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Protocol

Are citizens of Delhi willing to stop using private vehicles for their daily office commute in order to reduce air pollution and related ailments? A protocol for a contingent valuation study

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ABSTRACT

Background: Increased vehicular traffic is associated with higher levels of air and noise pollution which in turn causes high morbidity and mortality. Governments, including Delhi have invested high amounts in setting up and running public transport systems in order to rationalize road usage and limit vehicles on road. This study proposes to assess the willingness of the citizens to give up their private vehicles in favor of public transport and will provide specific policy recommendations.
Methods: This study will be conducted in Delhi/NCR along the Delhi metro route. A systematic review and cross-sectional community survey will be carried out to meet the study objectives. Data will be captured through computer aided personal interviews (CAPI) using contingent valuation methods (CVM). This study will provide information on the perceptions and attitudes of commuters towards the current public transport system and the economic value placed by them on private transportation and provide an estimate of the welfare gain associated with it. Specific objective wise outputs have been framed. This will be the first study using contingent valuation methods (CVM) in a similar setting in India.
Conclusions: The result will provide an evaluation of the public transport system of Delhi NCR from a user perspective. The willingness to pay values will provide a monetary value to the health benefits arising from shift from private to public modes of transport along with workable models of interventions for policy makers.

Keywords: Air and noise pollution, Contingent valuation, COVID-19, Outdoor pollution, Willingness to pay

INTRODUCTION

The present era of rapid urbanization and modernization comes with the challenge of maintaining air quality for which multi-faceted approaches aimed at various stakeholder groups including public health interventions and effective governance are required. Based on the live air quality and pollution city ranking by IQAir, Delhi remains the most polluted city in the world (as of March 2022).[1] Air pollution poses a greater environmental concern not only in terms of climate change but also the increased risk of morbidity and mortality associated with it and its impact on public as well as individual health. The World Health Organization (WHO) has stated that many adverse health outcomes are a result of exposure to air pollution such as cardiovascular diseases, respiratory infections and lung cancer. The fine particulate matter (PM2.5) particles have been referred to as the most harmful pollutants as they can be easily inhaled into the airways due to their microscopic size, resulting in premature mortality.[1,2]

The increased vehicular traffic congestion in the metropolitan cities and the inefficient modes of transport

are a major cause of air/noise pollution, road traffic accidents and productivity loss due to longer commutes. By reducing the number of vehicles on the roads, traffic related air pollution can be effectively controlled. The governments can make efforts to develop sustainable transport in the cities to reduce air pollution.[1] Encouraging the use of public transport can prove to be a significant intervention in reducing vehicular congestion and air pollution consequently. To assess the impacts of environmental sustainability and valuing air quality improvements including health impacts of air pollution, the contingent valuation (CV) methods have been used widely.[3] A similar study in Malaysia led to important policy interventions.[3]

COVID-19, air pollution and transport

However, the COVID-19 pandemic has impacted the use of public transport over the last two years, it has resulted in various restrictions worldwide including lockdowns and reduced mobility within the cities, impact on economy, remote working wherever possible and changes in the human behavior.[4-6] It has been reported that the imposition of lockdown measures led to certain environmental health improvements and a healthier air in 2020. This has also been referred to as an "unprecedented air quality experiment" as the pandemic led to dramatic changes in human behavior and improved air quality.[2] The spread of deadly coronavirus made people with already prolonged exposure to air pollution, more vulnerable to health risks such as increase in comorbidities, increased susceptibility to the virus transmission and compromised immunity.[2]

The outbreak of COVID-19 virus affected the public transport system in an unexpected way, globally as well as nationally, though, there is limited research available in detail regarding the same. Sahraei et al, examined the public transit usage and air quality during the pandemic in 12 countries. They reported that with lockdown restrictions and social distancing measures in place, the public transport system was negatively affected, whereas, the ambient air quality was certainly enhanced during this period.[4] Another study by Singh et al, assessed the impact of lockdown on air quality in India and reported that the big cities like Delhi, Mumbai, Kolkata, Chennai and Hyderabad observed a remarkable decline in PM2.5 and improved air quality.[5] Marra et al, carried out a long-term tracking study in an urban area of Switzerland which aimed at observing the effect of pandemic on the travel behavior of people and their preferred modes of transport and route of choice. It was mentioned that the perception of people regarding the use of public transport being unsafe in terms of avoiding the spread of COVID-19, strongly affected the mobility in the world.[6] This study also highlighted that a shift to private modes of transport was observed during the pandemic and its prevalence can have negative consequences post-pandemic in terms of increased traffic congestion and pollution.[6]

The above-mentioned facts underline the importance of implementing adequate policy measures in the current times to make the public transport safer and more attractive for use by the general population of a country. Therefore, this study will also take into account the context of pandemic and the use of public transport by the citizens. Such an input will seek and attract the attention of Government of India on the stringent management of vehicular pollution for the improvement in air quality and in turn influencing the overall public health in India.

Study aim

The study aims to assess the willingness of citizens of Delhi to stop using private modes of transport for their daily commute to office in favor of public transport instead and the monetary value that they attach to their ability to continue using private transport.

Study objectives

The study objectives are: to summarize the evidence on contingent valuation studies identifying the willingness to pay (WTP) or willingness to Accept (WTA) of private vehicle users to continue to use private transport modes or shift to public transport respectively. To assess the attitude and perceptions of private vehicle users in Delhi on the current public transport system, air pollution in Delhi and related morbidities. To assess the willingness of private vehicle users to shift to public transport for their daily commute to office and determinants thereof. To assess the willingness to pay of private vehicle users to continue using their private vehicles for their daily commute to office and associated welfare gain. To assess the impact of the COVID-19 pandemic in influencing citizens' choice of preferred mode of transport.

METHODS

The study will be conducted from January 2022 to December 2024. This section encloses the specific methods designed to meet the study objectives.

Systematic review

A systematic review will be conducted to meet the first study objective. An exhaustive search of databases will be done to obtain the articles for the review based on carefully identified search terms and inclusion criteria. Although the emphasis of this study is India, the review will be extended to include low and lower middle-income countries due to scarce published contingent valuation studies in India. A narrative synthesis will be done to extract and synthesize information from the articles. The review will follow Cochrane guidelines and the protocol has been registered on PROSPERO. No meta-analysis in terms of quantitative results will be performed. Further, detailed assessment of quality of

selected studies using accepted standards will also be done.

Community survey

A cross-sectional community survey will be conducted to meet the remaining study objectives.

Study setting and population

Delhi, officially known as the National Capital Territory (NCT) of Delhi, is the capital and also the largest metropolitan city in India. According to the estimates of World Population Review, the current population of Delhi in 2022 is 32,065,760.[7] The administrative division of Delhi comprises of nine districts.[8] The National Capital Region (NCR), which has been planned and centered around National Capital Territory (NCT) of Delhi, comprises of Delhi and its boundaries shared by several districts from the neighboring states of Haryana, Uttar Pradesh and Rajasthan.

The study would be conducted in the State of Delhi and NCR along the Delhi metro route. The study population will be selected from the four zones of Delhi- Zone 1 (North Delhi), Zone 2 (South Delhi), Zone 3 (East Delhi) and Zone 4 (New Delhi + NCR).

The study population comprises of an adult of any gender in the working age group of 25-60 years, residing in a house within 3 km radius of the metro station, having at least one vehicle and using their own vehicle for daily office commute.

Sample size and sampling

The willingness to pay is the primary outcome variable considering which the sample size has been estimated. The sample size was calculated using the nMaster 2.0 software by assuming a 50% proportion of willingness to pay and considering 95% confidence level and 5% precision. The required sample size for community survey after incorporating 10% non-response and a design effect of 2, is thus estimated as 888 eligible household (HHs) approximately. For the selection of households, a multistage sampling plan has been followed. The Delhi metro map of each zone will be taken into consideration. In the first stage, a random selection of 8 clusters in the form of metro stations has been done from zone 1, 2 and 3. A cluster of 12 metro stations has been selected from zone 4 in order to have equal representation from Delhi NCR as well. From each of the selected metro station approximately 27 eligible HHs, residing within 3 Km of the metro station will be systematically selected to achieve the target sample size. This selection will be done immediately before the data collection. This makes a total of 216 eligible HHs from zone 1, 2 and 3 and 240 HHs from zone 4. Figure 1 shows the schematic representation of the sampling design.

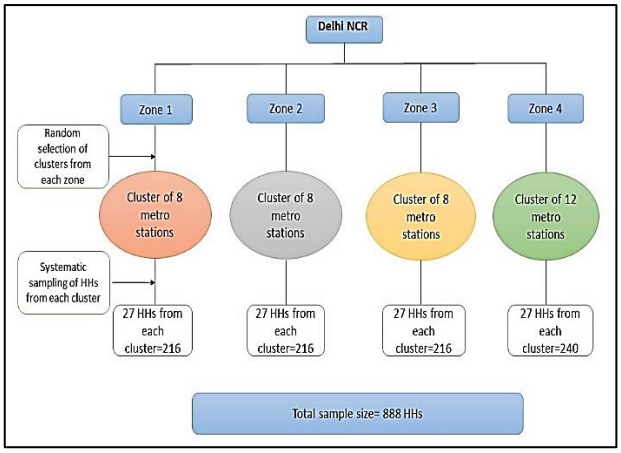

Figure 1: Schematic representation of sampling design.

Data collection

Face to face interviews will be conducted and the data will be captured electronically to minimize errors and facilitate data analysis. Required information for the study will be captured through community based cross-sectional survey using the questionnaire. The study tool has various sections including socio-demographic details, perception on pollution and related issues, perception on public transport in Delhi, health related information, daily commute for work related information and contingent scenario (Annexure 1). The attitudes and behaviors of respondents towards pollution and their choice of transport mode will be measured with respect to environmental impact using questions on a Likert scale. Open-ended questions will be used to identify specific barriers to the use of public transport.

For the purpose of collecting information on willingness to give up private transport, a contingent scenario of improved air quality and benefits to health and well-being will be presented to the respondents. They will be asked for their willingness to give up the use of private transport for their daily office commute and use the public transport instead, if the improvements described in the contingent situation apply. The COVID-19 pandemic situation and the resultant implications for public transport will be built into the contingent scenario. This would be necessary to avoid the results being biased by the pandemic situation.

The willingness to pay (WTP) is an extremely important information from the policy point of view. The WTP measures provide a direct method to value impacts. Willingness to pay will be examined by a close ended single bounded dichotomous choice question, commonly referred to as 'take it or leave it' (TIOLI). The respondent will be asked whether he or she is willing to pay a certain fixed amount to continue the use of private transport. This amount will be individually determined based on the current levels of spending of the respondent increased by a certain multiple. This will ensure that the current status-

quo of different participants are taken care of. The electronic data capture will be used to enable this level of customization.

The contingent scenario in the contingent valuation (CV) exercise will include the pandemic situation for examining the impact of COVID-19 pandemic. Respondents refusing to use public transport will be asked specific questions to ascertain whether they would be willing to shift in the absence of the pandemic.

Thorough training on data collection will be given to the investigators as explaining the contingent scenario is crucial for the study.

Pretesting and piloting

The tool has been pretested on a sample of thirty respondents. The questionnaire along with the contingent scenario was piloted and necessary changes were made to suit the actual data collection scenarios.

Data analysis plan

Data will be imported in the statistical software Stata 15.1 for the analysis. Descriptive statistics will be used to summarize the study participants. Perception of respondents on pollution and public transport in Delhi will be summarized using tabular and graphical methods. The willingness of private vehicle users to shift to public transport will be expressed in proportion. Logistic regression analysis will be performed to identify the determinants of willingness to give up private transport. Protest responses and incomplete interviews will be excluded from the analysis.

For willingness to pay, using the data of private vehicle owners, the welfare gain associated with the private vehicle use will be estimated.

The impact of pandemic will be assessed quantitatively by calculating the difference in proportion of respondents willing to shift to public transport with or without the pandemic. Same will be done for the difference in the willingness to pay amount.

Ethical approval

The study has been approved by the Institutional Ethics Committee of the Indian Institute of Public Health Delhi (IIPHD), under the aegis of the Public Health Foundation of India (IIPHD_IEC_04_2021). The study will follow standard best practices for research ethics. A participant information sheet (PIS) will be provided to every respondent explaining the research in simple language. Signed consent will be obtained and no personal identifiers will be recorded. Data will be stored in the IIPH-D research repository with access limited to the principal investigator.

RESULTS

Contingent valuation method (CVM) studies have been extensively used to value air quality improvements in monetary terms. No such study has been conducted in India in this domain as of now. This study would meet an important research gap in India. CVM studies have also been used in some countries to assess the willingness of private vehicle users to shift to public transport and the WTP associated with their decision.

The following are the specific objective wise expected outputs of the proposal:

Objective 1

The narrative synthesis of the selected studies in the systematic review would provide important information such as country/region/location, description of methods used, results, determinants of willingness to pay, and different biases.

Objective 2

The current attitude and the perception of the target population regarding the public transport system determines the use of public transport promoted by any intervention. Based on this information the interventions and communications need to be strategized. The expected outcomes would highlight the attitude of the respondents towards the public transport, their level of concern about air pollution, their perception on the efficiency of the public transport and the incidence of current health problems related to air pollution.

Objective 3

The output would include the proportion of respondents willing to give up the use of private transport, the reason for not willing to give up private transport and their attitude towards public transport.

Objective 4

This would include information on the mean willingness to pay to continue using private transport. The total welfare gain associated with the private vehicle use will be estimated based on the number of private vehicle users and presented by administrative regions. This would be important information for the policy makers which would also provide a basis for the cost-benefit analysis.

DISCUSSION

This study as a whole will provide information on the economic value placed by commuters on private transportation and provide an estimate of the welfare gain associated with it along with their perceptions and attitudes towards the current public transport system. It will also provide information on the possibility of new

interventions such as imposing additional fees/taxes on private vehicle use to encourage the use of public transport as well as indicate the optimum amount of such taxes/fees that will discourage the use of private vehicles. This is especially important in the Delhi national capital region given the huge amounts of investments in the Delhi metro and the feeder transport services across the city and suburbs. It will give important information on ways to engage with the citizens to reduce air pollution as well as policy recommendations to create incentives for using public transport as well as barriers to discourage the use of private transport. The following would be the short-term applications of the results of the study:

Development of specific interventions to improve the current status of public transport based on the current perceptions as indicated by the study. Development of specific interventions to improve perception and incentives to encourage use of public transport among the citizens. Uptake of measures to address the concerns of the citizens on the current status of public transport.

Long-term applications would be as follows:

Developing appropriate taxation/fee policy to discourage the use of private vehicles. Developing plan for the utilization of additional revenue from taxation to improve public transport or address the outdoor pollution issues in the National Capital Region of Delhi.

This study has some limitations. The study is being conducted in Delhi NCR which has a typical geo-political environment. Air pollution levels are influenced by multiple factors some of which have origins in neighbouring states. This might influence enumerator responses. The data collection will spread over at least six months. Air pollution levels change over seasons and that may also influence responses. Every city in India is unique and results from this study, being in one city, may not represent the entire country.

CONCLUSION

This is a novel study on multiple counts. This is the first contingent valuation study in this domain in India. The study will provide a validated tool for future researchers to explore further. This is also the first study that would record the perceptions of users for the mass transit systems in Delhi. The willingness to pay will provide a unique monetary valuation to health gains from shifting from private to public transport paving the way for future cost-benefit analysis. The study will provide definite pathways to policy makers not only to encourage the use of public transport but also to discourage the use of private transport.

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Conflict of interest: None declared
Ethical approval: The study has been approved by the Institutional Ethics Committee of the Indian Institute of Public Health Delhi (IIPHD), under the aegis of the Public Health Foundation of India (IIPHD_IEC_04_ 2021)

REFERENCES

1. Live Air Quality and Pollution City Ranking, IQAir; March 2022. Available at: https://www.iqair.com/in-en/world-air-quality-ranking. Accessed on 2 January 2022.
2. World Air Quality Report, IQAir; 2020.Available at: https://www.iqair.com/in-en/world-most-polluted-cities. Accessed on 2 January 2022.
3. Bazrbachi A, Sidique SF, Shamsudin MN, Radam A, Kaffashi S, Adam SU. Willingness to pay to improve air quality: A study of private vehicle owners in Klang Valley, Malaysia. J Clean Product. 2017;148:73-83.
4. Sahraei MA, Kuşkapan E, Çodur MY. Public transit usage and air quality index during the COVID-19 lockdown. J Environ Manage. 2021;286:112166.
5. Singh RP, Chauhan A. Impact of lockdown on air quality in India during COVID-19 pandemic. Air Qual Atmos Health. 2020;13(8):921-8.
6. Marra AD, Sun L, Corman F. The impact of COVID-19 pandemic on public transport usage and route choice: Evidences from a long-term tracking study in urban area. Transport Polic. 2022;116:258-68.
7. World Population Review, 2022. Available at: https://worldpopulationreview.com/world-cities/delhi-population. Accessed on 2 January 2022.
8. National Capital Region (India), National Capital Territory of Delhi; Wikipedia. Available at: https://en.wikipedia.org/wiki/National_Capital_Region_(India). Accessed on 2 January 2022.

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ANNEXURE-I

Questionnaire for the community survey

Are the citizens of Delhi willing to stop using private vehicles for their daily office commute in order to reduce air pollution and related ailments? - A protocol for a contingent valuation study				
			Enumerator Id:	
Participant screening				
1.	Do you or your family own at least 1 vehicle (two/four wheeler)			Yes/No
2.	What type of fuel is used in your vehicle?			
2.1.	Petrol			
2.2	Diesel			
2.3	CNG			
2.4	Electric Vehicle			
3.	Do you use your own vehicle for your daily office commute			Yes/No
4.	Consent obtained			Yes/No
If the respondent answers yes to the screening questions, proceed with informed consent, provide the PIS. Subsequently proceed with the interview				
Zone	Metro station	Locality	Respondent ID*	Date*
1 digit	2 digit	3 digit	3 digit	
				*to be auto-generated
Section 1- Perception on pollution Express your view on the following questions on a scale to 1 to 7. (1 would mean definitely not agree, 7 would mean definitely agree and, 8-does not know/not sure, 9-refuse to answer)				
SI.	**Question**			**Response**
1.1	Delhi NCR has a severe problem of air pollution			
1.2	Delhi NCR has a severe problem of sound pollution			
1.3	Vehicular traffic causes a significant part of the air pollution			
1.4	Vehicular traffic causes a significant part of the sound pollution			
1.5	Severe air pollution is associated with higher risks of			
1.5.1	Cardio Vascular Diseases (heart diseases)			
1.5.2	Chronic Obstructive Pulmonary Diseases (diseases of the lungs)			
1.5.3	Asthma			
1.5.4	Lung cancer			
1.6	Traffic related air pollution causes			
1.6.1	Lymphocytic leukemia (Blood cancer)			
1.6.2	Mental health disorder			
1.6.3	Reduced cognitive function in older men			
1.7	Increased vehicular traffic is related with			
1.7.1	Road traffic accidents			
1.7.2	Loss of productivity			
Attitude on Public Transport				
1.8	Reduction of vehicular traffic is key to reduce the pollution levels in Delhi NCR			
1.9	Reduction of the use of private vehicles and increasing use of public transport is important to reduce vehicular traffic			
1.10	What is your opinion on the overall status of public transport in Delhi currently? (Redefine scale from this ques- 1=very poor, 7= very good)			
1.11	We would want to know about your opinion on the different mass transit systems in Delhi NCR currently			
1.11.1	Bus service			
1.11.1.1	Efficiency			
1.11.1.2	Frequency			
1.11.1.3	Safety			
1.11.1.4	Overall impression			
1.11.2	Metro rail service			
1.11.2.1	Efficiency			
1.11.2.2	Frequency			
1.11.2.3	Safety			
1.11.2.4	Overall impression			

Continued.

SI.	Question	Response	
1.12	How good is the last mile connectivity in mass transit systems in Delhi NCR?		
1.13	What is your opinion on COVID safety and preparedness in the Delhi Metro service?		
1.14	What is your opinion on COVID safety and preparedness in the Delhi Bus service?		
Section 2- Diseases		Yes/No	No. of days of leave taken from work
SI.	**Question**	**Response**	
2.1	Did you suffer from any of the following conditions in the last 1 year?		
2.1.1	Cardio Vascular Diseases (heart diseases)		
2.1.2	Chronic Obstructive Pulmonary Diseases (diseases of the lungs)		
2.1.3	Asthma		
2.1.4	Breathing difficulty (non COVID-19)		
2.1.5	Burning eyes		
2.1.6	Hypertension		
2.1.7	Stress related disorders		
2.1.8	Road traffic accident		
2.1.9	Hearing impairment/issues		
2.1.10	COVID-19		
Section 3- Time & expenditure			
3.1	How many vehicles do you have in your household?		
3.1.1	No. of two wheelers		
3.1.2	No. of four wheelers		
3.2	Do you face traffic congestion while driving to office and/or back?	Yes/No	
3.3	How long does it take to drive to your office on an average day? (minutes)		
3.4	How long does it take to drive back from your office on an average day? (minutes)		
3.5	What is the estimated time loss that you suffer due to congestion while travelling to and back from the office on an average day? (minutes)		
3.6	Total commute time* (minutes)	3.3 + 3.4	
3.7	How far is your office from your home (km)		
3.8	Total commute distance*	3.7* 2	
3.9	Fuel consumption per day* (Avg. 12 km/Liter)	3.8/12	
3.10	Toll charges (one way) [INR]		
3.11	Total toll charges per day* [INR]	3.10*2	
3.12	Parking charges (daily) [INR]		
3.13	Total daily expense* [INR]	(3.9*Fuel price) +3.11+3.12	
3.14	How many days in a week do you go to the office?		
3.15	Total monthly expenses*[INR]	3.13*3.14*4	
3.16	Do you have easy access to public transport for your daily office commute?	Yes/No	
3.17	Did you use public transport for your daily commute before January 2020? (before COVID-19 pandemic)	Yes/No	
3.18	Calculated willingness to pay	3.15*0.5	
* The answers to the questions marked (*) will be automatically generated			
Section 4- Willingness to pay			

Contingent scenario: (presented as an infographic in form of a short video)
The following scenario will be presented as a presentation to the respondent on the tablet. Various pictures and graphics will be used to give information.

- Maintaining air quality is one of the biggest challenges in urban planning, public health and governance requiring multi-pronged approaches aimed at different stakeholder groups.
- According to Greenpeace estimates, thirty five out of fifty most polluted cities in the world are located in India.
- Delhi remains the most polluted capital in the world for a fourth consecutive year 2021. The National Capital Region of Delhi accounts for five of the top eleven most polluted cities in India.
- Air pollution has been associated with higher risks of cardiovascular diseases, chronic obstructive pulmonary disease, asthma and lung cancer.
- Prolonged exposure to traffic related air pollution has also been associated with higher risks of lymphocytic leukemia and mental health issues.

Continued.

- Ambient traffic related air pollution has been found to be associated with reduced cognitive function in older men.
- Increased vehicular traffic in big cities is a major cause of air/noise pollution, road traffic accidents and loss of productivity caused by longer commutes caused by traffic congestion.
- A graphical presentation of the AQI data for the area where the respondent is located. https://app.cpcbccr.com/AQI_India/ .Data will be presented for the week as well as historical data for the last 6 months. This will be possible as CAPI will be used. Relevant data can be downloaded for the area where data collection is being done.
- Traffic related air pollution can be significantly controlled by reducing the number of vehicles on the roads. Encouraging the use of public transport is one of the most important interventions aimed at reducing vehicular congestion and resultant air pollution.
- Governments across the world have heavily invested in the development of public transport systems and have looked for means of engaging with citizens to encourage the use of public transport.
- The Government of Delhi NCT has made huge investments in providing convenient, comfortable, regular, punctual, efficient, safe, reliable and eco-friendly public transport system. This includes
    - The Bus transit system run by the Delhi Transport Corporation (DTC) which includes a fleet of standard and low-floor CNG operated buses covering the entire Delhi NCR. The DTC has a fleet of 7000 buses which offer clean and technologically upgraded transport systems.
    - The Delhi metro services which are continually expanding to cover the entire Delhi NCR. The current operational network covers 391 km with 286 stations.
    - The Delhi metro has 12 functional lines which are spread all over the city.
    - Last mile connectivity is provided by various agencies including the DMRC. This includes
        - 174 MIDI, CNG non AC buses run on 32 routes by 2 operators
        - E rickshaw services at 17 metro stations
        - Cab aggregator services by UBER at 11 metro stations
        - Cab aggregator services available at 50 metro stations.
        - E-scooter services at 7 metro stations
        - Cycle sharing services at 40 metro stations
    - The Delhi Government has also provided the following services to improve last mile connectivity
        - Local E-rickshaw services
        - E-bike services within localities
        - Cycle sharing services within localities
- Once the complete masterplan of augmenting the public transport system in Delhi is complete the air quality of Delhi NCT is expected to significantly improve leading to improved health conditions and reduced morbidity of citizens.

SI.	Question	Response	
4.1	If what was shown in the video is true, are you willing to give up your private vehicle and use public transport for your daily office commute?	Yes/No/Don't know	If yes, go to 5.1. If No/Don't know, go to 4.2
4.2	Would a 50% discount on your current monthly travel cost be enough for you to shift to the public transport system? (the amount is displayed)	Yes/No/Don't know	The amount shown is 3.15*0.5 (3.18) If yes, go to 5.1. If No/Don't know, go to 4.3
4.3	Why are you not willing to shift to public transport even with a discount?	1. Inconvenient 2. Crowding 3. Time issues 4. COVID-19 5. Others (specify)	Yes/no Yes/no Yes/no Yes/no ---------
4.4	I understand that you would like to continue using your private vehicle for your daily commute to office. Now let us consider a situation where you are required to pay an additional amount of levy in the form of tax or any other payout to continue to use your private vehicle. Please understand that this is a hypothetical scenario and you are not required to pay anything now. -Would you be willing to pay an additional 50% over and above your monthly travel costs to keep using your car? -Will pay extra and continue using private transport	Yes/ No	display 3.18 If 4.4 is yes, then go to 4.5. If 4.4 is no, go to 4.4.1.
4.4.1	Will not pay extra and shift to public transport	Yes/No	If 4.4.1 is yes, go to 5.1. If 4.4.1 is no, go to 4.4.2.

Continued.

SI.	Question	Response	
4.4.2	As I understand, you will not pay extra and will continue using private transport. Is that correct?	Yes/ Don't know	If yes, go to 4.6. If don't know, go to 5.1
4.5	Why are you willing to pay extra to continue using private transport?		Go to 5.1.
4.6	Why will you not pay as well as not shift to public transport?		Go to 5.1
Section 5- Demographic information			
5.1	Sex	Male/Female/Others	
5.2	Age(in years)		
5.3	Living status	Staying alone Staying with relations	
5.4	Education	School (class 10) High school (10+2) Graduate Post graduate	
5.5	Employment status	Full time salaried Part time salaried Self employed	
5.6	How would you categorize your position in your organization?	Entry Level Mid- Level Senior Level	
5.7	No. of children		
5.8	Monthly Income		