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Indian Health Policy in Light of COVID-19: The Puzzle of State Capacity and Institutional Design

Ajay Shah
NIPFP

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NCAER India Centre, 11 Indraprastha Estate, New Delhi 110002
Tel: +91-11-23452698, www.ncaer.org

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Abstract

The pandemic has constituted a severe stress test for the Indian health system. In this article, we review the facts and experiences about COVID-19 in India in 2020. An array of initiatives are required in response to these experiences, in public health and in health care. In testing and in health care, the substantial role of the private sector needs to be recognised, and integrated into thinking about health policy. There is a need to reform government organisations, which wield coercive power or spend public money, so as to refocus them upon addressing market failure, and achieving state capacity. There is considerable knowledge, in the field of state capacity in India, which can help in this task.

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ajayshah@mayin.org This article draws on conversations with Amrita Agarwal, Harleen Kaur, Ila Patnaik, K. P. Krishnan, Nachiket Mor, Naman K. Shah, Renuka Sane, Shubho Roy, and Vijay Kelkar.

1. Introduction

Prior to the pandemic, there were many concerns about the working of public health and health care in India. The pandemic constituted a severe stress test to these systems. In this article, we pull together knowledge about the events in health and health policy in India of 2020, evaluate strengths and weaknesses, and obtain insights about the grand questions of health policy in India, drawing upon these experiences.

1.1. Public Health

Public health is primarily about disrupting the spread of the disease. Examples such as Taiwan, a country of 24 million people that has strong linkages to China, which achieved 449 cases and 7 deaths as of 5 July 2020, hint at the possibilities of what institutional capacity in public health can achieve.

The standard recipe of public health involves testing many people, finding those that test positive, tracing their contacts, and isolating all these persons for a period of time. This requires institutional capabilities for contact tracing, including the management capacity to rapidly increase the contact tracing workforce at short notice. In the full country, perhaps 300,000 contact tracing workers would be required. Contact tracing is not a particularly difficult problem in public administration; while there are numerous trans- actions, there is low discretion, low stakes and low opacity. In some parts of India, contact tracing worked relatively well, but this was not the case in other parts.

Enhanced social distancing would help slow the epidemic. The first element of this involves better choices by individuals and firms, based on fine grained data about the share of the population that is infected at the pin code level. The public release of such data is not done in India. The government ran a large-scale communication campaign for informing the populace about the disease and about measures that will enhance safety, which has helped modify behaviour.

The third line of attack in enhanced social distancing is the use of the coercive power of the State to force reduced social interactions, through varying degrees of 'lockdown'. These are best done in a decentralised way, reflecting the infection rate in a city, and the tradeoffs involved between public health objectives and social/economic objectives. The early lockdowns in India were led by the union government.

Government-run testing facilities ramped up their work substantially. The bulk of the diagnostic labs in India are, however, in the private sector. There were weaknesses in the engagement strategy of the government with this private industry.

While there is a universal admonition to do more testing, there are actually three distinct elements of testing which need to take place: testing in the context of clinical care (as part of the conversation between a doctor and a patient), testing special groups (e.g., finding out the infection rate among workers in a factory, which can be used to improve safety protocols) and testing in a neighbourhood or a city in order to shape public health responses there. When there is considerable dynamism in the testing protocols and capacity constraints in testing, the interpretation of aggregated data for the purpose of epidemiological research is problematic. Excess deaths, and causes of death attribution, could be a useful fall back for researchers, but these datasets also have constraints in India. Overall, we see a significant gap between the

required systems of measurement and data release, when compared with the requirements of private and public decision makers in India.

There are many scientific questions about COVID-19 which are unique to India. There is a need for a better organised research community which can pursue these questions.

In coming months, one or more research teams worldwide will achieve efficacious vaccines against COVID-19. The Indian public health community needs to think about the variety of policy questions about how these developments can best be utilised in the Indian context.

These experiences encourage a renewed focus on public health in India. A more decentralised approach, with an emphasis on city governments, will help. Contact tracing is a key pillar of public health; there is a need to build organisational capability, including the option value of surging this capacity when faced with an epidemic.

Recognising the fact that the bulk of testing in India is in the private sector, and recognising the presence of market failure in this market, there is a need for multiple mechanisms through which this market failure is addressed.

At the level of the union government, an organisation roughly like the US CDC is required. This would require corresponding work in establishing mandate, law, organisation design, and accountability mechanisms.

While there is a case for public funding of scientific research, the bang for the buck is maximised when the government contracts with private/public researchers, through a system of grant making and research review. Such an approach would work better than the conventional path of government hiring scientists as civil servants.

The essence of public health is the statistical system of health. Better measurement of birth, death, tests, etc., is required, and these datasets need to be connected up to the research community, while fully protecting the privacy of individuals.

Many of these elements of the public health reforms agenda involve the construction of state capacity. There is considerable knowledge in the field of state capacity in India, about the establishment of checks and balances, and organisation design, through which capable state institutions can be constructed.

1.2. Health Care

The most important problem in health care, in each country that has faced the pandemic, is about surging health care system capacity for the relatively simple supportive care that is required for most patients. The pandemic came relatively late to India, the lockdowns bought more time, and India has relatively young demographics. This gave greater time to prepare the health care system for the peak surge of cases, in most locations.

The public sector health care system has borne the brunt of health care for COVID-19. At the same time, there were limitations in what was possible in the public sector, owing to pre-existing constraints such as the number of ICU beds or the number of specialists.

The bulk of health care in India is in the private sector. There is an important market failure in private health care, in the form of asymmetric information. Mechanisms for addressing this market failure—private clubs, domestic and overseas accreditation, sophisticated buyers including public sector buyers, and a light layer of law and regulation—are at early stages of development.

When the COVID-19 surge reached cities like Mumbai, Delhi, and Bengaluru, this generated difficulties much like those seen in cities elsewhere in the world. There is an important possibility that needs to be harnessed, that of contracting with the private sector, in order to augment capacity.

The health care workforce faced difficulties, through a combination of poor safety protocols, the attrition of some health care workers to the disease, the fear of workers about the possibility of getting sick and the consequences of getting sick, and the problems of commuting to workplaces under conditions of lockdown.

Private health care organisations also faced considerable difficulties. The decline of non-COVID health care activity was an adverse shock to their cash flow. Their health care workforce was stretched. There was legal risk in the form of bans, lawsuits, price controls, etc. both as a flow of events and as uncertainty about future events of this nature. This has adversely impacted on their ability to surge health care capacity.

Health care expenditures associated with COVID-19 have also interacted with the difficulties of health care financing in India. While employees of large private firms are covered by ESI, in practice, ESI facilities are inadequately present for most workers. Government sponsored health insurance schemes (GSHIs) have become a significant part of the Indian environment of health care financing, and they are coming into play. They face constraints concerning the complexities of contracting with private health care firms.

Looking forward, the lessons that we can draw for health care lie in finding private and public mechanisms to address market failure. This agenda is a more complex version of the market failure in testing. The solutions include private clubs, domestic and overseas accreditation, public procurement that has features designed in order to combat the market failure, and a light touch approach to regulation through law.

2. The Questions

The Indian health system represents a slow evolution from the early beginnings in colonial India. The academic community and the policy com- munity have evolved in their thinking. Health policy has gone through three main phases: from an early focus on public health, to an emphasis on government-run health care facilities starting with the Bhore Committee, and then into government funded health insurance schemes ("GFHIS") such as RSBY.[1] Through this period, health outcomes as seen in some standard metrics such as longevity, infant mortality and maternal mortality have improved considerably, but remain at absolute levels which are inconsistent with a country at the present level of income.

[1] A history of ideas in Indian health policy is in Patnaik, Roy, and Shah 2018.

There is a broad consensus on the difficulties of health policy in India. The foundations of public health (i.e., addressing market failure in the form of public goods and externalities) are in poor shape. With health care, the citizenry has begun to exit government-run facilities, in a fashion that is similar to the exit from government run schools that was seen in the field of elementary education. Private health care is now the dominant force in Indian health care. However, the private market for health care suffers from important market failure in the form of asymmetric information. The State has retreated into an owner/operator of a network of hospitals with declining salience, and has not played an adequate role in addressing market failure.

It was in this context that the novel Coronavirus appeared on Indian shores in early 2020. The following period has proved to be an acid test for the Indian health system. Can health policy make a difference to these outcomes?

In this paper, we sketch the key elements of how the Indian health system fared when faced with this challenge, and utilise these experiences to obtain insights into Indian health policy.

Thus we try to address the questions:

1. What happened in India when the pandemic appeared here?
2. What were the strengths and weaknesses of the outcomes obtained?
3. How do these difficulties illuminate the traditional debates about policy questions in health policy?
4. What insights can we draw from these experiences, for the priorities of health policy in the coming year, and for the long run?

This treatment is organised as a section on public health (Section 3) and a section on health care (Section 4). Finally, Section 5 concludes the paper.

3. Public Health Policy

From the first principles of public economics, market failure in health has a clean split between public health and health care (Kelkar and Shah 2019). Public health is about externalities and public goods. In recent years, the WHO has initiated a 'Common Goods for Health' (CGH) initiative, aiming to bring focus back, in global health policy, to these issues (Soucat 2019; Shah et al. 2019).

The field of public health is about state interventions at the *population* level rather than at the level of one individual at a time. This primarily comprises scientific research, the statistical system in health, combating communicable diseases (e.g., eradicating some diseases, fighting epidemics and disease vectors, disrupting disease transmission) and creating conditions in which morbidity will be reduced (e.g., improving air quality in North India). It is largely about the prevention of ill health, and not about curing people. There is an essential role for the State in public health. It is hard to envision coping mechanisms through which private persons can overcome failures of public health. The puzzles of public health are largely problems of state capacity; the expenditures involved in public health are relatively modest.

There is considerable interest in India in health *care*, including primary health care. Health care is, however, largely a private good, with some kinds of market failure (asymmetric information, when faced with a private producer, and positive

externalities when communicable disease transmission is diminished). Health care, and primary health care, is distinct from public health. In this section, we focus on public health, the population-scale activities of the state that combat the market failures of public goods and externalities.

3.1. Institutional Capacity for Contact Tracing

The machinery of public health when faced with an epidemic consists of testing a large number of persons, finding the persons who are infected, tracing their contacts, isolating and testing their contacts, and treating the sick. Through this, the epidemic is contained.

A critical step in this is contact tracing, which requires complex organisational capability. Contact tracing requires a large workforce. A rough estimate suggests that India may require a contact tracing workforce for COVID-19 of about 0.3 million individuals for the full country or about 0.1 million individuals if this is done in the dense cities that add up to a third of the population.[2] This correspondingly calls for the management capacity, to overcome principal–agent problems, and get frontline workers to be effective. It involves writing process manuals, training staff, establishing oversight to monitor their work, etc.

In the class of problems in public policy, contact tracing is not a particularly difficult challenge for achieving state capacity. It is useful to think about this problem from the classification framework of Pritchett and Woolcock 2004, as extended by Kelkar and Shah 2019, which determines the complexity of building state capacity on a given problem by asking four questions:

1. *Are there a lot of transactions?* Contact tracing involves a high number of transactions.
2. *Is there a lot of discretion with frontline workers?* Contact tracing involves low discretion in the hands of frontline workers.
3. *Are the stakes high?* In contact tracing, the stakes are low; the decisions of frontline workers cannot induce a large impact upon an individual.
4. *Is there opacity?* It is possible to do contact tracing under conditions of high transparency.

By this reasoning, contact tracing meets one test of what induces difficulty in building state capacity: It involves a lot of transactions. As with other transaction-intensive problems in Indian public administration, there is the ever-present danger of frontline workers sinking into apathy, or becoming overbearing (Parsheera 2020). Some of the ideas about how this can work, which are well understood elsewhere in the world, do not port readily to most Indian settings: e.g., Sane 2020 draws attention to the difficulties in isolation in Indian cities.

The public administration challenge, with contact tracing for COVID-19, was accentuated by the fact that in most of India, institutional capacity for contact tracing was either fledgling or absent, and there was a need to build or scale this in merely one

[2] The values per 100,000 of population for some countries are: USA requirement (66), Germany (25), UK (37) and Iceland (14) (The George Washington University 2020; Morris and Beck 2020; Triggle 2020; Directorate of Health 2020). If we use a value for India of about 25 per 100,000, this scales up to an overall headcount of 337,500.

or two months.[3]. This is a unique dimension in the public administration challenge, one that has not been part of the traditional reasoning about transactions-discretion-stakes-transparency.

Contact tracing for COVID-19 seems to have fared better in some states such as Kerala and Tamil Nadu, and it is important to understand how this was achieved (Das, Gennaro, et al. 2020; Isaac and Sadanandan 2020; Sadanandan 2020). These states have foundations of public health, in terms of organisational structures and laws, of the kind which are not seen elsewhere in India[4]. At the same time, given the large differences in local conditions all across India, it is not easy to directly transplant the institutional design of public health in Kerala or Tamil Nadu into many other states. This is a problem that requires careful local solutions, one city at a time.

Given the difficulties of building state capacity for public health, in the form of organisational capability to do contact tracing, there was some initial attraction to a technology-intensive solution: an app on the mobile phone that would keep track of every person-to-person contact, so that once a positive result is obtained, a central computer database would be able to show all the individuals who have been met in recent weeks. However, such an app is no substitute for the painstaking work of contact tracing by a large field force of trained contact tracing staff. In addition, there are many concerns associated with personal information being visible to the Indian state (Bhandari and Rahman 2020). There is a need to focus on process engineering for contact tracing, where the development of apps is an element of institution building for contact tracing.

3.2. Social Distancing

Enhanced social distancing is an important mechanism through which human societies modify the dynamics of an epidemic, and create incentives for pathogens to evolve towards reduced virulence.

The first element of this is the optimisation of each individual (Cochrane 2020). Each individual has an assessment about her own tradeoffs, and manages the tension between the health hazard and the economic/social imperative. Different persons will face different tradeoffs. The first line of attack in public health must be to earn the trust of the populace, to deliver accurate knowledge to the people, and obtain gains from non-coerced modification of behaviour. These individual decisions will be supported by better knowledge about mechanisms of virus propagation, better estimates of the conditional probability of grave illness or death, and neighbourhood-specific updated data about the extent of infection. These three elements of knowledge are a public good, and there is a case for state provision.

In India, there was fair access to information about virus propagation and the conditional probability of grave illness or death, as seen in the international

[3] In early February, the first newspaper columns about the concerns about COVID-19 were appearing in India. Sethi and Shrivastava 2020, document two papers by government scientists in *Indian Journal of Medical Research*, which appeared in the last week of February; in early March some health policy papers started appearing (e.g. Shah 2020c; Kelkar and Shah 2020; Rajagopalan and Tabarrok 2020), and the first nationwide lockdowns began on 22 or 25 March.

[4] E.g., there are public health laws in these states in the form of the Tamil Nadu Public Health Act, 1939, and the Travancore Cochin Public Health Act, 1955

experience. The government ran large-scale information communication programmes, and these appear to have been effective. There was relatively little information about India-specific questions, e.g., the links between COVID-19 and spitting *paan*. Similarly, an article such as Thomas 2020 utilises papers done elsewhere in the world to illuminate what might happen under Indian conditions of temperature, humidity, and insolation, but little research was available under Indian conditions which directly informed decision-making in India.

When an individual chooses to engage in economic and social activities, there is a small negative externality that is imposed upon others. The magnitude of this negative externality is proportional to the infection rate prevalent at each point in time. In order to correct for this market failure, there is a case for using the coercive power of the state to force reduced social interactions. There are complex puzzles in addressing the tradeoffs faced in such regulation. While using state power to close temples and bars may appear reasonable, in many other respects, the picture is less clear. There is a case for decentralised action, which utilises local data for the infection rate, weighs the tradeoffs in a way that is sensitive to local conditions of economic and social life, engages in cost-benefit analysis, achieves democratic legitimacy through consultation and the display of expertise, and emerges with the cautious use of state coercion to increase social distancing, over and beyond the rational decisions of individuals.

The use of the coercive power of the state, in forcing social distancing rules, faces pitfalls in India owing to foundational difficulties on civil liberties. These weaknesses in the 'invisible infrastructure' shape health policy thinking in India, while they are not a concern in mature liberal democracies. As an example, few health policy experts could have anticipated the episode in Tamil Nadu, where two persons were arrested for allegedly keeping their shop open for 15 minutes more than the time allowed in a lockdown, and died in police custody.

In the Indian story, decisions about the design of social distancing regulations were taken at the union government level and not in cities, there was low information available about the true infection rate, and a high extent of coercion was applied. It was hard to see a sophisticated analysis of tradeoffs. These problems are related to the lack of checks and balances in the Epidemic Diseases Act, 1897, and the Disaster Management Act, 2005 (Shah 2020d; Kumar 2020; Kaur 2020).

3.3. Testing

Government-run testing facilities were significantly enhanced in response to the pandemic. The throughput through these labs went up dramatically over recent months.

The bulk of testing capacity in India is in the private sector. The business of testing contains a market failure, asymmetric information, as it is hard for the customer to know the extent to which the test is accurate. There were long-standing gaps in private and public initiatives that could address this market failure. There is an interesting tension between state power and a private health care system. One element of this was seen in diagnostic labs, which do testing. This is analysed in Kaur, Paleja, and Srivastava 2020. There was a process of obtaining approval, through which the government gave approvals to over 200 private labs, through which testing in private labs got started.

When the pandemic started, ICMR was thrust into a regulatory role on testing. ICMR is primarily a research organisation, and did not have organisational capacity for regulation of a private industry. The laws that were employed for the purpose (the Epidemic Diseases Act, 1897, and the Disaster Management Act, 2005) lacked checks and balances, and were therefore, not conducive to the development of state capacity (Kumar 2020; Kaur 2020). ICMR and other state organisations drifted into an intrusive command-and-control approach towards private testing featuring bans, price controls, and interference in management choices of private persons. These intrusive actions are generally inefficient.

One pathway to utilising the testing capacity in the private sector is public procurement. The government could become a large scale purchaser of the services of private diagnostic labs. This procurement process can design elements which address the market failure, i.e., it can ensure minimal quality standards.

3.4. Statistical System in Health

A key function in public health is obtaining high quality information about the state of health in the country. A statistical system needs to be constructed in health featuring micro data from all across the country, where the information is timely. Statistical analysis of this data would then reveal outbreaks, epidemics, pockets of unusual kinds of morbidity, which can kick off investigative work by public health authorities in order to solve these problems at their root cause.

All over the world, the response to COVID-19 has demanded high-quality data. This data (and models based on this) are required, at the city level and the neighbourhood level, in order to understand the threat, shape the public health response, optimise the behavioural decisions of each individual, and shape social distancing measures that are adopted at a community level.

There has been a clamour for 'more testing' worldwide. Governments have come to compete on achieving more tests per day. There was a dramatic gain in the raw number of tests per day which took place in India, over the early months of 2020. ICMR et al. 2020 shows basic facts about the measurement work at ICMR in early 2020. However, it is important to see the four distinct elements of testing (Shah 2020b; Mukhopadhyay 2020a; Malani, Mohanan, Balsari, et al. 2020):

Testing in the health care context: When an individual reports certain symptoms to a doctor, the doctor might prescribe a PCR test. The results of these tests can be aggregated, and are interesting time series at a neighbourhood level.

Public health objectives in small groups: Consider an at-risk group such as nurses or railway employees. It would be valuable to obtain a statistical estimate of the infection rate, every week. This can guide improvements in processes, and improve the morale of these groups.

Public health objectives in a neighbourhood: At a neighbourhood level, accurate and timely estimates of incidence are valuable as they feed back into decisions of each individual about the optimal level of economic and social activities. These estimates can also be used to shape state coercion on social distancing, which can be useful when the probability of getting infected is high.

Restarting the economy: The scientific community is working on a fuller

understanding of immunity, which can ultimately lead to one or more tests generating an 'immunity passport', which will tell the individual that the disease is no longer a threat.

Each of these four objectives is important and needs to be pursued. In the present state of the science, the fourth is not yet feasible. We will hence think about the other three.

A large number of tests can take place in the clinical care context. However, there are concerns about the extent to which the aggregate data is useful, for many reasons:

1. There have been fluctuations in the prescribed decision process ("protocol") that a doctor is supposed to use when prescribing a test;
2. When each change in the prescribed protocol takes place, there are vagaries in the communication of these changes to every doctor in India;
3. There have been capacity constraints in testing;
4. The bulk of health care capacity and the bulk of testing capacity in India is in the private sector, but state coercion was used to limit the ability of private doctors to prescribe tests and private labs to conduct tests.

In the standard epidemiological models such as the SIR model, what is measured is the fraction of persons who are infected in the population. This should ideally be measured in a statistical sample. It can be approximated by using data from a clinical setting, if the protocols are stable, applied consistently, with sound frontline measurement procedures, and are in place on scale. These features were not in place in India in early 2020. As a consequence, the conventional data about the number of tests, the fraction that test positive, etc., is hard to interpret (Mukhopadhyay 2020b; Das, Sircar, and Mukhopadhyay 2020; Sharma and Premkumar 2020; Bansal 2020; S Rukmini 2020a; Bajpai 2020). As an example, Malani, Mohanan, Kumar, et al. 2020 engaged in antibody testing for a statistical sample of migrants returning to Bihar from many locations across the country, and found numerical values which were hard to reconcile with conventional estimates reported from source locations or the overall country. While epidemiological modelling is a difficult area, even with the best of data, in India, the data limitations have particularly hampered the extent to which the analysis of the aggregate data could become useful.

One natural fall back, for measurement of the state of the pandemic, would have been to drop back from estimates of the number of persons infected to the number of deaths. Here, we encounter the weaknesses of the systems that attribute the cause of death (Rukmini 2020b; Sinha 2020b; Sinha 2020a). In particular, once officials are measured on the number of deaths owing to COVID-19, there are incentives to understate the number of deaths. Trusted daily statistics for birth and death can also be highly influential for public health work, but are not released in India.

There is thus significant uncertainty surrounding published estimates of the number of infected persons at a point in time, the number of persons who were ever infected, and the number of deaths, that can be attributed to COVID-19. Statistical sampling offers a natural path to sidestep these difficulties, and obtain sound estimates of the number of persons infected (using the PCR test) and a lower bound of the number of persons ever infected (using antibody tests). There was one such episode of measurement through statistical sampling, where ICMR conducted a study in late April 2020, which did measurement in 70 districts. A key finding of this appears

to be the presence of high heterogeneity within these 70 districts, where some locations such as the containment zones in Mumbai had sero-prevalence rates as high as 30 per cent, while there were other districts with values near 0. There are some newspaper stories which give a sense of these results, but the dataset or paper have not thus far been released. As of writing, in July 2020, this one survey dataset, from end-April 2020, was the most recent measurement project of this nature.

There are weaknesses in the information systems through which test data is assembled and released. With all its weaknesses, a substantial amount of testing has taken place in India, and there are many opportunities for utilising this data in ways that would better inform the actions of citizens, firms, doctors and various arms of the government. However, there are limitations in the mechanism through which aggregate time-series information is published (Agarwal and Kaur 2020). Unit-level information is not released.

Weaknesses in the statistical system are present in other aspects of COVID-19 also. As an example, assuming useful forecasts could be obtained of future infections and future hospitalisations, these would need to be compared against the health care system capacity in terms of the number of beds, the number of ICU beds, the number of ventilators, etc. These things are, however, not easily measured. The bulk of health care capacity in India is now in the private sector, and there is no measurement system that is able to obtain and update this information. The Ministry of Health has a 'National Health Resource Repository (NHRR)', which enumerates facilities and their capabilities. The institutional infrastructure for continuous updation of NHRR is not yet in place; it is updated episodically. It was last updated in 2019, but there was no data release.

Within public sector health care also, Roy 2020 points out that when officials are measured on the number of beds, they have tended to portray progress on the number of beds while sacrificing the ratios that are normally maintained about the number of ICU beds and number of ventilators per unit hospital bed; this hampers estimation of (say) ICU beds using thumb rules based on the number of beds.

Overall, it appears that there was a gap between the measurement and data dissemination that took place in India, when faced with the pandemic, as opposed to the information production that would have been influential in improving decisions by diverse persons across the country. It is important to see these difficulties in the initial conditions, of weaknesses in the core public health objectives of the statistical system in health, which were in place before the pandemic arrived (Sharma 2016; Rajan and James 2016; Chandra Sharma 2019). From that starting point, the outcomes that arose from firefighting in a few months when the pandemic arose are not surprising.

3.5. Medical Research

Once the pandemic got started, there was remarkable progress worldwide, on producing 'research in real time', which unlocked many of the secrets of the virus and the disease. Knowledge is a global public good, and India has been a great beneficiary of this knowledge.

There are an array of scientific questions, however, which are relatively specific to

the Indian locale, where researchers elsewhere in the world will not ordinarily embark upon research projects. Some examples of these include:

1. A significant body of evidence has been obtained from natural history studies in Wuhan (China), Lombardy (Italy) and New York (USA). The temperature prevailing in the months of rapid growth of the pandemic there was 3–11°C, 4–9°C and 0–10°C. How do Indian conditions of temperature, humidity and insolation change disease transmission?
2. What are the implications of Indian practices (e.g., spitting *paan*, customs in temples, death rituals) upon disease transmission?
3. The standard statistical techniques of epidemiological research are required, to find patterns in unit-level data about who gets infected and who gets adversely affected when infected, so as to create feedback loops to altered behaviour by individuals.
4. How do the standard results about the probability of serious illness and death, and their variation with age and co-morbidities, get modified under Indian conditions? Is there geographical variation? Is there variation by income class?
5. What are the effective clinical protocols which are feasible, under median conditions in an Indian health care facility? As an example, once we assume that ventilators cannot be used on a large scale in India, how can oxygen therapy be best applied (Sudhir and Mor 2020)?
6. What is the immune system response, in India, to COVID-19? What is the demographic variation seen in India, on questions like cross-reactivity, antibody neutralisation, re-infection, etc.?
7. The high prevalence of adult malnutrition in India is unique; could it interact with COVID-19 fatality in some ways?
8. India has the largest pool of persons who are or have been infected with tuberculosis. To what extent is this an important co-morbidity?

These are, of course, only examples. A robust process of movement of questions and ideas between researchers, persons in health policy and medical practitioners is required, through which questions are identified, and answers are rapidly discovered. ICMR has established teams, as part of the COVID-19 'Rapid Response Team', that are doing medical research. There is a need of a strong scientific community that is able to rapidly produce such papers, with large scape capacity across public and private sectors. This community will benefit from better linkages into researchers and research institutions outside India.

3.6. The Coming Vaccines

There is an active global race to build vaccines that protect against COVID-19. There are about 30 vaccine research projects in India, including major work at Bharat Biotech. It is likely that in coming months, multiple high quality vaccines will come about. This optimism draws on the remarkable scientific advances in the development of vaccines that has come about in the last 20 years.

Even if a good vaccine is invented outside India, India is an important producer of vaccines, on a global scale. As an example, Ramu 2015 shows a global vaccine development project, which chose to use certain elements of the overall project in India. Some of the prominent vaccine designers, world-wide, are likely to turn to Indian

companies for their manufacturing capabilities. Whether through research or manufacturing, there will be significant movement on vaccines in India in coming months.

At that point of time in the future, the following important questions will be faced:

1. How will Indian economic agents be able to purchase large quantities of vaccines at relatively affordable prices? What can be done to secure supplies of sufficiently high volume at a sufficiently low price?
2. A vaccine is a private good with a positive externality. What is the optimal combination of private purchase coupled with public financing which can share costs wisely?
3. How can a nationwide programme be organised to send this vaccine to a large mass of people? The present state-led immunisation programmes have many weaknesses. How can the private health care sector be harnessed for this problem?
4. Assuming there are supply limitations, how should the sequencing of the vaccination be optimised? Should the vaccine first be given to high-risk populations, to health care workers, or to front-line functions which can be super-spreaders?
5. It would be overkill to immunise the entire population. What is an optimal strategy which puts the epidemic to an end, protects the persons at risk, and minimises cost?

There is a need for innovative policy research on these questions in coming months.

3.7. Building a Public Health System in India

The COVID-19 pandemic has brought fresh emphasis upon building institutional capacity for public health in the country. Based on these experiences, we have fresh insights on elements of the public health system in India which would help deal with such a situation.

The gains from decentralisation: A recurring theme in this field is the importance of the Constitutional vision of India as a union of states. The bulk of the work in public health is best performed by cities and states.

How to solve the tradeoffs between livelihoods and contagion? How to allocate resources in testing? How to mobilise health care? What are the precise tactical details of organising a response, which work well? This work is best placed at the level of the city/district government. The officials at the local level understand their neighbourhoods and economic activities the best, and face greater feedback loops of accountability.

Local context is highly important. As an example, in a Kerala setting, with significant institutional capacity in contact tracing, there may be a certain optimal pathway towards building sound institutional arrangements for contact tracing, and there might be a certain optimal role for contact tracing apps in that context. But this context, and thus the optimal role for a contact tracing app, could be quite different in other states. This emphasises the need for a decentralised approach.

There is a small negative externality suffered by society when each individual

interacts with others in the course of economic and social life. The magnitude of this negative externality is proportional to the infection rate prevalent at a point in time, which varies sharply across cities. The tradeoffs about the kinds of economic and social activities that should be sacrificed depend upon local conditions. Hence, the best way to organise state coercion in social distancing is at the city level.

Public health work is best conducted through discussion and persuasion, and not the use of coercive power. The officials at the local level are well connected in local human networks. They have the ability to organise meetings with residents of the city, to engage in communication, persuasion, and negotiation layered with a small amount of coercion. An example of a feasible mechanism design at the local level, involving a 'Social Distancing Committee', is presented at Appendix A.

One reason in favour of local control is that, in fighting the epidemic, officials at the local level have to 'eat their own dog food'. Success or failure will directly impact upon them, through the health of their family and friends, and through the respect or criticism that they earn for their efforts. This is one element of the gains from decentralisation, of the 'subsidiarity principle' which argues that every government function is best placed at the lowest level of government where it can possibly be done.

The problems of the entire 3.3 million square kilometres of India are dauntingly large. It is difficult for any one mind or any one team to envision the correct strategies for health and economic policy on this large scale. As an example, if a policy team had to think about doing antibody measurement for a random sample of India, this is a difficult project to design and execute. The problem statement, 'Establish a random sample of 1000 people in Pune and run an antibody test on them' is a more tractable one when compared with 'Establish an adequate sample of people all over India and run an antibody test on them'.

Large states of India are of the size of countries elsewhere in the world. The decentralisation agenda in India is not just about decentralisation to the state capital; it is critically about decentralisation all the way to the city. The most important level of government, for high-transaction public health functions, is the city government. This is another dimension in which states like Tamil Nadu and Kerala have fared better than mainstream Indian arrangements.

At present, the organisation of union/state/city governments in India has many problems. There is a fragmentation of authority between the state government and the city government. Officials in the city government or at the district level are often overloaded, and find it difficult to rise to this challenge. Policy design needs to recognise these capacity constraints and envision commensurate responses to these constraints. The decentralised approach to health policy needs to go hand in hand with capacity enlargement for local government.

As an example, by default, many functions are often placed upon the Chief Medical Officer (CMO), who easily slips into the role of being the point person for anything connected with health. However, problems of public health, and particularly the problem of COVID-19, are inter-sectoral and often go beyond the capacity of the CMO. The CMO may often be the point person for the operations of government hospitals, but public health is distinct from hospital management.

In establishing a decentralised approach to health policy for COVID-19, there is a need to precisely articulate the problems that local government has to solve, and the

support that will be available to the leadership of local government from the state government and from the union government.

Building state capacity for contact tracing: Each state and city needs to embark on the problem of organisation design, and development of state capacity, for contact tracing. Recent events remind us that this organisation design is not like (say) hiring a lot of school teachers: what is required is a flexible small organisation that is able to rapidly scale up when faced with an epidemic and go back to the original size after the epidemic has ended. The small 'standing army' must be primarily about the option value of rapidly achieving large scale contact tracing when the need arises. As an example, while New York City had world-class public health institutions, once the pandemic arrived, 3,000 additional workers were hired into contact tracing. In this aspect, it presents a puzzle in public administration that is a bit different from mainstream problems in organisation design as seen (say) with the police, school teachers, etc.

*Addressing market failure in testing***:** The private sector is the dominant force in the Indian diagnostic testing industry. There is a market failure, asymmetric information, in this area. This market failure needs to be addressed through a three-pronged effort with: (a) Private initiatives of certification; (b) Mechanisms of public procurement; and (c) A light layer of regulation.

In this, we need to recognise the difficulties associated with more intrusive tools, such as price controls, bans, export bans, and government control of the technology used in testing. As an example, when the prices of PPE rose in India, this was not a cause for concern; in fact, this was the signal that worked its way through the market economy and incited a large supply response, to the point where India is now a large exporter of PPE. Every state interference in the prices of PPE served to slow down this supply response.

Construction of state capacity for the light layer of regulation can draw upon modern thinking in India about the difficulties of building state capacity in regulation.

Public goods at the level of the Union Government: There is a need for institutional capacity that is akin to the US CDC. While ICMR was placed into certain roles in the short run, when the pandemic began, clear thinking is required about the role of NCDC, and a systematic effort needs to commence, of building state capacity in the chosen organisation.

Scientific research: There is a need to rethink the frameworks through which public resourcing is put to work, through government research institutions, private research institutions and private firms, in order to achieve the requisite research capacity in the country, which will be galvanised to address the questions of importance to private and public decision makers in India.

In the prevailing vision of science in India, there is a fusing of public expenditure and public production. It is more effective to use public funding, through a grant mechanism, to get the production of research out into non-government organisations. This creates greater competition, and places management decisions about research organisations into non-government/private organisations which are better able to perform these functions. For an analogy, NASA is a contracting organisation; it does not have a vast scientific workforce, it does not do research, design spacecraft, or build spacecraft (Shah 2019).

Statistical system in health: There is enormous value in building datasets and models

around the questions of health. As an example, Rivers and George 2020 draw an analogy between the public goods of government-run weather data and forecasting, and the required public goods of government-run health data and associated forecasting. A particularly simple dataset, which can be highly influential for public health research, is daily release of accurate birth and death statistics.

When tests take place in a clinical care setting, this data needs to be assembled into a single database and made available in anonymised form to the research community. The Union Government, State governments and city governments must all have the ability to create time series of survey data, where some or all parts of the country are put into intensive surveillance using periodic waves of testing in random samples. Public health officials require the ability to commission testing of a random sample of (say) health workers in a given city, as part of their process of isolating the problem.

The development of electronic health records, with an open ecosystem of multiple but interoperable software systems at health care organisations, will help create a more information-rich environment, though there are grave concerns about privacy of individual information. The National Digital Health Mission (NDHM) could potentially play a useful role in protecting individuals, and improving data quality and interoperability of EHR.

The problem of purchasing: When an epidemic gathers momentum, a surge in testing is required. This requires the ability of government to purchase testing services from private persons. This requires establishing state capacity in contracting (procurement, dispute resolution, contract renegotiation, payments) in the public health authorities at all three levels of government.

Systematic process for construction of state capacity: Many of the steps above (contact tracing, NCDC) require systematically creating organisational capability. The lack of checks and balances in the foundational laws is a key source of arbitrary power and thereby low state capacity; a key feature of the road ahead lies in establishing checks and balances in laws. The road ahead involves designing laws, organisation diagrams, process manuals, accountability mechanisms, training procedures, and putting in the homeostatic functions of contracts, finance, HR, facilities management, and transparency. The public administration dimensions of this problem are similar to the mainstream state capacity problems seen in India, e.g., as analysed in Srikrishna 2013; Ministry of Corporate Affairs 2016; Roy et al. 2019; Kelkar and Shah 2019.

4. Health Care

There were two strengths which worked in India's favour in the pandemic. First, with young demographics, the fraction of those infected who required significant medical care was small. Second, there was more time to prepare, given that the pandemic came relatively late to India, and through the additional months that were obtained through varying degrees of lockdown. By and large, this time was utilised to significantly galvanise the public sector health care system into action.

From the first principles of public economics, health care is largely a private good, with the special case of infectious disease where there is market failure in the form of positive externalities. When we think of the market for private health care, there

is an important market failure in the form of asymmetric information. Most customers are not able to understand the extent to which the producer acted in their best interests, or to be able to shop around and thus exert market forces upon pricing. There is thus a significant problem in the form of consumer protection.

In India, there is one large health care organisation—the government—which accounts for about 30 per cent market share of health care and about 10 per cent of intensive care staff. The remainder of health care is produced by a large number of private health care firms, with a competitive market structure. While, in some other countries, there is market failure in the form of market power with a small number of health care firms, this is not a problem in India.

The prime focus of health policy in India has, however, been on the management, resourcing and operations of the health care organisation that the government controls. There has been little attempt at addressing market failure in the private market for health care, in recognising the important role of private health care providers, and in utilising them to achieve policy objectives.

4.1. The COVID-19 Surge in Health Care Requirements

As has been seen elsewhere in the world, the peak of the epidemic curve is associated with a surge in health care requirements, which can overwhelm the health care system. In the cities with the largest number of cases, Mumbai and Delhi, the health care system came under considerable stress. However, at the same time, in large parts of the country, the epidemic did not enlarge sharply in early 2020. The timing of the epidemic in each city is different, but the features of the health care crisis in each city are similar, and are reminiscent of those seen elsewhere in the world. As an example, Johnson TA 2020 is a recent story of the surge in Bengaluru.

Newspaper reports of the ICMR statistical sampling in 70 districts, in late April, suggest that in a large fraction of districts, the prevalence of the disease was rather small. In April and May, the expansion of cases was limited by the lockdown, which also helped forestall the possibility of capacity constraints in health care.

In a strategic view of the COVID-19 pandemic in India, the puzzle lay in utilising the levers of public health to flatten the epidemic curve, while simultaneously enlarging health care capacity, so as to minimise the extent to which surges took place that exceeded health care system capacity. The over-arching in the normative analysis of the Indian health care system in 2020 is to think about the extent to which health care capacity was, indeed, enlarged.

Indeed, looking into the deep future, COVID-19 has brought a new desirable attribute into the puzzles of health policy: In order to address the possibility of an epidemic in the future, that is not contained by public health, it is desirable if the health care system has greater optionality of rapidly scaling up on demand. Such optionality will, of course, come at a cost. As an example, it will mean holding capital goods (hospital beds, ICUs) and operating expenses (intensivists) who are under-utilised in normal times.

How could meaningful capacity surges of health care be obtained? One path lay in building additional health care capacity through the one large health organisation—the government. The public sector health care system worked very hard in 2020, and has

played a disproportionate role in addressing the health care requirements. Indeed, without these capabilities, the outcomes in India would have been significantly worse. However, given the initial conditions, where about 30 per cent of the ICUs or ventilators, and an even smaller share of specialist staff, it was difficult to obtain the magnitude of the supply response through the public sector health care system.

At the same time, this approach faced constraints in terms of operational capabilities and quality. The other path lay in establishing contracts with the private sector. This would face the complexities of government contracting. However, it holds an attraction in several respects: (a) The private sector started out at about 70 per cent of capacity, and it is thus easier to obtain large expansions when working through the private sector, and (b) The private sector is likely to have greater operational capabilities and quality.

For a city in India, three are many uncertainties about the magnitude of health care capacity required at a future date. A risk management perspective is useful, in thinking about this sizing. It would be efficient for the government to establish contracts with private persons, where the cost of establishing enlarged facilities is paid for regardless of actual use, so that society has the option value of being able to utilise these facilities in the event of a surge in the disease.

4.2. Difficulties Faced by Private Health Care Organisations

In the epidemic, demand for health care appears to have declined, perhaps through a combination of patients being afraid of infection at health care facilities, difficulties of transportation owing to the lockdowns and financial constraints faced by households. Alongside this, some health care facilities pulled back from non-COVID-19 activities in order to prioritise COVID-19 activities, there were difficulties with the health care workforce, and some managers of health care facilities may have chosen to retreat from full-fledged operation. Monthly notifications of TB have dropped by 80 per cent, which gives a sense of the extent of the disruption (Pai 2020, ˙India TB Programme COVID).

The new government health care programme, PMJAY, has become an important source of information about the developments in health care. Smith et al. 2020 analyse the data for claims in PMJAY during the COVID-19 epidemic, from January to June 2020. The value of claims dropped by 76 per cent in the early lockdown phase. There was a slight decline in claims by women, the young and the old. The number of active hospitals in the PMJAY system dropped by half at first, with private hospitals gradually recovering. Elective surgeries such as cataract or joint replacement at first dropped to near zero levels.

TABLE 1: Excess Returns of Health Care Firms

Month	Returns (per cent)
January	14
February	-1
March	-27
April	11
May	-2
June	4.5

Source: CMIE COSPI.

Table 1 shows the returns of the stock market index of health care firms, after the returns of the overall market index is subtracted.[5] This shows that in March, with the lockdown, there was a 27 per cent decline in stock prices, reflecting these concerns.

Such large declines in revenue are likely to have induced significant financial stress in private health care organisations. In an ideal world, private health care organisations should have been devoting their management skills to enlarging capacity; instead their energies were significantly utilised in addressing the financial crisis.

4.3. Protecting Health Care Workers

In the locations where the epidemic has surged, the health care system has faced significant constraints on the health care workforce. This reflects a combination of factors.

Given the substantial viral load that health care workers can be exposed to, many health care workers got sick and thus dropped out of the workforce. This problem was exacerbated by poor protocols in most Indian health care organisations. Concerns about possible sickness hampered labour force participation by some health care workers, particularly the elderly. In the lockdown, transportation constraints hindered the commute to work for junior staff. These problems added up to a decline in health care system capacity on account of the reduced workforce.

Improved protocols, access to PPE, and health insurance could help improve outcomes.

4.4. Health Care Financing

COVID-19 related health care expenses are a highly insurable risk; large expenditures are only incurred for a small fraction of the infected. One pathway for public resourcing to feed into health care financing lies in the government-run health care system. The other pathway lies in public financing of private health care.

Employees State Insurance (ESI) is a mandatory programme for workers of large private firms, which offers expansive benefits alongside mandatory payments by workers. In principle, ESI could be the kernel around which a significant health care arrangement could come about. However, in practice, ESI has become one more large

[5] This utilises the CMIE COSPI family of stock market indexes.

public sector health care organisation, with a prime focus on building and operating health care organisations. For most of the (forced) participants in ESI, in practice, the promise of service delivery is not matched by supply-side capabilities. ESI could significantly enlarge its outreach by shifting gears, from an emphasis on production, to an emphasis on contracting, where it could become a sophisticated purchaser of private health care services.

The many elements of government-funded health insurance schemes (GFHIS) could also play an important role in health care financing for COVID-19. There were initial delays in enlarging package designs to encompass testing and treatment for COVID-19. There is a need to build institutional capacity in the operations of these programs, in order to respond to the coming surge in requirements.

4.5. What Institutional Apparatus Would Have Helped?

The private market for health care suffers from health care in the form of asymmetric information. The conventional response of the state has emphasised instruments like bans, price limits, commandeering private facilities, etc. It is desirable to address the market failure through a combination of private clubs, domestic and overseas certification, and sophisticated buyers (either public systems like ESI or PMJAY, or private health insurance companies), around a small core of law and regulation. There is considerable complexity in identifying the minimal core of law and regulation, which fits inside the envelope of what is feasible given the constraints on state capacity.

A key barrier that inhibits the relationship between health policy and the private sector is that of contracting. Many government departments have low capacity in procurement, contract disputes, contract monitoring, contract renegotiation and timely payments. Private persons have low expectations for the extent to which the government will litigate or arbitrarily delay payments. Constraints in contracting have shaped up as a critical constraint inhibiting health policy.

At a practical level, in many cities, there is an impending storm, of the peak of the epidemic curve. The present landscape of actions by the Union Government, state government, and city government does not fully address the problem. It is in the self-interest of the health care and business community, in each city, to prepare better, to form local coalitions for coordination and action (Shah 2020a).

5. Conclusion

The pandemic has posed a huge challenge for health policy in all countries. There were significant weaknesses in the Indian institutional arrangements, before the pandemic commenced. These difficulties were partly grounded in the arrangements of health policy, and partly weaknesses of the homeostatic processes of the Indian state such as government contracting.

Some parts of the Indian health system have responded strongly to the pandemic. These include testing and health care in the public sector. At the same time, their pre-existing weaknesses have inhibited the scale of the response.

The stark light of the pandemic has created fresh insights on the difficulties, and the priorities for reform. The enormous adverse consequences of the pandemic serve to reinforce the prioritisation for public health. The possibilities for public health are summarised in one fact: Taiwan, a country of 23 million with strong travel links to China, got nine deaths. While adequacy of resourcing is an important element of public health, the prime problem is that of institutional reform. This reflects the long-standing Indian tradition of scaling up resourcing into pathways that have proved themselves in terms of delivering sound outcomes.

There is now considerable knowledge in the field of state capacity, on the tangible elements of institutional design, of the establishment of checks and balances, through which greater capability can be obtained. This knowledge can now be usefully brought into the field of health policy, with an accent on public health.

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A. Appendix: Institutional Arrangements for Social Distancing Regulation

The pre-COVID-19 world of social interactions is infeasible as it will give a surge of the infection that will overwhelm existing health care facilities. The other extreme, a complete lockdown for the entire country, has a large impact upon livelihoods. When GDP declines, this will (in and of itself) generate adverse health outcomes. As an example, infant mortality and maternal mortality go up when GDP declines. Similarly, the resourcing in the hands of the government, which can possibly be brought to bear upon the COVID-19 epidemic, is linked to GDP; when GDP declines, tax collections and the resourcing available to fight Covid-19 decline.

The puzzle lies in finding a balance between these two extremes. If an environment is set up, of the state trying to prevent personal freedom and the people trying to surreptitiously regain personal freedom, then the people will always succeed and the health policy objectives of social distancing will be lost. The emergence of an adversarial relationship with the people will hamper the everyday public health work of tracing, testing, isolating and reducing pathways of transmission. When scientific progress comes about in the form of a vaccine, a prophylactic or a cure, trusted public health channels are of essence in rolling out these advances on a population scale. That will be impeded if an environment of coercion and conflict is established.

For these reasons, there is a need for democratic legitimacy in the chosen path in social distancing. The strategy for social distancing should involve a great deal of discussion and very little coercion. While the State can introduce information into this decision making, ultimately, each individual and each organisation has to make these tradeoffs.

This starts with public health officials persuading individuals and organisations that there is an important threat. The government has made good progress with sending information into the populace about the dangers. If sickness or death takes place in a neighbourhood, this will impact upon the fear in that neighbourhood. Individuals are amenable to thinking about this problem and changing their behaviour in response to it. The sheer creation of accurate data, and its release, will create the requisite risk aversion.

Conversely, public health officials do not know enough about the life of each individual and each organisation. The imposition of a single rule book upon all people at all times will induce difficulties. If anything, the imposition of a rulebook that lacks nuance, and is insensitive to the particular conditions in each square metre, runs the risk of public health being seen as an out- of-touch imposition, which would lead to the people devoting themselves to evasion.

Alongside social distancing measures (e.g., close a *mandi* or modify the working of a *mandi* in ways that leads to reduced disease transmission), there are a host of public health measures which need to be considered. Questions such as the use of masks, enclosed spaces with recirculated air, disinfection protocols for public places, the use of hand sanitiser and hand washing, etc. All these problems need to be analysed at a local level, reflecting local constraints and local tradeoffs.

Democratic legitimacy comes from expertise, information, persuasion and the minimal use of coercion. A policy framework for social distancing may hence be

envisioned as the following steps.

There should be Green, Blue, and Red manuals for social distancing. The Green manual should have the mildest requirements and the Red manual should have the highest requirements.

A group of academics and intellectuals should be organised, which creates reference drafts of these three manuals at an all-India level. These draft manuals should then be released on a website and for public commentary. There should be no state coercion around these manuals; they should only be inputs for the public discourse.

Each of these manuals should involve the minimal use of force. The bulk of the manual should involve reasoning and recommendations, but not threats of state violence. A tiny portion of the manual should involve using powers under the Epidemic Diseases Act (1897).

Associated with these manuals should be the full reasoning about the logic behind the design of these manuals. Communication materials should be developed, which explain these manuals to officials and private citizens.

This work can be organised by MoH, NITI Aayog, academic institutions, etc. The manuals should be given as intellectual inputs to cities/districts. Armed with this knowledge, officials in the district/city should debate with their local interest groups, and adapt the manuals for their own use. For some places, it may be feasible to close down a *mandi*, but for another city, it may be essential to keep *mandi*s open but the response may lie in the extent of safety procedures that are built into the working of *mandi*s. These decisions are best made locally.

Each city would utilise the raw material (three draft manuals made by academics/intellectuals once, at an all-India level) and come up with their own practical manuals that are grounded in their reality. We might thus have a Nagpur Green, Nagpur Blue, and Nagpur Red manual that is discussed and released in Nagpur. Manuals of different cities would appear on the Internet and their merits would be debated.

The bulk of each city manual would involve voluntary actions by various communities, associations, organisations. The use of state coercion should be minimal. City officials would have to manage this process of engaging with the community, developing these manuals, developing a consensus around the design of the manuals, and getting to the right design of manuals while using the minimal state coercion.

Once a city has chosen its design of the Green/Blue/Red manuals, how might it transition between these manuals? When social distancing measures are brought in with greater predictability, economic activity can be better de- signed around this stochastic environment, and a given level of social distancing can then have a smaller impact upon GDP.

In order to achieve democratic legitimacy, predictability and high compliance, each city should establish a Social Distancing Committee which controls which manual is presently in use.[6] Designing the working of this Committee involves thinking about its composition and operations.

[6] These ideas draw on the knowledge in the field of monetary economics on the working of monetary policy committees, e.g., Shah 2014.

Composition and appointment of the Social Distancing Committee:

1. It should be made up of two officials (the most senior officials of the city government), three scientists and two business persons, thus adding up to 7 persons.
2. The appointment of these seven persons should be done by the city government.
3. All seven persons must be residents of the city and each must have at least 6 family members living in the city.
4. We may note that in a committee of 7, winning requires 4 votes. If the two city officials have made up their mind on a given idea, they have two votes in hand. For this idea to get through, they would require the support of 2 more votes out of the remaining 5 persons. Thus, we see that there is a healthy tension between having an important say for the officials, but requiring that they carry at least 2 of 5 of the private citizens along with their thought process. These ideas draw on the knowledge in the field of monetary economics on the working of monetary policy committees, e.g., Shah 2014.

Operations of the Social Distancing Committee:

1. This committee should meet every Friday, review the current data about conditions in the city and in the neighbouring environment, and vote on a possible change over from one manual to another.
2. City officials and their associated researchers would make a presentation to the committee at the start of the meeting, which would provide the committee with the requisite information, based on which a decision can be made. This presentation would be released into the public domain.
3. Each individual in the committee should be required to release a page or two of a rationale statement about why she voted in the way that she did. Public release of the voting record, and the rationale, would generate accountability. In the future, if it is clear (with the benefit of hindsight) that a decision to go to the Red manual was a mistake, this will generate an adverse impact upon the reputation of the individual. Meetings and voting should take place on a Friday and take effect from the next Tuesday, thus giving everyone three days to gear up for the changed setting.
4. This committee would also have the authority to modify the text of the three manuals over time. These decisions would also take place through voting, rationale statements, and transparency.

Such a committee process ensures that there is deliberation, and democratic legitimacy, in the decisions about social distancing. In their ordinary life, each of the seven persons would meet and hear the viewpoints of hundreds of persons, and all this knowledge would feed into thinking about the tradeoffs, and discovering low cost mechanisms to improve public health that can be used to modify the manual.

A well-known empirical fact in the history of epidemics is that democracies fare better in epidemics. The tools of public discussion, consensus, transparency, and lack of concentration of power will yield the best decisions. The democratic legitimacy of the Social Distancing Committee will help ensure that the people cooperate with its decisions instead of trying to get around the constraints. The bulk of the actions envisioned in the three manuals would be voluntary actions of individuals and private organisations, without bringing state coercion into the picture.