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How Has Covid-19 Impacted Mobility Preferences?

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Abstract: Background: COVID19 has slowed down businesses, changed consumer behaviour, and shifted regulatory trends, bringing public life to a halt. It has had a substantial influence on mobility, as public transportation ridership has decreased and vehicle sales have decreased.
As a result, the goal of this research is to determine whether there has been a shift in mobility preferences. Because discretionary users are more prone to demonstrate shifts, the focus of this report is on them.
Methods: Potential respondents were sent a questionnaire with themes related to pre and post COVID travel choices, reduced trip frequency, and perceptions of various transportation modes via WRI's social media page and email. (n= 229)
Limitations: Due to travel restrictions, the survey had to be conducted online. The sample is, hence, skewed towards high income, and salaried employees.
Results: We ran Chi-square tests to identify relationships between travel preferences and age, gender, and income. The tests didn't reveal any major correlation. However, linkages were found between age and perception of autorickshaws, and taxis. The inclination to use public transport was similarly linked to age.

I. RESPONDENTS

A. Who are Choice users?

People with automobiles have historically been defined as discretionary users, often known as choice users. Captive users, on the other hand, are those who rely on public transportation.
A choice user has the option of driving or taking public transportation. A captive user, on the other hand, can only use public transportation.
Potential mobility could be used as a metric for comparing the edge choice users have over captive customers. While mobility can be defined as the ability to move from point A to point B, *potential mobility* refers to the knowledge of being able to move from point A to point B with ease.
Captive users have fewer options for movement than choice users. The asset ownership patterns of millennials have shifted. They don't buy cars even if they have the financial means to do so.
The scope of *potential mobility* has widened as a result of this transition. People do not need to buy cars in order to afford a car journey.
As a result, choice users should be characterised in light of their prospective mobility. A car owner has more discretionary power than a high earner who does not own a car but can afford to book an Uber, and Uber passengers have more discretionary power than someone who can only take the bus. Choice users, to put it another way, are those who have more options for getting from point A to point B.

B. Why should Choice users be studied?

Choice users are more likely to report changes in mobility habits since they have more options. Despite the perceived concerns, captive consumers do not have the options to change their mobility choices. As a result, studying choice users reveals a clearer picture of shifting mobility choices.

C. Respondent Characteristics

The survey received 229 responses. The average age of the respondents is 32 years, while their average annual income in 11,00,000 INR per annum, average annual income of India is 1,44,564 INR[1].53.6% of the respondents were male, while 45.5% of the respondents were female. 65% of the respondents were salaried employees, and 54.5% used to commute daily.

[1] World Data (dot) Info: https://www.worlddata.info/average-income.php

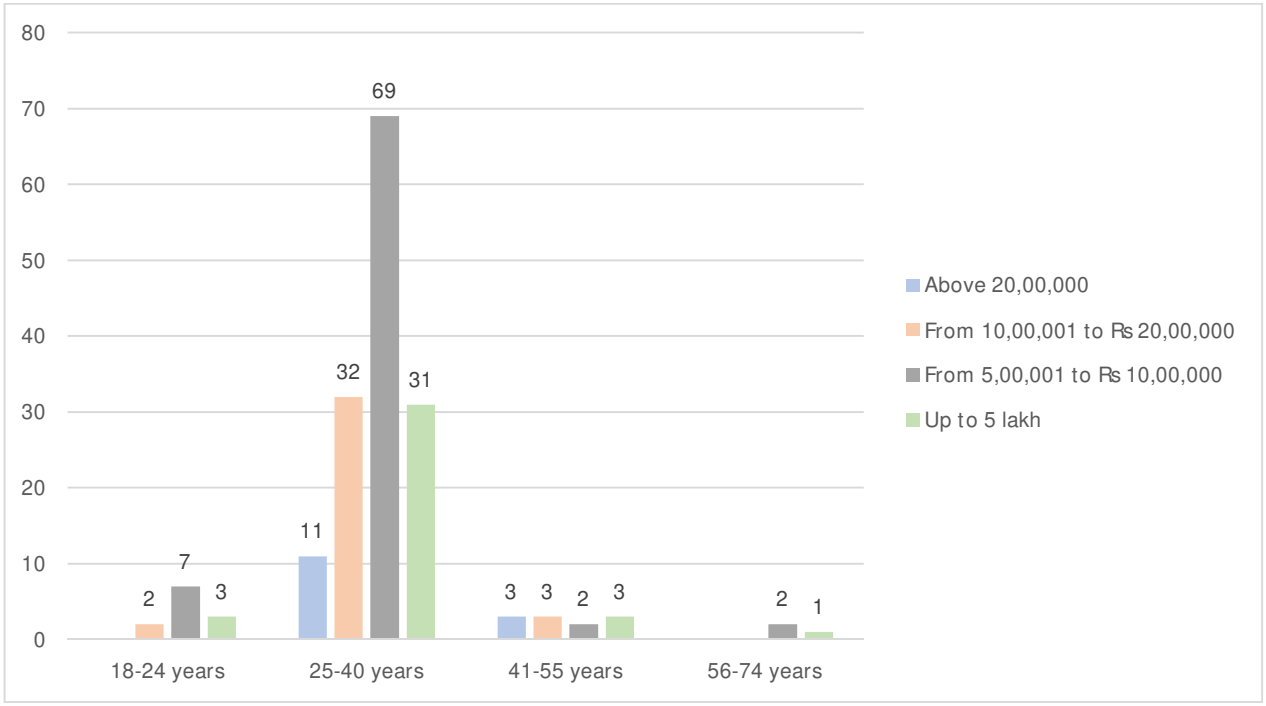


Figure 1 Respondents' age and income

169 respondents chose to share their income in the survey. 47% of the respondents earn between 5,00,000 to 10,00,000 INR per annum, 22.5% make up to 5,00,000 INR per annum, 21.8% make between 10,00,000 to 20,00,000 INR per annum, and 8.3% earn more than 20,00,000 INR per annum. 40% of the respondents earn between 5,00,000 to 10,00,000 INR per annum and are between 25 to 40 years of age.

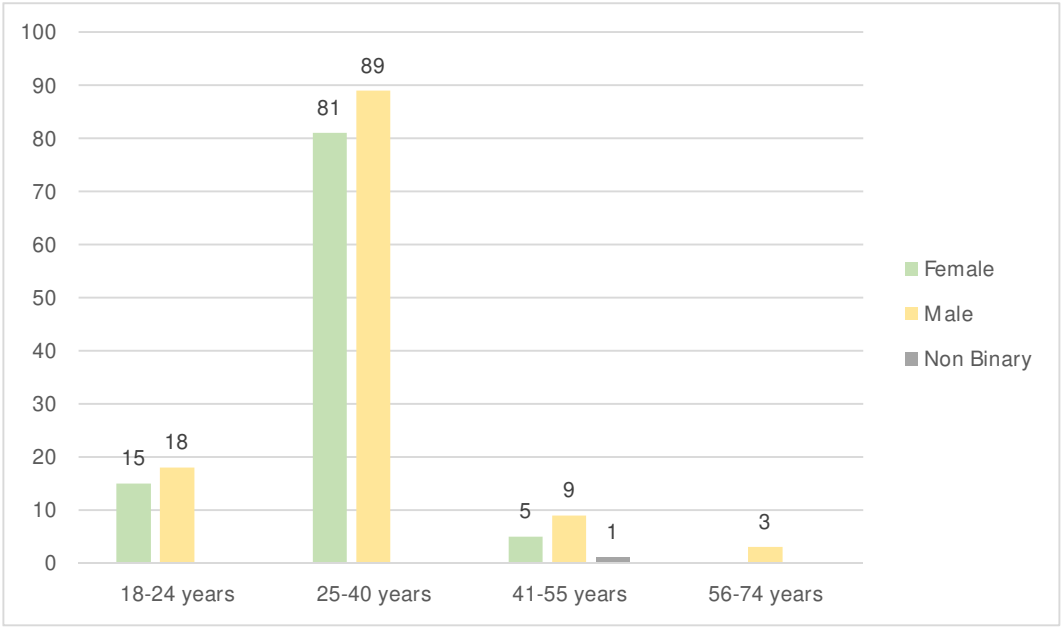


Figure 2 Respondents' age and gender

221 respondents chose to share their gender in the survey. 101 identified as female, 119 as male, and 1 as non-binary. 40.3% respondents identified as male and are between 25-40 years of age, and 36.7% respondents identified as female and are between 25-40 years of age.

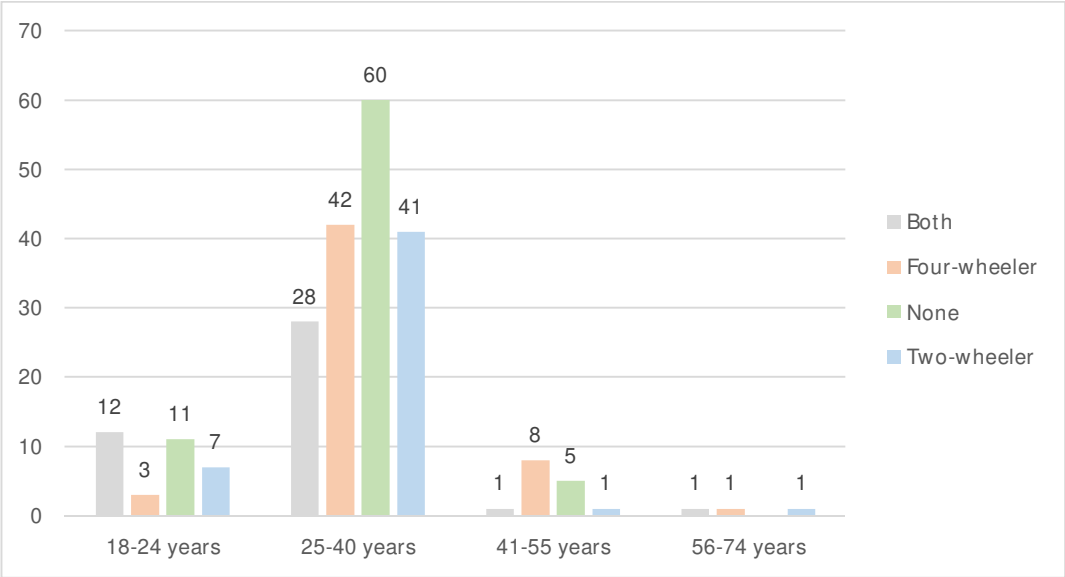


Figure 3 Vehicle ownership pattern by age

222 respondents chose to share their vehicle ownership details in the survey. 34% of the respondents owned neither cars nor two-wheelers, 24% owned cars, 22.5% owned two-wheelers, and 18.9% owned both cars and two-wheelers. Curiously, 36.4% of the respondents aged between 18-24 years own both two-wheelers and cars, while 35% of the respondents aged between 25 – 40 years own none.

II. RESULT

A. *Would COVID impact your mobility choices?*

223 respondents shared whether COVID would have an impact on their preferred mode for commute. A whopping 83% reported that COVID would change the way they commute. While the shift bears bad news for public transport, it brings hope for active mobility. The mode split of bicycle has increased from 0.54% to 8.15%. Public Transport modes like buses, suburban trains and metro trains saw lower preference. The preference for private cars also increased from 21.83% to 41.3%. Interestingly, the preference for two-wheelers remained unchanged.

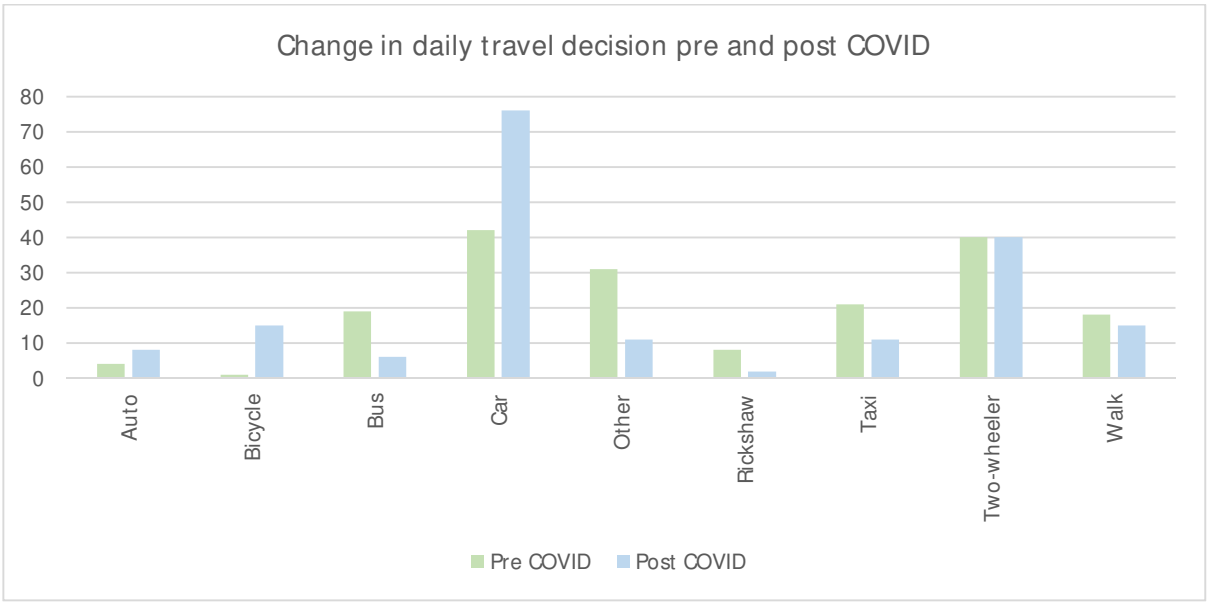


Figure 4 Change in daily travel decisions before and after COVID

The survey results are consistent with the mobility patterns of India. Hero Motocorp recorded its highest ever sales in October 2020, indicating that the demand for two-wheelers unaffected by the virus. Demand for entry level cars increased while the demand for premium cars remained low, indicating a shift from other modes. On the other hand, bus ridership slipped from 32,26,000 in March 2020 to 13,36,500 in August 2020, and Metro ridership plummeted from 57,00,000 pre-COVID to 10,00,000 post COVID.

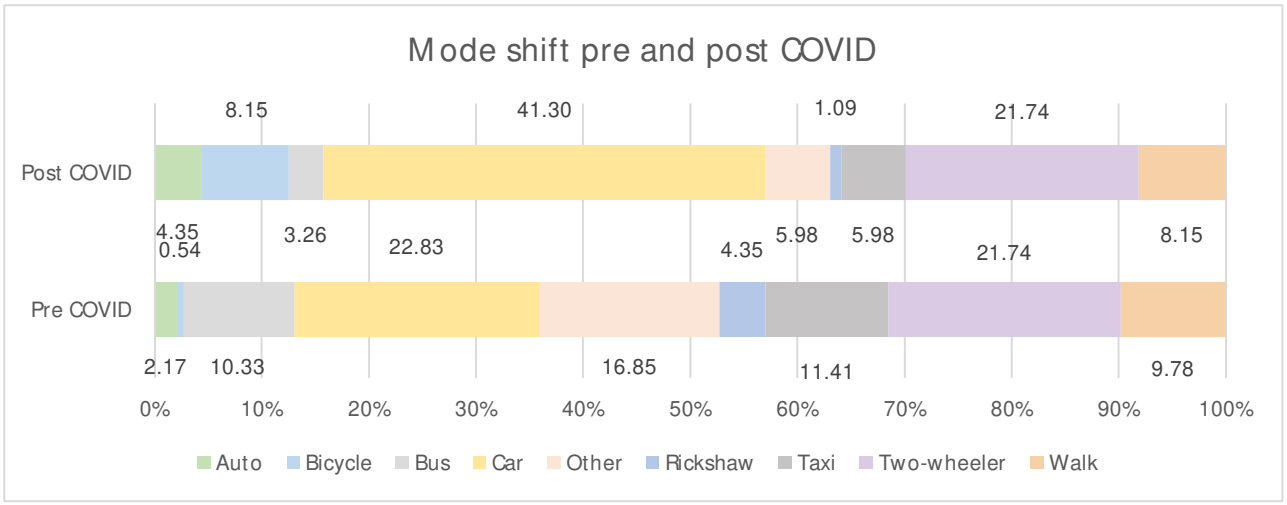


Figure 5 Shift in mode preference before and after COVID

B. Buying vehicle in COVID times – with decision drivers

The increased sales in two-wheelers and entry level cars indicates a shift towards private vehicles. The respondents were asked if they have bought a car or a two-wheeler in the preceding six months. 8.16% of the respondents had bought a new vehicle. Out of the respondents who bought new vehicles, 58.33% bought cars, while 41.66% bought two-wheelers. They were also asked the reasons for buying the vehicles. The respondents could choose multiple options. Affordability was the most chosen option.

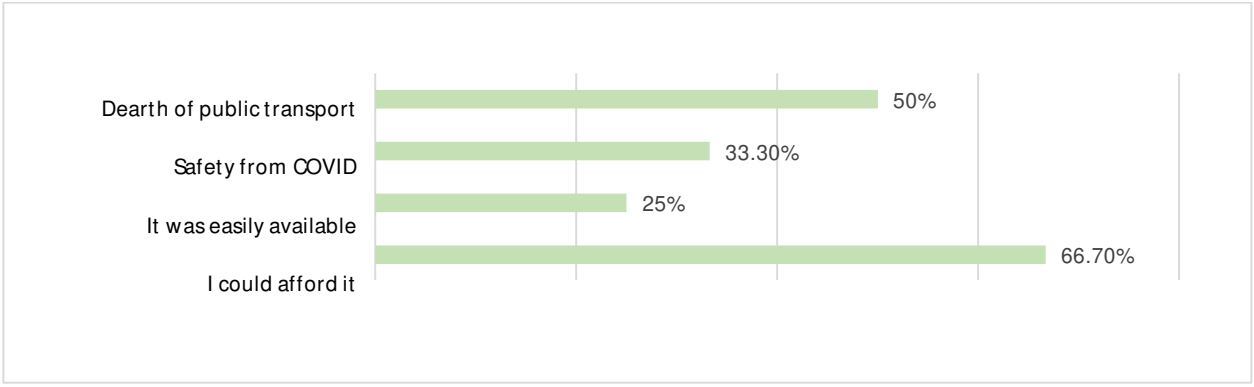


Figure 6 Reasons cited by the respondents for purchasing a new motorized vehicle during COVID

C. Relinquishing the Need to Travel

India observed a national lockdown in the first three months of COVID. The lockdown taught people to cook their own meals and order their groceries online; it taught neighborhoods to become self-sufficient to curtail the spread of the virus. As a result, people discovered that they could access certain services online. Of the 224 respondents, 85.2% had shifted to accessing, services like bill payments and banking, online.

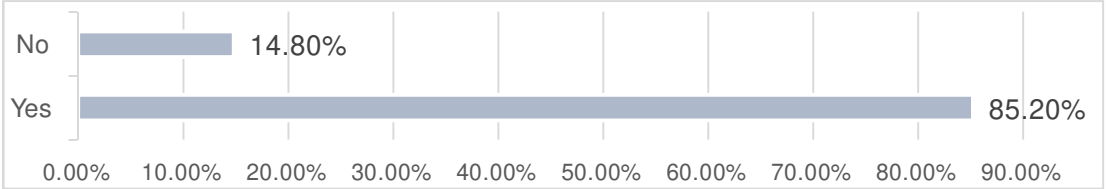


Figure 7 Shift to online modes for services such as bill payments and banking

However, the shift may not be permanent because 43.9% of the respondents shared that they would go back to accessing these services offline later.

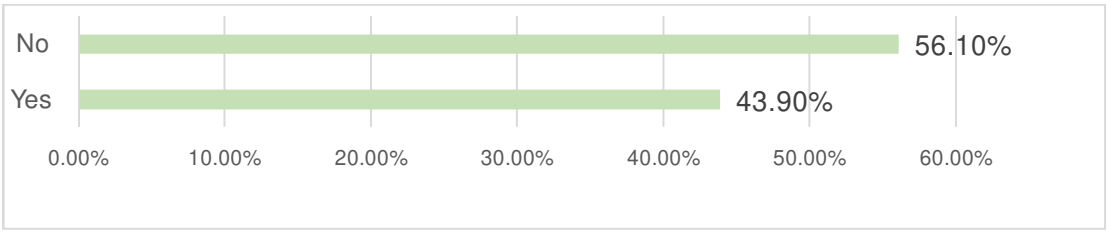


Figure 8 Willingness to move back to accessing certain services offline

D. Perception of Various Transport Modes

Respondents were asked to rate various modes of transport on a Likert scale, with 0 being extremely unsafe from the virus and 5 being extremely safe from the virus. The scores have been provided in Figure 9.

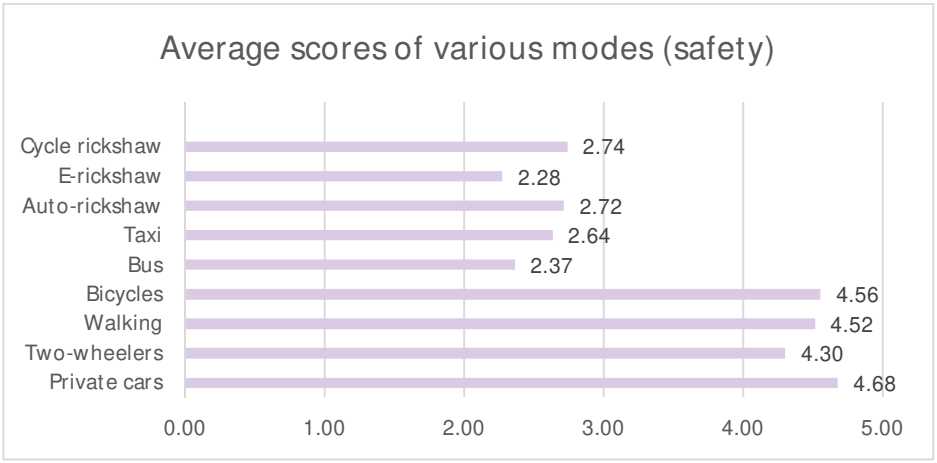


Figure 9 Average scores given by the respondents to various modes with respect to safety

E. Willingness to take the Public Transport

As explained in section 2.1, mobility preferences have seen a shift from public transport to cars. Respondents were asked if they would be willing to take the public transport if COVID safety protocols are adhered to. 61% of the respondents said they would be willing to take the public transport if COVID safety protocols are followed. Figure 10 shows the mode split of people willing to take the public transport if the safety protocols are adhered to. 24.09% of them were metro-loyalists, 10.22% take the bus regularly. Interestingly, 13.14% of the users own cars.

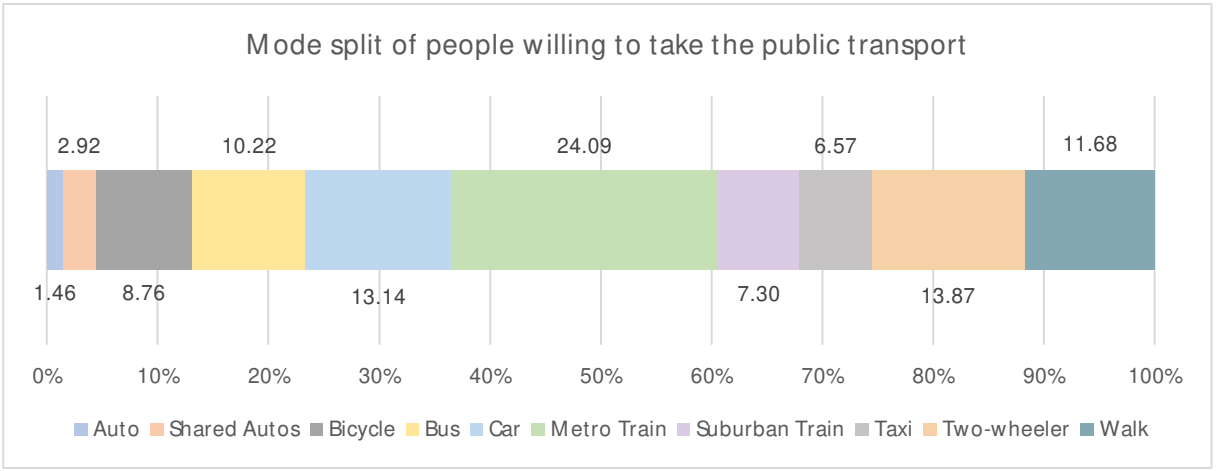


Figure 10 Modal split of the respondents who are willing to take the public transport if COVID safety protocols are followed

F. Openness to use shared/rental vehicles, such as zoom car, mobycy, yulu, vogo

The spread of the virus can be curtailed by sanitizing surfaces or maintaining a safe distance from a potentially infected person. It is, thus, pertinent to ask if people saw driver as a bigger threat or the vehicle. Respondents were asked if they would consider micro-mobility apps or rented vehicles and only 34.8% said no.

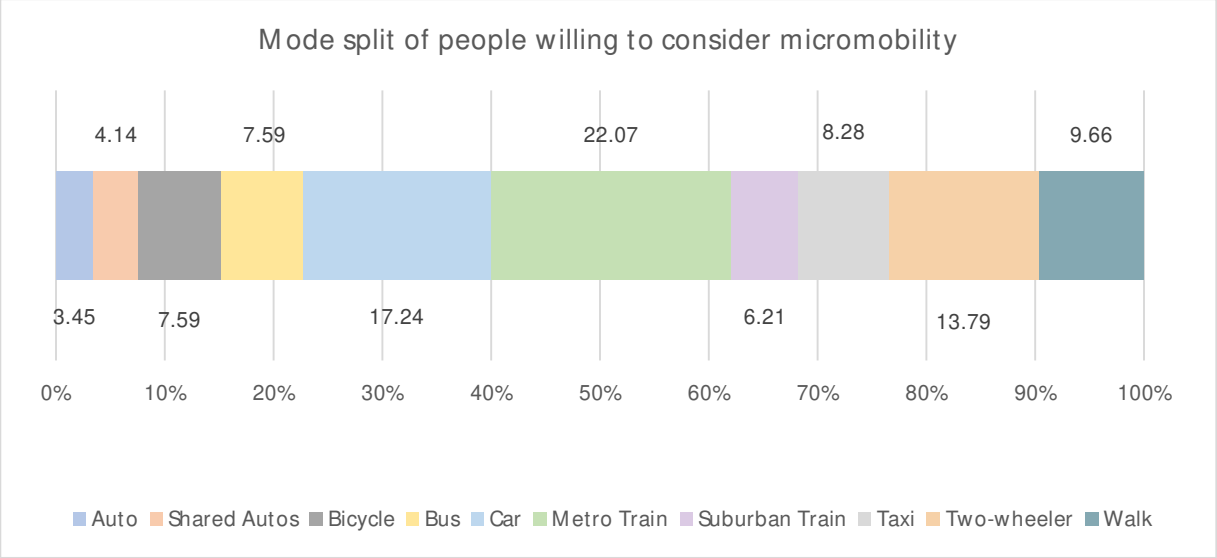


Figure 11Modal split of the respondents who are willing to consider micromobility, like YULU, Vogo, Lime, Bird etc

III. ANALYSIS

We further analyzed the safety rankings an openness to taking the public transport, with respect to age, gender, and income of the respondents. We ran Chi-square tests to identify correlation between the scores awarded to the various modes of transport and age, gender, and income.

A. Attitude Towards Transport Modes by Age

Table 1 presents the relationship between age and scores provided to the different modes. We found that age influence attitudes towards taxis and autos.

Transport Mode	P Value	Inference
Private Cars	0.96	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Two-wheelers	0.46	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Walking	0.64	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Bicycle	0.22	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Bus	0.67	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Taxi	0.017	With $\alpha = 0.05$, the null hypothesis can be rejected
Auto-rickshaw	0.022	With $\alpha = 0.05$, the null hypothesis can be rejected
E-rickshaw	0.40	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Cycle-rickshaw	0.37	With $\alpha = 0.05$, the null hypothesis cannot be rejected

Table 1 Results of Chi square test, with age and scores of various modes

B. Attitude Towards Transport Modes By Gender

Table 2 presents the p-values generated by running the Chi-square test on gender and scores provided to the different modes. No correlation was observed between the two.

Transport Mode	P Value	Inference
Private Cars	0.19	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Two-wheelers	0.28	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Walking	0.31	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Bicycle	0.19	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Bus	0.40	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Taxi	0.42	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Auto-rickshaw	0.71	With $\alpha = 0.05$, the null hypothesis cannot be rejected
E-rickshaw	0.51	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Cycle-rickshaw	0.24	With $\alpha = 0.05$, the null hypothesis cannot be rejected

Table 2 Results of Chi square test, with gender and scores of various modes

C. Attitude Towards Transport Modes by Income

Table 3 presents the p-values generated by running the Chi-square test on income and scores provided to the different modes. No correlation was observed between the two.

Transport Mode	P Value	Inference
Private Cars	0.19	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Two-wheelers	0.25	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Walking	0.93	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Bicycle	0.66	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Bus	0.97	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Taxi	0.98	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Auto-rickshaw	0.86	With $\alpha = 0.05$, the null hypothesis cannot be rejected
E-rickshaw	0.15	With $\alpha = 0.05$, the null hypothesis cannot be rejected
Cycle-rickshaw	0.34	With $\alpha = 0.05$, the null hypothesis cannot be rejected

Table 3 Results of Chi square test, with income and scores of various modes

D. Willingness to take the public transport by age

We further investigated the relationship between the willingness to take public transport and age and found that P value = 0.03; With $\alpha = 0.05$, the null hypothesis can be rejected. Willingness to take the public transport is correlated with age.

E. Willingness to take the public transport by gender

We also investigated the relationship between the willingness to take public transport and gender and found that P value = 0.40; With $\alpha = 0.05$, the null hypothesis cannot be rejected. No correlation was observed between the two.

F. Willingness To Take The Public Transport By Income

Finally, we investigated the relationship between the willingness to take public transport and income levels and found that P value = 0.15; With $\alpha = 0.05$, the null hypothesis cannot be rejected. No correlation was found between income levels and the willingness to take the public transport.

IV. CONCLUSION

According to the survey, respondents envision themselves shifting their mobility preferences from metro railways, suburban trains, and buses to cars and bicycles. During the six months leading up to the poll, some respondents had already purchased a personal automobile. Respondents also mentioned that they may use the internet to get some services. The changeover, however, may not be permanent, since nearly half of them will return to using the services offline when it is safe to do so. Cars, bicycles, and walking were deemed the safest modes of transportation, whereas E-rickshaws and buses were deemed dangerous, suggesting a preference for personal mobility. However, shared mobility in the form of rental automobiles or micromobility may still be appreciated.

Attitudes for shared mobility were found to be associated to age. The scores given to taxis and vehicles were shown to be connected with age, demonstrating that millennials prefer not to own assets but to use services. It was also found that age was linked with the willingness to take the public transport if COVID safety protocols were adhered to.

ANNEXURES

Questionnaire: Impact of COVID-19 on mobility preferences

With restricted mobility and disrupted supply chains, COVID-19 is a black swan event whose impact spreads far and wide. Through this quick survey, we want to find out how transport choices have changed due to COVID-19.

What is your age?

- Less than 18 years
- 18-24 years
- 25-40 years
- 41-55 years
- 56-74 years
- More than 74 years

What is your gender?

- Male
- Female
- Non Binary
- Prefer not to say

What is your employment status?

- Salaried employee
- Self-employed / Business
- Unemployed
- Student
- Retired

Please share your gross annual income

- Up to 5 lakh
- From 5,00,001 to Rs 10,00,000
- From 10,00,001 to Rs 20,00,000
- Above 20,00,000
- Not Applicable

What was your primary mode of transport (for work/business/school) pre-COVID?

- Metro
- Taxi
- Bus
- Private Car
- 2 wheeler

- Shared autos
- Bicycle
- Walk
- Other:
- [ ]

What was the frequency of your commute for the primary purposes pre-COVID?

- Once or twice a week
- 3-5 times per week
- Daily

Do you own a motor vehicle? If so, which vehicle do you own?

- Four-wheeler
- Two-wheeler
- Both
- None

Did you buy the motor vehicle in the last six months?

- Yes
- No

Which motor vehicle did you buy?

- Two-wheeler
- Four-wheeler

What drove you to a buy a motor vehicle? Check all that apply.

- Affordability
- Easy availability of loans
- Safety from catching the virus
- Absence of pubic transport

Would COVID have any impact on your daily travel decisions?

- Yes
- No

Which will be your preferred mode of commute for primary trip-purpose post-COVID?

- Car
- Two-wheeler
- Walk
- Bicycle
- Bus
- Taxi
- Auto
- Rickshaw
- Other

Did you switch to accessing certain services, such as shopping, bill payments and banking, online?

- Yes
- No

Would you go back to accessing these services offline?

- Yes
- No

Would you consider taking public transport if COVID-safety guidelines are strictly followed?

- Yes
- No

Would you consider shared/ rental vehicles, such as zoom car, mobycy, vogo, if COVID safety protocols are followed?

- Yes
- No
- Maybe

Commuter perception - Please rate the following based on how safe they seem from the virus.

Private car

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

Two-wheelers

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

Walking

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

Bicycle[

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

Bus

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

Taxi

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

Auto-rickshaw

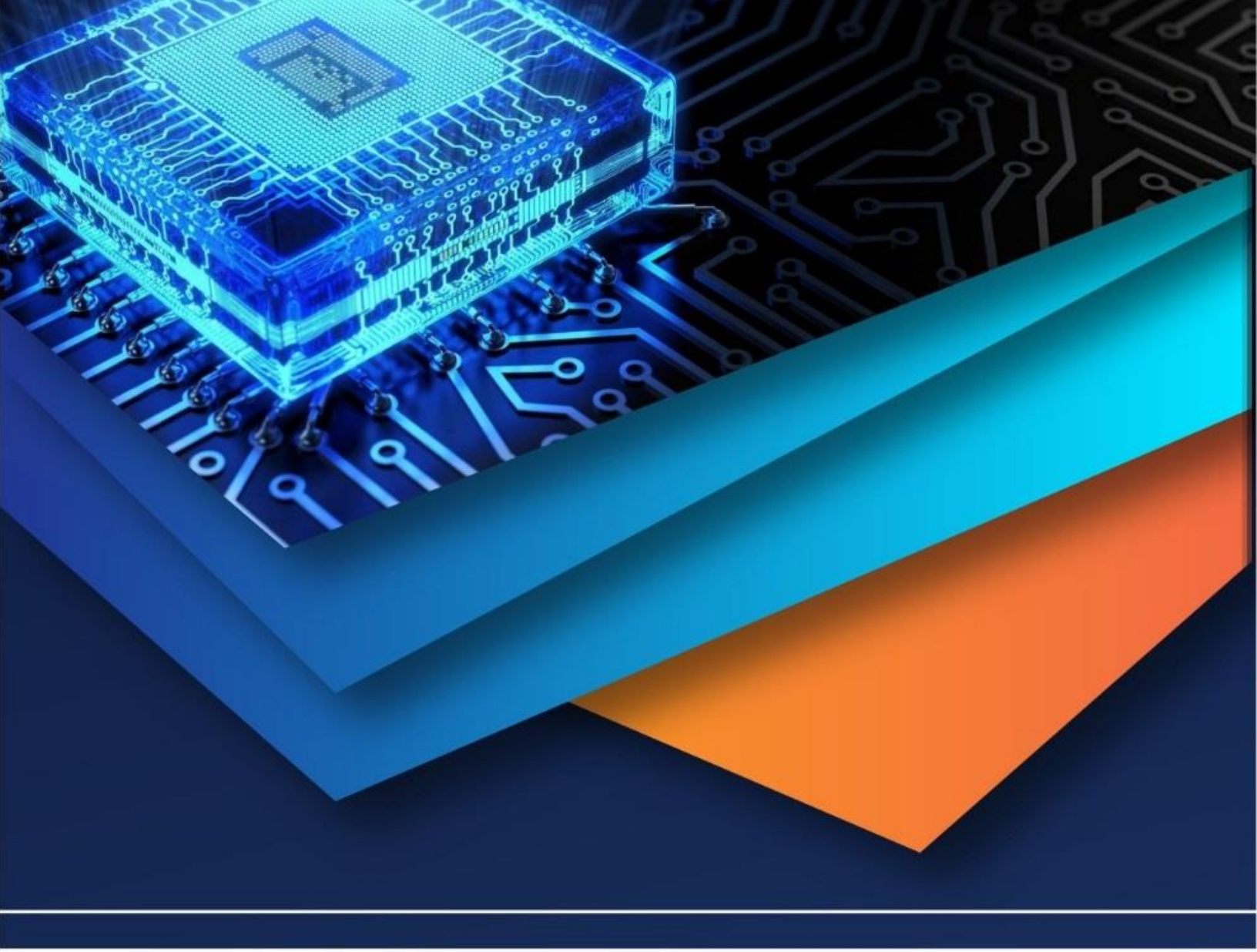
	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

E-rickshaw (shared)

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe

Cycle-rickshaw

	1	2	3	4	5	
Unsafe	◯	◯	◯	◯	◯	Safe



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