Pandemic impact on mobility pattern in Delhi

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Centre for Science and Environment (CSE) has carried out a rapid diagnostic assessment of the changing travel pattern during pre-lockdown, during lockdown and post-lockdown phases in Delhi. This shows COVID-19 pandemic related lockdown phases have seen the most drastic impact on the activity pattern. During lockdown, traffic nearly stopped and activity related to different travel purposes plummeted. But the rebound of congestion post lockdown shows Delhi is not prepared for transformational changes to cut down volume of traffic.

CSE has tracked this change with the help of data from the Google Mobility Report on different categories of visits classified as retail and recreation, groceries and pharmacies, parks, transit stations, workplaces, and residential. CSE has also tracked the traffic speed data from Google as a proxy to understand the level of congestion that has a strong bearing on vehicular pollution, which is significant in Delhi. Congestion and traffic can have enormous impact on air pollution. It has tracked the traffic speed data from Google to understand the congestion build up.

CSE has analysed Google mobility data and daily real-time information of Google Maps for 12 major roads that include MG Road, NH44, Sardar Patel Marg, Outer Ring Road, Dr KB Hegdewar Marg, Sri Aurobindo Marg, NH 9, Mehrauli-Badarpur Road, GT Karnal Rd, Lal Bahadur Sha, Dwarka Marg and Najafgarh Marg (*See Table 1: Details of road stretches taken for the study and*

Map 1: Location of road stretches taken for the study). Length of roads were identified to be representative of the geographical spread as well as the larger mobility pattern of Delhi. The travel time from origin to the destination was noted for every hour from 8 AM to 8 PM for the pre-lockdown period, during lockdown, post-lockdown period, which was later converted into speed in km per hour. The data was further analyzed for the peak hours (i.e. from 9 AM to 11 AM in the morning and 5 PM to 7 PM in the evening) and for the rest off-peak hours.

Table 1: Details of road stretches taken for the study

S.No.	Route	Length (in km)	Pre-lockdown (usual days)	During lockdown	Post -lockdown
1	MG Road	8.9	21st October, 2019 to 25th October, 2019 (5 weekdays)	6th May, 2019 to 8th May, 2019 (3 weekdays)	23rd November, 2020 to 27th November, 2020 (5 weekdays)
2	NH 44	10			
3	Sardar Patel Marg	9			
4	Outer Ring Road	9.1			
5	Dr KB Hegdewar Marg	10.5			
6	Sri Aurobindo Marg	7.8			
7	NH 9	9.1			
8	Mehrauli-Badarpur Road	11.1			
9	GT Karnal Rd	7.9			
10	Lal Bahadur Shastri Marg	9			
11	Dwarka Marg	13.3			
12	Najafgarh Marg	12.6			

Map 1: Location of road stretches taken for the study
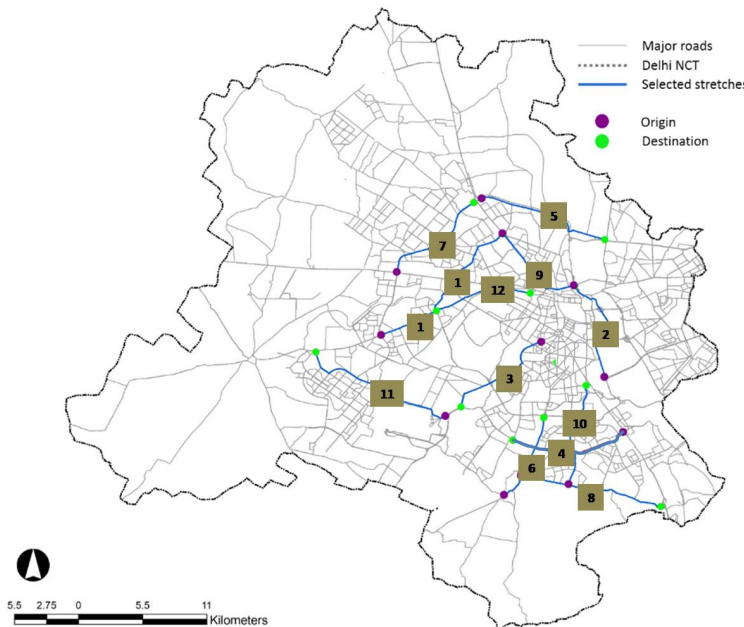
Source: CSE

1. Impact of hard lockdown on activity

Google Mobility Report for the pre-lockdown period (till Feb 2020), which is the baseline for comparison, and trends during the hard lockdown and reopening (till Nov 2020) bring out a clear change in the activity pattern.

Massive drop in visits to transit stations for different purposes during hard lockdown: The trips to transit stations were most badly hit. That was about 87 per cent lower than the baseline levels or the pre-lockdown phase.

Trips to grocery stores and pharmacies were reduced by more than 70 per cent, but were still higher than all the other visits, which is reasonable as people were trying to restock and prepare for the lockdown.

Work place trips reduced significantly by as much as 65 per cent during the weekdays as work from home was widely practiced.

This brings out how the city came to a near halt during hard lockdown. The change in traffic pattern has also shown up in the air quality data. In fact, the hourly change in nitrogen oxide levels that are more strongly correlated with the traffic and traffic peaks during morning and evening hours nearly flattened during this period. This is evident from the CSE analysis of the real time air quality data for that period.

2. Increase in activity with slackening of lockdown but still lower

By the end of May, when the nation-wide lockdown was slackened, the number of trips rebounded and increased but remained below the pre-lockdown baseline.

Trips to groceries and pharmacies were still the highest among all other purposes. Their numbers and share increased but they were still lower by about 25 per cent from the pre-lockdown baseline.

Work place trips also increased but were still lower by about 35 per cent from the pre-lockdown baseline.

Transit station trips were still very badly hit. Even though there was slight recovery it was still 60 per cent lower than the baseline.

3. Post lockdown recovery

Post lockdown the travel pattern was close to normal but did not fully regain the pre-lockdown level.

Grocery trips and workplace trips recovered maximum by the end of November and were now only about 15 per cent lower than the pre-lockdown phase.

Transit station trips improved but were still about 40 per cent lower than the baseline

Trips to retail stores, which plummeted to about -90 per cent by the end of April, have now recovered by more than 50 per cent.

Overall, the increase in these trips also signifies increase in need to travel to access the activities. With this traffic congestion is back on roads.

Graph 1: Travel purpose wise change in trips in Delhi
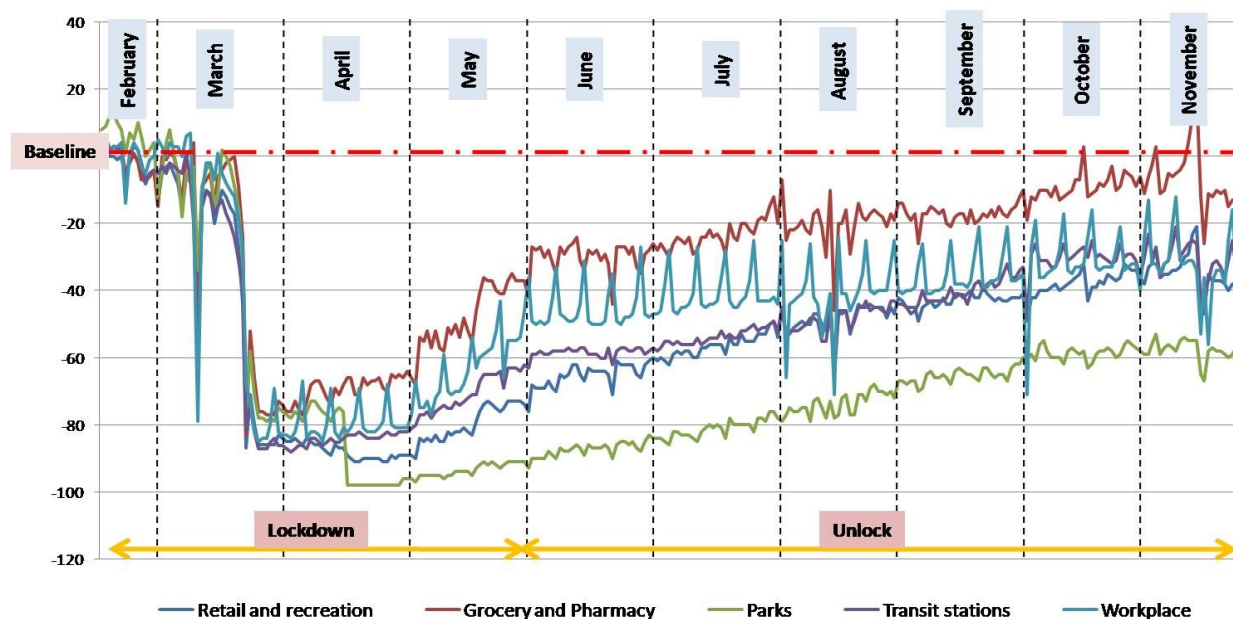
Source: Google Mobility Report, 2020

4. Congestion returned to close to pre-lockdown levels: losing the gains

Travel speed is only indicative of the level of congestion on roads; this is not to build case for high-speed traffic that can compromise safety and impede other forms of mobility like walk and cycling and use of public transport.

This analysis shows substantial change from the lockdown to post lockdown phases. The overall traffic speed that had improved dramatically during the hard lockdown phases gradually increased with the reopening of the economy (see Table 2: Percentage change in travel speed on roads, and Graph 2: Hourly variation in travel speed and Graph 3: Variation in travel speed as per peak/off-peak hour)

The travel speed data analysis shows that the mean travel speed on the selected stretches increased from 24 km per hour pre-lockdown to 46 km per hour during lockdown (i.e. 90 per cent increase).

But this reduced again to 29 km per hour (i.e. 36 per cent decrease) during post lockdown

During peak hours, travel speed on the selected stretches increased from 23 km per hour pre-lockdown to 44 km per hour during lockdown (i.e. 89 per cent increase)

But this again reduced to 27 km per hour (i.e. 38 per cent decrease) during post lockdown.

Similarly, during the off-peak hours, the travel speed on the selected stretches increased from 25 km per hour pre-lockdown to 47 km per hour during lockdown (i.e. 92 per cent increase)

But this further reduced to 31 km per hour (i.e. 34 per cent decrease) during post lockdown.

The hourly trends show that for both during lockdown and post lockdown, the most significant change was noticed after the 4 PM mark. The average increase in travel speeds after 4Pm during lockdown was 116 per cent compared to pre-lockdown levels (higher than any other time during the first half).

And post lockdown, the speeds reduced the by an average 42 per cent compared to during lockdown (lower than any other time in the first half). With a gradual reduction in travel speed on road post-lockdown, it is highly probable that the travel speed will come down further to be at the same level as that of the pre-lockdown scenario unless drastic measures are taken to reduce dependence on personal vehicles.

Table 3: Percentage change in travel speed on roads

| Duration		Mean speed (in km per hour)	Peak hour speed (in km per hour)	Off peak hour speed (in km per hour)
A	Pre-lockdown	24	23	25
B	During lockdown	46	44	47
C	Post lockdown	29	27	31
Percentage change				
During versus pre-lockdown		90	89	92
Post versus during lockdown		-36	-38	-34

Graph 4: Hourly variation in travel speed
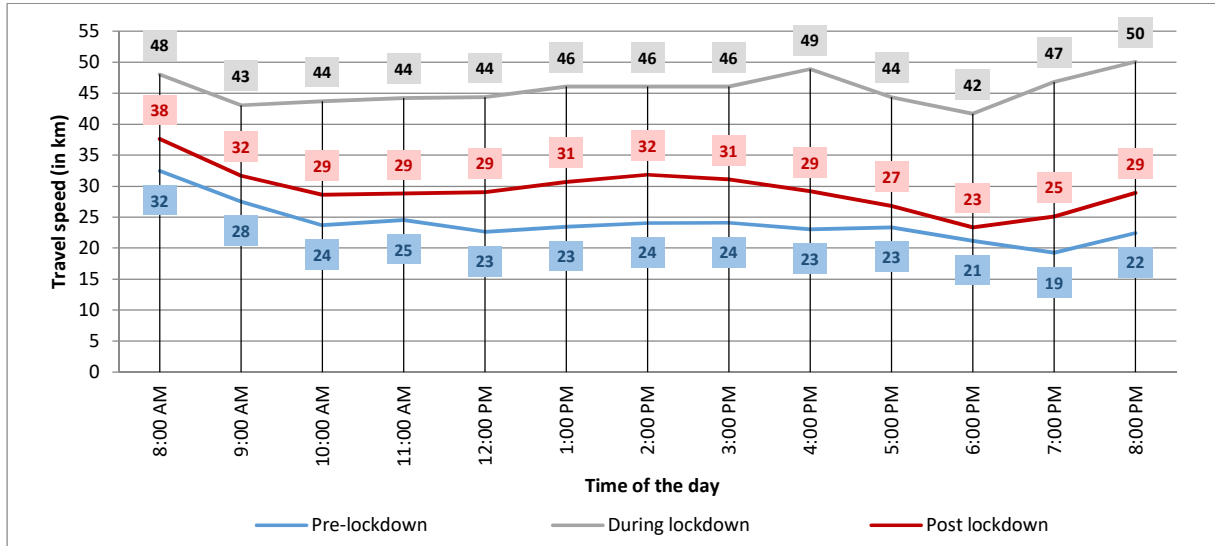
Source: Google maps traffic data

Graph 5: Variation in travel speed as per peak/off-peak hour
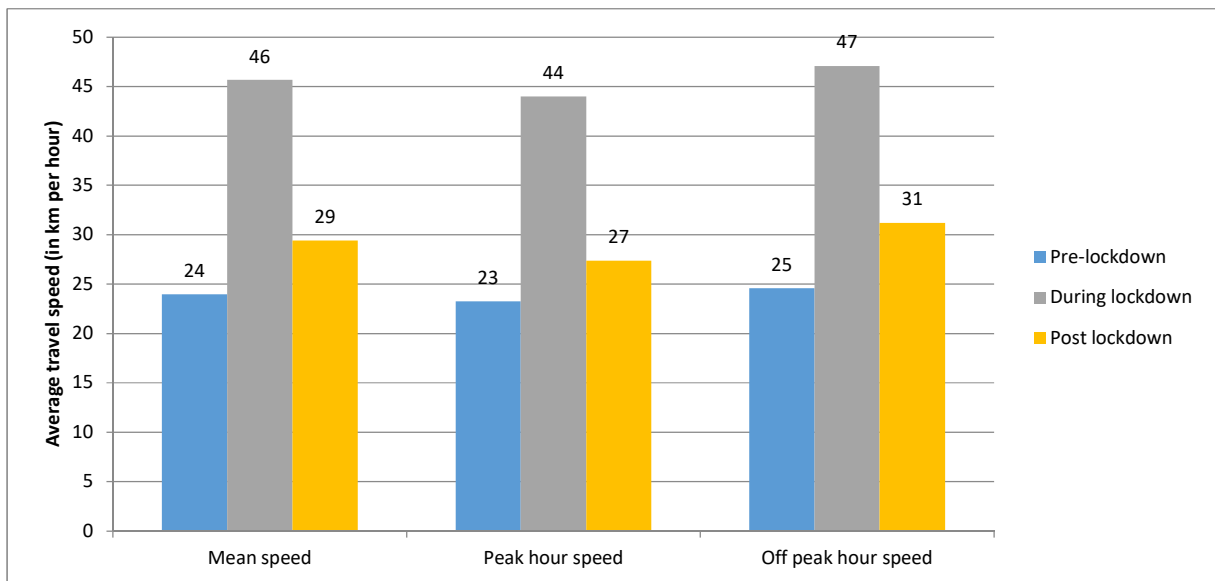
Source: Google maps traffic data

An insight from Odd-Even Scheme of November 2019 and its comparison with pandemic traffic: CSE had also analysed the change in travel speeds on the same stretches and during the same time intervals in Delhi during the Odd-Even phase (4th to 8th November 2019). Comparing the odd-even duration speeds with the normal or pre-lockdown speeds, we see that during odd even, an increase of 21 per cent was observed on an average for all stretches. The peak speed increased by 22 per cent; off-peak speed increased by 16 per cent. This change is comparable to the post lockdown speeds. Putting it

in numbers, the change from pre-lockdown to post lockdown was 21 per cent increase, same as during the odd-even period, however the peak speed change was only 17 per cent increase (5 per cent lower than odd-even), whereas off-peak speed increased by 24 per cent post lockdown (8 per cent higher than odd-even levels).

5. Loss of public transport ridership

Rebound of congestion is happening when the public transport ridership in Delhi is still low due to the fear of contacting the virus and the scale of public transport options is still very inadequate to meet the demand. Public transport is expected to be further constrained by the social distancing norms. This is already encouraging people to shift to private modes of transport. As per the latest media reports, Delhi metro ridership has reached only 9-10 lakh daily, as opposed to the approximately 55-60 lakh journeys that the service was recording pre-pandemic. Similarly the Delhi Transport Corporation (DTC) buses ridership is down by 59 per cent since March 2020.

6. The dangers of not improving mobility

Cannot miss the target for public transport ridership: Delhi cannot meet its clean air targets if overall traffic and vehicle numbers are not controlled. Delhi Master Plan 2020-21 had set a target of 80 per cent public transport ridership by 2020 that has been missed. The Delhi Decongestion Plan of the Ministry of Housing and Urban Affairs has also provided for a roadmap for increasing the share of public transport ridership that provides for the strategies including more buses, protected bus lanes, metro network and parking policy and parking charges. But these have not been implemented at a scale.

Bus procurement against the 2019-20 target of sanctioned 4000 new buses, 733 buses have been added taking the total buses to 6261. But according to the different estimates and directives the city requires between 10,000 to 15,000 buses. But during pandemic - service capacity of the fleet has been reduced significantly. Even though efforts are being made towards bus route rationalization and implementation of smart card with integrated fare system with metro services along with ETVMs in DTC buses, CCTV cameras in buses and more, efforts fall short of transformational changes needed for 100 per cent coverage of population and georgraphy.

At the same time Metro network of 389 km is in place and 153 km of phase 3 network has been commissioned. Out of proposed 63 metro stations 59 finalised for multi-modal integration; 14 being developed with pedestrian zones, dedicated pick-up and drop of locations for all services, traffic circulation plans etc. 5 stations as transit oriented zone. Speed of implementation is necessary.

Delhi also has to clearly meet the milestones for each parameter of its electric vehicle policy that aims for 25 per cent electrification by 2024.

Need bail out packages for the bus transport: Both the national and state governments need to urgently roll out a bail out package for the revival of the bus transport as part of the economic recovery. Without this one of the most important solutions to clean air can be derailed. Without mobility transition Delhi cannot meet the clean air targets.

Last mile connectivity under implementation but it is also slowest to improve. There are several plans afoot. These include 40 kms of metrolite and 427 BEV mini bus services. Introduction of 1000 e-rickshaw services at 29 metro stations and 500 more in another 29 metro stations. 250 e-bike services are to be introduced in 9 metro stations as pilot. Even though there are several proposals for walking and cycling infrastructure, on-ground implementation is still a challenge. Post lockdown Delhi will have to pay a lot of attention to accessible infrastructure for walking and cycling to enable contact free travel within short distance range and reduce dependence on personal vehicles. This will also help in saving time and cost incurred during travel to work destinations.

Need urgent city-wide implementation of parking area management plan and parking rules: Even though Delhi has taken the lead to notify the first ever parking rules for travel demand management, but the mandate for its city-wide implementation has not been taken forward. It still hasn't moved beyond the three pilot projects.

Leverage the changed work culture during the pandemic to reduce the need for travel: The government needs to work in coordination with corporates and other offices to initiate large scale adaptation of work from home strategies while improving public access to telecommunication infrastructure. This can be incentivised as is being done globally.