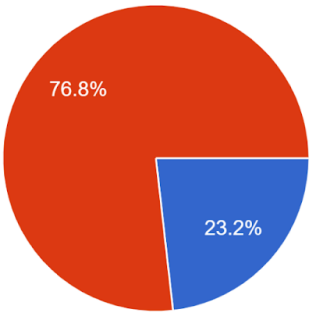
Age

56 responses



Gender

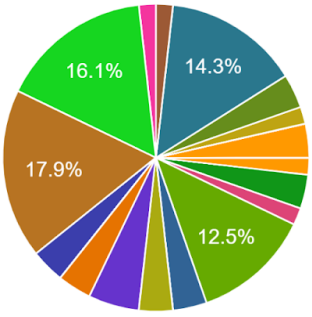
56 responses



Female
Male

State

56 responses

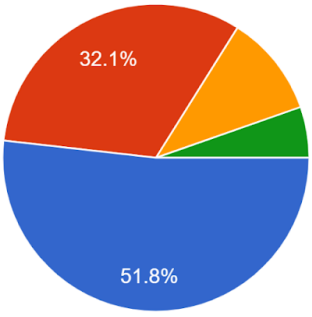


Andhra Pradesh
Arunachal Pradesh
Assam
Bihar
Chhattisgarh
Goa
Gujarat
Haryana

1/5

Vehicle Ownership?

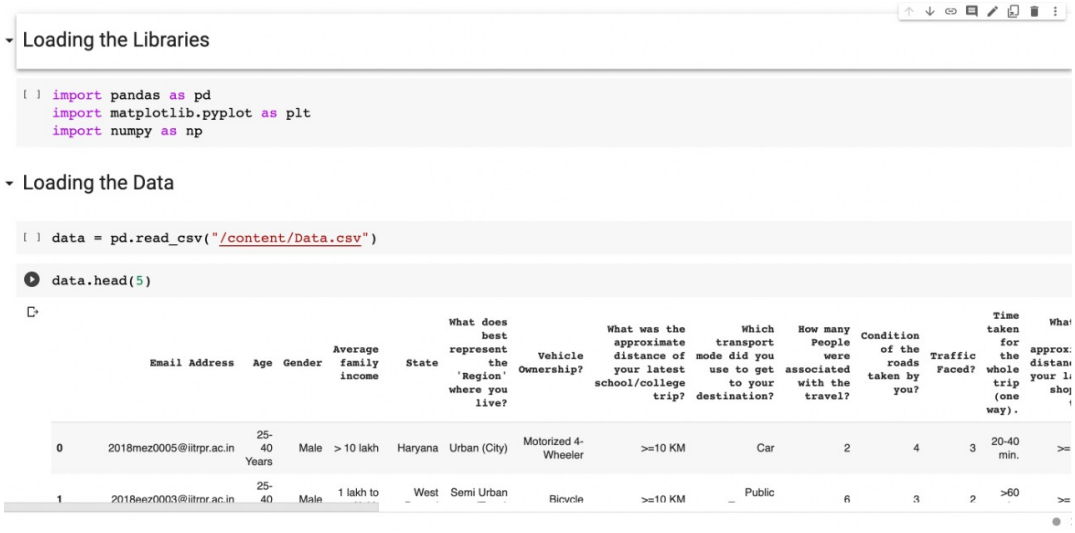
56 responses



Motorized 4-Wheeler
Motorized 2-Wheeler
Bicycle
None

- **Data Analysis:**

  We commenced the analysis part of our project after the successful completion of the data collection which could result in the ultimate advancement of our current transportation infrastructure.. The analysis is mainly done with the help of programming language python and analysis software microsoft excel.The snapshots of the code are attached below



Loading the Libraries

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
```

Loading the Data

```
data = pd.read_csv("/content/Data.csv")
```

```
data.head(5)
```

	Email Address	Age	Gender	Average family income	State	What does best represent the 'Region' where you live?	Vehicle Ownership?	What was the approximate distance of your latest school/college trip?	Which transport mode did you use to get to your destination?	How many People were associated with the travel?	Condition of the roads taken by you?	Traffic Faced?	Time taken for the whole trip (one way).	What approx distan your l shop
0	2018mez0005@iitrpr.ac.in	25-40 Years	Male	> 10 lakh	Haryana	Urban (City)	Motorized 4-Wheeler	>=10 KM	Car	2	4	3	20-40 min.	>=
1	2018eez0003@iitrpr.ac.in	25-40	Male	1 lakh to	West	Semi Urban	Bicycle	>=10 KM	Public	6	3	2	>60	>=

Cleaning the data

```
# removing the unnesseray Data Columns
data = pd.read_csv("/content/Data.csv")
data.drop('Email Address', axis = 1, inplace = True)
data.drop("State", axis = 1, inplace = True)
```

```
data.columns = ['Age', 'Gender', 'income', 'Location', 'vechileOwnership', 'SchoolTripLength', 'SchoolTripTranport', 'Sch
```

```
data.head(5)
```

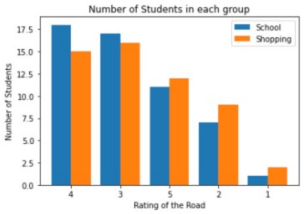
	Age	Gender	income	Location	vechileOwnership	SchoolTripLength	SchoolTripTranport	SchoolTripPeopleCount	SchoolTripRoadCondition	SchoolTripTraficFace
0	25-40 Years	Male	> 10 lakh	Urban (City)	Motorized 4-Wheeler	>=10 KM	Car	2	4	
1	25-40 Years	Male	1 lakh to 3lakh	Semi Urban (Town)	Bicycle	>=10 KM	Public Transport	6	3	
2	18-25 Years	Female	> 10 lakh	Urban (City)	Motorized 2-Wheeler	1-2 KM	Bike/Scooter	1	4	
3	18-25 Years	Male	> 5 lakh	Urban (City)	Motorized 4-Wheeler	<=1 KM	Bicycle	6	4	
4	18-25 Years	Male	1 lakh to 3lakh	Rural (Village)	None	<=1 KM	Walking	6	5	

```
from collections import Counter

X_axis = np.arange(len(Counter(data['SchoolTripRoadCondition']).values()))

plt.bar(X_axis - 0.2, Counter(data['SchoolTripRoadCondition']).values(), 0.4, label = 'School')
plt.bar(X_axis + 0.2, Counter(data['ShoopingRoadCondition']).values(), 0.4, label = 'Shopping')

plt.xticks(X_axis, Counter(data['SchoolTripRoadCondition']).keys())
plt.xlabel("Rating of the Road")
plt.ylabel("Number of Students")
plt.title("Number of Students in each group")
plt.legend()
plt.show()
```



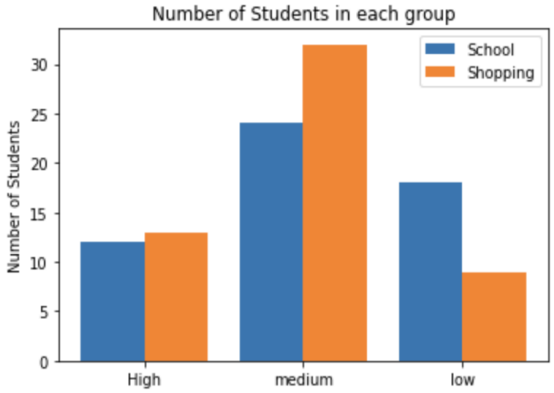
*Traffic Faced :- 1 -> Low
2 -> Medium
3 -> High

*Condition of Road :- 1 -> Worse
5 -> Very Good

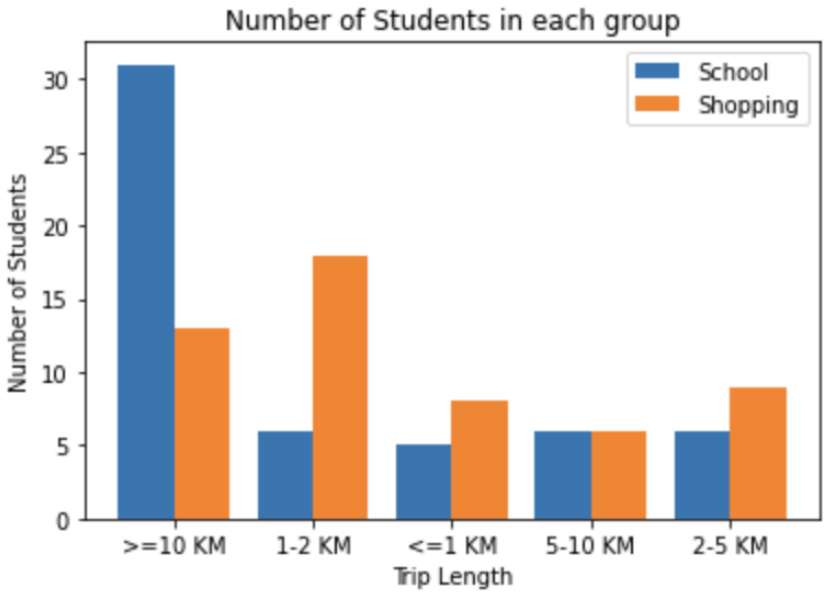
- **Traffic Faced while going to school/college is slightly less than while going shopping**

  Avg traffic faced by students while going shopping is 2.09 out of 3 where 3 means very high and 1 means low traffic.

  Avg traffic faced by students while going to school/college is 1.88 out of 3 where 3 means very high and 1 means low traffic.

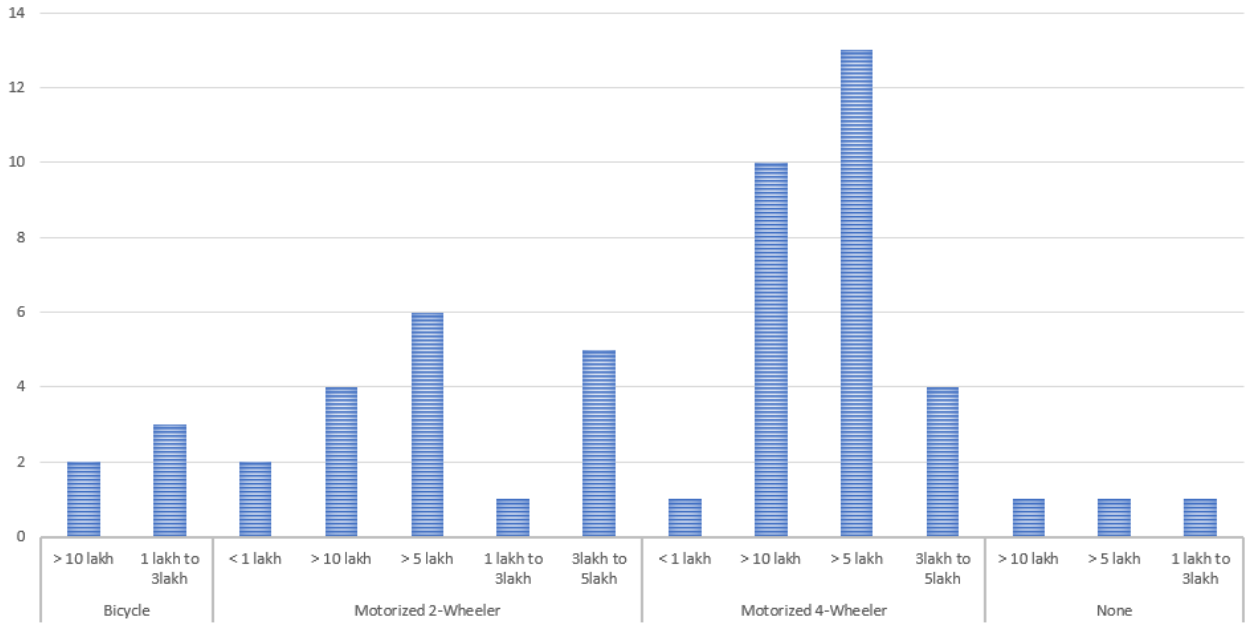


➔ **Shops are near to people in comparison to school/college.**
Average distance traveled while going to school is 6.75 km
Average distance traveled while going to school is 4.18 km
So, distance traveled while going to school is more than while going shopping so we can conclude that shops are nearer in comparison to educational institute



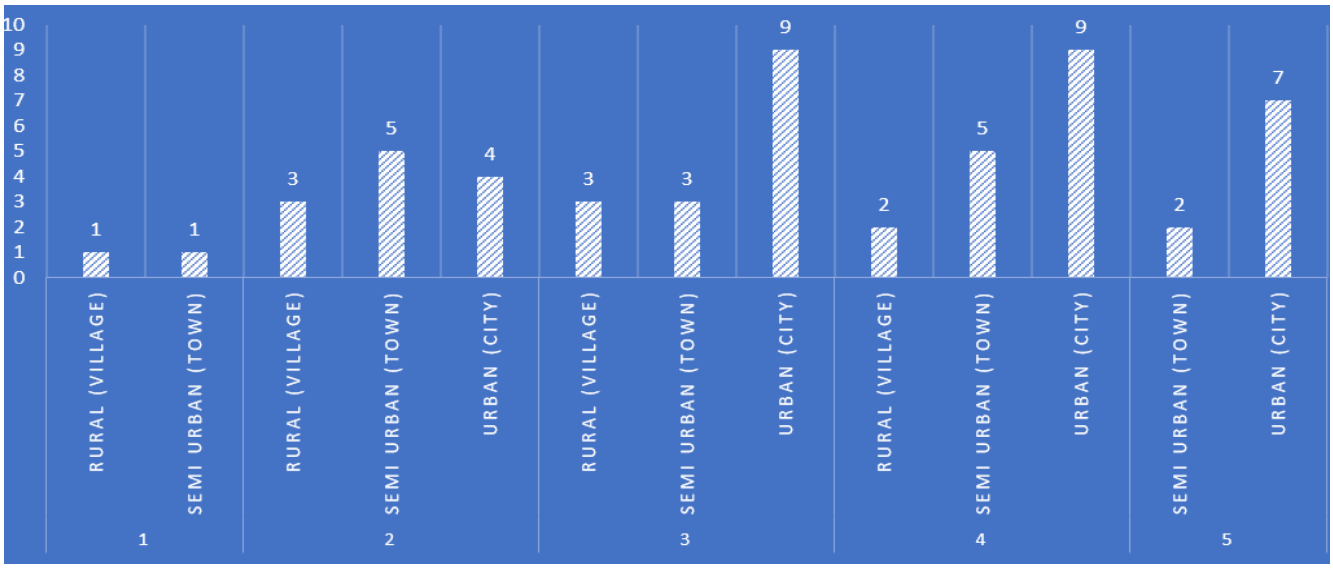
➔ **People with income more than 5 LPA or 10 LPA tend to have a motorized 4 wheeler**

10 out of 17 (58.8%) people with annual income greater than 10 lpa have a motorized 4 wheeler and 13 out of 20 (65%) people with annual income in range 5-10 lpa have a motorized 4 wheeler. As more than 50% people with average income have 4 wheeler so we can conclude that People with income more than 5 LPA or 10 LPA tend to have a motorized 4 wheeler



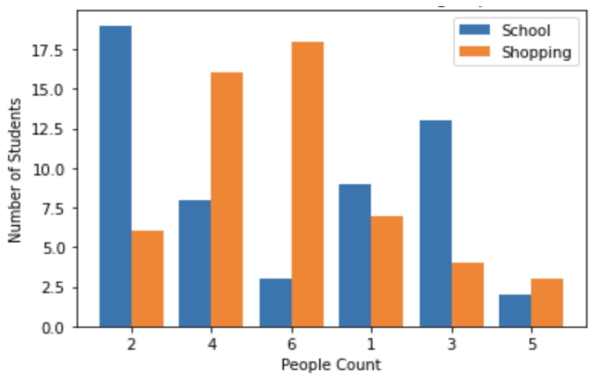
➔ **The condition of roads are in better condition in Urban areas than semi urban areas and Rural areas.**

Avg. Road condition rating in rural areas 2.67/5
Avg. Road condition rating in semi-urban areas 3.125/5
Avg. Road condition rating in urban areas 3.655/5
Road Rating :- Urban > Semi-Urban > Rural , so we can conclude that urban areas have better road conditions in comparison to semi urban areas and rural areas.

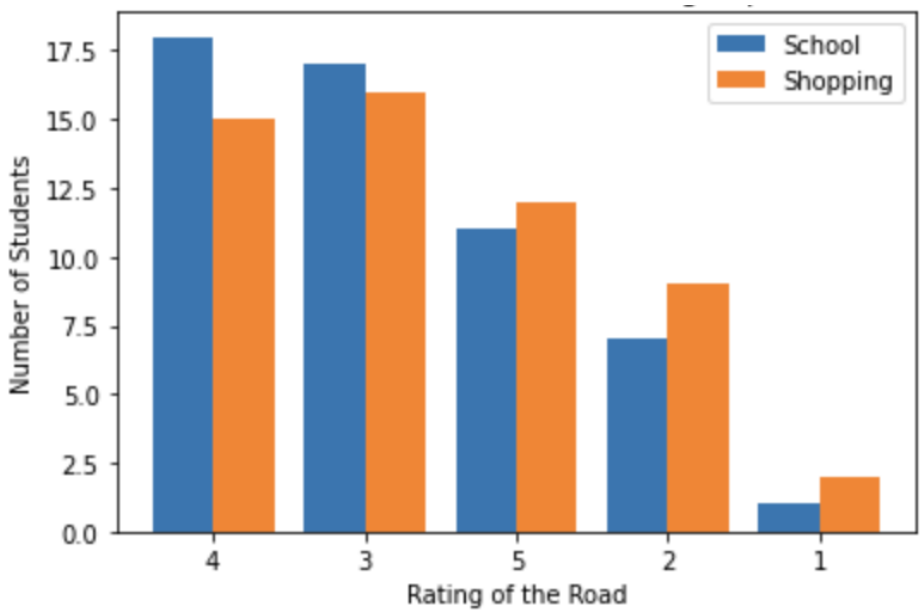


➔ **People tend to go in a group of 2 or 3 in school/college while these numbers increases to 4 while going to shopping**

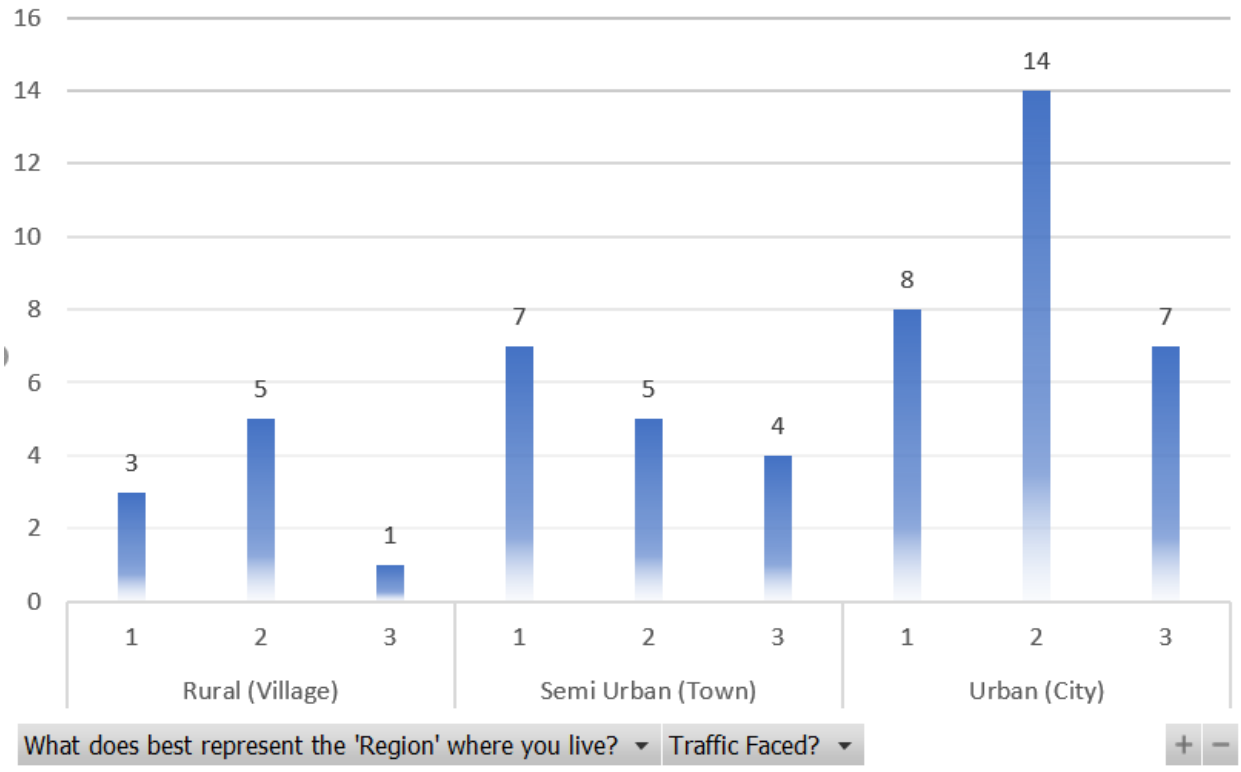
Avg no. of people in a group while going to school/college is 2.7(i.e 2 to 3)
Avg no. of people in a group while going to shopping is 4



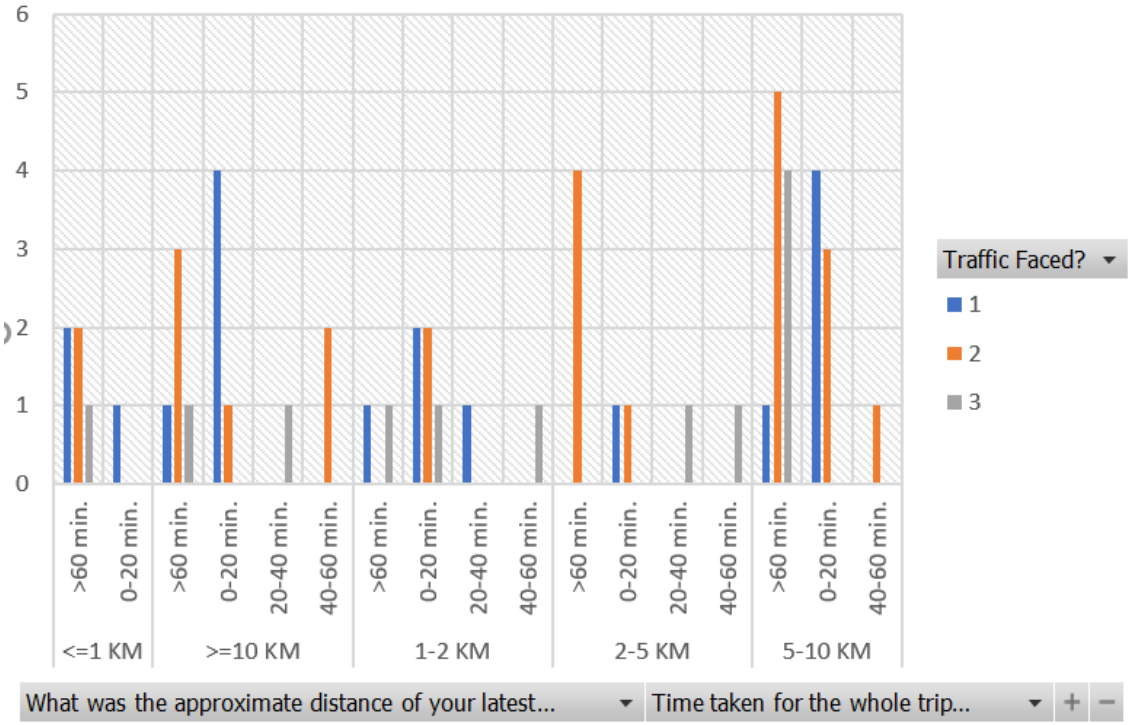
➔ **Most of the people have a satisfactory review about the quality of the road that they have taken as the average rating is greater than 3.5 out of 5**
Average rating of the road while going for college 3.57 out of 5 where 5 rating is for excellent condition of road
Average rating of the road while going for college 3.5 out of 5



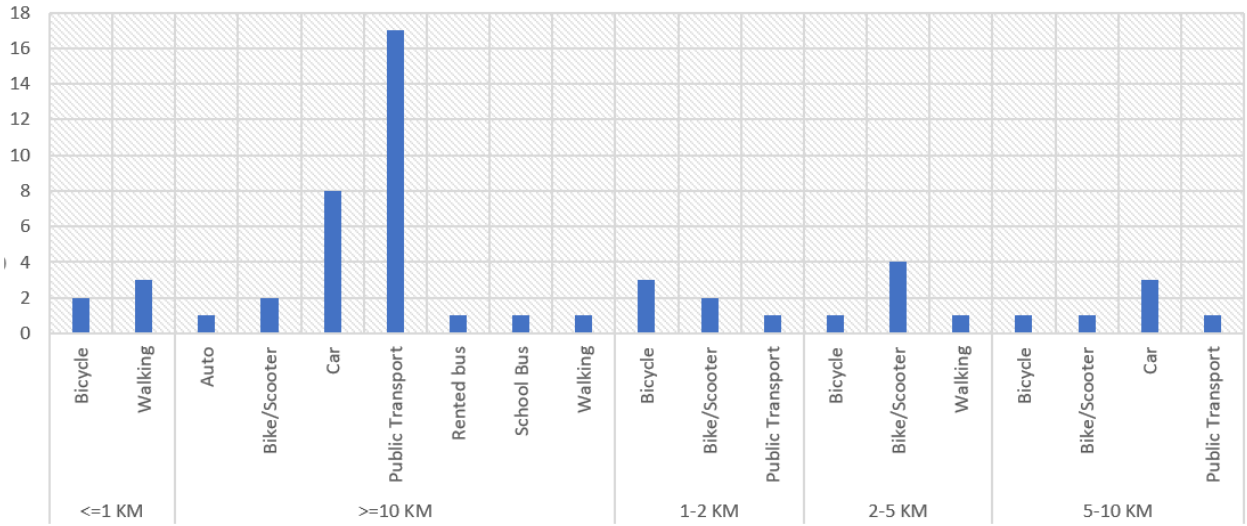
➔ **Traffic in rural areas(villages) is less than traffic in Semi Urban areas(towns) and Urban areas(cities)**
Avg traffic in Rural areas 1.77
Avg traffic in Semi Urban areas 1.81
Avg traffic in Urban areas 1.97



➔ **Generally time taken for a trip is inversely proportional to traffic faced.**



➔ **Distance vs Transport : For larger distances people prefer public transport**
If people had to go for a distance greater than 10km 54.8% people prefer public transportation while 25.8% chose cars.



Conclusion:-

After creating a questionnaire we collected the data and analyzed it and after analyzing it we come to several conclusions like **Traffic Faced while going to school/college is slightly less than while going shopping , Shops are near to people in comparison to school/college , People with income more than 5 LPA or 10 LPA tend to have a motorized 4 wheeler , The condition of roads are in better condition in Urban areas than semi urban areas and Rural areas , People tend to go in a group of 2 or 3 in school/college while these numbers increases to 4 while going to shopping , Most of the people have a satisfactory review about the quality of the road that they have taken as the average rating is greater than 3.5 out of 5 , Traffic in rural areas(villages) is less than traffic in Semi Urban areas(towns) and Urban areas(cities) , Generally time taken for a trip is inversely proportional to traffic faced and For larger distances people prefer public transport.**

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