A Centre for Science and Environment Paper

PANDEMIC AND MOBILITY

Lessons from the COVID-19 crisis for building solutions

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WHY THIS STUDY?

As Indian cities get ready to reopen the economy to secure jobs and livelihoods and end the human misery that the pandemic has occasioned, public transport and safe access have become an urgent necessity. The surreal images of empty roads, crisp clean air and blue skies during the lockdown that caught public imagination are also the evidence of disruption at a scale never witnessed or experienced before.

The Central Pollution Control Board (CPCB) has estimated that during the lockdown, contribution of vehicles to the overall decline in particulate pollution in cities like Delhi has been profound. Hourly analysis of PM2.5 data on a typical week day shows flattening of the peak hour pollution. This transitory reprieve from pollution and congestion is not expected to last. But everyone is asking what might it take to sustain these gains — are we fated to go back to the regular toxic gridlock?

To avoid that, we need a massive transition towards a 'new normal' with a high level of ambition to cut pollution and congestion. This is our only chance to make the big shift. Stakes are high after the collective experience of a cleaner environment.

Not just in India, but globally, cities are reinventing solutions to survive the crisis and are also setting the terms for sustained change. Challenges are many. Fear of infection and need for social distancing have led to a near-collapse of movement all across. This has stigmatised public transport. This has also provoked worries around higher usage of cars and two-wheelers in future that will also lock in more congestion, toxic pollution, energy guzzling and carbon emissions.

Yet the solutions that are being worked out for the immediate crisis management are also indicating a direction of change that is needed in any case to combat pollution, climate change and to improve liveability. Despite the crisis, this opportunity will have to be leveraged.

So, what is going on globally? The immediate focus is on the emergency measures to make public transport and ride-sharing systems safe and hygienic for use — for that, detailed guidelines have been adopted. Simultaneously, city governments are promoting walking and cycling as safer and contact-free modes for shorter trips and also to take the pressure off from the strained public transport systems operating at very low occupancy and earnings. Overnight, bicycle lanes and wider walkways are popping up as city authorities are using soft barriers to demarcate lanes on carriageways for safe passage. Virtual workplace and use of digital platforms for communication widely adopted for social distancing, have greatly reduced the need for unnecessary travel. This has also brought down the pressure on strained public transport.

The newly crafted fiscal and bail-out stimulus packages — at least in some countries — have been extended to support public transit. Hong Kong and London have taken the lead. In fact, Hong Kong has designed the most elaborate package for transit, para-transit as well as for users of the systems. Moreover,

bail-out packages for the auto industry, though not as extensive, are in focus as well. There is public demand for linking these packages with clean energy transition, especially electric mobility. In fact, China has already taken steps to extend the subsidy regime for new energy vehicles.

Most of these solutions are known and have been part of the conversation on sustainable mobility and policy guidance on pollution and climate change, but have never been practiced at this scale. If this massive unintended experiment and demonstration has been possible once, it must be repeated to lay the foundations for future action.

We are in for a long haul. There is massive change in activity patterns in cities. Our analysis shows that activities in residential areas and for accessing essential needs have remained high, but activities related to all other needs — offices, recreation, shopping etc — have dropped dramatically. Some of these will certainly bounce back post-pandemic, but some structural changes in consumer behaviour such as strong preference for internet-based retail, work-from-home, staggered timing, and roster-based attendance to reduce travel would have far-reaching consequences.

This may completely change the way cities plan for mobility and decide investments in infrastructure. With reduced travel, higher share of walking and cycling for shorter trips, less crowded but efficient public transport systems, and restraints on use of personal vehicles through parking restraint and pricing, congestion charging and low-emission zones, cities may not even need so many roads.

India needs to get wiser. India has a much better opportunity to make this transition. According to Census 2011, as much as 24 per cent — close to a quarter of the working population — work from home. Almost more than half of all trips in most cities are within the distance range of 5 km. Personal vehicle usage is still low in India. The invisible majority is walking, cycling or using public transport. Even though a sizeable part of the public transport users, walkers and cyclists in India are captive users, there is an emerging trend of higher income groups opting for these modes by choice. It is important to make these systems work for everyone.

In view of this, Centre for Science and Environment (CSE) has carried out a perception survey on changing commuting choices post-pandemic. The first flush of results, based on the survey of middle- and high-income groups in Delhi and surrounding cities in the National Capital Region (NCR) indicate that the public mood is changing. While use of public transport is expected to reduce in the short run, there is a positive shift in attitude towards high quality public transport, contact-free walking and cycling, and lifestyle adjustments to reduce unnecessary travel trips in the longer term. Middle- to high-income groups are willing to make a big shift if high quality public transport is available. This is an opportunity for more inclusive change.

This is a strong signal for policymakers. Indian cities urgently need to leverage the solutions emerging from this crisis to control overcrowding in buses and metro, maximise fleet utilisation to improve services, plan for augmentation, make massive shift towards walking and cycling to give options of contact-free travel to all income classes, and re-engineer workplaces to reduce unnecessary travel needs to take the pressure off the stressed public transport systems. We cannot miss the bus now.

This will also require changing the master plans and development norms in cities to ensure all new development and redevelopment follows the norms of compact city with well distributed density, mixed use and mixed income development, high street density for walkable and accessible neighbourhoods, easy access to public transport nodes, adequate open green spaces, and decentralised services. As we have understood during this pandemic, well planned and distributed density must not be confused with overcrowding. City has to be safe and liveable for all.

Indian cities may not get another chance to prevent a mobility debacle, with high-cost congestion and pollution. This public health crisis is a lasting reminder that the only way forward is to build on the change underway. This is an unprecedented opportunity to change the way we travel, make commuting choices, and create inclusive and healthy spaces for overall wellbeing.

- **Rebuild public confidence in safe public transport** with stringent implementation of hygiene and social distancing measures. Public transport cannot be an exception when other public spaces including offices and markets are being accessed with sufficient safeguards.

- **Implement reform-based fiscal package and fiscal instruments** to support revival and for sustainability of transit systems**.** Economic reform packages are needed for public transport, especially buses, and these need to be reform-based. Initiate tax reforms to reduce tax burden on bus systems. Even the support provided to para-transit must be linked with operational reforms. Implement long-term fiscal strategies and instruments to augment integrated public transport and services. Infrastructure-based stimulus need to be linked with public transport infrastructure along with active mobility systems. Restructure the transport sector funding accordingly.

- **Move shorter trips to active transportation — walking and cycling.** Immediate scaling up of protected footpaths and cycle lanes is needed, with flexible barriers to enable all income groups to access workplaces and meet other needs within a reasonable radius of residence. Leverage the growing interest in contact-free and safe commuting. If short trips can move to walking and cycling as much as possible, this can also alleviate pressure on strained public transport systems and prevent conditions that push people towards personal vehicles. As activity patterns are expected to change with more work-from-home options, access at the neighbourhood scale has to improve. Even commercial spaces need to adopt more pedestrianisation approaches for safer experience. Cities need to design and implement the network plans very quickly.

- **Need integrated travel demand management strategies to reduce unnecessary travel trips** to scale up alternatives and reduce pressure on stressed public transport systems. Institutionalise measures like work-from-home, staggered timing, roster-based attendance etc to reduce travel demand. This will allow essential services and critical components of other services to avail of the public transport systems. This will also help contain the rush towards personal vehicles. Unconditional opening of the economy when public transport is mandated to operate at low occupancy can accelerate personal vehicle dependency. This needs to be averted.

- **Need extensive digital data management to improve provisioning of public transport services.** With growing application of intelligent technology (IT)

for management of public transport, it is necessary develop systems to leverage this data for more demand-responsive service deployment and management. Transport providers need digital readiness for planning public transportation services for efficient deployment of services city-wide and according to demand and requirements. Under the Smart City Mission, IT application has expanded considerably and this provides an opportunity to track real-time data on several operational parameters and travel characteristics. More granular tracking of movement has become possible across the city to know travel volume by route, time and place, travel behavior and more. This digital data platform should be integrated with service planning.

- **Need aggressive measures to restrain dependence on personal transport.** Rationalise taxes on personal vehicles to cross-subsidise public transport. Implement parking area management plan with variable parking pricing across the city to reduce demand for parking. Explore congestion pricing. Introduce pedestrian zones and low-emission zones, among other measures.

- **Implement compact urban form code and transit-oriented development policy.** The Government of India as well as administrations of some cities like Delhi have adopted transit-oriented development policy and requirements of compact city form for new development and redevelopment. These need to get fully integrated with the Master Plans that are notified under Town and Country Planning Act. This must make mixed use, mixed income, and high-density development with dense and accessible street networks, integration with transit, small block sizes, decentralised services and adequate per capita green spaces non-negotiable.

- **Link economic stimulus for the auto industry with green deal.** As a stimulus package is expected for the auto industry, it needs to be leveraged to accelerate transition towards zero emissions pathways and massive bus-based mobility transition. A scrappage policy is expected soon to phase out older vehicles — most likely, it will be tied to the phasing out of old trucks and buses. This can be tied to mobility and logistic reforms. On the other hand, stronger fiscal support for FAME II that provides incentives for buses, para-transit and two-wheelers can be more effectively designed for scale and performance. This is the time to design and link zero emissions mandate with stimulus and tax reforms and time-bound transition.

SECTION 1

1. A COLLAPSE OF TRANSIT

While public transport ridership has come to a halt in India due to a complete lockdown, countries which did not resort to a lockdown and kept their public transport functional, have faced a drastic reduction in ridership — as much as 70-90 per cent — and massive financial losses. Even intermediate transport and shared mobility has started to re-purpose for emergency health services, deliveries of groceries and essentials; courier services and fixed route services.

Globally, cities have kept public transport operations running despite low frequency and incurring huge costs to maintain essential services for those who need it. They have adopted detailed protocol and guidelines and strict measures including more appropriate scheduling practices, rationalisation of routes, modifications in vehicle design, sanitisation of vehicles etc to ensure safety. There is a significant focus on hygiene and sanitation. Cities have adopted reduced schedules, special services, weekend schedules, modification in routes etc and protocols to ensure public safety.

The UK, Europe, Canada, the US, the Philippines, Turkey and Indonesia, among others, have either halted or reduced operations of public transport as a measure to maintain social distancing to contain the virus. The process of suspending operations began around January 2020 when Wuhan, the epicenter of the pandemic, had shut down public transport operations and other Chinese cities made testing the temperature of passengers mandatory as a precaution.

Data from Germany, France, Italy, Spain, Brazil, Iran, China, Canada, Belgium, Austria and other countries show how public transport system is operating at its lowest capacity — a mere 10 per cent of the existing capacity in most cases (*see Table 1: Reduction in services and ridership of public transport systems in cities across the world*).

Moovit, which is a Realtime Worldwide Public Transit app, reported a decline of 750 million user trips on bus, train, subway, light rail, shared services, rider aggregators, two-wheelers etc across cities of Europe, the US and Latin America (*see Graph 1: Public transportation ridership in different cities, January-March 2020*). The public transport systems also survived the crisis by adapting to the new requirement of the health emergency. They aligned with the new service delivery pattern — reduced service duration and weekend services, reduced coverage and rationalised services according to new origin and destination, including special services.

Similarly, Paris in France and cities in Finland and Germany have re-purposed their trips and operated on reduced timetables and holiday schedules for essential services and workers. Washington has rationalised routes and kept 20 stations closed to avoid crowding. Germany also reduced the length of trains to maintain the frequency required for reduced operations. Cities in New Zealand, which has flattened the COVID curve, had announced free trips on March 24, 2020 to support low-income groups dependent completely on public transport. They did not push users towards cars. They have facilitated essential workers

and took steps to maintain user trust in the system even though the ridership is negligible compared to what it is during normal times.

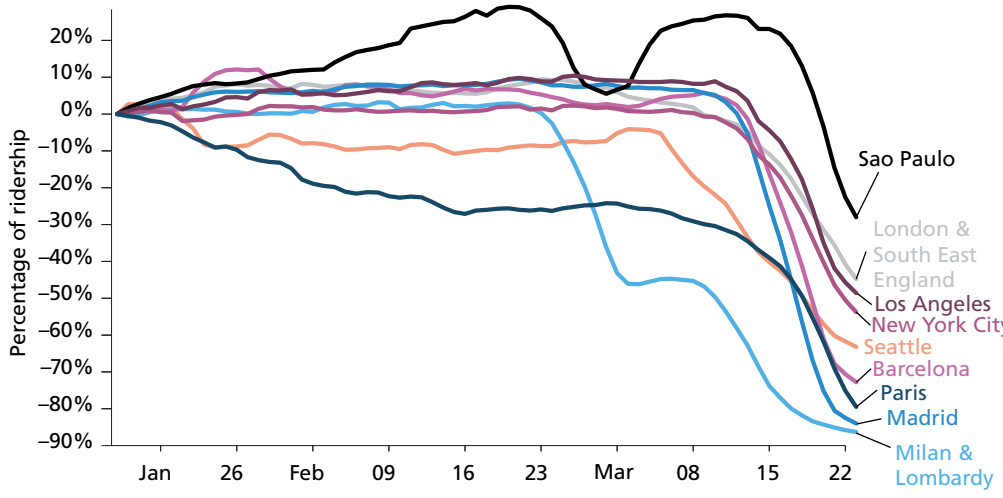
It is anticipated that this disruption will continue for more months to come and will have far-reaching impacts. While the immediate focus is on how to make the systems work in the shorter term with extreme emergency measures, there is also an interest in taking the opportunity of the emergency to rebuild better systems in the long term. This will have to be leveraged.

Table 1: Reduction in services and ridership of public transport systems in cities across the world

Cities	Service reduction	Ridership decline
Germany: Berlin, Hamburg, Munich, Augsburg	Sunday schedule	80%
Italy: Milan, Lombard	Weekend schedule	90%
Spain	40-65%	85-90%
Paris Milan, Lombard	70% Sunday schedule	70%
UK — London TFL London Buses	Reduced services, closed stations 60% 80%	 95% 85%
Vienna	Reduced operation	80%
New York, San Francisco, Chicago	Reduced timetable	90%
Washington, US	Closed 20 stations	95 %
Brazil	65%	85%
Iran	50%	65%
Wuhan Beijing	Stopped operations Partial operation with restrictions	20% 90%
Canada	20%	80%
Belgium	60-75%	70%
Finland	Peak hour schedule cancelled and overall timetable reduction for metro, bus, tram	70 %
Israel	Closed operations	NA
Ohio	Rationalised peak routes to operate with lower passenger load	NA

Source: Data sourced from city transport websites and reportage (see references)

Graph 1: Public transportation ridership in different cities (January-March 2020)



Source: Moovit, https://qz.com/1824243/coronavirus-has-killed-off-public-transportation-across-the-world/

2. PERSONAL DRIVING EXCEEDS PUBLIC TRANSIT TRIPS

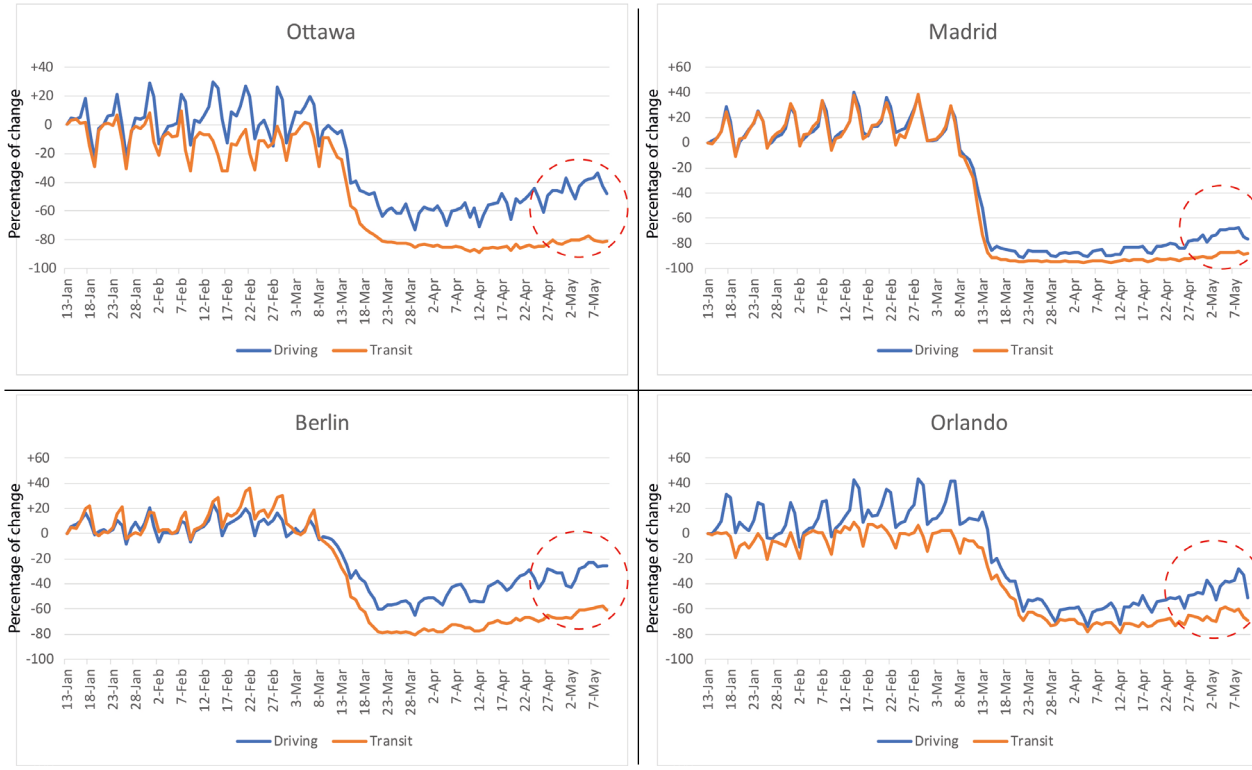
There are also fears now that this emergency will push the world more towards automobility and personal vehicle use will increase. While overall mobility has reduced across the world, analysis of data from Apple Mobility Trends Reports shows that after the cities ease the lockdown restrictions, the relative share of driving personal vehicles has begun exceeding that of transit share (*see Graph 2: Comparison of driving and public transit trends in cities after easing of lockdown restrictions*).

It is being anticipated that there is likely to be a temporary surge in use of personal vehicles to avoid crowding, especially for densely populated countries. For instance, in China, right after the travel restrictions were lifted on April 7, 2020, a surge in number of vehicle purchases was reported. The year-over-year weekly car sales rose for the first time since the lockdown on April 10, 2020, by about 18 per cent. In the fourth week of April, the sales increased by 12 per cent compared to the previous year. The overall sales in April were 4.4 per cent higher than in the previous year, hitting the two million mark. During the first week of May as well, an increase was observed across the country compared to 2019; Shanghai was up by 49.6 per cent, Chongqing by 28.5 per cent and Zheijang province by 8.8 per cent.

An online survey by Ipsos in China in March 2020 recorded responses from 1,620 commuters. The results show that before the outbreak, 34 per cent consumers preferred private vehicles while 56 per cent preferred shared modes. After the outbreak, 66 per cent planned on using private vehicles while only 24 per cent said they would continue with shared mode. Non-car owners planned to acquire new cars and attributed the reason for this shift to lack of trust in public transport.

This has raised the pertinent question about how this trend can be restrained with well-designed interventions. Otherwise, the phobic reaction against sustainable modes and induced preference for personal vehicles will lock in enormous pollution and energy guzzling, increase carbon intensity and negate all efforts to mitigate air pollution and climate change.

Graph 2: Comparison of driving and public transit trends in cities after easing up of lockdown restrictions



Source: Apple Mobility Trends Reports; analysis by CSE

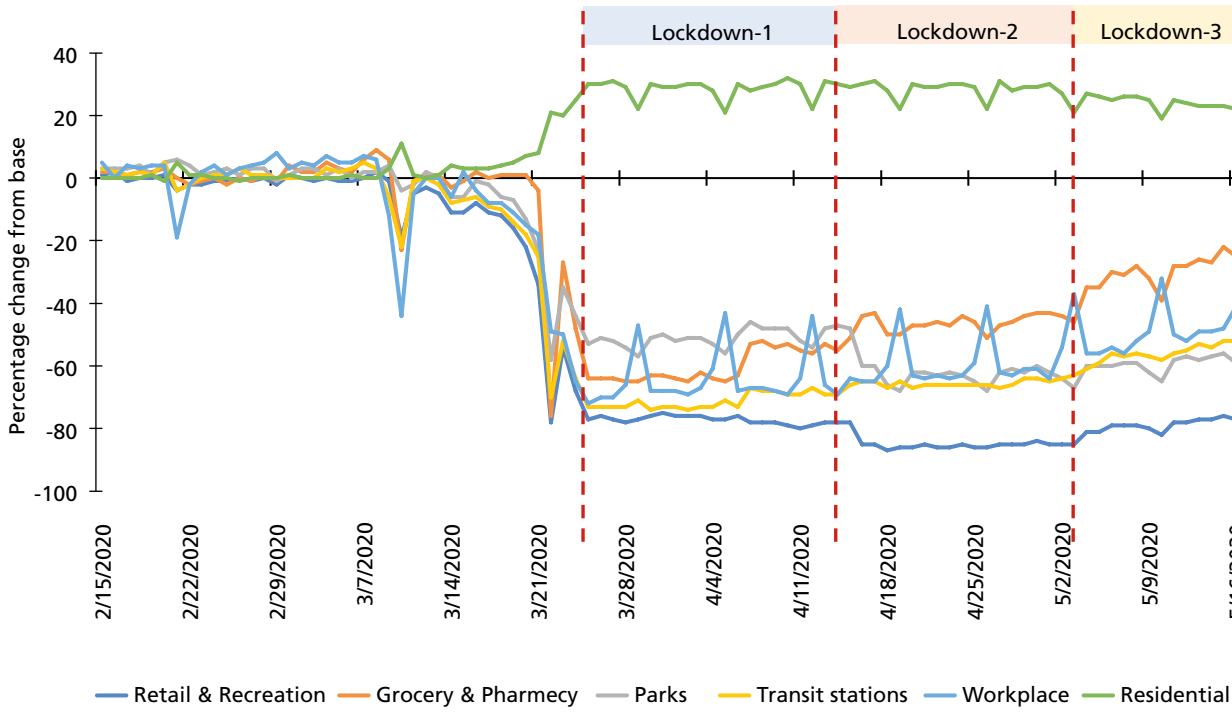
3. CHANGING ACTIVITY PATTERNS IN INDIA

Even in India, the pandemic-induced physical distancing requirements have altered activity patterns dramatically. Granular Google Mobility Data allows tracking of change in activities related to different needs, including residential, grocery and pharmacy, retail and recreation, workplace, transit stations, and parks. CSE has analysed this data for the period February 15 to May 16, 2020 to indicate the changes in India (*see Graph 3: India — impacts of lockdown on different activities and Graph 4: Changes in activity patterns in India*). It shows activities in residential areas have increased by 29 per cent, visits to workplace reduced by 60 per cent, and visits to retail and recreation reduced by 84 per cent. Grocery and pharmacy visits also indicate a drop, but at a lower range.

This also brings out the massive drop in visits to transit stops and nodes as usage of public transport plummeted quite significantly in India. It ranged among the lowest globally (*see Graph 5: India and the world — percentage change in visits to transit station areas*). This is in contrast to countries like Hong Kong that have continued to keep their public transport systems functional and show higher usage of transit during the restriction phase.

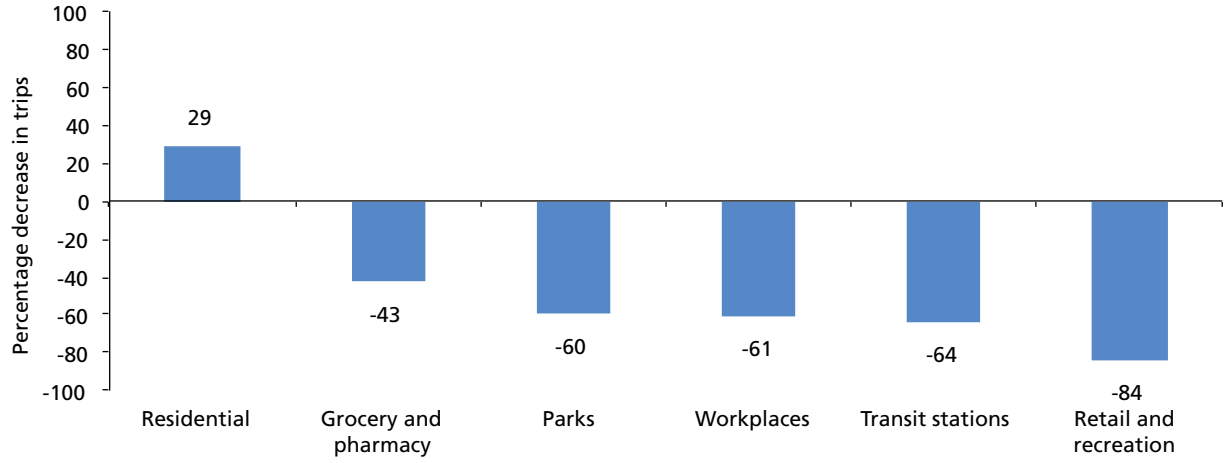
This changing pattern in activities has huge implications for organising mobility services in urban India. This will need to be taken into account for designing mobility strategies.

Graph 3: India — impacts of lockdown on different activities (percentage change)



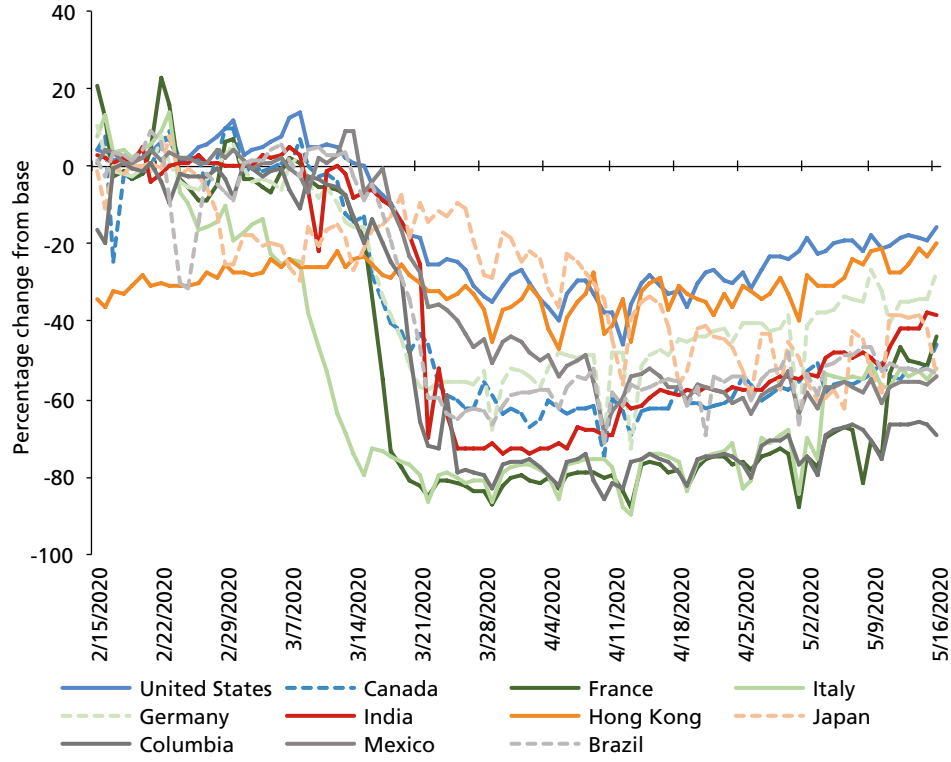
Source: Google Mobility Data (from 15th Feb' 2020 to 16th May' 2020)

Graph 4: Changes in activity patterns in India (Percentage change in visits to various activity places in India)



Source: Google Mobility Report (from March 18, 2020 till April 30, 2020)

Graph 5: India and the world — percentage change in visits to transit station areas



Source: Google Mobility Data (from 15th Feb 2020 to 16th May 2020)

4. IMPACT ON INTERMEDIATE TRANSPORT MODES AND SHARED MOBILITY

A formal public transport network, with a set of auxiliary transport modes based on intermediate public transport, allows a better degree of penetration as it provides last mile connectivity to people. In areas that are deficient in public transport networks, autorickshaws, shared IPTs, taxis, e-rickshaws etc become the primary mode of commute. These intermediate transport services grow informally / organically based on perceived demand and often operate on unplanned schedules and overloaded capacity — and they have been equally affected. These are not organised or operated through state-instituted bodies. Reports indicate that this is a big section impacted by the lockdown with huge livelihood concerns as their income depends on daily trips.

After the slow reopening, city governments in India are adopting their respective strategies to operate public transport systems by adhering to social distancing norms. During the lockdown phase 4, they have been allowed to operate with one or two passengers depending on the system.

5. IMPACT ON RIDE AGGREGATORS

Ride aggregator platforms depend on marginal workers to run their fleet of vehicles. Though this is an institutionalised sector, their revenue depends on the daily trips undertaken — and so do the earnings that go to each driver. As in the case of public transport services, aggregator services including Uber, Lyft, Ola, Shuttl, Rapido etc have also been affected due to the pandemic. Uber's (world's largest cab aggregator) main ride-hailing business is down by 80 per

cent; the company has reported losses worth US $2.9 billion in the first quarter of 2020[5]. Another, global player, Lyft, has lost approximately US $400 million[6] during this period. Both the companies have reacted by laying off 14 per cent and 17 per cent of their employees, respectively, to reduce their cost burden. In Dubai, Careem, a ride-hailing service, is cutting down its workforce by 31 per cent due to the virus outbreak.

The situation arising out of the pandemic — particularly the social distancing norm, partial or full lockdowns, and the new work-from-home culture — has raised many questions on the immediate future of ride-hailing services. The sector, however, seems hopeful about strategizing with innovative interventions to win back their customer's trust. In the US, due to loss of transit ridership, transit authorities are engaging with Uber to provide fixed route services. Some transit agencies are giving monthly bus pass holders a limited number of Uber rides, while others are covering the entire cost of regular Uber riders[7].

The experience of aggregator service providers operating their businesses in India has been slightly different — they had started to feel the pinch of the pandemic from the second week of March 2020), but were finally compelled to completely shut down their operations due to the nation-wide lockdown (wef March 23, 2020). While Uber had learnt from its global experience and completely stopped its ride-hailing services to stem the spread of the disease, the others had begun by adopting some hygiene measures to keep their customers safe.

These aggregators are keen to revive their old passenger transport business with the help of technology, strict passenger safety and hygiene measures. Shuttl, the bus aggregator, is already planning to implement seat numbering and connecting it to tickets (similar to air travel) for their corporate customers, besides a cash-less payment system. Zeelo, the UK-based bus aggregator, has suggested that safety is the key priority: it has adopted strong safety and hygiene measures such as PPE kits for drivers, limited capacity of services, regular and periodic disinfecting of vehicles, maintaining social distancing on board etc[8]; Zeelo says it has started witnessing positive results.

6. CHANGING PUBLIC PERCEPTION AND IMPLICATIONS FOR MOBILITY SERVICES — THE CSE SURVEY

To understand the direction of change in India, it became necessary to do a reality check. The clue to this lay in the changes in public perceptions and preferences. CSE, therefore, rolled out a perception survey to understand how the preferences for modes and activity patterns are expected to change in the short run (within six months post-lockdown) and in the longer term (one-two years and beyond). This survey is designed for middle- to high-income classes with respect to age groups and varied family status.

While the survey is still going on, the first set of results from it is now available. This includes the perception of the middle- to high-income groups in the Delhi-NCR region. **Perceptions of lower income groups are being assessed separately and will be available soon.**

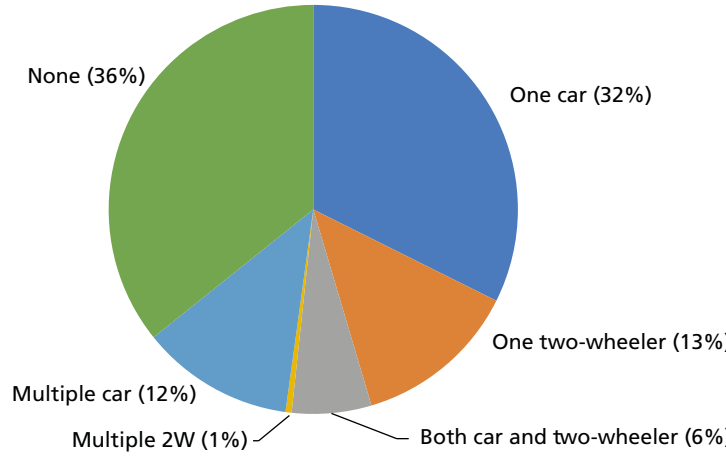
Among the respondents, 15 per cent are in the age bracket of 18-25 years; 57 per cent in 26-35 years; 13 per cent each in 36-45 years and 45-60 years; and 2 per cent in the age group above 60 years. In this middle- to high-income group, 27 per cent earn more than Rs 1 lakh per month; 38 per cent between Rs 50,000

and 1 lakh; 24 per cent between Rs 25,000 and Rs 50,000; and 11 per cent below Rs 25,000. This profile has a bearing on the results of the survey.

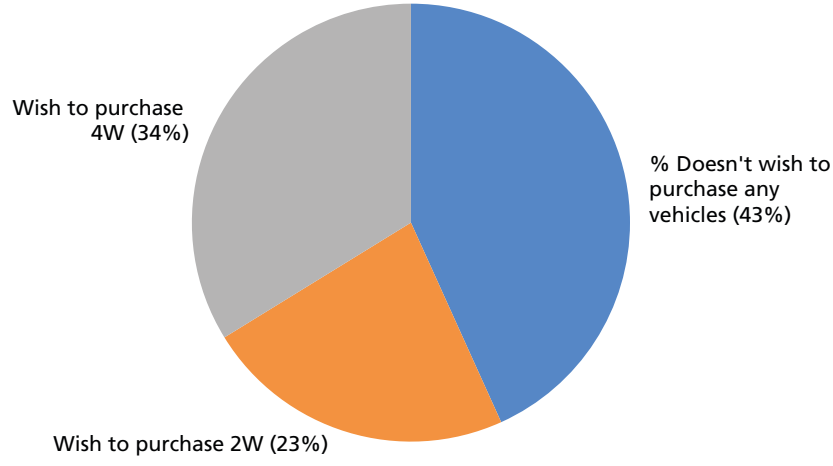
Vehicle ownership and future vehicle purchase decision: Among the respondents, 64 per cent already own vehicles (car or two-wheeler including multiple ownership), while 36 per cent do not (*see Graph 6: Vehicle ownership pattern of respondents*).

About 23 per cent of all the respondents said they may want to buy a vehicle for reasons of safety in the near future. In terms of distribution among the 36 per cent of those who do not own any vehicle, about 43 per cent said they do not wish to own any vehicle in the near future. It is not clear to what extent family support, economic recession or conscious choice is responsible for this decision (*see Graph 7: Purchase decision of those who do not own any vehicle*).

Graph 6: Vehicle ownership pattern of respondents



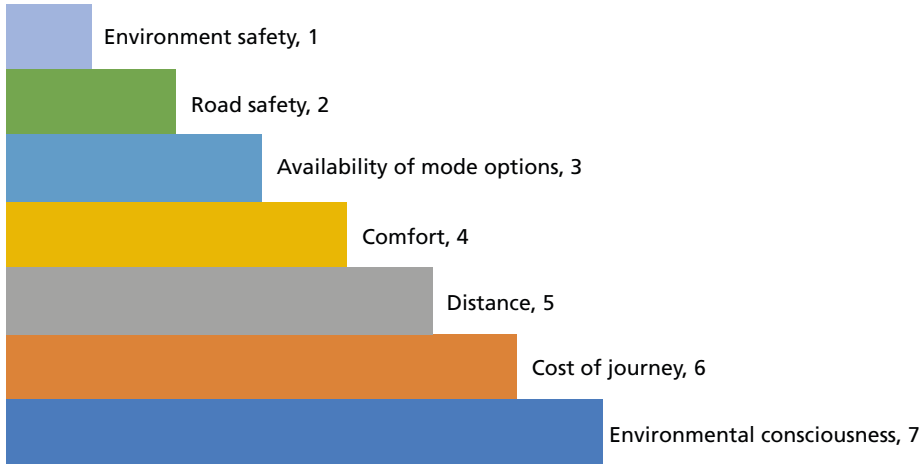
Graph 7: Purchase decision of those who do not own any vehicle



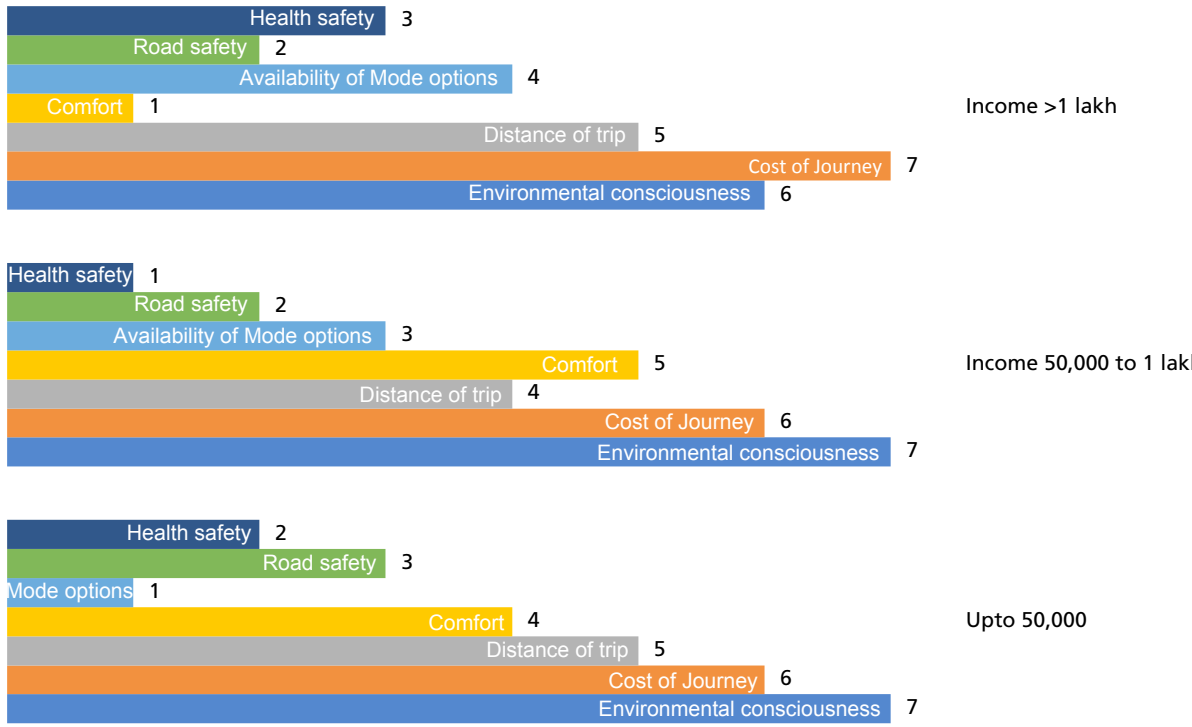
Health safety tops the rank: The overall ranking of the factors that will influence the preference for using public transport shows that health safety is now the top concern. This is followed by road safety, availability of mode options, comfort of the commute, distance of trips, cost of journey and

environmental consciousness, in that order. This ranking is expected to change when responses of lower income groups are analysed. More granular analysis shows that the high-income group ranks comfort above everything else (*see Graph 8: Overall ranking of factors influencing public transport mode choice and Graph 9: Ranking of factors influencing public transport mode choice by income groups*).

Graph 8: Overall ranking of factors influencing public transport mode choice (where 1 is best)



Graph 9: Ranking of factors influencing public transport mode choice by income groups (where 1 is best)

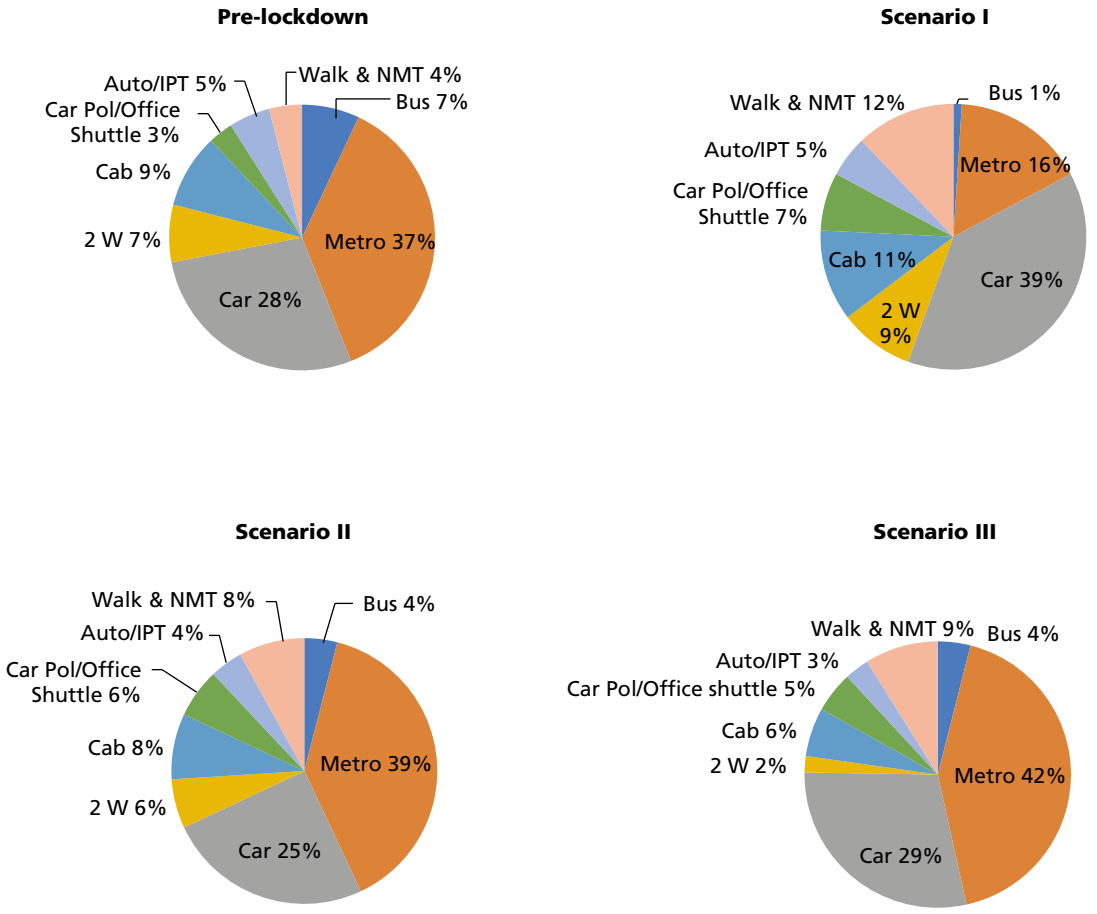


Note: The scope of this survey does not include low income groups

Long-term positive signs for public transport and walking and cycling: This survey has assessed preferences for modes during the initial six months after lockdown, and over one-two years and for a longer term. Within six months of post-lockdown, metro ridership is expected to decline from 37 per cent at pre-lockdown level to 16 per cent. But the share of cars and two-wheelers would increase from 35 per cent to 47 per cent. Encouragingly, walk and cycling share will increase from 4 per cent to 12 per cent. In the long-term Scenario III, public transport share will increase, with total bus and metro share regaining and increasing from 44 per cent to 47 per cent. But intent to use personal vehicles shows an arrested trend — reducing from 35 per cent to 31 per cent. Walking and cycling share will also increase from 4 per cent in pre-lockdown to 9 per cent in the long term.

The survey results show that despite the initial setback to public transport and increased preference for personal vehicles, the preference for public transport and walking and cycling gains in the long run (*see Graph 10: Mode choices for daily trips shift post-lockdown*). In fact, preference for cars is plateauing and declining over time. Policy needs to respond to this intent and stimulate the dormant demand for good quality public transport, walking and cycling and reduce dependence on personal vehicles.

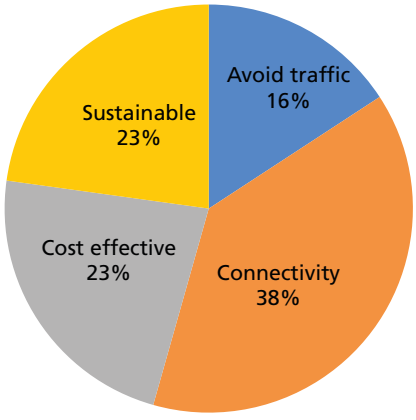
Graph 10: Mode choices for daily trips shift post lockdown



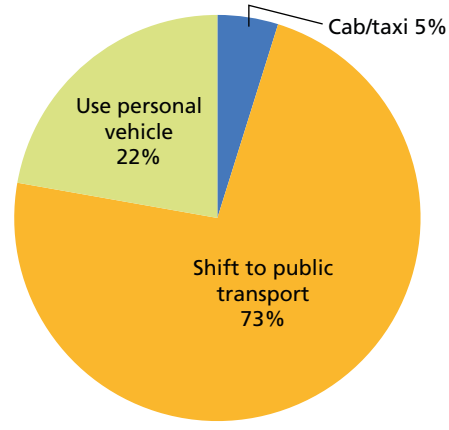
Preference for high quality public transport increases in the long run: The respondents were specifically asked about their longer-term preferences if public transport systems and access improve to meet a high quality benchmark. The good sign is that majority of the respondents — as many as 73 per cent — have preferred to move to public transport if systems meet high quality standards for services. Only about 22 per cent said that they will continue to use personal transport, while the rest would prefer to move to cabs and shared mobility.

About 38 per cent have preferred public transport for reasons of connectivity; 23 per cent each for cost effectiveness and sustainability; and 16 per cent to avoid traffic congestions. This is a clear indicator for policymakers that a massive shift towards public transport, walking and cycling is possible if good quality and convenient public transport systems and well-designed walking-cycling infrastructure are made available (*see Graph 11(a): Reasons for choosing public transport Graph 11(b): Strong support for good quality public transport*).

Graph 11 (a): Reasons for choosing public transport



Graph 11 (b): Strong support for good quality public transport

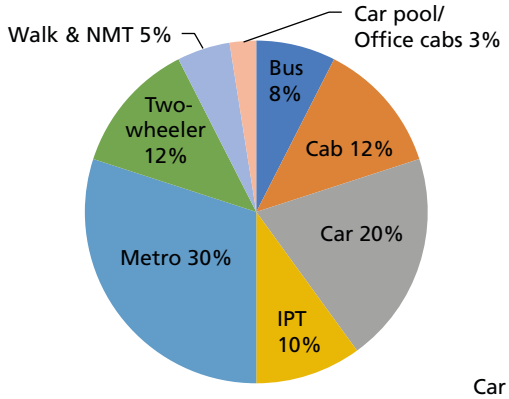


Travel distances will influence immediate mode choices: As expected, average commuting distances have a profound influence on intended mode choices, especially in the short run (initial six months post-lockdown). In the distance range of five-10 km for work trips, the use of cars is expected to increase from 20 per cent at pre-lockdown level to 33 per cent; metro usage will decline from 30 per cent to 10 per cent; and para-transit use will increase from 10 per cent to 15 per cent (*see Graph 12: Mode choice according to trip distance within six months of lockdown*).

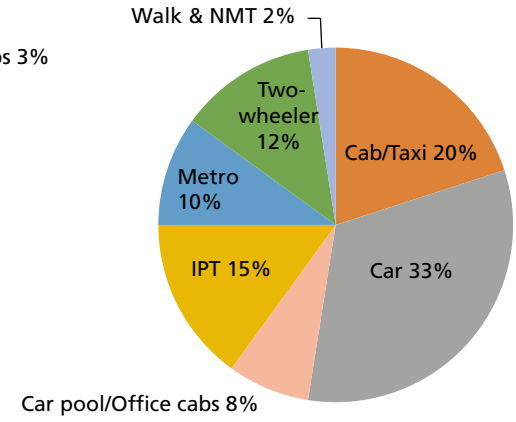
But below the five-km distance range, walking and cycling is expected to increase significantly from 14 per cent to 43 per cent; car usage would reduce from 23 per cent to 16 per cent; and metro usage will go down from 16 per cent to 5 per cent. If city authorities intervene immediately to provide the infrastructure, a dramatic shift in the walking-cycling distance radius is possible. This will also help to reduce pressure and burden on public transport systems. Census 2011 data shows that a substantial proportion of about 60 per cent travel trips in the region is below five km — this offers a great opportunity.

Graph 12: Mode choice according to trip distance within six months of lockdown

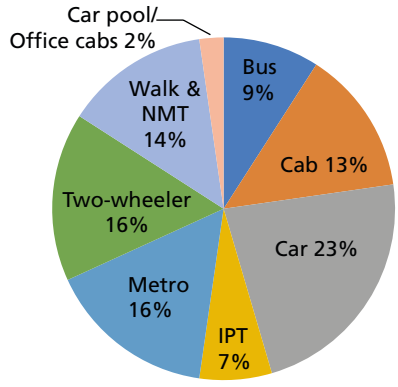
a. Pre-lockdown modal spilt for trips within 5-10 km



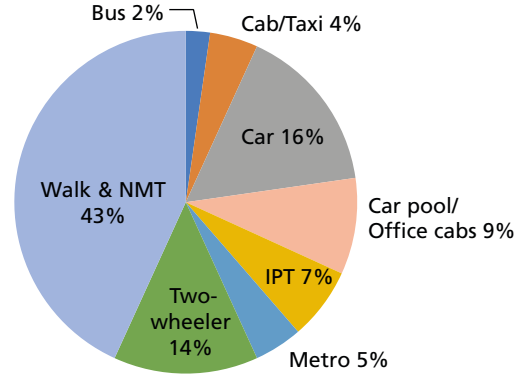
b. Post-lockdown modal spilt for trips within 5-10 km



c. Pre-lockdown modal spilt for trips below 5 km



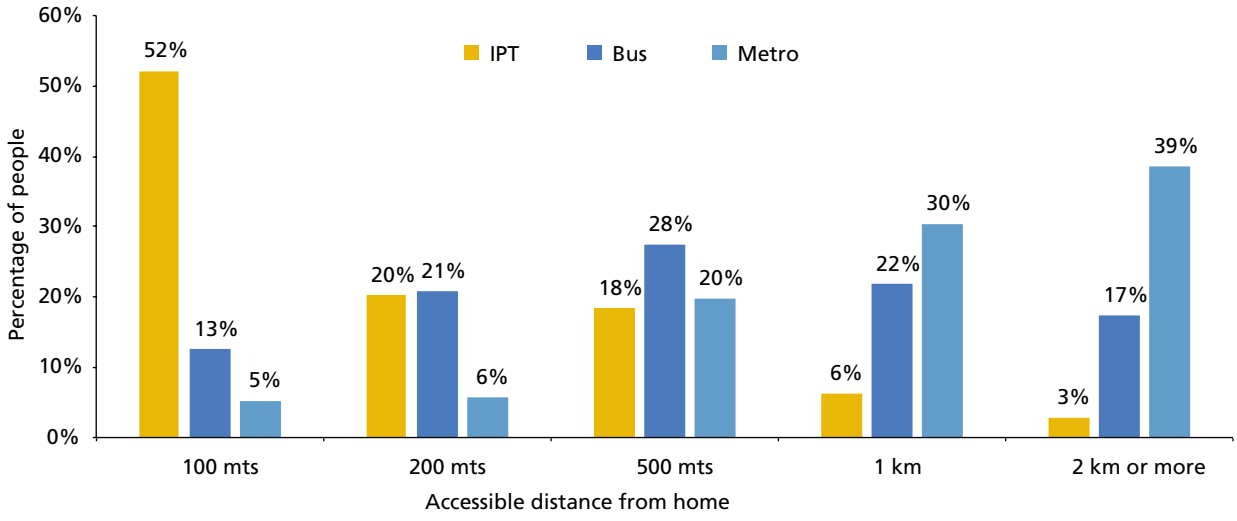
d. Post-lockdown modal spilt for trips below 5 km



Improving access to public transport nodes is critical to influence commuting choices: One clear impediment to using public transport that is evident from the survey is that the majority of the respondents do not have convenient access to formal public transport nodes in this region. At a Delhi-NCR wide level, close to 40 per cent do not have access to bus stops within 500 meters; and 69 per cent do not have access to metro stations within 500 meters. This will vary from city to city. But clearly, this makes using public transport inconvenient and people become captive users of personal transport.

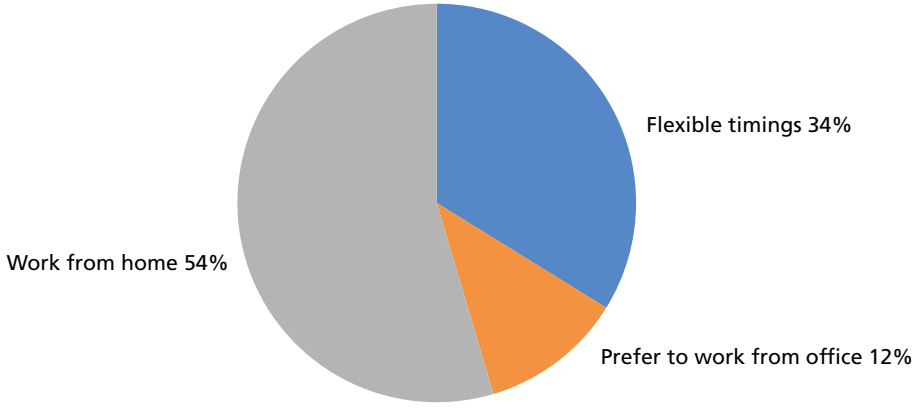
On the flip side, about 34 per cent have access to a bus stop and 11 per cent have access to a metro within 200 meters. Only para-transit modes are available more widely and within close proximity. It is important that economic reconstruction packages in cities need to be linked with transport and street-based infrastructure to improve access to transportation modes along with walling and cycling infrastructure. This requires local area plans and appropriate infrastructure along with public amenities and public parks within neighbourhoods to enhance the experience (*see Graph 13: Need to build infrastructure*).

Graph 13: Need to build infrastructure



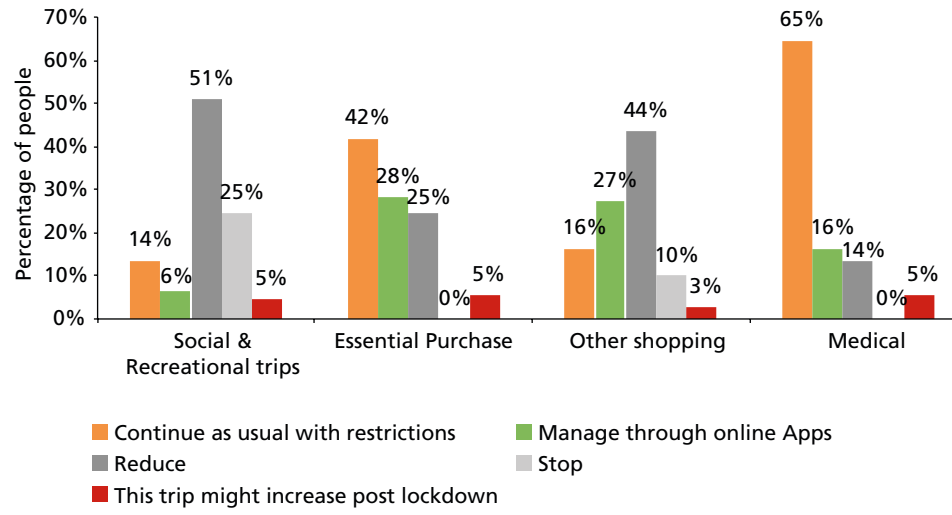
Majority opting for substantial behavioral change that can reduce unnecessary trips: The middle- to high-income groups have shown a strong preference for work-from-home. As many as 54 per cent have opted to work from home and 34 per cent for flexi-timing. Smaller numbers have preferred to work from offices. There is a growing consensus that some of these strategies need to be institutionalised. While this can work for health protection, it can also alleviate pressure on our highly stressed bus and metro systems (*see Graph 14: Alternative methods of working*).

Graph 14: Alternative methods of working



Drastic change in activity patterns: A CSE analysis of Google data report shows that activities in residential areas during the lockdown have increased by 29 per cent, while visits to workplace reduced by 60 per cent and to retail and recreation by as much as 84 per cent. But going forward as the survey data indicates, activities related to essential services and medical requirements will continue to remain high at 42-65 per cent. For essential and other purchases, around 28 per cent have shown an interest in online marketing. About 25 per cent of the respondents may completely stop trips related to recreation (*see Graph 15: How mobility needs will be met*). This change in commuting choices needs to inform infrastructure planning.

Graph 15: How mobility needs will be met



SECTION 2

7. REINVENTING PUBLIC TRANSPORT POST-PANDEMIC

The public transport that is normally overburdened and overcrowded in India, is now operating with just its one-third capacity during the relaxation period. Massive ridership loss has huge financial implications for these systems, and can affect their long-term solvency and viability.

Operation of mass public transport systems like metro and buses are subsidised by the state, where the cost is often multiple times heavier than the earnings. These systems are often debt-ridden — a situation that is further aggravated by several fixed cost parameters such as taxation, staff costs and depreciation etc. The only thing that keeps a public transport running is the balance between ticket box revenues and cost of operating the trip. The lockdown has triggered an imbalance in this already burdened system due to which public transport systems are continuously losing revenues and fixed costs are piling up. State transport corporations are facing bankruptcy.

Many cities with insufficient state-run bus services depend on private bus operators. These are not institutionalised and are largely individual-run systems or are a part of private bus associations. Their revenues and financial sustainability depend on daily trip earnings. The financial viability of all these operations has been deeply impacted by the pandemic. In Kerala[9], 70 per cent of private bus owners have said that the lockdown has badly hit their operations; they have refused to resume operations with lower capacity. In Kolkata[10], private bus associations have proposed three times equivalent fare to balance the loss in ridership. Private bus operations have raised concerns around increased fixed costs, insurance and taxes, as revenue is zero during lockdown. They have emphasised on the impracticality of operating at 30 per cent load capacity post-lockdown. They have demanded that post-lockdown, governments would have to re-assess the insurance validity terms, tax measures, registration of bus body post-BS VI regime, interest moratoriums etc to ensure sustainability of city bus systems.

If the lockdown continues with restrictions on public transport and minimal transport operations, another section that would be most hit will be intermediate public transport that have negligible or no operations. A closed public transport system has also created more problems for the lower socio-economic sectors along with essential workers dependent on only public transport for commuting. In its absence, streets that are inadequate for walking have compounded the challenge of commuting.

The bigger challenge is that while Indian cities will need immediate steps to tide over the crisis, they will have to build in strategies for longer term strengthening of public transport. It may be noted that there is already an enormous deficit in bus transport in India and the existing fleet is facing recurring financial losses. Currently, urban India has 48,000 buses but according to the estimates of the Union Ministry of Housing and Urban Affairs, 1,88,500 buses are needed[11]. There is already a legacy of deficit while the pandemic is cutting down the capacity by more than half.

Globally, as in India, the immediate focus is on detailed protocol and guidelines for hygiene and cleanliness in public transport systems while maintaining social distancing. Simultaneously, some thoughts have begun to emerge on long-term financial strategies to make the systems viable. While pursuing these goals, cities across the world are also adopting methods to reduce travel requirement to bring down the pressure on skeletal public transport services by promoting walking and cycling for shorter trips and adopting work-from-home approaches. Understanding some of these strategies is critical to inform the response and reform process in India.

Today, re-strategising public transport systems will have to ensure financial viability and safety and rebuilding confidence to prevent people from moving to personal vehicles. Without these strategies, Indian cities will experience and lock-in more congestion and pollution.

Hygiene and sanitisation protocols: The ability of the virus to survive makes it necessary to disinfect and sanitise the surfaces inside public transport, especially handrails and seats which are more likely to be touched multiple times by passengers. Almost all public transport operators have ramped up the frequency of cleaning and sanitising their vehicles. State transport undertakings and other bus systems in India have also adopted these measures. Several such guidance frameworks are now available.

Globally, cities are also trying to advance some of these cleaning systems. For example, Shanghai bus operators are using ultraviolet lights to kill the virus in interiors and exteriors of public transport services; this takes five to seven minutes per bus[12]. A Hong Kong rail operator is using robots to carry out disinfection as it reduces the risk of humans catching the virus[13].

There are also concerns around the closed environment of air-conditioned public transport as transmission of the virus increases in circulation of stale air, negating any social distancing norms[14]. Therefore, open windows or the use of exhaust fans for ventilation are important for rapid air exchange. KMB buses in Hong Kong have retrofitted open widows to help increase air circulation[15]. Similarly, the Shenzhen Bus Group (SZBG)[16] and Massachusetts Bay Transportation Authority (MBTA)[17] are running buses with open windows.

Social distancing protocols and service operation protocols: Globally, most cities have adapted reduced scheduling and timetable to continue service operations and prevent community spread of the virus. For example, the MTA in New York is running its bus service at 75 per cent of its typical capacity during usual days under the Essential Service Plan[18]. San Francisco and Chicago have reduced their timetables, and Washington metro has modified its routes and kept as many as 20 stations closed to avoid crowding. Some major cities in Germany namely Berlin, Hamburg and Munich have eliminated the extra bus and train deployment during peak hours and have adopted weekend timetables with 10-minute intervals (instead of five minutes or less).

In Vienna, the Saturday schedule has been implemented on weekdays and the Sunday schedule on weekends[19]. Unlike other countries, Singapore has increased peak-period frequency from one train every five minutes to one train every three minutes[20]. Transport for London (TFL) managed to operate 60 per cent of its tube service and 80 per cent of the bus service during the lockdown period to ensure safe commuting of NHS staff and essential workers. In the rest of UK, services were reduced to six-20 minutes interval and 38 stations were

kept closed. The LTA also implemented safe distancing measures in trains, buses, bus stops and bus interchanges where orange stickers were placed to demarcate seats that should be avoided and green stickers to designate places where people should stand.

Wuhan city started its 30 per cent public bus transport service on March 25, 2020[21]. Safety supervisors were deployed on each bus, whose duty was to ensure people scanned a QR (quick response) code as proof of their health status before boarding. People who do not have a health code need to bring a health certificate issued by their residential community.

Staff protection protocols: Protection of staff is critical to keep the service operational for essential travelers. The measures taken for staff protection include the provision of safety equipment such as masks and gloves, regular temperature checking, maintaining social distance between staff and passengers, and contactless ticket transactions. For example, the Metropolitan Transport Authority (MTA) of New York has installed plexi-glass barriers at all bus depots and a pilot programme is underway to install vinyl shields on the buses to separate operators and customers. The use of front doors for boarding and alighting has been banned in London and middle door boarding is allowed temporarily only. A protective screen shields the bus driver's seating space. Customers are asked not to sit on seats close to the driver. Similar measures are being taken in Paris, Dublin, Chicago, Anchorage, Atlanta, and cities in Switzerland. In Shenzhen, a travel record is being maintained for staff going out or entering Shenzhen for emergency services and a daily health monitoring and mandatory self-isolation is done if required.

Staff management protocols: The efficient utilisation of staff during the pandemic is important as allowing more staff at a time affects social distancing. The MTA has strategically re-purposed its staff by reassigning employees with high customer service to essential service roles — for instance, platform controllers who are qualified for road service management are working in the revenue service as conductors.

Contactless ticket transactions: To promote contactless ticket transactions, public transport operators have either made ticket transactions cashless or are running the services free temporarily. For example, Melbourne city has allowed digital payment for buying tickets. The usage of buses and trams in Santa Cruz de Tenerife has been made free since March 23, 2020. A similar measure is being taken in Wellington[22], Berkeley, Anchorage, and Atlanta[23].

Bus lanes can make systems more efficient now: Protected bus lanes, bus priority lanes, and bus rapid transit systems (BRT) can help operate buses with higher frequency to meet the demand for public transport. BRTS are known for high frequency services and large carrying capacity as high as 22,000 persons per hour per day at a speed of 40 km per hour. Unlike conventional city bus operations, a BRTS is able to achieve high frequency and high carrying capacity due to reduced time in boarding-alighting, increased speed and bus routes, and disciplined operations.

Even without a BRTS, it is possible to create bus lanes quickly to enable quicker movement and turnover of buses to improve the carrying capacity. In today's context, when social distancing will be the norm for everything, protected and dedicated bus lanes could be very useful. As per government orders, public transport is allowed to operate with less than half or 30 per cent capacity than

usual. Hence, in order to maintain safety and social distancing norms, the only way our city buses can operate to meet the demand is to augment fleet size and frequency of operations.

A ballpark estimate by CSE shows that from the pre-lockdown time, Delhi has 5,400 buses with a total service capacity of 741.6 lakh km per day (total carrying capacity of all the buses multiplied by their daily operational km) and carried approximately 45 lakh passengers every day. There are two major public bus service providers in Delhi. Delhi Transport Corporation (DTC), a state transport body, is owned and operated by the Delhi government. The Cluster Bus System, a private partnership model-based gross cost contractual framework, is operated by private operators and managed by the Delhi Integrated Multi-modal Transit System (DIMTS), a professional agency hired by the state.

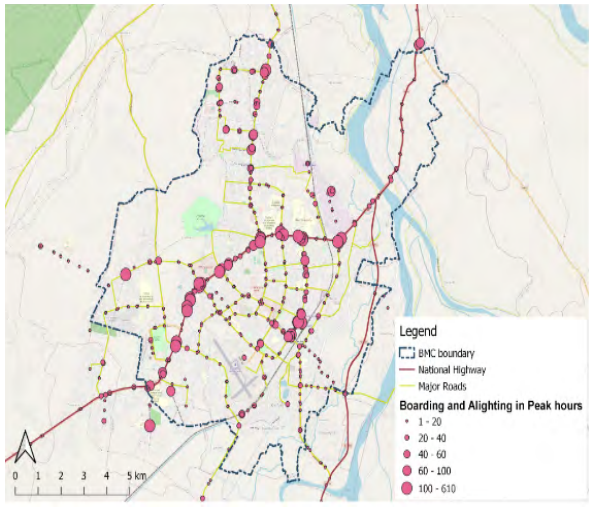
City-level initiatives in India: City authorities and bus transport corporations have started adopting a set of guidelines to operate their respective bus systems while meeting hygiene and physical distancing norms. Metro systems have also defined similar guidelines (*see Box: Indian cities — steps taken by transit agencies to operate services post-lockdown*).

Some cities are being more inventive in regulating movement by working out officially staggered timings for offices in targeted areas to manage the pressure on existing systems. Bhubaneswar, capital of Odisha, has taken the lead in this. The city authorities have made special efforts to identify and map bus stops with high demand and activities within the influence zone of one km. They have also worked out staggered timing and recommended operation hours for various activities at Patia IT Hub for morning and afternoon shifts for IT offices, government offices, banks and shops with well-defined opening and closing times[24] (*see Figure 1: Demonstration of staggered demand in Bhubaneswar*).

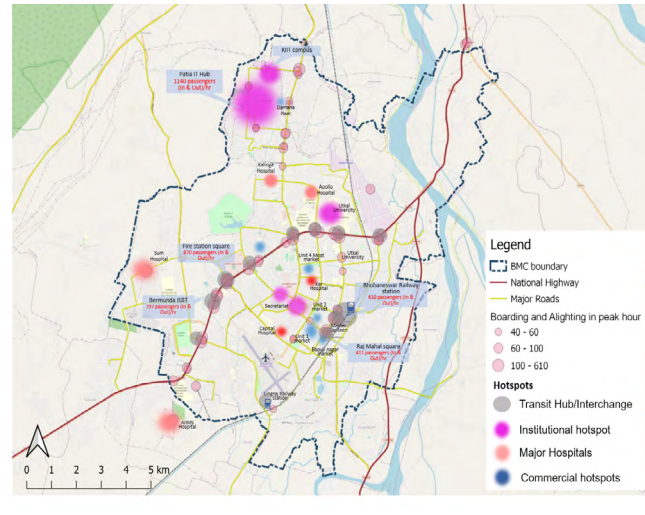
With new physical distancing norm at 20 persons per bus, the service capacity of the combined systems of DTC and DIMTS in Delhi has reduced substantially to 211.9 lakh km per day. If looked at from the service capacity perspective, to regain the original service capacity level of pre-lockdown time, the city needs

Figure 1: Demonstration of staggered demand in Bhubaneswar

Step 1: Identification of high demand bus stops



Step 2: Activities in locations around influence zone of 1 km



Source: Laghu Parashar, 2020, Reinventing Public Transport and Mobility in the "NEW NORMAL", GIZ, at CSE Webinar, May 25

Indian cities — steps taken by transit agencies to operate services post-lockdown

With the easing of the lockdown, transit agencies in India including bus systems and metro systems are preparing for restricted operations to provide safe services. The immediate focus is on safe and hygienic operations.

BANGALORE METROPOLITAN TRANSPORT CORPORATION (BMTC), BENGALURU[25]

Measures for passenger safety:
Periodic sanitisation of buses and other premises
Maintaining proper ventilation (open windows) within buses
Limiting vehicle capacity to 50 per cent (30 persons per bus)
Queue marks for waiting passengers at stops
Boarding from rear door and alighting from front door
Provision of hand sanitisation during boarding / alighting
Mandating masks for all users

Measures for crew safety:
Restricted entry at office premises, depots, canteens etc
Compulsory temperature monitoring and use of hand sanitisers
Daily health monitoring and reporting
Providing necessary safety equipment — masks, gloves, sanitisers etc
Special allowance for crew working during this crisis period
Training programmes — crowd management, yoga classes etc and training imparted by officials of department of health and family welfare

Communication and outreach campaigns:
Spreading awareness through posters, audio plays — like do's and don'ts; hygiene and physical distancing measures at bus terminals, within buses etc
Requirement of proper disposal of used masks and gloves

Innovation and digital reform:
No cash-based ticketing within buses
QR code-based daily passes issued by conductor; weekly and monthly passes at bus stations or terminals
Implementing bus priority lanes

DELHI BUS SERVICES (DELHI TRANSPORT CORPORATION AND CLUSTER BUS SYSTEM OF DIMTS)[26]
Maximum 20 people allowed at a time in the bus
Screening of passengers done before entering the bus

CRUT, BHUBANESWAR (MEASURES TO BE INITIATED)
No cash transactions — the system already has e-ticketing facilities for tickets and passes; no plans for QR-based tickets
Temporarily, the city is also planning on having drop boxes where people can drop their fares, closed loop card system for ticketing in the longer term

METRO SERVICES

Delhi Metro[27]

All the passengers to maintain one meter physical distancing at stations and within the metro coaches

No standing passengers allowed; passengers to be seated after vacating alternate seats

Thermal screening of passengers at all metro stations

Trains not to stop at crowded stations

Frequency of trains may vary depending upon the situation

Passengers to follow all government advisories while traveling in metro

Mumbai Metro[28]

Capacity restricted to 100 seated and 75 standing people per coach (the original capacity is 400 people, with 200 seated and 200 standing)

Alternate seat marking for passengers

Planning to stop using plastic tokens; instead will use disposable paper tickets

Encourage people to go digital — book tickets through apps, use smart cards to reduce queues at ticket counters

an additional fleet of 13,243 buses. There is an opportunity of enhancing the existing system capacity if some protection is accorded to bus lanes to improve the speed of buses — essentially, by increasing system capacity with bus lanes and increasing overall bus utilisation rate to 2,40 km per day. Only if protected bus lanes are introduced immediately, the fleet can provide more kilometers of service and reduce the additional requirement to 10,049 buses (at current physical distancing norms).

Even in a future scenario with higher occupancy but with controls on overcrowding, the city will need more buses quickly. But creating traffic-free lanes for them will still be essential for operational efficiency and speed of mass transit. This is what global cities are doing. In fact, the BMTC in Bengaluru has started creating bus priority lanes to improve carrying capacity of its fleet.

Digital data in maintaining safety protocol and mobility: With increased IT application and digitisation for public transport service monitoring and automatic ticketing, digital information and massive data generation have become possible. In 2017, an IBM study estimated that 90 per cent of all data being generated in the past two years reflect people's movement, their spending habits etc. This can be analysed to assess trends. This requires predictive modeling. Public agencies in many countries are currently using these big data in managing the pandemic and predicting the spread of the disease. They are also using data to further refine service deployment. Indian cities need to draw upon this learning for more advanced and sophisticated data analytics for planning services. In fact, cities like Bhubaneswar have already started this initiative.

Under the current circumstances, extensive use of data can be seen as a way forward to resolve the issues of taking services to those users and neighbourhoods which need them the most; this can also make scheduling more demand-responsive. Wuhan has shown some promising examples. After being completely locked for nearly 76 days, Wuhan has started its transit services where it has limited the service capacity up to 40 per cent. The city has linked its transit data with health data and barred people to book tickets if their health status is not well.

Similarly, at this time, by analysing people's behaviour, one can predict the future demand and make provisions accordingly for transit services, or rationalise the current one. Analysis of demand will also help transit agencies to choose the right type and size of transit vehicles to deploy in a given situation for optimisation of services. Transit schedules can be made with a fair degree of accuracy, considering temporal variation of travel time between two specific points. Data will also assist transit agencies to identify the areas of service deficit that need to be fulfilled by other services. Integration among different transit agencies will become more crucial after the pandemic, which can only be possible through integrating the data of different transit / associated services — it will greatly impact people's travel choices.

On the other hand, due to social distancing norms and the work-from-home culture, people have started using digital platforms like social media, online marketing and video conferencing more rigorously than before. Social media apps like WhatsApp and Facebook have reportedly observed approximately 40 per cent increase in usage during this phase. Zoom reported more than 300 million people using its platform for meeting or video conferencing. The online marketing industry, particularly sales of grocery and essential items, has boomed.

8. FISCAL AND BAIL-OUT PACKAGES TO REVIVE PUBLIC TRANSPORT

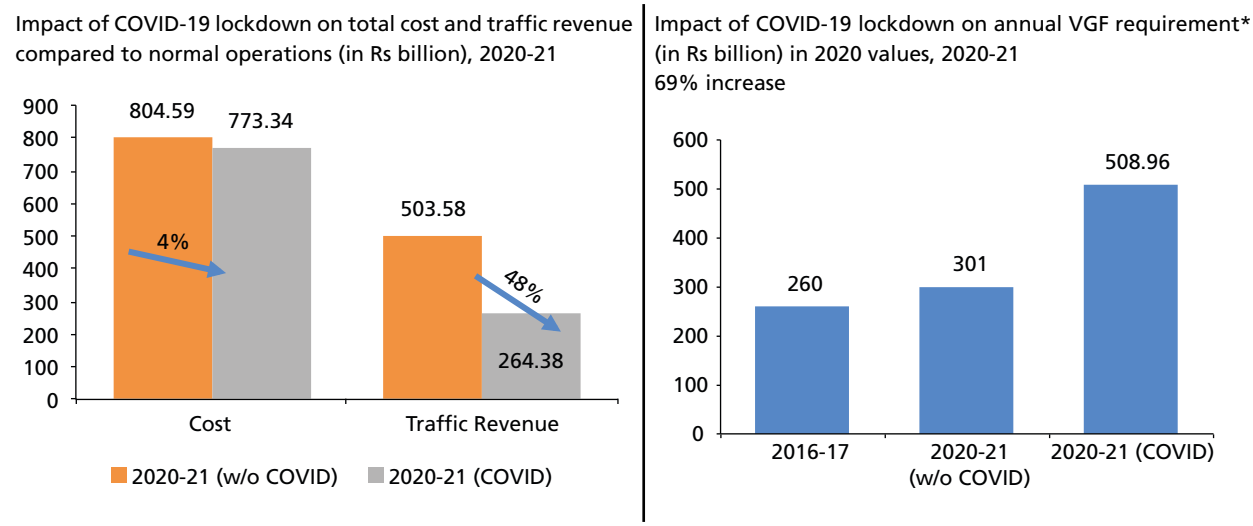
The most compelling concern at the moment is the economic reconstruction of the transport sector to survive the financial crisis as well as to rebuild the systems for scale, comfort and convenience to enable a massive shift. How can bail-out packages and economic and job revival strategies be linked with this process? Reopening bus and metro services is essential for the opening of the economy and for livelihood security.

All transit operators In India (bus- and rail-based) are now burdened with increased fixed costs, high taxes on buses, and plummeting revenues. So far, there is no financial package for rebuilding public transport systems. Stimulus packages also need to be linked with transport augmentation plans and mobility reforms.

The estimates available from GIZ show that while the overall cost reduced by 4 per cent during the lockdown, the traffic revenue reduced by 48 per cent. This has created a 69 per cent increase in the annual viability gap funding requirement of bus transport agencies in India (*see Graph 16: Impact of lockdown on fiscal health of bus transport in India*). This assessment also states that poor bankability of the state transport corporations, limited revenue sources with urban local bodies, and disproportionate share of transport-related funding going to road infrastructure further aggravates the challenge[29].

This makes a long-term reform-based national bus funding essential. It needs to co-finance public transport and walking and cycling infrastructure. It is equally important to identify new revenue sources.

Graph 16: Impact of lockdown on fiscal health of bus transport in India



Note: *Estimated for period from March 2020 to February 2021 considering regular operations from May 2020

Source: Laghu Parashar, 2020, Reinventing Public Transport and Mobility in the "NEW NORMAL", GIZ, at Centre for Science and Environment, Webinar, May 25

The global learning curve: Several governments around the world are working towards specific fiscal packages to revive their transit systems.

Hong Kong is already providing a broad range of financial support, benefiting both customers as well as public and private operators. This includes 20 per cent fare subsidy to commuters for six months; employment support scheme for transit operators where the government is providing 50 per cent wages, capped at HK $9,000 per month for six months; fuel subsidy to franchised buses, ferries, trams, taxis, and public light bus operators; and one-time subsidy to private bus, school bus and hired car owners. Similar strategies linking economic recovery with the transit systems and associated reforms have to begin immediately in India.

According to Alok Jain, managing director of Hong Kong-based Trans-consult Asia Ltd, transport businesses in Hong Kong experienced a drop of nearly 40 per cent in fare incomes on weekdays, and 50-60 per cent on weekends — this has spurred a spate of fiscal packages to help out the sector. In Hong Kong, all buses and trains are running as normal without any disruption or lockdown. Detailed fiscal packages have been created for different target groups.

Fiscal support for citizens and commuters includes one-off cash grant of HK $10,000 to all permanent residents. There is a public transport Fare Subsidy Scheme, which benefits ~3.8 million commuters to get a subsidy amounting to one-third of their public travel expenses exceeding the threshold of HK $400 per month with a cap of HK $400. The threshold has been lowered to HK $200 a month. MTR is proposing to cut fares by 20 per cent for six months starting July 1, 2020. An Employment Support Scheme includes 50 per cent of wages, capped to HK $9,000 per month for six months.

An Anti-epidemic Fund for public transport has been created that provides fuel subsidy and reimburses one-third fuel / electricity cost between July 1, 2019 and June 30, 2020. In the next round, subsidies for regular repair and maintenance costs and insurance premium has been given. Hong Kong is also reimbursing regular repair and maintenance costs and insurance premium from April 1 to September 30, 2020.

Fiscal support is also available for taxis and light buses. The Anti-epidemic Fund allows a fuel subsidy at HK $1 discount per litre of LPG for 12 months for LPG vehicles; and reimbursement of one-third of the actual fuel cost for 12 months for petrol/diesel vehicles. In the next round, a one-off subsidy is being given to the green minibus: a non-accountable subsidy of HK $30,000 per vehicle is being given. Other packages include one-off subsidy to registered vehicle owners of taxis and red minibuses; one-off non-accountable subsidy of HK $30,000 per vehicle; subsidy to taxi and RMB drivers; and a monthly subsidy of HK $6,000 for each eligible active taxi and RMB driver for six months. To drivers not fully meeting the eligibility requirements of an active driver, a lump sum of HK $7,500 is being given.

Non-franchised buses and other similar categories are also being supported under the Anti-epidemic Fund. This includes one-off subsidy to registered owners; one-off non-accountable subsidy of HK $20,000 for each licensed non-franchised public bus; one-off non-accountable subsidy of HK $10,000 for each licensed school light bus and hire car. In the second round, measures include one-off subsidy to registered owners; and one-off non-accountable subsidy of HK $30,000 for each licensed non-franchised bus, school light bus and hire car.

Other global cities: Similarly, London has introduced a £1.6 billion funding and financing package after the pandemic for Transport for London to protect and continue transit services. It also includes a support fund of £1,095 billion of new grant and a loan facility of £505 million until October 2020. The US has created a US $25 billion fund 'Relief Act for Transit Services' to be managed by the Federal Transit Administration. In France, the government has introduced a cash relief fund of €50 million for road-based passenger transport in the bus and tourism sector, including social security contributions. China has taken steps to waive over ¥140 billion in road tolls. Kazakhstan has introduced tax and social payment exemptions for various sectors including transportation. Poland have introduced a government assistance package for leasing financing for transport companies.

It is also possible to learn from past experiences. During the 2009 economic recession, South Korea overcame the global financial crisis by creating a $60 billion green stimulus that, among others, focused on energy-efficient transport, rail and vehicles. This was the highest amount ever that any country had spent on green infrastructure to revive the economy. This not only lowered the unemployment rate in South Korea compared to other OECD countries, but also revived the economy significantly. A study on the Great Recession shows how investment in transport generates 31 per cent more jobs and supports the economy in a big way. In 2018, China's central government had provided $150,000 per bus to revive Shenzhen city's transport service and convert the entire fleet into an electric bus fleet.

India needs its own package: Public transport is a big employer and has a huge potential for job and livelihood creation. While an immediate bail-out package is needed to tide over the crisis, well-designed investment plans in public transport infrastructure, its digital management, technology transition, electric mobility and infrastructure development for integrated services offer enormous opportunities for economic stimulus. Already, the financial packages announced by the Government of India have created links with larger economy-wide reforms. Similarly, the financial stimulus for the transport sector needs

to accelerate reforms in the sector, especially in the bus sector, to reduce its overall tax burden.

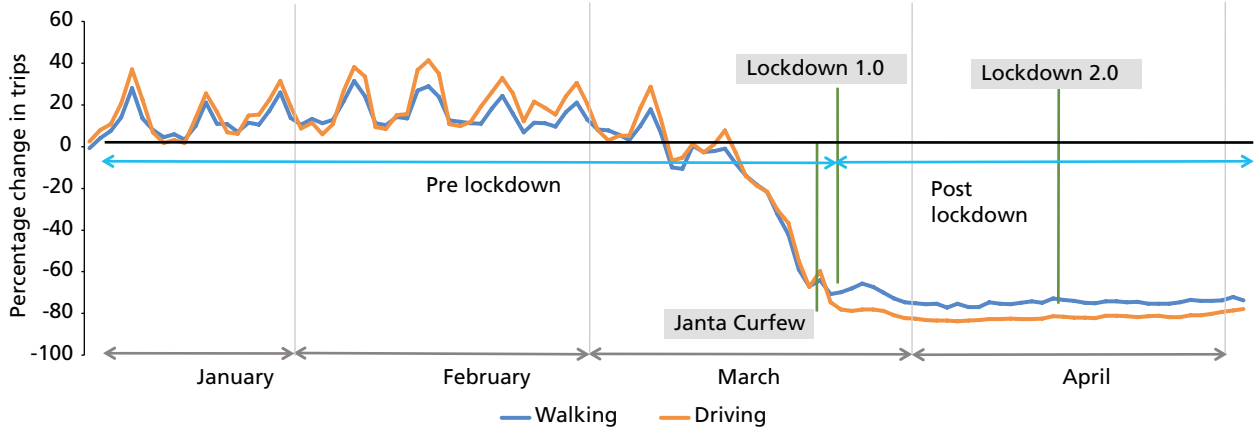
9. ACTIVE TRANSPORT EMERGING AS AN ENABLER OF MOBILITY AND SAFETY

The pandemic has stimulated a demand for contact-free active transportation — walking and cycling — to maintain social distancing. This silver line of change is evident in India as well (*see Graph 17: Change in walking and driving trips observed in India — an opportunity*). Post-pandemic share of walk trips has increased and is more than driving trips. The CSE survey has also shown increased preference for walking and cycling immediately after the lockdown, and also in the longer term. This is an opportunity to scale up and promote micro-mobility for shorter trips. This will not only reduce pollution, congestion and energy guzzling but also take the pressure off public transport systems for shorter distance travel.

Global shift towards active transport: Globally, the pandemic has catalysed a dramatic change in people's travel behavior. Contactless walking and cycling are also faster modes of commute for shorter trips. Several cities are seeing a boom in the use of cycling amid the lockdown (*see Table 2: Increase in bicycle usage amid lockdown*). Even the World Health Organization (WHO) has recommended on April 21, 2020 to "consider riding bicycles and walking" in a new technical guidance manual on moving around during the COVID-19 outbreak.

The pandemic has also increased the sales of bicycles. Brompton, the largest bicycle manufacturer in the UK, has seen a five-fold rise in online bicycle sales since the start of April, compared to normal sales of 50,000 bicycles per year. The company has also lent 200 bicycles to the staff at St Bartholomew's Hospital in central London for a month to help them get to work[30]. In New York, San Francisco, Berlin, and across the UK, bike shops have been allowed to stay open[31]. City bike counts across the world have increased by 74 per cent to 470 per cent among cities like Melbourne, New York, Philadelphia, Chicago, Shenzhen, Edinburgh, Glasgow, Manchester, and Wuhan. Rapid increase in usage and sale of bicycles has been reported in the UK, European countries, and the US.

Graphs 17: Change in walking and driving trips observed in India — an opportunity



Source: Apple Mobility Trends Report (from January 13th, 2020 till April 30th, 2020)

Table 2: Increase in bicycle usage amid lockdown

City	Country	Description
Melbourne	Australia	Number of bicycle users recorded on April 25, 2020 during the lockdown increased by 270 per cent compared to the count on November 10, 201932
New York	US	City experienced a 67 per cent surge in demand in early March compared with the same period last year33
Philadelphia	US	City bicycle count took an unprecedented growth of 471 per cent along Kelly Drive between 2019 and 202034
Chicago	US	Bike share system use doubled in early March 202032
Shenzhen	China	Demand for Hellobike in Shenzhen's commercial areas of south China's Guangdong rose by 20.9 per cent between two consecutive weeks of February 202035
Edinburgh	Scotland	Edinburgh saw a weekday increase up to 252 per cent and weekend increase up to 454 per cent in the first three weeks of April 202036
Glasgow	Scotland	Cycle traffic rose by 74 per cent37
Manchester	England	There has been a 22 per cent increase in bicycle usage since the beginning of the lockdown
Wuhan	China	Meituan Bikeshare service provided around 2.3 million trips in Wuhan, which is more than half of the non-walking trips from January 23, 2020 to March 12, 202037

Source: Various news reports on cycle sales

To contain the spread of the virus, as well as stem the rapid increase in usage of personal modes post-lockdown, various cities across the world are temporarily or permanently expanding the non-motorised transport (NMT) infrastructure. Soft barriers are being used on carriageways to create what is popularly known as 'pop up' cycling lanes. Cities are repurposing space allotted to traffic lanes and on-street car parking into NMT-friendly environment. For example, the city of Tampa has closed down streets for two weeks to maximise outdoor seating and providing service space for local restaurants and shops[38].

Australia and Ireland have seen unprecedented cycle sales. Melbourne is planning 12 km of temporary bicycle lane by using car parking spaces; these may be made permanent. A mix of lane marking and separation barriers will be used[39]. Milan has plans for revamping streets over the summer to maintain the reduction in motor traffic under the nation-wide lockdown. The city plans to develop 35 km of city-wide streets with cycling and walking spaces, and devote part of existing street space to low cost temporary cycle lanes, wider pedestrian pavements and NMT priority lanes[40].

Bloomberg reports that California has designated 74 miles of streets to strengthen pedestrian ways, cycling and NMT usage. Auckland has created 22 km of temporary bike lanes. France has plans to devote Euro 20 million for shifting to pedal-powered mobility[41]. This will include construction of temporary bicycle parking areas, and funding for repairing used bikes at registered bike shops. Paris is also banning private cars completely on one of the main streets, the Rue de Rivoli, at least till the containment of COVID-19[42]. The city is planning the roll-out of 650 km of emergency bike lanes which will come mostly by removing 72 per cent of its on-street parking facilities[43].

Post-lockdown New York too has an ambitious plan to reconfigure road space to reallocate space from cars to walking and cycling. Croydon city in England has banned the parking of vehicles in front of shops to increase standing queue space for customers. Residents living along residential roads will be allowed to put barriers along a section to utilise road space for exercises[44].

Even in the past, it has been noted that crises like this have stimulated the demand for walking and cycling. A study on the 9/11 incidents and the 2003 SARS episode mentions that one definite pattern that evolved as a result was to travel by road. European countries and Taiwan had shown a decline of public transport ridership as people avoided public transports as precaution. Reports show soaring cycling demand in Bogota, the UK, New York, Mexico, Ireland, Germany, China, Philadelphia etc.

London takes the lead: The most sweeping change is happening in London where the Mayor of London is taking this opportunity to roll out the "London Streetscape" programme — he has adopted a street space plan to accommodate a 10-fold increase in cycling and five-fold increase in walking during the pandemic. The plan is designed to fast track this change by transforming streets with wider footpaths, pedestrianisation of streets and reclaiming parking spaces to make cycle tracks.

The city is widening its pavements at key locations to facilitate a local economic recovery, with people having space to queue for shops as well as enough space for others to safely walk past maintaining social distance; repurposing traffic lanes and parking spaces for temporary bicycle lanes; and re-phasing green time to give more time for pedestrians. The bicycle-sharing system has been made free for health workers[45]. Leicester city in England is creating a "Key Workers Corridor" for people close to Leic hospital to help workers involved in the National Health Service (NHS)[46]. An extensive cycling network has been mapped out and newer car-free zones have been identified. The Waterloo Bridge is being restricted to only walking and cycling.

Another dramatic decision that is awaited is to further increase congestion charging from June 22. If this comes through, then the timing of the congestion charging will be extended and the pricing will increase from UK £ 11.50 to UK £ 15. All of these measures will be complemented with work-from-home and related strategies. The thrust continues to remain on restraining auto-mobility.

10. INDIA NEEDS ACTIVE MOBILITY TRANSITION

This is an opportunity to leverage the mass movement based on walking and cycling in India — especially now, when it has emerged as an option for both middle- and low-income groups. This paradigm is no longer about captive users, those who cannot afford to use any other modes, but also includes those who want to walk and cycle by choice. This pandemic is forcing to ensure equity in access for all income groups. Safe cycling and walking infrastructures can ensure health safety for all and also access to livelihoods for all. As per the Census 2011, 47 per cent of daily trips in urban India are by walking and cycling: for NCR, the percentage is 40 per cent and for the NCT of Delhi, it is 37 per cent (more than one-third of its daily trips). In terms of distance, almost 60 per cent of daily trips in urban India is within five km. In fact, for the NCR, the share is 47 per cent of daily trips, and in NCT, it is 48 per cent.

Another government statistic available from the report of the Ministry of Housing and Urban Affairs (MoHUA)[47] shows the share of walk and NMT trips

at 41 per cent in Delhi, while 80 per cent of all trips is within six km. A third study by IIT-Delhi also reports that more than half of all travel trips in most Indian cities are below five km. But lately, this advantage is eroding due to sprawling urban areas and gated development. Statistics also reveal that cars account for only 4.8 per cent of daily trips in urban India and barely 13 per cent of daily trips in the NCR.

This data has to influence investment decisions on transport infrastructure in India. Even though the majority in urban India are walking, cycling and using public transport and this share is expected to increase, actual investments have generally remained narrowly focused on car-centric road construction and highway building. Data on implementation of smart cities accessed from the MoHUA in February 2019 shows footpath and NMT infrastructure accounted for only 7 per cent of the funds spent; public transport accounted for 17 per cent of the funds in contrast to 50 per cent spent on road and highway infrastructure. Now is the time to reverse this trend and provide infrastructure for non-vehicle users to address the crisis while improving job opportunities and increasing other economic spin-offs.

Going forward, therefore, Indian cities need to prioritise micro-mobility including walking and cycling on a neighbourhood scale and at a network scale across the city. Local area plans need to identify catchment areas for walking and cycling demand and create appropriate infrastructure. Ward-wise plans are needed to develop infrastructure for bicycle lanes, footpaths, expansion or repair of sidewalks etc. Develop public amenities and public parks within neighbourhoods to enhance the experience. Improve environment around existing and future walking and cycling networks. These dense street networks need to be intrinsically linked with the public transport nodes.

If social distancing is going to be the new norm, the pandemic has indeed re-emphasised the need for equity in transportation systems, public spaces, and street spaces for safety and accessibility for all.

Reallocate roads and parking spaces from cars to sustainable modes by re-designing streets and re-purposing streets. This is the global trend to reallocate road space to walking and cycling, contain auto-mobility post-pandemic, and optimise travel needs to cut down unnecessary trips. This can also help reduce the pressure on already strained public transport operating at low occupancy for safer commuting during the pandemic. Mobility recovery based on a street-based programme requires an emergency plan to demarcate wider lanes for walking and cycling to stimulate the dormant demand and preference for contact-free travel among all income groups. It needs local area plans to create appropriate infrastructure including public amenities and public parks within neighbourhoods to enhance the experience.

COVID-19 has given us an opportunity to re-look at the priorities and bring equity in this allocation.

11. PANDEMIC REINFORCES THE NEED FOR A COMPACT URBAN FORM

The need for reinvention of mobility has brought the focus back on the way we design our cities. It is increasingly clear that the new normal needs mass transit and street-based changes for active mobility that requires deliberate policies and strategies to keep the urban form compact and high density well distributed. The trend towards sprawl and gated development will have to be contained to prevent inefficiency in delivery of all kinds of basic services,

including transport and health services, and to prevent locking in of pollution and energy guzzling.

The pandemic has stirred yet another discussion around high-density development. Fear of contagion has made many weary of crowded cities. There is a growing anxiety that high population density will increase human contact and lead to more infections and deaths. But such fears may reinforce undesirable trends towards low density, gated and ghetto development that will lock in more pollution, ill health, carbon and social inequity in the long run.

This can detract attention from the possibility of maximising a city's potential to secure greater economic and social wellbeing with better environmental and health protection. A recent report from Tod Litman of Victoria Transport Policy Institute, Canada[48] states that many people may "assume, incorrectly, that infectious disease risks increase with density, making cities dangerous and rural areas safe". While city dwellers are more exposed to infectious diseases, rural residents are more likely to die if infected due to weaker healthcare systems. Cities allow to optimise not only healthcare services but also a range of other community-level services that add up to greater protection for much larger numbers of people.

The risk is actually associated with 'crowding' in terms of the number of people per unit of space and not 'density', which is the number of people per unit of land. Litman argues that many dense and highly urbanised countries such as Hong Kong, Japan, Singapore and South Korea have been more successful at reducing Covid-19 transmission and deaths. This shows that an effective public health system, community responsiveness and healthcare quality are far more important in infectious disease risk management. Most people are best off during a disaster living in a walkable urban neighborhood with convenient access to common services and activities, and good social connections. A compact city can save 10-30 per cent of the transport cost, reduce travel time, increase productivity, reduced traffic casualty rates, use up less land for parking, and allow energy savings and emissions reduction.[49]

Yet, in India, the ideas of high density or redistribution of density provoke strong public reaction and protests. People fear that this will add to the crowd and traffic in over-crowded cities. It is not clear to many how urban renewal with well-planned density and medium-height buildings can reduce crowding and traffic and provide decent housing to masses.

After this pandemic ends, India needs to realise the value of high density, compact and connected cities that can be more resilient, safe, healthy and clean than a sprawled, gated, ghetto-like urban expanse. Most Indian cities are densely populated. But cities control density at one level, without adopting adequate urban design and planning strategies to meet the requirements for all and to minimise impacts of overcrowding.

Density control and high land prices in our cities are edging out large numbers of people from liveable neigbourhoods. Low- and middle-income groups and businesses are moving out to cheaper peripheries with huge deficits in urban and mobility services. This locks in congestion and pollution and social inequity at huge costs. In Mumbai and the National Capital Region, affordable housing projects are located as much as 65-75 km away from the city centre.

A 2016 World Bank study[50] estimates that an extensive sprawled urban development model in India could lead to additional costs in the range of US $330 billion to US $1.8 trillion per year by 2050, or 1.2-6.3 per cent of the GDP, as compared with a better managed urban development model. It has found that compact cities perform economically better than those that have sprawled.

The study cites the WHO which has estimated the health benefits from walking and cycling (avoiding crash damage costs and traffic safety etc). For example, aggregate savings in India from moving to smart growth (with more walking and cycling tracks) vs sprawled growth between now and 2050 could be in the region of US $120 billion per annum. Even households gain from compact growth — for example, indicatively, households in sprawled, automobile-dependent areas pay a bill of about Rs 50,000-120,000 annually for transport, compared with Rs 10,000-20,000 in a compact, multi-modal neighbourhood. For the same reason, people choose to live closer to workplaces to reduce the cost burden and save time of daily commuting.

In India, over the last decade, new policies have come into force upholding these principles. The National Habitat Standards have defined accessible compact urban form for new development. The Transit-oriented Development Policy has asked for integration of land use and transport planning with walkable and livable communities, with high density mixed land use, more open green and public spaces and well-organised transit facilities within the influence zone of transit stations and corridors (500-800 m radius). The policy says that this walkable and liveable community should include all income groups — economically weaker sections and middle-income groups in the influence zone and in the total housing supply.

It is encouraging that the Indian Railway Stations Development Corporation Limited is developing a first-of-its-kind "Form Based Codes" for the development of railway land — this will include designing and approval of layout plans and building plans for station areas to ensure a compact, pedestrian-friendly, market-responsive, transit-oriented sustainable development. This urban form is based on a compact grid of well-planned small block sizes, high street density, mixed use and mixed income housing etc to counter the challenges of urban sprawl, deterioration of neighborhoods, neglect of pedestrian safety, pollution and energy wastage, and iniquitous impact on the urban poor in new urban development.

The challenge, however, is to ensure that the key approaches of compact, accessible, equitous and liveable principles of these policies are not compromised and detached from densification strategies in new/re-development.

This is not only about the role of urban planning. In fact, cities grow and take shape spontaneously and autonomously that often precedes any planning. Communities give shape to it through self-construction and to answer their needs. Therefore, improve design of affordable housing and provide support to self-constructed housing in terms of decentralised services and habitat planning for healthy living.

At a city scale, new development and urban renewal need to ensure more efficient, equitable, and affordable use of urban land for all. The poor will have to be part of this solution. Revisit and modify land regulations that constrain well-planned densification, unnecessarily impose inappropriate set-back requirements and minimum parking requirements, are uncertain on green and

public spaces, and divert resources to high speed road infrastructure, among others. These lead to inefficient and iniquitous use of space that compromise wellbeing and safety.

Rebuild neighbourhoods based on walking, cycling and electric para-transit, well served by convenient, reliable, safe and sanitised public transport services. The pandemic has led to massive lifestyle changes, telecommuting and digital workplaces to reduce travel demand. Build on this solution and add more. Post-pandemic, the new normal in our cities will have to ensure co-benefits of affordable decent living and mobility.

12. LIFESTYLE ADJUSTMENTS TO REDUCE MOBILITY

One of the biggest learnings from the COVID crisis has been the lifestyle adjustments that have been possible to reduce the need for travel. To practice physical distancing, institutions and offices have maximised the use of digital platforms to move towards virtual workplaces and have promoted work-from-home. This has helped to reduce overall movement and travel in cities and lowered the burden on public transit systems. This is one of the biggest contributory factors to reducing vehicular emissions and congestion in cities during this public health emergency.

This dramatic change is evident globally. 'Work-from-home' has kept the dislocated economy going. Businesses could be conducted without being in physical office spaces. Many establishments that earlier thought working from home was an unproductive practice, are now actively participating in this. This has opened up new possibilities for the future.

Conventionally, work-from-home (WFH) had always been seen as a means to reduce peak traffic problem in cities. But this was not practiced widely. Many MNCs and IT companies today have already adopted mandatory WFH for employees — also to manage and reduce daily parking and urban land demands.

As seen earlier, the mobility trends report of India released by Apple shows that outdoor trips (usually consisting of large work trips) started decreasing rapidly from March 9, 2020, way before the implementation of lockdown 1.0. The lockdown has been responsible for the reduction in outdoor trips and adoption of WFH culture.

Post-lockdown, companies are developing a guidance framework for employees to help them maintain professionalism in their daily work routines. The guidance framework ranges from setting up physical and virtual workspaces to managing personnel time and wellbeing, as well as specific guidance for managers. This is leading to maximisation of digital platforms and systems that are now expected to define the new normal. There will be a big push towards digital working and minimum face-to-face learning. This will enhance the demand for digital services, telecommunications and technology to remain functional in a virtual space. Governments, institutions and companies are also realising that the need for commuting does not just increase peak road space demand, but also the subsequent demand for urban land for parking. This can be addressed through a virtual workplace.

Globally, cities such as Wellington in New Zealand[51] have come up with their guidelines to promote 'alternate ways of working' for a longer duration. The regional councillor of Wellington city says that it would be impractical to return back to a chaotic, congested and polluted state. A survey of Chief

Financial Officers (CFO) conducted by Gartner has revealed that 74 per cent of the respondents intend to shift 5 per cent of their employees to WFH after the pandemic resolves, and 17per cent of respondents intend to make 20 per cent of their employees move permanently to WFH[52].

It is reported that WFH has brought benefits for businesses as well as their employees. Considering the current losses experienced by businesses amid the lockdowns, WFH will help in reducing facility costs such as electricity and rental space requirements to accommodate more employees — these can be re-purposed. Already, a conversation has built up not only in India but also globally about repurposing office spaces.

In India, it is estimated that renting an office space that can accommodate 500 people can cost up to Rs 10 crore in annual rent, which means Rs 2 lakh per employee per year[53]. Other additional costs include those for air-conditioning, ventilation, lighting, furnishing, cleaning staff, and cafeteria. For employees, the benefits include travel cost-saving, time and flexibility when it comes to work-life balance. Studies have shown that an employee with a distressing ride needs the first 13 to 25 minutes to decompress which can now be utilised in office work[54].

Also, it encourages women — especially mothers — to join the workforce. Considering these benefits, some companies are seeking to move to WFH permanently. In fact, Google and Facebook are planning to allow its employees to WFH until the end of this year[55] while Amazon has allowed WFH until October[56]. Tata Consultancy Services is planning to allow 75 per cent of its employees to WFH by 2025[57]; Delloite[58] has reported that individual employee productivity has gone up. Companies like Amazon, SAP, Walmart, AT&T, PwC and Guardian Life Insurance have announced their plans to re-skill their employees for digital working. Infosys is setting up a 'digital economy aspirations' lab.

The 2011 Census of India has, for the first time, reported data on how Indians go to work. This shows that 24 per cent of Indians work from home. In 2016, the Department of Information Technology of the Government of India had launched a scheme as a part of Phase II BPO promotions to incentivise WFH for tier-2 and tier-3 cities in the country. A former president of the Confederation of Indian Industry (CII) has announced that more than one million IT employees are expected to work from home even after the lockdown is lifted.

In sectors that are not too involved in on-site works, information and communication technology (ICT) is helping businesses to realise WFH as the future. It has brought a huge boom in the use of telecommunication applications such as Zoom, Hangout, Google Chat, Skype, Whatsapp, etc. The physical commute trips to offices, meetings, and conferences have reduced and are now being performed through video chats. Also, companies have shifted their in-person recruitment systems to virtual workplaces using web and video conferencing. Capgemini plans to call only 10 per cent of its employees who are involved in critical company projects; the remaining 90 per cent will continue to work from home post-lockdown. Companies such as Skill Soft and the Addeco Group have shifted their in-person recruitment systems to the virtual.

Pros and cons: The world is now debating the implications of WFH strategies for the city, offices and employees (*see Table 3: Alternative work places — pros and cons*).

Table 3: Alternatives work place - Pros and cons context

	Pros	Cons
For the city	- Will decrease traffic generation in cities - Lower the need for fuel in running cars - Decrease the demand for parking spaces - Decrease the demand for personal vehicles for daily commuting - Decrease pollution level in cities	- Lower sales of auto industry - Residential infrastructure not equipped to handle work infrastructure requirements - Increase electricity consumption in residential spaces - Increase need for data consumption
For workplaces	- Decrease needs for physical infrastructure - Save electricity, utility and service costs	- An office is built to address all infrastructure requirements of work at one place — managing multiple locations and providing infrastructural requirements like intranet, administrative support, software etc might be a problem - Work time punctuality might diminish
For employees	- Saving commuting time - Low per capita carbon footprints	- Blurring work and home roles - Diminishing social interactions - Might create difficulty in communication

Source: CSE assessment based on literature review

From the perspective of the city, residential infrastructure is not yet built to handle work infrastructure requirements. This will lead to increased electricity use and costs, and higher cost of using the internet in residential areas.

Offices would need to enhance infrastructure requirements to manage working from multiple locations, and provide infrastructure requirements like intranet, administrative support, and software etc to employees. They will need guidelines for maintaining and enforcing work time discipline. Employees may suffer a lack of social interaction that is expected to affect socio-psychological dimensions.

If these strategies to reduce travel volume are institutionalised, they have the potential to reduce pollution and carbon intensity of travel. However, this may be noted with a word of caution. Studies such as one from CEPT University carried out in Bengaluru has indicated that WFH does not necessarily reduce the number of total trips in a day. It changes the peak time travel, but increases overall social trips after work.

This means that along with reducing work trips, it is also important to price automobile trips including parking pricing and low emissions zones approaches to maximise the gains from this initiative.

13. REPOSITIONING THE AUTOMOBILE

The pandemic has brought big uncertainties in the automobile market with regard to sale and purchase of automobiles. The industry is vulnerable. Consumer demand has plunged as decisions to buy vehicles have been postponed. Moreover, strategising for reduced dependence on automobiles makes its future uncertain.

Global downturn: According to the European Automobile Manufacturers Association, production losses across the European Union amounts to at least 2,317,369 motor vehicles so far, including passenger cars, trucks, vans, buses and coaches during the average lockdown period of 29 working days[59]. Across the US, the lockdown started after March 20, 2020 in most states. However, vehicle sales took a hit earlier that month as more and more active cases were confirmed. By March 15, daily vehicle sales dropped 36 per cent below the baseline projection made by J D Power[60].

Trends in India: In India, the national lockdown has been in effect since March. It has been extremely challenging for the Indian automotive industry as sales numbers have taken a big hit. According to the Society of Indian Automobile Manufacturers (SIAM), there has been a 51 per cent reduction in sales of passenger four-wheelers and a 40 per cent reduction in sales of two-wheelers in March 2020 (as compared to March 2019)[61]. The harsh impact can also be understood from the fact that Maruti has reported a 32 per cent sales dip in March and zero sales in April 2020 (*see Table 4: Comparison of vehicle sales in March 2019 and 2020*).

Table 4: Comparison of vehicle sales in March 2019 and 2020

Category	March 2019	March 2020	Percentage change
Passenger vehicles	2,91,861	1,43,014	-51%
Commercial vehicles	1,09,022	13,027	-88%
3-wheelers	66,247	27.608	-58%
2-wheelers	1,440,593	8,66,849	-40%

Source: Society of Indian Automobile Manufacturers (SIAM)

In India, private manufacturers believe that the current downturn in the automobile industry will be reversed. Maruti Udyog Ltd predicts that people's attitudes will change as more people will defer using shared mobility options[62]. Hero MotoCorp and Honda Motorcycles and Scooters, the major two-wheeler producers, also expect a mass shift to private two-wheelers as people would like to resume social distancing[63]. There might be a surge in demand for used second-hand two-wheelers and cars.

However, India in 2020 is in the midst of two transitions — BS VI and electric vehicle economy. The strategy in India should link revival with the green deal. This is the right time to link the stimulus package with electric vehicle pathways and a zero emissions mandate.

Concerns around stimulus for the auto industry: Even though several governments across the world have announced economy-wide stimulus and recovery packages, a specific strategy for the automobile industry has not emerged as yet. China has been the first to define a package — a fiscal stimulus — for the auto industry. It includes the following:

- Cash-for-clunkers, which is a compensation for scrapping old vehicles this year. The amount will be higher than scrapping a vehicle next year. Local officials are also urging manufacturers to match or exceed these incentives while selling new cars[64].
- Subsidies extended for new energy vehicles (NEV) that largely include electric vehicles. China had planned to end the NEV subsidies this year. But in March 2020, they have been extended till 2022, along with tax exemptions on purchases. This plan is expected to support the development of the electric vehicle sector while replacing high-emission vehicles.[65]

At the regional level in China, some cities have introduced incentives for purchasing cars either by offering cash incentives for new purchases or releasing more license plate quotas. However, these incentives differ from city to city. For example, in Changsha[66], a subsidy of up to Yuan 3,000 (Rs 32,000) can be availed on new car purchases built by local manufacturers. Although this incentive will boost sales numbers, it may also give rise to questions on environmental issues.

In many other countries, electric vehicle strategies are under consideration.

India needs a strategy: In India, there are worries that the economic recession will lead to a push-back from the industry to delay some of the imminent auto-standards. In fact, recent reports suggest the Ministry of Road Transport and Highways (MORTH) has accepted several proposals from the industry to delay new automotive standards that were scheduled for implementation in the near future. These include safety features and changes in road-worthiness certificates that vehicle manufacturers needed to revise for BS VI vehicles[67]. This has raised concerns about the adherence to the deadline of 2022 for implementation of the new fuel economy standards for cars.

It is also evident that the MORTH is finalising the scrappage policy for old vehicles, though the actual design of this package is unclear. This will work towards providing a stimulus to the industry.

This is the time to design a support and bail-out programme for the industry to link with conditional reforms and clean pathways. Scrappage incentives can be linked with mandatory share of electric vehicle sales and charging infrastructure development. Industry can earn credits for selling higher share of zero emissions vehicles to get tax benefits and other incentives. It is important to link economic revival with the green deal.

14. ONLINE DELIVERY WITH THE FOCUS ON ESSENTIAL GOODS AND SERVICES

With the pandemic at its peak, people's preference for online delivery services has increased phenomenally. In India, e-commerce companies and e-retailers such as Amazon, Flipkart, BigBasket, Grofers and DUNZO have currently restricted their services to delivering essentials such as groceries, protective gears and personal hygiene products. Online food delivery companies such as Zomato, Swiggy, Domino's etc have started "contactless delivery" services for providing food as most restaurants are not functional.

Some of the delivery companies have teamed up with bike-sharing or ride-hailing operators — BigBasket is using Rapido and Flipkart has partnered with Meru[68]. Amazon has even partnered with the Indian Railways under its 'COVID-19 Parcel Special Trains' for providing services on 55 lanes during the lockdown[69]. Uber has opened up a new service called "Uber Delivery" primarily for grocery deliveries; to do this, it has linked up with Flipkart, among other companies. Uber has also started "Uber Medic" services in association with medicine suppliers like Medilife to facilitate door-to-door delivery of pharma products. During this critical period when people have stopped visiting their friends or neighbours, Rapido has come up with a new service namely "Sent Package" in which one can send a home-made food or some groceries or any other item to their friend's house.

Almost all ride aggregator service providers are presently offering grocery delivery services. Uber is active in this field in Brazil, Spain and Australia[70]. Similarly, with its passenger and food delivery businesses having stalled, Rapido has started grocery delivery services for Big Bazar and BigBasket. This is another aspect of mobility which is emerging in these times.

Most emergency service vehicles are presently involved in transporting COVID-19 patients. It has, therefore, become difficult to transport non-COVID-19 patients to clinics or hospitals. To fill the gap, Ola has come up with "Ola Emergency" services which transport non-COVID-19 patients to hospitals. Presently, these

services are available in 15 Indian cities[71]. Available information from reports shows that Uber has started its "Uber Essential" services to transport people involved in delivery of essential services (such as doctors) or to connect critical places like hospitals or pharmacies; this Uber service is available in five Indian cities[72]. Similarly, Shuttl, the bus aggregator, is planning to provide pick-up and drop-off services to hospital staff.

This shows why service delivery companies will have to be integrated with the overall mobility design of cities. Currently, the e-commerce industry is working at a partial capacity in India, but once the lockdown in lifted, augmentation in this service is expected to meet the surge in online request for goods in cities, both due to pending purchases during lockdown and because of change in buying behaviour of customers. This traffic will have to be managed.

SECTION 3

15. NEEDED — AN IMMEDIATE ACTION AGENDA FOR MOVING FORWARD

It is clear that Indian cities cannot go back to the chaos of congestion and pollution of the pre-lockdown era. This humanitarian crisis must end quickly. But we must learn from this crisis to rebuild and redesign the way we move in our cities to reduce the overall health risk and toxic exposure for all income groups. The CSE survey of middle- and high-income groups has underscored that the public mood and attitudes are changing. Even if the preference for personal vehicles for reasons of safety may increase in the short run, the longer term preference is tilted towards public transport, walking, cycling and shared mobility, especially if good quality public transport is available. This is the opportunity to redesign our mobility strategies for health and convenient access for all income groups, including the urban poor.

Going forward, the immediate challenge will be to rebuild user confidence and trust in mass transit systems. But this is also an opportunity to build on social distancing norms to frame longer-term strategies to control overcrowding in public transport.

The most critical challenge will be to build finances for the transit system, as there will be a massive shortfall in public transport services due to low occupancy. Economic recovery and stimulus packages must include a longer term funding strategy linked to service reforms and infrastructure development for integrated public transport systems along with last mile connectivity.

This pandemic experience has also shown that the demand for auto-mobility need not be treated as infinite, insatiable, and uncontrollable. Solutions related to vehicle restraint and travel demand management measures that earlier seemed difficult, are doable if collective support is strengthened — as has been possible during this public health emergency. Across the world (not just in India), massive lifestyle adjustments including cutting down of unnecessary travel and promoting work-from-home systems have become possible. We need to build on this.

Globally, cities are reinventing walking, cycling and small para-transit modes. India needs to take a cue from this to scale up these solutions for its big and small cities.

It is also the time to get serious about implementing policies related to more compact urban forms and transit-oriented development policies to have a high but well-distributed and planned density, dense street networks, small block sizes, better accessibility, localised services and micro-mobility at neighbourhood scale.

At the national level, the Ministry of Housing and Urban Affairs would need to frame policy guidelines not only for the immediate scenario for adapting transit and mobility systems to meet the social distancing requirements of the pandemic, but also for longer term strategies to financially support scaling up of public transport, walking and cycling infrastructure, demand management measures and compact city forms for the new normal. This approach needs to

devolve at the state and city levels. City authorities need detailed strategies for rebuilding of public transport, walking and cycling infrastructure and other restraint measures.

It is hoped that the blue skies and rejuvenated public spaces that have been collectively experienced across the country will help deepen public awareness for building support for these strategies, and also galvanise political support for the new normal.

Immediate steps needed

- **Rebuild public confidence in safe public transport** with stringent implementation of hygiene and social distancing measures. Public transport cannot be an exception when other public spaces, including offices and markets, are being accessed with sufficient safeguards.

- **Implement reform-based fiscal packages and fiscal instruments to support revival and for sustainability of transit systems.** An economic reforms package is needed for public transport, especially buses, and this needs to be reform-based. Initiate tax reforms to reduce the tax burden on bus systems. Link the support for para-transit to operational reforms. Implement long-term fiscal strategies and instruments to augment integrated public transport and services. Infrastructure-based stimulus needs to be linked with public transport infrastructure along with active mobility systems. Restructure the transport sector funding accordingly.

- **Move shorter trips to active transportation — walking and cycling.** Immediate scaling up of protected footpaths and cycle lanes is needed, with flexible barriers to enable all income groups to access workplaces and meet other needs within a reasonable radius of their residences. Leverage the growing interest in contact-free and safe commuting. If short trips can move to walking and cycling as much as possible, it can also alleviate the pressure on strained public transport systems and prevent conditions that push people towards personal vehicles. As activity patterns are expected to change with more work-from-home options, access at the neighbourhood scale has to improve. Even commercial spaces need to adopt more pedestrianisation approaches for a safer experience. Cities need to design and implement their network plans very quickly.

- **Need integrated travel demand management strategies to reduce unnecessary travel trips** to scale up alternatives and reduce pressure on public transport systems. Institutionalise measures like work-from-home, staggered timing, limited attendance etc to reduce travel demand. This will allow essential services and critical components of other services to avail of the public transport systems. This will also help contain the rush towards personal vehicles. Unconditional opening of the economy when public transport is mandated to operate at low occupancy can accelerate personal vehicle dependency. This needs to be averted.

- **Need extensive digital data management to improve provisioning of public transport services.** With growing application of IT for management of public transport, it is necessary to develop systems to leverage this data for more demand-responsive service deployment and management. Transport providers need digital readiness for planning public transportation services for efficient deployment of services city-wide and according to demand and

requirements. Under the Smart City Mission, IT application has expanded considerably — this offers an opportunity to track real time data on several operational parameters and travel characteristics. More granular tracking of movement has become possible across the city to know travel volume by route, time and place, travel behavior, and more. This digital data platform should be integrated with service planning.

- **Need aggressive measures to restrain dependence on personal transport.** Rationalise taxes on personal vehicles to cross-subsidise public transport, implement parking area management plan with variable parking pricing across the city to reduce the demand for parking, explore congestion pricing, and introduce pedestrian zones and low emissions zones.

- **Implement compact urban form code and transit-oriented development policy.** In India, the central government as well as administrations of some cities like Delhi have adopted a transit-oriented development policy and requirements of a compact city form for new development and redevelopment. These need to get fully integrated with the Master Plans that are notified under Town and Country Planning Act. This has to make mixed use, mixed income, and high-density development with dense and accessible street network, integration with transit, small block sizes, decentralised services and adequate per capita green spaces (among other things) non-negotiable.

- **Link economic stimulus for the auto industry with the green deal.** As a stimulus package is expected for the auto industry, it needs to be leveraged to accelerate transition towards zero emissions pathways and massive bus-based mobility. A scrappage policy is expected soon to phase out older vehicles — in all likelihood, it will be tied to the phasing out of old trucks and buses. This can be tied to mobility and logistic reforms. On the other hand, stronger fiscal support for FAME II that provides incentives for buses, para-transit and two-wheelers can be more effectively designed for scale and performance. This is the time to design and link a zero emissions mandate with stimulus and tax reforms.

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As Indian cities get ready to reopen the economy to secure jobs and livelihoods, public transport and safe access have become an urgent necessity. Statistics point to the significant decline in pollution levels in cities like Delhi during the lockdown period. But this relief from toxic pollution cannot last unless we initiate a massive transition towards a 'new normal' with a high level of ambition to cut pollution and congestion. This is our only chance to make the big shift. The pandemic has offered us an opportunity change the way we travel, make smart commuting choices, and create inclusive and healthy spaces for overall wellbeing.

This report presents us with a comprehensive blueprint for doing just that.

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