Research Diary

Impact of Social Distancing due to Novel Coronavirus (Sars-cov-2) on daily travel for work during Transition to Lock Down
KID: 20200109

Summary
The outbreak of COVID-19 pandemic resulted in a change in both commute and personal travel patterns. Though in India, the lockdown was implemented from 25th March 2020, change in commuter behaviour was observed from the beginning of March due to self-awareness and pandemic fear. This study attempts to use decision tree approach to investigate the modal preference of 1542 commuters in association with socio-economic and travel characteristics, and safety perceptions with respect to public and private mode during the transition to lockdown due to COVID-19 (i.e., from 14th March 2020 to 24th March 22) in India. About 41% of commuters stopped travelling during the transition phase, 51.3% were still using the same mode of transport and 5.3% commuters shifted from public to private mode. The study findings revealed the various interactions of factors influencing the decision to use public or private mode of transport for daily commuting, even in a threatening situation like COVID-19. Interestingly, safety perception of commuters (associated with personal health) did not play a significant role in their mode choice behaviour during the transition phase. Though people perceive public transportation is unsafe over private, the actual commute pattern did not validate this due to possible reason that commuters do not have enough alternatives with respect to the modes available. Given the uncertainties in the minds of commuters regarding their travel behaviour due to social distancing, the insights from this study are important to the policymakers and local transport authorities to understand the change in travel pattern.

Introduction
Few millions of people around the world are affected due to the Novel Coronavirus (SARS-CoV-2) pandemic that started in China's Wuhan city early December last year. As on 2nd May 2020, no vaccine or treatment is available for COVID-19. Besides its worrying effects on human health and life, the novel virus has potentially slowed down the transportation system among other things. Avoiding personal physical contacts and reducing interaction between individuals (i.e., social distancing) became a compulsory norm in most of the counties. Therefore, governments of various countries are in the process of isolating themselves and some countries like India have already restricted the human movement by incorporating lockdown to ensure social distancing and promote self-isolation. The timeline of positive cases recovered patients and deaths in India due to COVID-19 are shown in Figure 1.
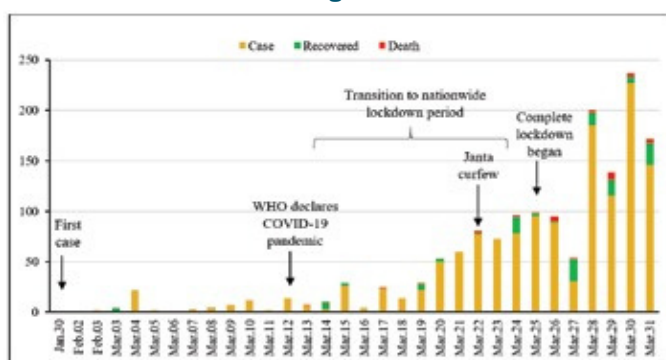

**Figure 1. Timeline of cases, recovered and deaths in India due to COVID-19**

Study Method
An online questionnaire survey was designed to gather information about the travel behaviour of commuters before and during the transition period of COVID-19 outbreak. The responses were collected from 18th to 28th March and the participants were specifically asked to fill data with respect to the third week of March (i.e.15th March to 21st March). The questionnaire enquired about the commuters' socio-economic characteristics (age, income, and city of residence) along with travel characteristics (preferred mode of transport, distance from home to work, travel time and frequency of travelling to work) and health-related safety perceptions with respect to public and private mode. A detailed description of the research organizations involved and the objective of conducting this study was provided to the respondents at the beginning of the questionnaire. The online survey link was posted on various social media platforms, public forums and circulated through personal communications.

Research Diary

Figure 2 shows the research methodology adopted in this study.

The present study analyzed the decision making of commuters with respect to selecting the public or private mode during the transition period of COVID-19 outbreak. A decision tree approach was used to understand the underlying interactions among various explanatory variables. The relative importance of various interaction variable features used in the decision tree analysis is shown in Figure 3. It can be observed that people give the highest importance to travel time followed by the distance covered between the residence and workplace. The next deciding factors are age and income of commuters, followed by the frequency of going to work, safety shift and the city of residence.
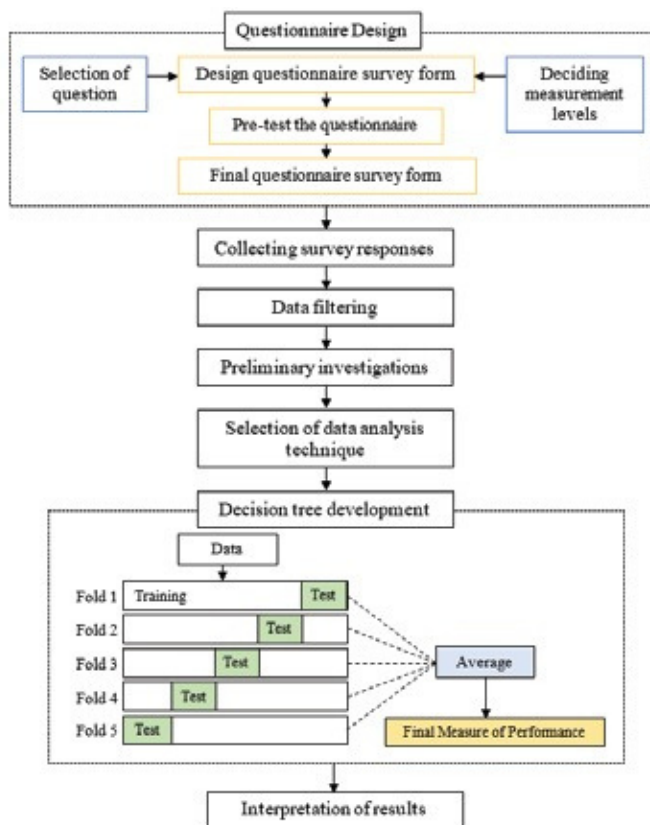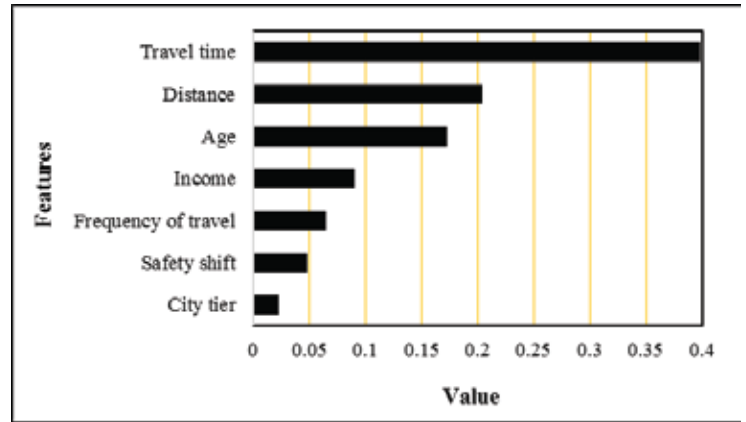
Figure 3. Feature importance of decision tree variables

Discussion

The present study demonstrated that commuters' decision to select a favourable mode of transport during the transition to lockdown due to COVID-19 outbreak. The effect of complex combinations of their socio-economic and travel characteristics was analyzed and studied. An interesting observation from the study is that, although public transportation was rated most unsafe among other modes, the mode choice decision did not significantly rely on the safety perception of the commuters during the transition phase. It was observed that about 18.3% of the commuters continued using public transportation during this period. Irrespective of the public health effects and safety risks of COVID-19, passengers did not give much importance to safety aspects while taking the mode choice decision for daily commute during the transition to lockdown. This behaviour probably would be due to a) Lack of alternative modes of transport from home to work and vice-versa. b) Less awareness of the ill effects of COVID-19 among Indian commuters during the initial phase of COVID-19.

In the Indian context, the issue of COVID-19 outbreak is critical as it instils fear among the population due to its rapid spread, lack of vaccine treatment, number of fatalities increasing every day, and the gaps in knowledge and understanding of its behaviour (Jacob John, 2020). As India is the second-most populous country in the world after China, there is a high chance of viral transmission due to public movement in mass, which is quite common while using public transportation. In this regard, strict monitoring of infected individuals and efficient enforcement of preventive measures such as social distancing needs to be followed effectively.

Figure 2. Research methodology of the study

Research Diary

The lockdown approach adopted by the Government of India is crucial in minimizing the spread of COVID-19. If there would be no lockdown, people would still be using public transportation for their commute, which would have led to increased transmission of COVID-19 among the Indian population.

The researchers recommend spreading more awareness about the ill-effects and spread of COVID-19, especially in the lower strata of society. This study is quite useful in understanding the decision-making behaviour of commuters while selecting their preferred mode of transport during a pandemic like COVID-19, which is a threat to public health as well as the economy of the world. The rapidly changing diaspora of the pandemic is making human life more challenging. More research is required to investigate the public concern over modal choice during disastrous situations like COVID-19.

Public transportation is an integral part of billions of people's lives, and therefore governments from the different states of India may run the system with strict norms on social distancing and sanitization to keep riders and employees safe. Moreover, the policymakers may need to think about possible approaches to integrating these preventive measures into the daily commuting habits of public transit users when the lockdown period is over. It would be challenging to effectively manage such a huge population at transit stations and during the entire journey. Additionally, there would be a requirement of behavioural shift with respect to the attitude in the usage of public transportation from the users' side. This attitudinal shift would only be possible with adequate awareness about the COVID-19 transmission and proper education on its preventive measures.

Consequently, there would be a need to increase the frequency of public transport as the number of passengers per vehicle would reduce and demand may not see significant reduction due to the lack of alternatives, especially among the poor population.

Note from Author: *This study has been done in collaboration with Dr. Nagendra R. Velaga, Associate Professor, Transportation Systems, Engineering, Department of Civil Engineering, Indian Institute Of Technology (IIT) Bombay.*

Dr. Digvijay S. Pawar
Assistant Professor,
Transportation Systems Engineering,
Department of Civil Engineering