Beyond Biomedical and Statistical Approaches in COVID-19
How Shoe-leather Public Health Works

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The evolving COVID-19 pandemic requires that data and operational responses be examined from a public health perspective. While there exist deep contestations about the epidemic control strategies to be adopted, past experience seems to be corroborated in the present epidemic that a contextually rooted “shoe-leather public health” approach provides the most effective interventions and operational strategies, more so in a society as diverse as ours. Drawing from this, an analysis of the COVID-19 situation in India is put forth, and debates on mitigation strategies, optimisation of testing, and the essential steps for a comprehensive set of interventions in order to minimise human suffering are addressed.

Humankind has encountered a rapidly spreading, relatively low virulence “new” virus in 2019, or so it is thought with the present knowledge. Identified as a member of the coronavirus family, it has been named SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), and the disease it causes—COVID-19 (coronavirus disease 2019). As of 10 April 2020, globally, more than 1.5 million persons were detected as having been infected with the virus with nearly 93,000 deaths across 212 countries, increasing to 7.5 million cases and 4,50,000 deaths by 15 June 2020 (WHO 2020a).

Every epidemic and pandemic comes with its own characteristics, inherent uncertainties about its dynamics and prognosis. Additionally, context specificities operate to make issues more complex. Therefore, the response has to evolve as the epidemic unfolds and new knowledge about it becomes available. Previous experience provides lessons in terms of principles and enables “making sense” from limited and uncertain data as it becomes available. This is assisted by statistical modelling exercises based on assumptions made from historical experience and from other parts of the world. However, in all epidemics, much of the right assumptions and effective responses have come from an “epidemiological imagination” coupled with a grounded sense of the context.

Dilemmas and contentions about effective policy and strategies to adopt are bound to arise in such a situation, and the COVID-19-related crisis is no exception. There has been a national-level epidemic control response and varied state-level responses. Some states had initiated responses earlier than the centre and went beyond in their breadth and depth of preparedness. In this paper, we attempt to examine some of the critical issues for India from an interdisciplinary public health lens, and suggest measures for consideration for the immediate, medium-term and long-term responses. Critical to our perspective are the questions: What works best, for whom, under what conditions, what are the unintended consequences and who pays the costs?

We have found that public health approaches that are either narrowly biomedical or mechanically statistical tend to produce reductionist understandings of a public health problem. Shoe-leather epidemiology, on the other hand, pertains to
Figure 1: National Epidemic Curves—Numbers Tested, Cases and Deaths
(A) Data till 6 April 2020
COVID-19: tests, confirmed cases and deaths per million people, India

(B) Data till 14 June 2020
Total COVID-19 tests, confirmed cases and deaths per million people, India

The confirmed counts shown here are lower than the total counts. The main reason for this is limited testing and challenges in the attribution of the cause of death.

Source: Official data collated by Our World in Data; European CDC—Situation Update Worldwide — Last updated 6 April, 12:00 (London time) OurWorldInData.org/coronavirus. CC BY.

walking door to door (wearing out shoe leather in the process, hence the term) to ask direct questions. (Last 2007)

We are using the term “shoe-leather public health” for a public health approach of epidemic control investigation, planning and implementation that is based on familiarity with the specific context and grounded in real-life evidence from local conditions (Freedman 1991).

Learnings from the earlier experience of handling and analysing public health efforts in India—of the malaria and tuberculosis control programmes (Banerji 1985, 1988), cholera outbreak in 1988 in Delhi (Priya 1993; Dasgupta 2012), the plague in Surat 1994–95 (Qadeer et al 1994; Shah 1997), the polio eradication control programmes (Sathiyamala et al 2005), the HIV epidemic since the mid-1980s (Priya 1994; Priya and Mehta 2008), the health effects of economic structural adjustment policies of the 1990s (Qadeer et al 2001; Baru 2011; Sadhna and Baru 2000), and the H1N1 influenza pandemic of 2009 (Purohit et al 2018)—have contributed to this analysis. Official data sources and documents, academic literature, media reports, and informal reality checks from people in the front lines of action in the pandemic form the basis of our understanding, which is as tentative as the situation.

Interpreting the Numbers

In India, we had over 6,000 detected cases and over 200 deaths by 10 April 2020 (increased to over 3,50,000 cases and 11,000 deaths by 10 June 2020) (GoI 2020a). The experience is similar to that of other parts of the world, which tells us that despite persons of all ages being infected, the elderly and those among them with pre-existing heart disease, diabetes and lung diseases are the ones who become severely ill and among whom majority of deaths occur. Given our demographic structure of a younger population, a majority of those infected are younger than 60 years, but 63% of deaths until 7 April 2020 were among those over 60 years. Another 30% of those who died were in the 40–60 years age group, and only 7% were below 40 years (Dey 2020). Globally, studies estimate that the case fatality rate varies from 0.25% to 4.5%, going by age, pre-existing disease conditions and complications (Rajgor et al 2020).

Data on the number of cases must be interpreted keeping in mind that it comes from the diverse ways in which surveillance and testing is being done. The most accurate data, globally, is of those with severe disease, hospitalisation, those cured while in hospital or those who died of covid-19-associated illnesses. In some cases, especially those with no underlying morbidities prior to the covid-19 infection, the cause of death can primarily be attributed to covid-19. However, in the majority, where the death is of persons who are covid-19 infected and have co-morbidities, the more scientific approach is to call it “covid-19-associated death (as is being done by the United Kingdom [UK] health authorities).

Less accurate data will be available on the covid-19-infected persons with no symptoms or mild and moderate disease since they are less likely to be tested. By government guidelines, until 20 March 2020, only public laboratories were testing for covid-19 and only for those with symptoms who had a relevant travel history, or history of contact with a known positive person (ICMR 2020). Thus, the asymptomatic or pre-symptomatic would be tested and counted only if they were contacts of a known positive person. On 21 March 2020, testing was opened for all healthcare workers and patients with severe acute respiratory illness (sari) or influenza-like illness (ILI).

Since 3 April 2020, private testing has been allowed, resulting in testing of even those outside these criteria who are ready to pay, and the results may or may not be reported in the official count.

The Indian Council of Medical Research (ICMR) stated that “private labs testing is to ensure real time reporting to the Integrated Disease Surveillance Programme (IDSP) and the ICMR headquarters for timely initiation of contact tracing and research activities” (Economic Times 2020). The experience of poor reporting of notifiable diseases by the private sector does not give confidence of its reporting to the public system on a real-time basis.

The accuracy of data will also depend upon the degree of completeness of contact tracing, surveillance for symptomatic cases and testing. Therefore, till the first week of April, there were relatively small numbers tested, but more comparable...
data across states. Until 3 April 2020, a total of 69,245 tests had been conducted in India, with an all-India testing rate of 32 tests per million persons. Of these, 10,034 tests were conducted on a single day, that is, on 3 April—when the private laboratories were allowed to start testing—and the numbers have increased exponentially since then, as indicated in Figures 1A and 1B (p 48).

After testing became more available through the private sector, it rapidly increased in volume and facilitated identifying individuals with infection. However, the results became less comparable and more uncertain. If we are to make any public health meaning of the testing results, along with the number tested, we should know who was tested and why. Only then will we be able to know the source of infection and the stage of the epidemic.

**Stages of the Epidemic**

The World Health Organization (WHO 2020b) defines four stages of the spread of CoV-2 in a country: (i) no case at all; (ii) isolated cases linked to travel abroad or contact with someone who is infected during travel abroad; (iii) clusters of cases in time, location and/or with an identifiable common source; and (iv) community spread with no identifiable common source. With the lacuna of not having a denominator by way of the number of people infected, assessment of the stage, especially its shift from stage three to four, and the potential effects of COVID-19 in a population remain inherently uncertain.

Since it is a rapid spreader, under natural situations, we can assume that the majority of the population will get infected in a short period. If 80% of the infected then get a cough and cold, or cough or with mild fever kind of illness and acquire immunity, herd immunity develops and it becomes another of the common seasonal illnesses, heralding the end of the epidemic, which we can call stage five. In the process of reaching this stage of endemicity, 20% of those who get infected suffer moderate to severe disease that requires hospitalisation and would result in deaths of 0.25%–4.5%. It is this loss of life that is concerning. India is currently at stage three, with some pockets already in stage four. The country certainly needs to be prepared for stage five, and it would be wise to do so in a way that prepares us for handling the endemic stage. Besides adding temporary emergency quarantine and isolation facilities, strengthening public facilities at the primary, secondary and tertiary levels would be the rational cost-effective approach, so that they are available even post pandemic, for preventive services and for patients of COVID-19, H1N1 influenza and other respiratory diseases, pregnant women with complications, and so on (Qadeer et al 2019).

**Policy Options and Challenges**

There have been two broad approaches to deal with the epidemic across countries. The first is the suppression of infection in stages one, two and three, which means minimising the entry and spread of infection in the population as the primary objective. The second is the mitigation of the effects of the infection, which implies interventions for minimising the effects on those who do get infected, and requires medical care corresponding to the stage and severity of the illness. The prioritisation between these policy options and strategies designed to operationalise them are premised on the assessment of risk and magnitude of the expected threat to life from the epidemic.

**Logic of a Lockdown**

There have been a number of modelling exercises to predict the likely course of the epidemic globally, and in India (Hellewell et al 2020; CDDEP 2020; Mandal et al 2020). While more nuanced estimates can be obtained by a state-by-state and district-by-district calculation, the broad parameters of a response have been set by a modelling logic that suggests something like this when applied to the Indian population: With 50% infected in the first few months and about 20% needing hospitalisation, 10% of the population—about 138 million in a 1.38 billion population—will need hospitalisation in the span of a few months (Ferguson et al 2020). Since we have a relatively young population, with an assumed 10% case fatality rate among those above 60 years and 0.3% among the below 60 years population, the estimated number of fatalities is around 8 million (76,24,500 deaths). Memories of the Spanish flu pandemic of 1918–20 are revived, when an estimated 15–20 million Indians had perished. Such projections and images are what create the spectre of a widespread serious epidemic with the likelihood of a huge number of fatalities, thereby requiring hard measures.

Thereby, restrictions on the inward flow of international travellers and on gatherings of people became the widely accepted responses by countries. Halting of normal domestic and international movement of people, educational institutions and workplaces being shut down, disruption of daily lives and economies were the trade-off for survival. This was to be accompanied by containment measures that include intensive contact tracing of known cases, and the imposition of quarantine if asymptomatic, or isolation if symptomatic or tested positive.

Such a humungous effort can limit the spread of disease and thereby lower the peak of the epidemic curve, that is, decrease the number of persons infected at a time, and thus decrease the pressure on health services, but it also prolongs the period of the epidemic. In the long term, it may not significantly lower the number of people infected, but it gives a window period in which to gear up for a better response—to prepare health services and improve societal capacity to understand and deal with the epidemic—and thereby decrease the deaths.

**Necessary Widespread Suppression?**

While this is the logic of the strategy advocated globally, and being followed by India, there is also a basis for questioning of this received “wisdom.” The analysis of the 2009 H1N1 pandemic in the UK had shown that there is little to gain by a massive lockdown, since the natural herd immunity is interrupted, the public health services are engaged in the tracing and isolation efforts rather than attending to the ill, and the
disruptions cause their own suffering (DHHS-UK 2011). As Watkins (2020) observes:

In the aftermath of the 2009 H1N1 global threat, the Department of Health’s [uk] pandemic preparedness planning team paid particular attention to the value, or otherwise, of containment as a strategy to prevent spread. In 2009 considerable time and effort were spent on a catch, isolate, and treat approach in the early stages of the emerging pandemic, and public health teams were expending considerable energy with, as it turned out, little effect. The resulting UK Influenza Pandemic Preparedness Strategy 2011 emphasised the need to maintain the continuity of essential services and everyday activities as far as possible.

However, in the context of the UK and of an influenza pandemic, given the endemicity of influenza-like illness and the high death toll due to it in the UK in “normal” times, the excess deaths and cutting down of excess deaths were weighed against the costs of closing down everyday activities. There was also the hope that the well-established National Health Services (NHS) would, with some augmentation, be able to take care of the severely affected and a vaccine would build up the herd immunity.

We, in India, cannot rely on medical technology alone, with an extremely weak public health service system, poor access to healthcare for a majori ty of people, and a covid-19 vaccine at least 12 months away. The endemicity of influenza-like disease and deaths due to it is relatively low in India, and so the health services are even less prepared to handle covid-19. With the projections of millions dying, low economic capacity of majority of our citizens, high population density and news reports (since January 2020) of numerous countries facing a serious covid-19 crisis, closure of borders and enforcing minimisation of human interactions would be the obvious strategies for any government, however difficult they may be. With rising cases in the country and a delayed closure of international borders, the Indian government saw little option but to impose a complete lockdown.

An appeal by the Prime Minister for a “Janata curfew” on 22 March 2020, where everyone (except those providing essential services) stayed at home, was followed by a three-week lockdown period, announced at 8 pm on 24 March and enforced from midnight, that is, effected within four hours. This was the action initiated by the Government of India to operationalise the strategy for suppression of the epidemic with the purported objective of “flattening the epidemic curve” and preparing the health services.

However, the enforcers of such a measure must be aware of the trade-offs, the likely negative fallouts, who benefits, and who stands to lose most. Ethical policy then requires that, as far as possible, only minimum areas or populations are involved and for the least amount of time in such a measure for suppression. Measures to mitigate the negative consequences of policy decisions must also be planned for in advance and simultaneously instituted (Smith and Unshur 2019; Prasad et al 2020).

Diverse Conditions and Responses

The first covid-19 case in India was reported on 30 January 2020 in Thrisur district of Kerala. On 3 February 2020, Kerala reported its third confirmed case, all three being students returning from Wuhan, China. After a one-month lull, India reported six new cases of covid-19 from Maharashtra and Karnataka in the first week of March, of which, four had a travel history to the United States (US) or Dubai. A rapid rise to 50 positive cases was reported by 11 March 2020. Of these, 39 had a history of foreign travel, while the rest contracted the infection through local transmission from them. The first covid-19 death reported was of a 76-year-old man in Karnataka on 12 March 2020. Since then, the average case fatality rate in India has been less than three per 100 infected (limitations of knowing the total number infected, the denominator in this estimation, have been discussed above). What the data does show is that the spread is not even. Some places have evolved as hotspots, while most others have very low or no reported cases.

The available data for the states of India, and districts within them, shows that they are at various stages of the epidemic, from stages one to three, and entering stage four also differently (Figures 2A, 2B and Figures 3A, 3B, p 51). As of the first week of April, 274 districts had reported a minimum of one case, that is, 37% of the 739 districts in the country (MohanFW 2020a). Should there be a differentiated approach for areas with...
different epidemic dynamics? On 1 May 2020, when the third phase of the lockdown was to begin, zoning guidelines were an effort in this direction (Got 2020b).

The initial cases had largely been reported among the middle- and upper-middle classes in urban areas, since they were more linked to international travel. By April, only a few cases had begun to trickle in from poorer residential areas, most often through contact with well-off employers whose services they were engaged in. However, once the spread reaches high-density and low-resourced areas, there is likelihood of more rapid spread. In rural areas with relatively sparse population density, but an increase in return of migrants from urban areas and likely high social interaction, the extent of the spread remains to be seen. The large concentration of cases still remains in the initial cities and states, with some significant shifts in rank order, such as of Kerala and Gujarat (Figures 2 and 3).

In all likelihood, the lockdown was announced before the virus had significantly travelled to the poorer sections of urban areas, including to the migrant settlements. Therefore, even when the migrant workers returned to the rural areas in large numbers—due to the lockdown and closure of all livelihood sources for them—the rural areas would have had only very limited encounter with covid-19. Now, as the lockdown is lifted, even in phases, it will mean increasing spread to the poor and working population, including rural populations. Given our demographic and occupational pattern, the vast numbers projected would come from these sections. However, the diversity of conditions is so wide across states and districts within them that the spread should be visualised as multiple epidemics. Their dynamics vary, and so should the response to them.

Hotspots arising out of mass gatherings—such as at the Tablighi Jamaat’s Markaz in Nizamuddin, the shraadh ceremony in Morena, and Navratri/Ram Navmi gatherings in temples all across North India, all in the period from mid-March to early April—have also been recorded, and depending on how widely people disperse from them, they take the virus along. Parallels can be drawn to the classical mode of spread of cholera epidemics after Kumbh melas in the early decades of the 20th century.

Controversy around Testing

As indicated above, there has officially been a very conservative approach to testing for covid-19 (ICMR 2020). In light of this, there have been numerous calls to expand and improve the scope of testing in order to achieve larger coverage for the same (National Herald 2020; JSA 2020). The argument for wider testing is that we need to know the extent of the infection to plan. Our considered view is that even without much expanded testing, it is possible to make sense of the available data with knowledge of the local context. Testing on a scale that can identify each infected person and either send them to isolation or for treatment, as attempted by South Korea and Germany, is not a feasible proposition in the Indian context, given the low reach of health services, limited laboratory capacity for the confirmatory test and limitations of the rapid tests, such as high false negative results (Financial Times 2020; Cummins 2020).

Till 3 April, with exclusively public system testing, cumulative testing rates were highest for Kerala (200 per million), followed by Delhi (122), Rajasthan (59), Karnataka (52), Jammu and Kashmir (48), Punjab (35), Tamil Nadu (34) and Maharashtra (32.5) per million.

By 10 April, Delhi had the highest rate of tests conducted per million population, while Tamil Nadu had the highest positivity rate. Low test counts and high positivity rates, as in Tamil Nadu and Haryana (Table 1), indicate the possibility of a

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**Table 1: Testing Rates, Cases and Deaths for Selected States**

<table>
<thead>
<tr>
<th>States</th>
<th>Total Tests Done</th>
<th>Tests Million</th>
<th>Percent Positive among Tested</th>
<th>Total Confirmed Cases</th>
<th>Total Deaths</th>
<th>Case Fatality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>9,363</td>
<td>494.0</td>
<td>7.7</td>
<td>720</td>
<td>12</td>
<td>1.66</td>
</tr>
<tr>
<td>Kerala</td>
<td>12,710</td>
<td>538.4</td>
<td>2.8</td>
<td>357</td>
<td>2</td>
<td>0.56</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>30,229</td>
<td>247.9</td>
<td>4.5</td>
<td>1,364</td>
<td>98</td>
<td>7.18</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>18,281</td>
<td>229.7</td>
<td>2.4</td>
<td>430</td>
<td>2</td>
<td>0.47</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>7,267</td>
<td>94.2</td>
<td>11.5</td>
<td>834</td>
<td>7</td>
<td>0.84</td>
</tr>
<tr>
<td>Haryana</td>
<td>2,173</td>
<td>78.2</td>
<td>7.2</td>
<td>170</td>
<td>2</td>
<td>1.17</td>
</tr>
<tr>
<td>Gujarat</td>
<td>6,199</td>
<td>95.7</td>
<td>4.2</td>
<td>262</td>
<td>18</td>
<td>6.87</td>
</tr>
</tbody>
</table>

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Data as of 10 April 2020. Sources of data: Hindu (2020); MoHFW (2020a).
large number of missed cases, while Delhi’s higher testing rate and yet high positivity rate indicate true spread. Maharashtra and Gujarat have intermediate positivity but highest case fatality rates, indicating either the highest load of cases and severity of cases, or that they are doing poorly in containment and treatment, relative to the other states.

There appears to be some locational pattern in terms of positivity and case fatality rates—Delhi and Haryana are similar on both, Maharashtra and Gujarat are similar on both, and Kerala and Tamil Nadu are similar in terms of case fatality rate. Therefore, this locational effect seems to be more significant than the rate of testing.

However, Kerala and Rajasthan, locationally distant from each other, stand out as outliers, with the lowest positivity and lowest case fatality rates, indicating that the extent of testing may not be playing a significant role in the conditions for spread and the rigour of intensive community-level work. As we will see in the following section, both states have employed intensive ground-level action; screening and testing has apparently been done with effective targeting so that they have an optimal level of testing for planning and operationalising control activities, while also being able to identify and treat cases. To do better targeting of tests would require more of “shoe-leather public health,” that is, knowing where conditions require more focused surveillance and optimising testing. Other analyses, too, reveal that appropriately targeted testing is important (Rodriguez 2020). Increasing the number of tests by itself may not be the solution.

Optimising Resources and Results

Some pointers on the manner in which the limited supplies and human power can be optimised for testing at the present stage of the epidemic are discussed.

A classical shoe-leather epidemiology that requires first-hand knowledge of the ground conditions is essential. The Integrated Disease Surveillance Programme (idsp), meant to record and identify early any unusual increase in communicable diseases, must be involved but is not yet adequately equipped with epidemiological capacity, and there are interstate variations in quality (Dasgupta et al 2020). However, public health services everywhere have some personnel who have the requisite insight and knack of local community action, and they need to be given the space to use their local knowledge to fine-tune the epidemic response (Naraindas 2020).

In addition to red–orange–green zones based on covid-19 test reports, we suggest a differentiated strategy framework that combines considerations across socio-economic and geographical locations—urban middle class, the urban poor, peri-urban and rural areas—within each district. The diverse population densities, occupations and socio-economic conditions create specific epidemic dynamics and requirements for containment and medical care as well as for meeting basic needs. The peri-urban areas are especially important since they tend to be excluded from services, with neither the rural panchayat institutions nor the urban municipalities perceiving them as their responsibility (Waldman et al 2017).

This framework will allow for better monitoring on the grounds to follow the dynamics in communities and tailoring strategies for epidemic control as situations emerge. Within each district, covid-19 hotspots and potential hotspots can be identified, as well as those sections vulnerable to hunger, unemployment and so on, embedded in the urban middle class, urban poor, peri-urban and rural populations; such identification can draw attention to addressing these and other related needs.

Simultaneously, the trends in numbers of hospitalisation and serious cases can function as a “sentinel surveillance” marker and monitored as such. Where these cases start coming from (and increasing) tells us that there are likely many more infected there. In communities where accessing of healthcare is not an issue, primarily the middle and upper classes, we expect people to self-report to or seek medical care from the government system or private doctors/hospitals. So, hospitalisation and sar with testing for covid-19 could be valid markers for a sentinel surveillance strategy among the urban-middle class, and the official system should now focus its active surveillance on other sections.

Communities that face multiple barriers in accessing health care—comprising a large proportion of the other three sections in our proposed framework, that is, the urban poor, the peri-urban and the rural—may face the real problem once the lockdown is lifted. Through some shoe-leather epidemiology, each district and town can identify the most vulnerable areas in terms of access to healthcare, and the likelihood of covid-19 spread. In those areas reporting some cases, undertaking prevalence testing in a small sample would provide enough pointers to plan strategies. Keeping similar areas under observation and moving in for active surveillance through testing when some signs of infection appear in them would limit testing needs and yet mean an expansion to where it is required.

However, these steps have to be carried out with community participation, confidence-building measures and transparency in all activities. It has to be recognised that the marginalised sections of society within poor, Dalit, religious minorities and the women among them, are not only more vulnerable in such situations but also may be less forthcoming for official services. Their past experience has often generated distrust of officialdom and the government. Thus, pre-existing social cleavages can act as barriers to the implementation of even people-centred approaches. Unless undertaken with great empathy, engagement of the community and building bridges of trust, non-cooperation of the people can lead to victim blaming and justify adoption of more authoritarian approaches.

Differential Responses

The central government set up a group of ministers to monitor the situation led by the minister of health and family welfare on 3 February 2020. However, it was only on 19 March that an economic task force for the covid-19 response, headed by the finance minister, was announced. A task force of health experts, led by the nh11 Aayog and another led by the principal scientific advisor to the Government of India were constituted.
on 23 March 2020, and 11 empowered groups of bureaucrats formed on 29 March.

The state governments have acted in concert with the central government, and also on their own initiative, a few states having acted much before the central government gave its call. Kerala had a draft policy for the containment of COVID-19 prepared by mid-January 2020, that is, before it got its first case later in the month. It was followed by Delhi, Maharashtra, Rajasthan, Punjab, Odisha, Madhya Pradesh and Uttar Pradesh, that is, states which got their first few cases and responded in the first fortnight of March 2020. Also noteworthy is the early response of states like Chhattisgarh, which had no positive case then, yet announced extensive plans in view of the looming threat. As the cases began to emerge in other states, action plans were put in place.

**Kerala model:** Kerala has emerged as the state with the most effective response, with evident outcomes. It has combined public health and administrative skills with mobilisation of primary care and hospital health personnel effectively, undertaken intensive contact tracing and isolation strategies, as well as provided services and support that makes it evidently a “caring state.” The responses of the Kerala government were at the state, district and panchayat levels with active community mobilisation, assisted by volunteers (Sadanandan 2020; Roy and Davéo 2020).

After the reporting of the third COVID-19 positive case on 3 February 2020, the state government declared a state disaster. The state government constituted a 24-member state response team chaired by the health minister, members being senior officials and experts from various departments: epidemiology, community medicine, infectious diseases, pediatrics, drug control and safety. A state-control room ran round the clock and 18 teams were constituted to coordinate various functions such as surveillance, human resource management and setting up of call centres.

Clear guidelines for clinical and other aspects of management were issued by the state. Additional doctors were appointed to carry out the preventive work (as part of surveillance teams and support services) as well as clinical care. The objective was to prevent fatigue of doctors and nurses (Jacob 2020).

Contact tracing of confirmed cases was done at the district level. Rapid response teams were also set up at the district level and systems were put in place by 10 March 2020 manned by multidisciplinary teams. Medical students and health department staff were mobilised. Community-level organisations were coordinated for support to families. Ernakulam district partnered with private hospitals for providing intensive care (Kumar 2020).

A revival package of ₹20,000 crore was announced for health packages, free foodgrains, subsidised meals, loan assistance and welfare pensions. Systems were set in place to deliver food and other essential supplies at home, including by the anganwadi workers to the home of each registered child. Helplines have been set up for calls for any kind of assistance, psychological counselling support, and so on (DMs—Kerala nd). From early on, the health minister, soon joined by the chief minister, started daily interactions with the media and briefed the public.

The entire effort has been hailed as a well-planned public health response with intensive containment measures at the ground level, measures for social security and meeting people's basic needs, as well as a transparency about the situation and the government’s steps towards the same. As data shows, the planning and ground-level execution has paid off. However, this successful response arises from a situation where health has been a priority area for decades and the state has the best health indicators in the country: the primary healthcare, medical care and public health activities are all interlinked, and there has been institutional learning from the Nipah outbreak and the floods experienced over the past few years. Equally importantly, the state has integrated public health with a people-centred, decentralised structure and the people’s right to know about public policy decisions and participate in them (Kurian 2020; Nileena 2020).

**Cluster containment in Rajasthan:** In a very different situation, Rajasthan is known as one among the less developed in terms of health indicators. But its Bhilwara district was able to successfully contain spread from a cluster emanating from a hospital in a way that has the central government advocating the “Bhilwara model” for cluster containment. As soon as indications of the first case of COVID-19 appeared in the district on 21 March 2020, the district administration swung into action. In a population of about 26 lakh persons, 850 primary-level teams were sent out into the urban and rural areas. As reported by Dhingra (2020),

From isolating the district to mapping the hotspots, conducting door-to-door screening and aggressive contact tracing, ramping up quarantine and isolation wards to readying a monitoring mechanism for rural areas—the instructions from the DM’s (district magistrate’s) office were real-time and unambiguous, officers said.

The district magistrate’s years of experience and his being “embedded in the system in the state helped.” In this textile hub, not only were all factories shut down, but “the district administration swung into action the very next day ordering the district industrial in-charge to talk with all establishments urging them not to retrench workers and ensure a part of their wages were paid” (Manish 2020). Supply chains of essentials were ensured for citizens, as the lockdown was planned. More than 6,000 persons were identified and quarantined either at home or in facilities created for the purpose, and 3,900 “helpless and homeless persons” were provided shelter and food. With 27 cases and two deaths, there was no new case reported after 30 March 2020, until expatriates started returning at the end of May.

Unfortunately, the national lockdown was announced without any preparation for its immediate fallout. The closure of all economic activities left all informal sector workers, daily wage earners and contractual workers (large numbers of them migrants) in cities to fend for themselves, but with no where-withal to do so. Some of the suffering, mental and physical, that this has caused on a mass scale has been witnessed on
television channels, of migrants attempting to walk hundreds of kilometres to reach their home. What this can mean in terms of health can well be imagined. Immediate consequences can be gauged by at least 22 deaths reported in the media, of migrants in travel between 24 March and 29 March 2020 (Scroll.in 2020). By 10 June, collated media reports showed that non-COVID-19 deaths increased to 883, with causes, such as accidents, starvation, exhaustion, suicides and deaths in government organised special Shramik trains to bring migrant workers back to their state of origin, as well as in quarantine centres (Aman et al 2020).

**Mitigating Effects**

Since the entire objective of the suppression strategy was to buy time for preparing to handle the pandemic through containment and treatment of cases, we need to examine the extent and nature of preparedness. The sudden national lockdown has led to a whole range of negative consequences: economic and service access (leading to nutritional and health declines and mortality); and social and psychological (leading to stigmatisation, domestic violence, mental illness). The focus will have to be on reviving the economy, ensuring people have enough food, and strengthening the public health services. Steps for these must consider the immediate ground realities of the urban middle class, the urban poor, the peri-urban and rural populations with all their diversity, and plan immediate, intermediate and long-term interventions.

The economic package announced in several rounds by the finance minister-headed task force has been too little and too late (Kumar A 2020; Ghosh et al 2020). Here, we outline what urgent measures are essential from a public health perspective.

**Ensuring basic needs and livelihoods:** Shelter and food for all informal sector workers, where they were, should have been envisaged for at least a few months. This is what the Punjab government attempted to do by requesting industries to stay open and keep their workers in the premises while practising social distancing, and this was also implemented to some extent in Gujarat and Haryana. Such arrangements should have been discussed with state governments and industry representatives prior to imposition of the lockdown. Now, as the lockdown is lifted, this measure must be followed, with the need to revive economic activity and to prepare in the case of a second wave of the epidemic within a few months.

Equally important will be enhancing economic activities in rural areas, especially through the Mahatma Gandhi National Rural Employment Guarantee Act and initiation of relief works on an emergency basis, with prompt and complete payments, facilitation of harvesting and procurement/marketing of agricultural and horticulture produce, their links with related processing units and active supply chains. Support to informal sector livelihoods, such as construction and agriculture, individual self-employed persons like vendors, plumbers, carpenters, and so on, is equally crucial.

District collectors must ensure through panchayats, self-help groups, block development offices, and all such channels that no starvation deaths happen, through community identification of food short households and provisioning. The public distribution system (PDS) outlet network and infrastructure for cooked mid-day meal in schools must be put to use to deliver dry rations and cooked food to all who need them and for as long as required. Anganwadi workers can be mobilised to take food to homes (as being done in Kerala), including to the elderly living alone, and simultaneously enquire about symptoms and contacts, as well as educate about preventive measures and so on.

**Community engagement:** Collective community action is an essential component and must be encouraged in all activities. Empathy and philanthropy tend to rise to high levels at such times of crisis. “Physical distancing and social bonding” has to be the mantra. Recognising that the community as a whole—across lines of caste, creed, religion, and gender—is going to be essential in combating the epidemic, all must be engaged meaningfully in contributing to the collective effort. Encouraging solidarity and altruism at local levels, with decentralised platforms for philanthropic fund collection and utilisation, rather than a centralised fund alone may provide immediate and longer term results. Local volunteer groups should be mobilised to assist the healthcare efforts, the elderly in the community, ensure supplies, psychosocial support and so on (Purohit et al 2018; Priya and Dasgupta 2020).

To minimise anxieties, public health messages need to be trustworthy. They should be generated from the highest levels of government, with openness and clarity about the unfolding situation, including frank acknowledgement of the uncertainties, and the efforts being made to meet the challenge. Messages by the Prime Minister of Singapore, as well as those by the Kerala health minister and chief minister are stellar examples of such communication (CNA 2020; Nileena 2020).

**Prevention and treatment of the infected:** The “flattening the curve” strategy was intended to buy time in order to gear up health services for appropriate treatment of the COVID-19 patients. This was the one effort getting attention by the centre and all states since the third week of March. Given existing shortages in the public health system, why was it not initiated since February is, of course, a question to be asked.

Hospitals and hospital beds are being designated for COVID-19 patients, railway bogies and stadia are being prepared as isolation and COVID-19 care centres. Capacity of personal protective equipment (PPE) production and testing has been ramped up. However, a public system that was already facing shortages of doctors, nurses and paramedics, can anticipate getting overwhelmed further, with likely attrition of healthcare providers due to infection, fatigue and burnout. There was evidently little preparation on this count until May–June as seen in Mumbai and Delhi (Krishna 2020; Pathak and Saxena 2020). While 80% of doctors in the country are in the private sector, there has been little attempt to requisition them for emergency work in this crisis. Therefore, we find our leading metropolises, Mumbai and Delhi, facing the most horrendous...
situation for overworked doctors and nurses, while a large number of those available in the city are not mobilised (Gupta 2020). Reconciling the fact of vacant COVID-19 designated beds in public hospitals with reports of denial of admission to COVID-19 patients, constrained human resources to cater to the patients seems to be at least part of the explanation (Dutta Roy 2020). Improving physical infrastructure has been the focus of hospital preparedness, but this is being done without simultaneously focusing on improving human capability to treat patients.

Besides creating new infrastructure or improving existing public health services, the government must ensure that the private institutions empanelled for the Pradhan Mantri Jan Arogya Yojana (PMJAY)—the insurance programme for free hospitalisation for the poorest 40% households—provide services in such a crisis and that entitlements are honoured (Baru and Bisht 2020). Spain has nationalised its private sector services in the wake of this pandemic (Baru 2020). In India, the least that can be done is to bring all services under one unified command of the chief district medical officer or municipal health officer, so that optimal use can be made of the available infrastructure and human resources in both public and private sectors, and free services provided to all.

Instead, there have been reports of private hospitals overpricing COVID-19 treatment, with insurance companies asking the government for regulatory measures (Economic Times 2020). The Supreme Court directed the government on 8 April 2020 to issue directions to approved testing laboratories for conducting COVID-19 tests free of cost. Experts said the order, while aimed at making testing easily available, may force many private firms to scale down operations (Kaul 2020).

While hospitals are prepared for an influx of COVID-19 patients in all regions, patients suffering from other ailments and needing timely attention must also be ensured care. A systematic “medical care plan for non-COVID patients” must be put in place and implemented. Otherwise, many may succumb to non-COVID-19 illnesses but as a result of the COVID-19 response strategy.

Besides isolation and quarantine, hospitals and medical care, an epidemiologically sound approach also requires measures to prevent the conversion of infection into manifest disease, that is, how to increase the proportion of persons who get infected but remain asymptomatic or only mildly symptomatic. A vaccine is awaited in order to achieve this. The role of immuno-boosters—commonly used in home remedies and AYUSH systems of medicine—is yet to be adequately studied epidemiologically for effectiveness in such situations (Priya and Sujatha 2020; Balachandar et al 2020). In China, there were reports about the high use of traditional Chinese medicine and tai chi for prevention and for treatment, including in the special COVID-19 hospitals (Yang and Zhang 2020; Dyer 2020). In India, there was much public wrangling around the AYUSH ministry advisory on the use of homoeopathy and ayurveda for prevention of infections (Print 2020).

The use of home-made masks can also serve as an important mass-level preventive, if propagated widely for use by all they are in public spaces, and also within homes in cases of infections. However, this measure was actively discouraged in mass media messages initially, until the principal scientific advisor to the government issued an advisory on the same on 4 April 2020 (Koshy 2020). Hard, top-down solutions in the form of the national lockdown and strengthening medical infrastructure via improved testing rates, bid to develop a vaccine, and increasing the number of hospital beds/ICUs/ventilators, etc, remain the focus of epidemic control measures by the central establishment.

**Strengthening primary healthcare**: A strengthened primary healthcare approach based on universal health services is what we must aim for. That is what has been demonstrably effective in the Kerala and Rajasthan responses to the pandemic. Besides the special hospital services organised for treatment during the community spread stage of the pandemic, efforts at primary levels of care will be necessary to limit the pressure on the hospitals, and it is what will remain with us for mitigating the endemic phase, once the epidemic ends.

**Governance Issues**

With the organisational mobilisation at the national level to oversee the epidemic control activities that were described above, the Prime Minister’s Office and Ministry of Home Affairs seem to be in command, with the Ministry of Health and Family Welfare and several expert groups advising the Government of India. Despite that, there seems to be a limitation in planning in terms of shoe-leather public health. Social dimensions of an epidemic situation and the essentials of a social response require social science and interdisciplinary public health expertise to be drawn upon. The absence of this is evident in the COVID-19 response.

Community mobilisation by way of mass drills on a designated day and time, following a call by the Prime Minister, have been among the most successful of efforts, at least by media reports showing a high degree of compliance in middle-class residential areas. However, instead of social solidarity, messages encouraging “keeping oneself safe” have enhanced the “othering” of all perceived high-risk groups. Therefore, the valorisation of health workers as “corona warriors” has not prevented their stigmatisation (Sharma 2020).

Since May 2020, as the lockdown was softened and staggered by zoning, the central government seems to have dissociated itself from pandemic control activities and has left state governments and citizens to fend for themselves. The orders for production and procurement of equipment have been made, a newly-created PM CARES Fund has received billions in donation, economic packages have been announced, and now the centre has stepped back. National tasks, such as of ensuring adequacy of funds with state governments to handle the epidemic, safe and free movement across state boundaries, sharing of healthcare resources across states as per need, reigning in the private health sector, seem to have been left unaddressed. Corrective action is taken only when the gaps become glaringly evident (Chaturvedi 2020).
Despite some slowing down during the lockdown, the epidemic continues to grow and escalate (Patel et al. 2020). Some strict rules and regulations will have to be followed in such a situation, but compliance can be improved by a caring government with the intent to achieve the same. Using the situation for partisan action against any section, ignoring of basic needs, or violation of privacy by naming of the affected publicly, can only prove counterproductive. The stigmatisation and callousness of the medical system, civil authorities and police, make infected persons go underground even at the risk to their lives. It is through reversing such conditions and introducing community-engaged contact tracing and support for isolation/quarantine that the biggest slump in Asia, Dharavi in Mumbai, beat the pandemic, even while the rest of the city continued to see an upsurge in cases and deaths (Pandya 2020).

**Research for public health:** Research and expertise need to focus not only on research and development in vaccines and medicines, but also on public health and epidemiology, on appropriate technologies and the social determinants. The ways of optimising the role of the private sector in healthcare, the role of community participation in inclusive decision-making as well as volunteer work and self-care, and even the role of Ayush and local health tradition regimens as a mitigation strategy, are all essential components that need researched inputs. A public health cadre that can operationalise such health systems’ research findings must be a strong plank of long-term strategy.

Another noteworthy phenomenon has been the environmental resilience seen in the lockdown and post-lockdown period. As the pressures of human activity decreased markedly across the globe, signs of rejuvenated air, waterbodies, and bird, animal and plant habitats were witnessed. The move into a post-COVID-19 world will have to factor in ecological health alongside human health and well-being. Interdisciplinary research on a “one health” approach and transdisciplinary research for sustainable transformations provide directions that will require greater policy consideration (Debnath et al. 2020; Marshall et al. 2018).

**Conclusions**

Instead of a national lockdown involving 1.3 billion persons, would it have been more prudent to initiate suppression measures only where the infected were concentrated, in the metropolises? And, if the quarantine of international travelers had been strictly enforced early enough in February 2020, could the country have been saved any lockdown? We think these measures should have been attempted before a national lockdown was even contemplated. The delay in action until mid-March 2020 led to a knee-jerk, unplanned measure that has had horrific consequences.

A grounded, people-centred public health perspective, rather than mathematical modelling, can lead to such a nuanced approach. Viewing the pandemic as multiple epidemics based on epidemiological dynamics would lead to contextualised policy approaches rather than imposition of one centralised, universal measure.

In India, the first spread of the epidemic was among the middle class and the response has been largely focused on that section. As the epidemic unfolds and moves to the next stages of community spread and endemicity, this middle class and globalised elite nature of the pandemic will shift, as already evident. Eventually, it will affect the poorer sections, and with worse outcomes. The Indian government’s response must be in that vein.

However, it is evident that the loss of confidence in the government, whether it is the informal sector workers or the minority community, will hinder epidemic control activities. The onus is on the government to gain trust of all sections for successful outcomes.

There is also a need to examine why the health system response has been primarily a biomedicine-led approach rather than a public health one. As the analysis in this paper shows, testing cannot yield results unless combined with intensive ground-level work conducted with empathy, community engagement coupled with strong administrative measures and an epidemiological understanding. The suggested framework for categorising populations for surveillance and epidemic control activities, engaging communities as active agents, are all illustrations of epidemic control dependent on shoe-leather public health.

While these issues can be better understood once the dust settles on this pandemic and a more comprehensive database is available for analysis, it is imperative that we make urgent correctives as we go along. This is not only about governments, but about the lives of millions, and with effects for decades to come.

**REFERENCES**


Engage, Through EPW Engage, our new digital initiative, we seek to explore new and exciting possibilities of communicating research in a creative and accessible manner to a wider audience.


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Gandhi advocated ‘a return to the village’ as the only genuine way to gaining swaraj, or self-rule. Nehru and Ambedkar too saw the village as the site of India’s traditional life; however, to them it was also a signifier of India’s economic backwardness and social ills. These notions have shaped social science scholarship, popular politics and public policy.

This volume provides a historical perspective on the subject of the ‘rural’ and covers a wide range of topics that have been critical to the imaginings and empirics of village life in contemporary India. This comprehensive collection will be an invaluable source for students and scholars of sociology, social anthropology, economics, development studies and public policy.

