Advances in 21st Century Human Settlements

T. M. Vinod Kumar *Editor*

COVID 19, Containment, Life, Work and Restart

Urban Studies

Springer

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This Series focuses on the entire spectrum of human settlements – from rural to urban, in different regions of the world, with questions such as: What factors cause and guide the process of change in human settlements from rural to urban in character, from hamlets and villages to towns, cities and megacities? Is this process different across time and space, how and why? Is there a future for rural life? Is it possible or not to have industrial development in rural settlements, and how? Why does 'urban shrinkage' occur? Are the rural areas urbanizing or is that urban areas are undergoing 'ruralisation' (in form of underserviced slums)? What are the challenges faced by 'mega urban regions', and how they can be/are being addressed? What drives economic dynamism in human settlements? Is the urban-based economic growth paradigm the only answer to the quest for sustainable development, or is there an urgent need to balance between economic growth on one hand and ecosystem restoration and conservation on the other – for the future sustainability of human habitats? How and what new technology is helping to achieve sustainable development in human settlements? What sort of changes in the current planning, management and governance of human settlements are needed to face the changing environment including the climate and increasing disaster risks? What is the uniqueness of the new 'socio-cultural spaces' that emerge in human settlements, and how they change over time? As rural settlements become urban, are the new 'urban spaces' resulting in the loss of rural life and 'socio-cultural spaces'? What is leading the preservation of rural 'socio-cultural spaces' within the urbanizing world, and how? What is the emerging nature of the rural-urban interface, and what factors influence it? What are the emerging perspectives that help understand the human-environment-culture complex through the study of human settlements and the related ecosystems, and how do they transform our understanding of cultural landscapes and 'waterscapes' in the 21st Century? What else is and/or likely to be new vis-à-vis human settlements – now and in the future? The Series, therefore, welcomes contributions with fresh cognitive perspectives to understand the new and emerging realities of the 21st Century human settlements. Such perspectives will include a multidisciplinary analysis, constituting of the demographic, spatio-economic, environmental, technological, and planning, management and governance lenses.

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ISSN 2198-2546 ISSN 2198-2554 (electronic)
Advances in 21st Century Human Settlements
ISBN 978-981-19-5939-4 ISBN 978-981-19-5940-0 (eBook)
https://doi.org/10.1007/978-981-19-5940-0

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

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About the Editor

Prof. T. M. Vinod Kumar had 49 years of experience in Urban Planning, as a teacher, researcher, and adviser/consultant, and worked in India, China, Bhutan, Nepal, Malaysia, Indonesia, and Hawaii, USA. He was Dean of Studies, Head of the Department of Urban Planning, Head Centre for Systems Studies and Analysis, Centre for GIS and Remote Sensing, and Centre for Urban Studies of School of Planning and Architecture, New Delhi, Visiting Professor at National Institute of Technology, Calicut, and Institute of Technology Bandung, Indonesia, Professional Associates at East-West Resources Systems Institute Honolulu, Hawaii, Fellow Centre for the Study of Developing Societies, Delhi, Project Manager in Council for Social Development, New Delhi, Regional Programme Coordinator at the International Centre for Integrated Mountain Development (ICIMOD), and Planner-Engineer at the Ford Foundation. He is the author of many books and journal articles. He coordinated and edited *Geographic Information System for Smart Cities* (Copal: 2014), *E-Governance for Smart Cities* (Springer: 2015), *Smart Economy in Smart Cities* (Springer: 2016), *E-Democracy for Smart Cities* (Springer: 2017), *Smart Metropolitan Regional Development: Economic and Spatial Design Strategies* (Springer-Nature: 2018), *Smart Environment for Smart Cities* (Springer Nature: 2019), and *Smart Living for Smart Cities Vol. 1 Case studies and 2 Community Study and Ways and Means* (Springer Nature: 2020). He is now working on four books to be published by Springer Nature entitled *Smart Global Megacities: Collaborative Research*

Tokyo, Delhi, Mumbai, New York, Hong Kong-Shenzhen, Calcutta, Bangalore, Chennai, Hyderabad, Ahmedabad, Kochi-Kannur Vol. 1 and 2 (in 2021) and *Smart Master Planning for All Cities: Innovations and Case Studies* Vol. 1 and 2 (in 2022).

Introduction

COVID-19: Containment, Life, Work and Restart: Urban and Regional Studies

T. M. Vinod Kumar

Abstract COVID-19 manifests as a viral respiratory disease that first was imported from Wuhan, People's Republic of China, and then it spreads from human to human when they come into contact everywhere in every continent. The response has been national and state governance with cooperation from the local government based on disaster management laws. The public health system became the frontline Corona Warriors and was respected by all for their services, but the system capacity was evaluated for its capability to have an unusually substantial number of patients. Many disciplines jointly must contribute a knowledge-based solution based on time series data on infected, recovered and died as well as more reliable serum tests. When a nation declares one peak has reached, the local data shows it has not and so local governance shall be the effective measure based on local data for COVID-19 governance. This book concentrates on local governance for COVID-19. This book believes that COVID-19 cannot be eliminated like smallpox or polio. It can appear and disappear seasonally like common cough and cold, with never-ending mutation of the virus, but it can cause deaths even after we had full vaccinations. The public health systems came out with preventive culture such as wearing masks, practising social distancing, washing hands with disinfectants to combat this virus. The police were deployed to implement preventive measures enumerated above. In this process, both police and public health workers got infected and can even threaten the entire population with more deaths and collapse of the public health system. This book advocates concentrating on urban centres for COVID-19 because of high population density and public realms where the danger of COVID-19 spread from human contact is maximum. The use of humans for data collection and management involving surveys and analysis, policing and intervention of public health persons is all risky prepositions for the individuals involved. This book concentrates on the public realm for work and living and finds an alternate solution that can automate COVID-19 prevention methods with less human involvement. This book gives more importance to local governance based on local data and the use of tools available for local governance such as Master Plans, zonal plans, public realm management using

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T. M. Vinod Kumar (ed.), *COVID 19, Containment, Life, Work and Restart*,
Advances in 21st Century Human Settlements,
https://doi.org/10.1007/978-981-19-5940-0_1

ICT-IoT systems, E-Democracy and E-government. These require modifications to the existing body of knowledge based on COVID-19 prevention capabilities. Hence, zonal plans may get modified and non-human control of the public realm may be institutionalised. This chapter brings together the state of knowledge on all these discussed, and the rest of the chapters use many of them to demonstrate locally based solutions based on locally generated data.

Keywords Coronavirus spread locally in aggregate and spatial · Governing responses · Related urban research and design issues · The urban restart · Carrying capacity of public realm · The smart Asparsa new urbanism principles for smart community · Recommended spatial approach · Tools for COVID-19 preventing urban restart project · Research objectives of COVID-19 project · Strategies and design of future of smart living and smart work post-COVID-19 · Smart metropolitan regional development · Smart economy · Smart work in Kozhikode metropolitan area post-COVID-19

1 The Virus Spread COVID-19 in Brief

The status of COVID-19 pandemics in the world and India is presented in a few maps from the WHO dashboard, which gives the status of the cases, deaths and vaccination, respectively, daily. For 7 January 2022, the WHO dashboard gives data for the world as well as for individual countries for example India as given below (Fig. 1).

COVID-19 pandemic spread and its disaster governance locally, regionally and globally throw challenges unknown to humanity [1–3]. For the first time, we see Chief Ministers, Prime Ministers and Public Health Officials giving daily statistics and their decisions on fighting the pandemic based on data through TV news and other news media. The community is organised to run a community kitchen and deliver food, and the government provides free rations for the needy. Helpless migrant workers rush back to their home states. Although it spreads eventually to all parts of the country both urban and rural infecting all with or without symptoms, it starts and remains an urban phenomenon that requires great attention. The infection, recovery and death we see every day during the pandemic create a situation to find a better way based on city studies to intervene in the urban system so that humans that created the system are asked to live and work and then adopt a new urban restart based on the yet new urban culture that transforms the existing urban culture as well as the future urban structure. This is the subject matter of the book, and this chapter introduces what it is all about. During the pandemic, disease spread occurs in waves until all are infected and then the intensity of waves in terms of infected, recovered and death then starts diminishing in the later part but will then become a periodic urban phenomenon that cannot be ignored is the challenge of an urban restart.

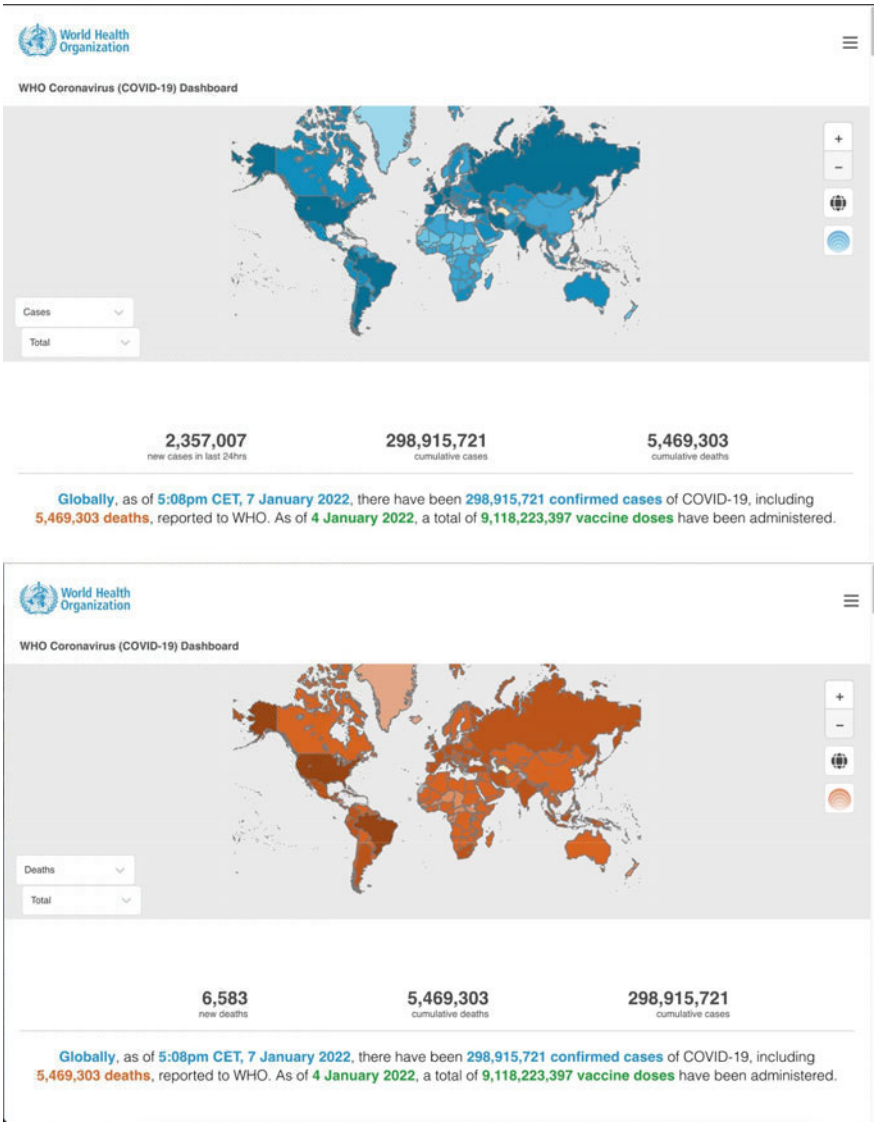
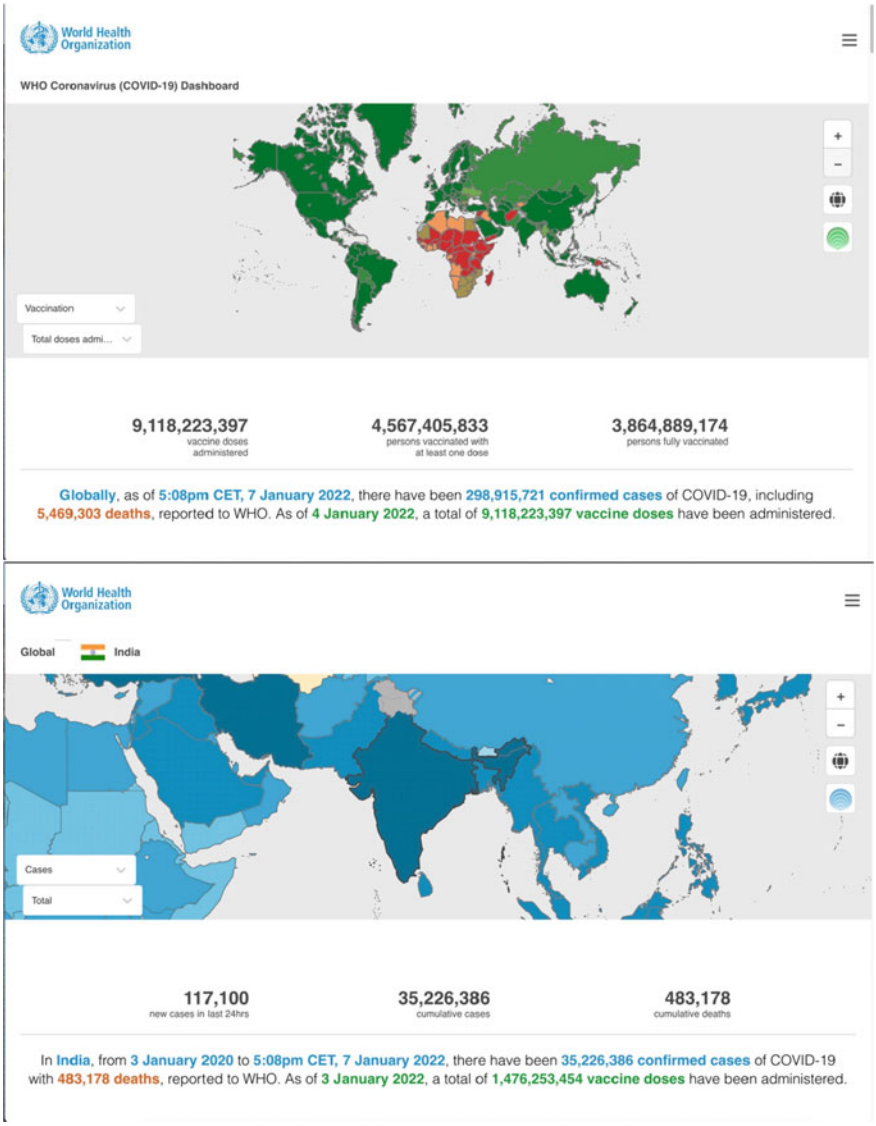


Fig. 1 WHO dashboard COVID-19. *Source* WHO



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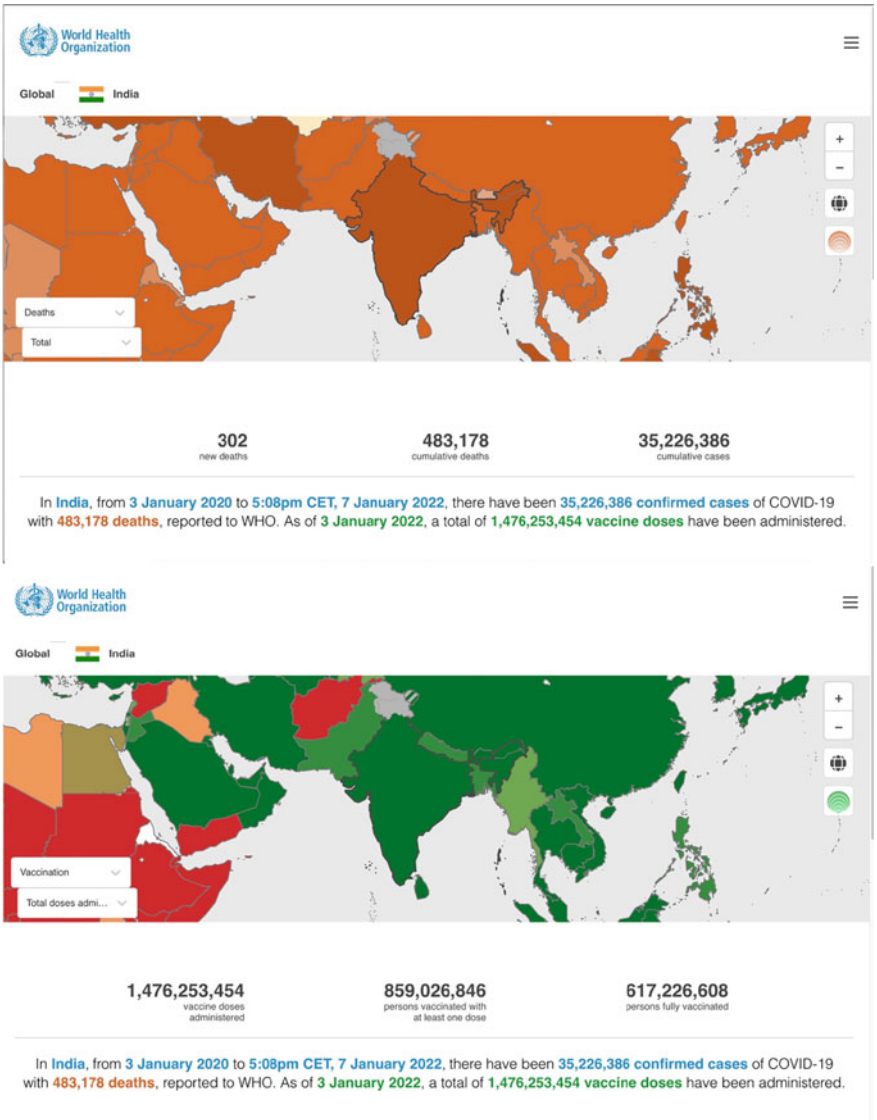

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What is prominent in the wake of this pandemic is a great disruption of all that happens in cities and the prominence of the government hierarchy in a federal system of governance in sorting out for the best interest of the citizen. The wet market in Wuhan, China, sells wild animals for food for local Chinese. Such markets are banned by many rule-based democracies around the world. The reason for this restriction in democracies is the first wildlife protection and second to avoid unknown animal

to human transmission of diseases like COVID-19. From Wuhan, the virus is most dangerous to humanity with far-reaching impacts on living and working transmitted from animal to human. Until then, this infection is unknown as regards its protocol for diagnosis and remedies. This virus seems to have transmitted from the breath through droplets and aerosol and affected the respiratory organs and breathing soon, some patients moved to ventilators, and some died soon after in varying proportions of those identified as affected. It was also found that this virus spread at a hitherto rapid rate from human to human by contact had spread all over the world instantly. First, it was felt that children below 10 years and senior citizens above 60 are most vulnerable, but statistics worldwide have not substantiated it fully and often quote other age groups from country to country. Those with the premorbid condition also are found very vulnerable. Many got infected with no symptoms, but testing confirmed the incidence of COVID-19 which was most dangerous but seemed innocent carriers of this virus. Deaths were reported from few with death rates varying from country to country which seems not correlated with the income level of the country. The spread locally was alarming, and many deaths produced more local spread than imported. Since the dead body can also transmit disease, the special cremation protocol was followed including the protocol to limit the funeral event to twenty persons was also followed. For many reasons, this virus was not announced immediately by the People's Republic of China to the world through the World Health Organization so that there can be precautions for further spread. In China, domestic air travel stopped immediately but not international air traffic resulting in a situation of unannounced pandemic. The rapid economic development of the People's Republic of China and the initiation of the Belt and Road Initiative by China further spread the virus wherever the Chinese population are in business along the Belt and Roads either for construction or running industries and services. The older generation of silk roads spread science, mathematics, culture and religion along with locally produced surplus commodities, but newer ones spread disease and pandemics. The rapid economic development in the People's Republic of China created many Chinese tourists who travel around the world. Their travel spread the virus during the holiday season like the Chinese New Year worldwide. It was extremely late when the World Health Organization woke up and declared the epidemic a pandemic.

In most countries first, the disease got imported from travellers from outside the country not necessarily China or the outside federal states. The gateway for the entry of the disease was airports, railway stations and bus terminals and cars and buses from outside. The rest is history and statistics are reported daily of those affected, who died and recovered. I have not made any attempt to illustrate it in this para with ever-changing numbers daily. There is daily reporting by those who govern at the chief ministers' level in some states and related administrators every day as per the democratic tradition. The printed media came out with many expert articles and visual media spent considerable time on COVID-19. The virus in the process got mutated into many forms. Many vaccines for viruses are under a certain stage of development around the world and are also authorised to use by WHO. The vaccine came out by the end of 2020 or early 2021. Vaccine delivery with a cold chain is costly for many countries and people below the poverty level. The urgency of the situation made their

development so rapid than at any time in the history of the development of vaccines before that for other epidemic diseases. The virus nationalism made this extremely competitive in virus research and production that some vaccines got registered like Sputnik 5 from Russia before its full mandatory stages of testing and validation before registration, but it is now being assessed in some other countries the missing stages of testing. The disease has an incubation period of 14 days and above. The person affected sometimes carries a virus with no symptoms at all as discussed, and others start showing symptoms such as temperature, cough and respiratory troubles after a fortnight. Both these types of patients freely spread the disease, and the number of persons infected with contact increased disproportionately higher than those imported. Contact testing, tracing, breaking the chain, isolation and treatment became the new mantra to fight the disease. Everyone called for an increased test, but the test was time-consuming, specially equipped laboratories to assess coronavirus were few and the kits were costly. The home and institutional quarantine then became the norm for 14 days, and some government tries to reduce it to 7 days. There were lockouts countrywide, then district-wide and followed by selected high infected areas called hotspots. The public health systems got strained with this virus since this system is not prepared with special equipment and number of beds and adequate medical professionals. The police force worked hard to implement with fines all the protocols from time to time of virus governance that is universally applicable or special for selected affected areas or clusters. Both police forces and health service staff got infected despite all care they extended for prevention. There were one wave and the second and third waves of disease in many countries, federal states, cities and union territories. There were few instances of reinfection for those who were treated earlier. The number discharged after quarantine, and treatment in hospitals became bigger and often surpassed the number infected daily. It is interesting to note that later the imported disease from outside became less and less and those affected with local contacts increased increasingly.

As stated, it was found that testing is a costly affair and was time-consuming. There was no instant testing where the result is known soon after the sample is taken. To start with, the test was conducted on only those who are suspected of affliction by contact tracing methods. Soon it spreads, and massive random or purposive sampling-based testing started in many places. There was also a serum test in many rounds on a sampling basis to find the spread, and it was found that the spread is at an alarming rate. Testing, more testing, contact tracing of those affected and treatment and quarantine became the norms. Face masks and keeping a social distance of two metres were used everywhere often marked on the floor to guide the population on social distancing. The places where this social distance is difficult such as religious congregations and schools and colleges, cinema theatres and so on were first closed for many months and then opened systematically with capacity restrictions. The healthcare system was assessed for its full capacity for equipment and healthcare professionals to treat the patients, especially with costly ventilators requirement on a massive scale. The oxygen supply was made uninterrupted by governments to hospitals. Many specialised COVID hospitals with beds and equipment came up within brief time intervals since the numbers were found uncontrollable with the

existing setup. The medical team were the frontline warrior and appreciated by all for their challenging work and services sometimes endangering their own life.

Many stages of lockouts followed by unlocking announced by the government gradually resulted in the contraction of the economy alarmingly rapid in size and recession; it also created massive unemployment for all especially the informal sectors of the economy and migrant labourers. They faced hunger in the twenty-first century. The daily normal life was disrupted with consequent mental and emotional discomfort and reported suicide of COVID-19 patients in hospitals. The government spending was increased since many below poverty must be provided free food and rations for extended months. Most government expenditure went for relief and not for the development or creation of vital infrastructure.

2 The Serosurveys of India and Kerala

The first India-national severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) serosurvey, in India, was conducted in May–June 2020, among adults aged 18 years or older from twenty-one states and found a SARS-CoV-2 IgG antibody seroprevalence of 0.73% (95% CI 0.34–1.13). I quote from the surveys, "The second household serosurvey was conducted among individuals aged 10 years or older in the same seven hundred villages or wards within seventy districts in India that were included in the first serosurvey. Individuals aged younger than 10 years and households that did not respond at the time of the survey were excluded. Participants were interviewed to collect information on sociodemographics, symptoms suggestive of COVID-19, exposure history to laboratory-confirmed COVID-19 cases, and history of COVID-19 illness. 3–5 mL of venous blood was collected from each participant and blood samples were evaluated using the Abbott SARS-CoV-2 IgG assay. Seroprevalence was estimated after applying the sampling weights and adjusting for clustering and assay characteristics. The survey then randomly selected one adult serum sample from each household to compare the seroprevalence among adults between the two serosurveys.

Between Aug 18 and Sept 20, 2020, the survey enrolled and collected serum samples from 29,082 individuals from 15,613 households. The weighted and adjusted seroprevalence of SARS-CoV-2 IgG antibodies in individuals aged 10 years or older was 6.5% (95% CI 5.8–7.4). Among 15,084 randomly selected adults (one per household), the weighted and adjusted seroprevalence was 7.1% (6.2–8.2). Seroprevalence was similar across age groups, sexes, and occupations. Seroprevalence was highest in urban slum areas followed by urban non-slum and rural areas. We estimated a cumulative seventy-four three million infections in the country by Aug 18, 2020, with 26–32 infections for every reported COVID-19 case. One in fifteen individuals aged 10 years or older in India had SARS-CoV-2 infection by Aug 18, 2020. The adult seroprevalence increased tenfold between May and August 2020. A lower infection-to-case ratio in August than in May reflects a substantial increase in testing across the country. Some 67% of India's population above the age of six has been exposed

to COVID-19, according to the latest national serosurvey. The Indian Council of Medical Research (ICMR) surveyed 36,227 people across twenty-one states in June and July—and found that two out of three have antibodies. Four hundred million people were vulnerable to the infection, officials warned against lax Covid protocols."

Daily statistics that monitor the death, inpatient and quarantine patients admitted to ICU were published daily in all local newspapers and TV channels. Many issues to face the pandemic were felt at the national and state levels with immediate interventions to remedy the current malady. This includes free food kits, community kitchen, voluntary effort, hotspot surveillance, mask manufacturing, augmented oxygen generation and supply to hospitals and so on.

"The fourth serosurvey shows there is a ray of hope, but there is no room for complacency. We must maintain Covid-appropriate behaviour, ICMR chief Dr. Balram Bhargava said. Seroprevalence means the presence of antibodies against COVID-19 in the population. For the first time, the survey included children, between six and 17 years—and more than half of the 8691 samples that were evaluated had antibodies."

The serosurveys conducted by different states with adequate sample sizes show a different picture in different states. For example, the state of Kerala showed a disproportionately higher prevalence of COVID-19 in comparison with the rest of the country despite the higher standard of health care there. The daily patients reported classified into inpatient, outpatient and home and institutional quarantine, COVID-19 hotspots as well as deaths. There were many numbers than in other states. There was also an under-reporting of death in Kerala to display the capability of the ruling dispensation. Since the death is tied up with compensation, this record is being corrected to save face among people.

"The summary of serosurvey result is as follows. Serosurvey: 70% in Kerala may have acquired natural immunity against COVID-19 (Vide C. Maya GOK, THIRUVANANTHAPURAM, OCTOBER 19, 2021, 16:01 IST UPDATED: OCTOBER 19, 2021, 16:01 IST). According to Maya, When the State was organising mass vaccination drives to protect the community from the ill effects of COVID-19 infection, the natural infection had already penetrated 70% of the State's population. The third round of serosurvey conducted by Kerala across all districts to assess the levels of COVID-19 antibodies in the population has reported that post second wave, at least 70 % of the population may have achieved natural immunity against COVID-19. While the overall seroprevalence in the adults in the community is estimated at 82.61% (either Anti-spike IgG antibody or Anti-nucleocapsid IgG antibody), the health. This means that even when the State was organising mass vaccination drives to protect the community from the ill effects of COVID-19 infection, the natural infection had already penetrated to 70% of the State's population."

"The seropositivity of 70% observed among the unvaccinated population may be an indicator of the background infection rate in the population", is how the health department has chosen to put it. The other side of the story is that since natural immunity is stronger and more long-lasting than the immune cover provided by any of the vaccines currently in use, Kerala is in a much better position now as far as population immunity against COVID-19 is concerned, than it had been in June this

year, despite there being a disproportionately higher daily incidence of COVID-19 among the population in Kerala in comparison to the national figures. This shows that immunisation is not the sure and final remedy for COVID-19 pandemic, but the social distancing and other preventive measures discussed in this chapter elsewhere.

"In June, the fourth round of serial serosurvey conducted by ICMR had estimated seroprevalence of only 44.4% (42.7% for S1 spike protein receptor-binding domain (RBD) neutralising antibodies) in Kerala against a national average of 67.6%. Seropositivity amongst those who were fully vaccinated has been pegged at 90% (89.92).

The difference in seropositivity amongst the unvaccinated (70%) and the vaccinated (90%) in population samples indicates that 20% of the State's population have only vaccine-derived immunity, among whom, breakthrough infections will continue to be reported for some time.

Given the heterogeneous pattern of natural immunity in the State (as seen in the variation in seroprevalence across districts) and waning vaccine immunity, shortly, these breakthrough infections are likely to occur in clusters in regions where vaccination coverage has been high but natural infection has been a low dose of the vaccine also went up from 30% in May to over 80% by September, when the current serosurvey was undertaken. Hence, we would like to believe that a chunk of Kerala's population now has hybrid immunity (combination of immunity from natural infection and vaccination), which is stronger and sustainable," said T. S. Anish, public health expert. Low seropositivity among children was observed. The fact that only 40.2% of the State's children (5–17 years) have natural immunity against the virus is quite concerning because this is one group that is vulnerable to COVID-19 as they do not have the protection of the vaccine. The low seroprevalence in this group indicates that when schools reopen next month, large-scale clustering of COVID-19 cases could be expected in schools and within families. Children are the only group where the seroconversion has been due to natural infection alone. District-wise, the seroprevalence among children ranged between 7.9% in Wayanad and 63.3% in Kasaragod.

The State claims that "the low levels of seropositivity among children is a surrogate of flattening of the curve of natural COVID-19 infection of the State and an indicator of the State's fight against the rapidly spreading infection." The State used two assays to estimate anti-spike antibodies (signals immunity through vaccination or natural infection) and anti-nucleocapsid antibodies (signals either prior natural infection or vaccine-derived immunity through Covaxin). The enormous difference in seroprevalence due to anti-spike antibodies (82.14%) and anti- nucleocapsid antibodies (19.26%) is quite surprising, indicating that seroconversion in the State has been contributed through anti-spike antibodies. It does raise questions about the efficacy of the seroconversion rate of Covaxin.

The survey also included 7252 healthcare workers, and 85% of them had antibodies. Eighty-two per cent in the 18+ age group have antibodies, finds Kerala serosurvey. The third phase of the seroprevalence survey was held in September among six categories of the population—those aged above 18, pregnant women, children between 5 and 17, the tribal community, residents of coastal areas and urban slums

dwellers—to diagnose the rate of infection. Eighty-two per cent in the 18+ age group have antibodies, finds Kerala serosurvey. The latest serosurvey conducted by the Kerala Health Department to estimate the prevalence of SARS-CoV-2 infection in the state has revealed the presence of antibodies in 82.6% of samples taken from residents aged 18 years and above.

The third phase of the seroprevalence survey was held in September among six categories of the population—those aged above 18, pregnant women, children between 5 and 17, the tribal community, residents of coastal areas and urban slums dwellers—to diagnose the rate of infection. Unlike the previous serosurveys held by the ICMR, this time the 13,000 odd samples were collected from all districts.

Presenting the survey result in the Assembly, Health Minister Veena George said the high prevalence of antibodies in the sample population could be due to the natural infection of the virus or vaccination coverage in the state. The survey revealed that the presence of antibodies was high among the tribal community (78.2%), residents of coastal areas (87.7%) and urban slums (85.3%). However, the presence of antibodies was lowest among children in the age group 5–17 years (40.2%). This assumes significance as Kerala is all set to open schools from November 1 which got postponed to partial. The September serosurvey results are in stark contrast to an ICMR serosurvey in May. In the May survey, Kerala's seroprevalence at 42.2% had been much lower than the national average (67.6%). This implied that over half of Kerala's population remained susceptible to COVID-19.

The Technical paper COVID-19 ICMR Sero-Surveillance 2nd Round—Kerala summarises the Results of ICMR Seroprevalence studies: Kerala as quoted below.

"ICMR is doing population-based seroepidemiological studies to measure the extent of spread of infection in an area and recommend containment measures accordingly. The strategy for population-based sousveillance adopted is repeated cross-sectional investigation in the same geographic area to establish trends in an evolving pandemic. Two rounds of such studies have been completed—one in May and another in August. The survey was conducted in the general population among individuals aged 18 years or more in selected representative 736 districts in India. Samples are collected from three districts of Kerala (Ernakulam, Palakkad, and Thrissur). ICMR has communicated the results of the second serosurvey as per D.O.No. ECD/COVID r9lt\ {isc./2020 Dated, the 30th September 2020. The current paper discusses the results of the sero-surveillance and its interpretation for Kerala" (Tables 1 and 2)

Table 1 Summary of results—Kerala

Date of sample collection	18–23 May	24–26 August
Total IgG positive	4	11
Total tested	1193	1281
% IgG positive	0.33%	0.8%

Table 2 Comparison of results with national average

	May 2020	August 2020
Kerala (%)	0.33	0.8
National average (%)	0.73	6.6

1. Kerala's seroprevalence in August was eight times less than the national average.
2. The state's seroprevalence increased by 2.4 times over three months. The national average increased by nine times during the same period. Different states' increases may be further higher than the national average.
3. This shows the effectiveness of robust containment measures including quarantine norms, following sanitised corridors for travellers coming from outside the state, effective contact tracing, rapid detection of cases through improved access to tests and isolation of COVID-positive cases, picking up clusters' formation at the beginning through surveillance and containment measures within clusters and the 'break the chain' measures that were adopted in the state.
4. It is worth noting that the estimated gap of unidentified cases was very less in Kerala as compared to the national average.
5. All credits for the lower prevalence of COVID in the state goes to the responsible citizens of the state who followed all COVID protocols rigorously and cooperated with all containment measures. All line departments coordinated actions have contributed to maintaining low infectivity rates in the state till August.
6. This also implies that further cutting down transmission is possible if all citizens strictly follow physical distancing by reducing the number of primary contacts, use masks and practise hand hygiene and all shops/establishments/markets follow 'COVID compliance.'
7. Understand how the infection is spreading in the country, and all states' comparative analysis is possible. It will clarify the rate of infection spread in various parts of the country and the state.
8. All the states must take uniform actions to ensure that the infections come under control. If not, the virus will keep circulating in the community and cause illness and fatality till it reduces its virulence.

ICMR study suggests that the IgG positivity has gone up from 0.33 to 0.8%. This needs to be seen in the context of the vulnerability in the state such as a high density of population, an inflow of people from outside the country and other states, a high percentage of the elderly population, high percentage of people with morbidity. Despite all these adverse situations, the state is maintaining low infection transmission as reflected through the ICMR study. It shows the sincere efforts of all at the grassroots.

Director of the All-India Institute of Medical Sciences (AIIMS), New Delhi, Dr. Randeep Guleria hailed the ongoing COVID-19 vaccination drive in the country and said that no booster dose is required in the country as of now.

Speaking at the launch of the book "Going Viral: Making of COVAX in—The Inside Story," authored by ICMR Director-General Dr. Balram Bhargava, Dr. Randeep Guleria said, "It is unlikely that the third wave of COVID-19 of a magnitude comparable to the first and second will hit India. With time the pandemic will take an endemic form. We'll continue to get cases, but the severity will be highly reduced."

He also underlined that the absence of a surge in cases now suggests that vaccines are still protecting against the virus, and there is no need for a booster dose for now.

Lauding India's progress in terms of medicine, Dr. Guleria further said, "When H1N1 had hit India, vaccines were imported from foreign countries. From importing vaccines to manufacturing our indigenous vaccine, we have come a long way. Today, our COVID-19 vaccines are being exported to other countries."

Speaking on the current situation of COVID-19 in the country, Dr. V. K. Paul, a Member of NITI Aayog, warned that the pandemic is not over yet and will not likely be over in near future. "It might become an endemic instead of a pandemic or could be a pandemic in a pandemic. The virus might take a different shape, but India is ready to deal with the situation. We are in a better situation now," he added.

The reduction in infection rate and the absolute number of cases is possible only if people follow health advisories and change behaviour by taking prevention measures.

3 The Full Vaccination or Full Natural Immunity or Hybrid Immunity Is not the Foolproof Remedy for COVID-19 Pandemic

Based on all serosurveys conducted and analysed at the world, national and state levels, I submit a hypothesis that full vaccination or full natural immunity or hybrid immunity is not the foolproof remedy for COVID-19 pandemic. It is undoubtedly required. It is the social distancing and redesign of the city for work and living.

This is substantiated by the fact of rising Covid cases in Europe despite high vaccination rates and even applications of booster doses do not prevent further waves. The European situation is a similar reason for worry in Kerala (November 11, 2021, Indian Express) where a high rate of vaccination has occurred, but the incidence of diseases is not vanning, many days it is as high as 50% of total India. Europe with a high rate of vaccination record saw a six per cent increase in new infections in mid-November 2021 compared with the week before and a corresponding 12% rise in deaths. The rising curve of COVID-19 infections in European countries, especially among fully vaccinated people there, can be worrying for a state like Kerala specifically because the healthcare standard is like the Europe, where breakthrough infections are spiking each day, said a member of the state's expert panel. Then what about the rest of the states in India?

Germany, whose 67.2% population is fully inoculated in November 2021, reported over 50,000 cases, the highest since the beginning of the pandemic. The UK, one of the worst-affected countries in Europe in terms of Covid fatalities, has also been

reporting over 35,000 cases this week. A virus gets mutated. First, we had Delta variant spreading in all parts of the world with more rapid spread capability than prevalent and now the World Health Organization (WHO) classified a new variant of SARS-CoV-2, currently circulating in South Africa, as a 'variant of concern.' It is also named Omicron much more efficient in spreading disease above Delta variant capability. This adds to further dilemma and makes us doubtful vaccination alone strategy cannot deliver the required state but a combination with a change in living and work in the urban habitat.

Europe saw a six per cent increase in new infections mid-November 21 compared with the week before and a corresponding 12% rise in deaths. The WHO said Europe was at a 'critical point' and could be seeing a spurt in cases due to 'uneven vaccine coverage' and premature relaxation of restrictions.

Dr. Anish T. S., a member of the expert committee advising the Kerala government on COVID-19, said on 21 November, "It is worrying for us because Kerala is more epidemiologically like the European countries than other Indian states. What is happening there could have comparable results here. Why (cases are rising) in Europe is an important question. Is it because the effects of the vaccines are waning? Or since it is winter there right now, there will be more closed interactions. It could be because of such social factors; we still do not know it yet. So, it is certainly alarming for us." But the last seroprevalence survey conducted in Kerala, which pointed to antibodies among 82% of the population, offers hope, he said. "We cannot drop our guard right now. But we hope to tide over (any possible) wave," he said.

The breakthrough infections form a chunk of Kerala Covid cases, symptoms mild in Kerala, 95.3% of the eligible population have got the first dose and 56.1% both doses of the Covid vaccine. In terms of vaccination per million population in the country, Kerala occupies the top spot, claimed Health Minister Veena George, but the trend of increasing breakthrough infections each week in the state holds on.

A whopping 47% of the new cases were found among those who had taken both doses of the vaccine. Another 20% had taken the first dose, and 31% were reported to be unvaccinated. However, declining hospitalisation and demand for oxygen and ICU beds in the state suggest that vaccines are proving to protect those infected from serious repercussions. The health department said that of the 74,976 cases reported between 3 and 9 Nov, only 1.7% of them needed oxygen beds and 1.4% ICU beds.

"All the breakthrough infections are not very severe. Comparatively, death rates are low. Such data is very consistent with that from European countries. In other Indian states, breakthrough infections are not being captured, it may be very mild so that the (health) system does not capture them. That may be one reason. The second reason is natural infections are quite high in other states. So, it will be a sterilising kind of immunity where there will be no infections at all. Those who have been infected with the Delta variant of the virus once may not get infected again at all," said Dr. Anish. "If you look at the pattern of sterilising immunity, the prevalence of it is quite low in Kerala. The seroprevalence study has data on that. In Kerala, more people have immunity via the vaccine, so they are more prone to breakthrough infections."

4 Then What Is the Solution?

New mutant COVID virus-like Delta and Omicron are already active globally and showed their capability in increasing rapidly the case load, hospitalisation, death, and more are yet to come not only in the coming months but also in coming years nobody can deny. Here is a disease where the hospital staff from nurses to doctors and all others are showing they can get infected and governing officers like police, public health officials and volunteers who supply food packets also get infected and hospitalised can even die. What one can imagine virus speed to be seasonal COVID-19 infections with hospitalisation, less severe case history which can be controlled by yet to be invented medicine taking place annually despite the hundred per cent up of vaccinations cover even with additional booster dose and all humans irrespective of age is covered by vaccinations probably annually or bi-annually along with other medicines in future.

This is unfortunately not sufficient since the preventive approach needs to be put in practice side by side with the above curative approaches which can drastically reduce the future caseloads. The focus of this book is on preventive spatial cum digital urban governance in a smart city that has considerable digital infrastructure.

The present professional practice of urban planning, land use planning, urban design and landscape architecture needs to look at cities again from the point of view of preventive urban governance for recurring COVID-19 attacks annually involving urban governance for social distancing, especially in the public spaces for work and living. The conventional human involvement in COVD 19 preventive governance needs to be minimised and eliminated, if possible, by assistive digital technologies to cover the risks discussed earlier. IoT, ICT and machine to machine (M2M) controlled spaces shall be designed by urban designers, site planners, landscape architects and smart cities specialists who can effectively design a control system that ensures social distances without having a police officer or other public healthcare workers controlling it. This creates automata in public space management for the COVID-19 pandemic which is yet to be explored by spatial planners and designers but is possible in the current state of assistive technologies. As a by-product of this design, we are at the threshold of terror-preventing space, but not yet there. This is my unintended recommendation of design electronically with failproof terror-preventing space.

I look forward to researching the worker-authors world around with thousands of real-world solutions based on the above in this two-volume book or even beyond this project. If any city can adapt it, we will be a great service to humanity.

How this can be done?

Master Planners of cities especially in India create sick cities with nineteenth-century city planning they were forced to learn from their colonial masters who were simply not concerned or interested in the quality of living and working of their slaves and natives. This creates a series of land use sick cities in India and many developing countries. What is the profile of land use sick cities especially from the point of view of the COVID-19 pandemic? If you see a disproportionately higher percentage of

residential land use and miserably inadequate public realm or open spaces as I see all over Kerala cities in comparison with examples of highly liveable cities which caters for all spatial needs of all sex and age group or very minimal urban standards for the public realm of land use percentages adopted in India, we can identify an example of a sick city. Now I know I live in such a city and despite I sit on committees that advise Master Planning of one city today but still failed to achieve. In other words, if public spaces are lost with the land use succession of private spaces, it is land use sickness that can generate more COVID-19 pandemic deaths and hospitalisations in ICUs, and Kerala is a good example not withstanding COVID-19 immunity by serosurveys. This partially explains the persistence of COVID-positive cases in Kerala where the land use percentages for the public realm are even much below the standards adopted in India. The statistical details have been analysed in my books on smart living. The suicide statistics of Kerala are much higher than the other states in India since public spaces where people can meet talk and sort out their problems are limited in Kerala compared to other states like Delhi and urban agglomerations in the National Capital Region.

It is not sufficient if you create public spaces with land use zoned qualitatively with differing intended characteristics in adequate quantity, but they should be used by people in a way that prevents COVID-19 infections without any human interventions by electronic means. If there are locational planning defects, there can be urban spaces, but it never gets used. For example, in western cities, it is hard to see a man on the roads and not to talk about animals since if animals are there, they may be killed by a speeding car no sooner than it appears in high-speed road systems. In western cities which have been designed more for automobiles than for people who are living there, there is no opportunity to use the public spaces for human or even human-animal contact barring a few car parking spaces. In western cities such as the USA and UK, you commute in a car from origin home to destination at the mall at an extremely high speed than in India, without spending any time in the public spaces intervening between. If they redesign the city with cycle tracks and footpaths thereby reducing movement speed as in some European countries like the Netherlands and Denmark, the possibility of use of public spaces increases manifold and make cars eventually redundant for urban life and useless. Then households need not spend considerable money side by side with subsidies to finance the household for the electric car ownership by government incentives to convert their car to expensive electric cars with still very undeveloped storage battery system. This mistake is also there in less developed countries since they often follow their yesteryear colonial master's in urban development.

There are many land management tools such as land pooling, accommodation reservation and transfer of development rights to make cashless creation of public spaces such as cycle and footpaths, open spaces, children's playgrounds and senior citizen spaces for outside living and gardens, but still, our bureaucracy and politician go for largely unsuccessful land acquisition for urban development in India and especially in Kerala, and they are interested to build residential, institutional and commercial spaces and not open cities for fresh air and outdoor human activities in public spaces. The main reason is if there is more money flowing into the government

system through land acquisition, the potential income from corruption can increase, but cashless urban land management cannot be used for corruption, and it is less popular for causes like spaces for outside living from congested houses with high values for unit areas of new constructions. Corruption wins against the public space creations in cities with end-user's helpless spectators.

Corruption emanating from bureaucrats and politician make it a risky proposition to use government-funded infrastructure and buildings. An 11-story bus terminal in Kozhikode is found to be dangerous; all occupants are vacated since 80% of pillars have less reinforcement and are to be strengthened as per the IIT Madras report before human use. A flyover in Kochi, Kerala, collapsed within one year. So, I think twice before using any government-funded building and avoid it as far as possible and use e-commerce.

How to avoid it? Use UPI, NEFT and RTGS instead of going to your public sector bank and use E-government smartphone apps instead of going to a government building. Use e-commerce and electronic payment instead of going to government-funded malls. Gradually, cut and eliminate such buildings and infrastructure from cities whether it is a collectorate or public sector buildings and convert them into public spaces. What you can trust is only a well-designed public realm with trees and shrubs and footpaths and water bodies and your home which needs to be converted to a legal workspace as we did in COVID-19 days.

Now public transport like metros and water metros, air crafts, buses and trams must be redesigned for COVID for social distancing. In aeroplanes, the challenge is to make all-economy class travellers reap the space benefit of business class which can create more social distancing. The challenge is how to make it practical for the economy class passengers and airlines financially. Probably use planes for goods traffic along with passenger traffic. Only the financial arithmetic after spatial design can work out this. Roads in cities should be made solely for walking and cycling and make car parking fees so expensive that car users will think twice before using the car parks and keep the land value high by policy designs that makes it not feasible to invest in car garages by household than using public transport or cycles. The unintended benefit is less air pollution from cars and sound nuisance.

I look forward to the years to come with rigorous empirical analysis of the current situation of living and working, a clear exposition of what happened as well as a solution to COVID-19 in workspaces and living spaces in a situation full vaccination is not a guarantee for the repetition of the pandemic.

Let the chapters of this book are more useful documentation than professional academic writing not necessarily useful to humanity and often recycle other scholars' work with no innovative designs but mere hypothesis testing and mindless modelling.

5 Governance Responses of COVID-19

Governance responses to COVID-19 varied a great deal if one analyses Communist countries with now-infamous Chinese lockouts for zero tolerance COVID-19 infections of major cities [4] and capitalist counties and as well as democracies. All these result in deeper impacts on humanity. How to deal with a sick city [5], how to secure a city against disease and death [5] and what shall be the political rationality [6, 7] are critical questions whose answers we find in diverse ways in different countries.

In federal democracies, the multi-level governance that came up was organising, more top-down level governmental responses and limited or no bottom-up level responses. In federal democracies such as India COVID, nineteen is considered a national disaster and governance responsibilities are shared among central and state governments disproportionately based on disaster management governance legislation which gives overriding powers to the central government in India. The central government, in this case, acting through the Ministry of Home Affairs assisted by the Ministry of Health with the help of expert groups shared the disaster management governance on COVID-19 and produced standard operating procedures for different living and working activities from time to time. Unlike disasters like floods and earthquakes, there was no extensive use of the army with their special infrastructure and special capacity which is under the central government. Under disaster governance, the central government has overreaching powers to declare measures that mitigate disasters, and the state government must follow and fully support it with additional and over and above supporting measures and standard operating procedures if found required.

In today's competitive democracy as against yesteryears consensus democracy practised in ancient Greece and Indian republics like Lichavis, the opposition questions all that is taken up by a ruling party as inadequate and what they have in mind which none of us knows exactly and which we will know when they are voted to power is the best. Cite an example the special fund set apart for donation was criticised by the opposition, and there was a case on that in Supreme Court which was rejected by Supreme Court as constitutionally valid. The opposition political parties in a democracy undoubtedly are vested with their right to criticise disaster governance of pandemic COVID-19 of the ruling party to refine their approach to governance, but often this criticism was difficult for a common citizen to rigorously evaluate and come to their conclusion in getting scientific directions to a citizen. While what scientists say is highly respected by the citizen, most of them are government servants who do not come out and direct people openly scientifically criticising government administrative directions as per rules and regulations laid out. Under this circumstance, the politicians' word is suspected by the citizen of their intentions and was not taken in by citizen without any reservation. The overall effect was confusion among the citizen of democracy with TV and mews media who instantly come to know these conflicting views of government and opposition in mass media often highlighted by visual media like TV and Internet discussion groups.

As stated, governance responses in India include policing, the compulsory wearing of face masks and using personal protective equipment such as disinfectants for hand washing and production of all items that are required in hospitals to self-sufficiency in such a brief time, mandatory reduction of twenty persons for the funeral, fifty persons for marriage and cremation protocol instead of burial, closure of schools, colleges, religious places, shopping complexes, mall and so on.

The monthly or weekly protocol announced to face COVID-19 was announced by the central government and state government followed it with 'no questions asked' as per disaster management Laws. The protocol started with a full lockout for many weeks. The district became the designated area for disease control and not the most vulnerable city or village panchayats the political space. Imported COVID-19 carriers were guaranteed either under their own home or institutions selected for 14 days, and some with very adverse symptoms were taken to the nearest hospitals for special treatment. The contact tracing was undertaken which could identify potential carriers of the virus for quarantine and then give treatment if warranted. The municipality and panchayat were there to assist the state government, and the police kept a watch and fined if anyone breaks the disaster mitigating measures announced from time to time. Interdistrict travel was highly restricted initially but relaxed later and only goods traffic that moves essential goods was allowed always. E-commerce could work only for selected essential items initially but soon became full-fledged with special protocols for delivery. E-commerce and electronic payment got a boost.

As stated, the trend, initial incidence of disease based on imports from outside which was controlled with quarantine soon gave way to a massive and alarming amount of disease spread by contacts. This is because many infected do not show symptoms for a long time and they are fully capable of spreading the disease like those confirmed patients. The countrywide serum sample surveys conducted by the Indian Council of Medical Research in a few rounds show about zero. Seven per cent of the total country was found initially about 0.01% died but soon increased faster. There was no effective prevention of spread in such cases. Despite the swelling of those identified as affected by COVID-19, the government started with unlocking because tax revenues started decreasing faster than anticipated, workers lost jobs that moved them towards hunger, and there was a widespread loss in business and income and employment reduced often to zero. It was a step-by-step method of unlocking based on expert views. Despite that, the COVID-19 numbers went high all over India. The responses of governance of this pandemic were not only from the Ministry of Home assisted by the Health Ministry, but they did consult a variety of experts in different related disciplines.

5.1 COVID-19-Related Urban Research and Design Issues, Requiring Answers

Is COVID-19 an urban phenomenon? It is urban because of high urban population density and therefore elevated levels of human contact? Is it first urban and then spread to rural by urban–rural movement? What is the ideal administrative space to work on for COVID-19 governance? Is that district, cluster of most affected municipal wards or even parts of the ward? The gateways of the COVID-19 disease to a district indeed are an urban area and not anywhere. Since all urban areas have a strong interrelationship with rural areas, it spread also to rural areas. This urban to rural spread does not diminish the importance of urban areas for the rapid spread of the disease since conditions for rapid spread due to high-density living exist more in an urban area than in rural because there are compact development and people tend to get together with likely body contacts for various activities like shopping, religious ceremonies, marriages and funeral in a limited space in urban centres which are much more than less dense rural areas. This means we must go for permanent and automated crowd management following the social distance protocol as opposed to police controlling the crowd periodically say during the festival or on hot spots as practised today. Hence, studying the city-centred intervention can yield better results for the future, and some of the permanent solutions can be adapted to a village if some similar spatial situation arises. There is every reason to believe the permanent change in urban structure at the micro-level shall be adopted through a legal tool like zoning to prevent the future spread of COVID-19. The central and state governments do not have such special COVID-19-related legal tools at their disposal. The city government have the legal power to zonal plan-based development control provision. Today local bodies support central government and state government to support the rules and regulations laid down as part of disaster management law but do not take an active and decisive front seat in it. With legal tools available at the local body level, a more active role in the prevention of COVID-19 with the zonal plan-based development control than before if ways and means are spelt out in this book.

The above approach is to empower city governance and allow them to design and manage permanently COVID-19 regulations in specific locations in cities using the existing power to regulate urban areas by local bodies and is in a way more decentralised than existing and can be more rewarding in results than practised today and much more in tune with the provision of Constitution of the country. The permeance can have a life span of say 3–5 years when the zonal plan needs to be revised.