

SUPPLEMENTARY MATERIAL

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Details on application of the framework to the Indian lockdown phases 1.0 and 2.0

Harm/Necessity: After the first outbreak of coronavirus disease 2019 (COVID-19) (December 2019) in China, the World Health Organisation (WHO) declared it a Public Health Emergency of International Concern (PHEIC) with 9826 confirmed cases and 213 deaths on the 30th January 2020. Subsequently, a pandemic was declared on the 11th March 2020, with 118,319 confirmed cases and 4292 deaths due to the virus. The 31st January 2020 WHO situation report pointed to the possible human-to-human viral transmission through droplets or contact thereby establishing harm due to high infectivity and the exponentially increasing cases and deaths. Although knowledge about the virus is being continually updated with scientific evidence, e.g., the possibility of aerosol transmission [1], there is a consensus within the scientific community about the harms posed by the pandemic. In India's case, the numbers of cases and deaths, and crude case fatality rate (CFR) have been frequently used to demonstrate the harm in Ministry of Health and Family Welfare (MoHFW) press briefings. Hence, there was strong scientific evidence demonstrating the known harm of the virus with an indicator to measure the harm before the implementation of the Indian lockdown.

Justifiability: Multiple studies published since lockdown 1.0 (24th March 2020) have agreed upon the lockdown being an effective strategy to curb COVID-19 spread [2–6]. However, these studies have differing views as to how and when the lockdown should have been implemented. E.g., one study [3] advocated periods of sustained lockdown interspersed with periods of relaxation while two others [4,5] suggested that lockdown be restricted to locations with a high caseload. The MoHFW also conducted an independent statistical analysis stating that containment measures and lockdown were instrumental in limiting the number of cases to 7,447 till 11th April 2020 [7]. The analysis also estimated that the absence of all restrictive measures would have led to over 820,000 cases by 15th April 2020 and this number would have been 120,000 with the implementation of other containment measures without the lockdown. Previously, individual or small-group level quarantine and isolation have been used against the spread of infections, e.g., the 1918-19 swine influenza virus A (H1N1) pandemic [8] and the 2002 severe acute respiratory syndrome (SARS) epidemic [9]. However, this was the first in history for countries to implement nation-wide lockdowns. An expert group under COVID-19 task force head, National Institution for Transforming India (NITI) Aayog monitored the lockdown effectiveness by observing the risk of community transmission, reviewing literature published by public health experts, and advising the Government of India (GoI) [10]. Thus, based on the considered indicators, the lockdown was justifiable as demonstrated by evidence of the effectiveness of movement restrictions in not only the COVID-19 pandemic but also other pandemics in history.

Proportionality: The Oxford University's COVID-19 Government Response Tracker (OxCGRT) developed a scaled stringency index (SI) (0-100, with a higher score depicting greater stringency) based on nine response indicators including school closures, workplace closures, and travel bans [11]. India had an SI value of 100 as of 22nd March 2020 when there were only 320 cases and 4 deaths due to COVID-19. India was quick to enforce a stringent lockdown even though cases and deaths were quite below other countries such as the United States (US) that had more than 6000 cases and 108 deaths before attaining their highest stringency index [12]. Apart from the US, Italy, and Spain enforced lockdowns only after crossing 1000 cases and 1000 deaths [13]. Based on the findings in an empirical analysis [14], measures were considered to be most effective if they were

instituted early, i.e., 7 days before the 1st case for travel restrictions and 14 days before the 100th case for lockdowns. Thus, although India's lockdown was the most stringent relative to other countries, it might be argued to be disproportionate.

Least Restrictive Means: We considered the least restrictive measure to be the cancellation of visas for travelers from China (4th February 2020) while the most restrictive measure was the nationwide lockdown (24th March 2020). There were seven transition steps with a time interval of 49 days between the least and most restrictive measures (**Supplementary Figure 1**). While there is no normative standard for the number of increasingly restrictive measures to be tried out before imposing lockdown, we provide a comparison with the trajectories of other countries. For instance, compared to India's national-level lockdown, China began with smaller city-level containments and then applied varying levels of lockdowns in other parts of the country. Similarly, the lockdown in Italy was imposed in stages and gradually extended nationally. India's lockdown was drastic compared to China and Italy. Each restrictive measure needs to be tried out for a sufficient time interval before moving on to the next restrictive measure. While there are no normative thresholds for these time intervals, analysis of impact of stringency of restrictive measures on epidemiological parameters provides certain cut-offs specific to COVID-19 [15]. E.g., travel restrictions should be in place for at least 7 days before implementing the next restrictive measure (see **Table 2** in the article). However, these time cut-offs were only available for 3 restrictions (travel restrictions, school/workplace closure, and the lockdown) in India's case, of which 2 restrictions complied with the sufficient time interval standards. Thus, the least-restrictive means can be said to be somewhat followed though better cut-offs would help in reaching finer conclusions.

Utility-Efficiency: The benefits of the lockdown in the form of averted COVID-19 incidence and mortality should be weighed against its economic (loss of incomes, closure of business, etc.) and broader social (rise in suicides, migration-related accidents, domestic violence, food insecurity, etc.) costs. One such cost-benefit analysis by independent economists compared the cases and deaths averted by the lockdown as benefits and the unemployment and loss in production as costs to find that the net benefits of the lockdown were negative as compared to its costs [16]. While more evidence is needed for an assessment, the available study supports that lockdown did not satisfy utility-efficiency.

Reciprocity: GoI announced myriad relief measures to protect the economy and livelihoods of those affected by the lockdown (**Supplementary Table 1**). The subsidies amounted to INR 21.7 trillion, targeted 32.3% of the population [17], and included measures for food, shelter, healthcare security as well as direct monetary transfers. Concessions were given for tax and loan payments, while non-essential routine activities including the national-level exams were postponed [18]. Free helplines were set up early-on for mental health issues [19]. To tackle the anticipated discrimination faced by patients, high-risk communities, healthcare workers, etc. the government issued an advisory on 8th April 2020, asking the citizens to act more responsibly and to refrain from stigmatizing any community or area [20,21]. However, guidelines for mass media houses to prohibit any discriminatory narrative were lacking. Although there were surveys to assess awareness amongst people about mental healthcare needs during the lockdown [22], there were no surveys to assess people's perceptions and understanding about the importance of avoiding stigmatization. Robust anti-discriminatory measures could have helped prevent the instances of discrimination and violence that were seen against certain communities, e.g., discrimination of

Muslims in the Talibhi Jamaat case, Northeast Indians [23], the social stigmatization of healthcare workers [24]. Along with the government initiatives, various organizations and private individuals rose to the task of helping those affected by COVID-19 and also the lockdown [25,26]. For instance, Mumbai's premium hotel Taj made its rooms available for quarantining healthcare workers [27]. However, these mitigation measures of the GoI were insufficient in providing relief to the affected population [28–30]. For instance, the actual government spending was lower than the proposed spending (30) and more than 100 million people were excluded from the Public Distribution System (PDS) [28]. Thus, the response from the government was mostly reciprocal for economic losses but lacked in tackling the discrimination.

Transparency: Government press briefings in local languages were regularly released (<https://pib.gov.in/newsite/bulletinn.aspx>). The first two months of the lockdown saw daily press releases while later months saw infrequent updates [31]. The MyGov platform was launched to promote the engagement of citizens with content in multiple languages and sign language to ensure maximum participation and reach [32]. Television programs and audio podcasts through MyGovSamvaad on community radio stations were also used. The Prime Minister of India in his address to the nation on 24th March 2020 before the lockdown, explained the need for a complete national-level lockdown in Hindi [33]. A written record of the speeches could be easily accessed at the Press Information Bureau (PIB) website in local languages [34]. While the Prime Minister's speech advertised the need for a lockdown, it failed to share with the public the rationale and evidence for choosing this over other less restrictive strategies. Press conferences wherein the journalists could question the decision-makers were limited during the lockdown. While the decision for the lockdown was communicated, the process of arriving at the decision was criticized for lacking transparency [35]. Thus, the communications about lockdown implementation were mostly transparent.

Relevance: Few public opinion polls have been conducted during the Indian lockdown [36,37]. Sentiment analysis of tweets from Twitter showed that a majority of the people were positive about the lockdown, trusted the government's decision, and were committed to flatten the curve [36]. In another online poll conducted by Inshorts, 82% of Indians wanted the lockdown to be extended beyond 14th April 2020 [37]. However, these platforms collected views from relatively young, educated, and higher-socioeconomic groups thereby leaving out a major chunk of the population. GoI setup dedicated response teams called Empowered Groups that included Members of Parliament (people's representatives), domain experts and specialists, state legislators among others from the NITI Aayog to coordinate COVID-19 response activities with the private sector, grassroots non-governmental organizations (NGOs), and international organizations [38]. Thus, the relevance of lockdown was justified due to the presence of public opinion polls and the presence of people's representatives in the decision-making process of dedicated response teams.

Equity: GoI took various measures to provide food and shelter security to below poverty line (BPL) groups, the destitute, migrant workers, and pilgrims (**Supplementary Table 2**). The National Commission for Women launched an emergency helpline to assist women experiencing domestic violence. The Central Ministry of Women and Child Development used the 'One Stop Centres' under an existing program to assist women facing any kind of violence and harassment during the lockdown [39]. Karnataka launched a special scheme called 'Santhwana' to provide counseling, legal and medical aid for victim-survivors of domestic violence [40]. States had their helpline

numbers for domestic violence as listed by Oxfam India [41]. The MoHFW issued a health advisory for elderly people during lockdown which included a list of Do's and Don'ts [42]. Among essential health services, the availability of drugs for chronic conditions faced logistic constraints during the nation-wide lockdown [43]. The measures presently taken by the government for the elderly during the lockdown were focused on financial security but mechanisms to ensure health service delivery to the elderly and chronically ill during the lockdown were needed. Thus, the equity-focus of the COVID-19 response was present in some areas such as food and shelter security for certain needy groups but missing in others such as health care access to chronically ill and elderly groups.

Accountability: To generate mechanisms for feedback, the Ministry of State for Personnel, Public Grievances and Pensions launched the 'Feedback Call Centres on COVID-19 Public Grievances' on 15th June 2020 to address the grievances filed between March to May 2020 [44]. Additionally, the Department of Administrative Reforms and Public Grievances (DARPG) in collaboration with Bharat Sanchar Nigam Limited (BSNL) operationalized feedback call centers in major cities with 1406 operators [44]. The MoHFW has also launched the 'COVID India Seva portal' for real-time grievance redressal on 21st April 2020 [45]. However, there were no dedicated public platforms to challenge the restrictions by directly approaching the concerned authorities. While the journalists were initially allowed to question the restrictions during press conferences, for televised press conferences, three out of twenty arbitrary questions would be chosen by the officials via a government WhatsApp group. The number of journalists attending subsequent press conferences was restricted to involve only PIB- accredited journalists from 2nd April 2020 [46]. During the lockdown, aggrieved parties were allowed to file an appeal against the adjudicating authority's order before the appellate authority within three months from the date of the order under Section 107(1) of the Central Goods and Services Tax (CGST) Act (2017). On 23rd March 2020, the Honorable Supreme Court of India invoked Articles 142 and 141 to extend the limitation period of all appeals with effect from 15th March 2020 until further orders, due to the difficulties faced by the complainants in filing appeals during the lockdown [47]. The Court issued a Standard Operating Procedure on 15th April 2020 for filing and listing of urgent matters and conducting hearings through video conferences [48]. Though video conferencing would ensure the continued functioning of the judicial system during the lockdown, there were no norms as to what constituted 'urgent matters' and only a handful of advocates were beneficiaries of the virtual court system, which led to few cases successfully getting listed for a virtual court hearing. This led to delayed judgments even for urgent cases, such as the one filed on 17th April 2020 for the return of migrant workers back to their hometowns [49]. Mechanisms for demanding reparations due to loss of lives and livelihoods and violation of fundamental rights due to lockdown restrictions were lacking [50,51]. However, public interest litigations (PILs) were seen taking up these issues [50,51]. While India's COVID-19 response ensured measures to affect public grievances and feedback, laws for filing appeals during the lockdown, and a fairly uninterrupted judiciary system, it lacked an efficient platform to challenge the restrictions and mechanisms to demand reparations due to loss of lives and livelihoods as a consequence of the lockdown thereby portraying a limited scope for accountability.

Cost and Feasibility: Lockdown implementation was made possible under Section 6(2)(i) of the Disaster Management Act (2005) that authorizes the National Disaster Management Authority (NDMA) headed by the Prime Minister to take steps for "the prevention of disaster, or the

mitigation, or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary". Section 38 [52] of the Act mandates states to follow NDMA's directions. On the ground, the Central Armed Police Force (CAPF) were deployed to guard containment zones and ensure people maintain quarantine [53]. The State Governments set-up isolation wards in government-run hospitals, nodal centers, and some private hospitals for COVID-19 positive and symptomatic patients. On 8th April 2020, the Indian Railways converted 5000 train coaches to quarantine/isolation facilities [54]. For international travelers and asymptomatic individuals, hotels and schools were used for 14-days quarantine with permits for home-quarantine. However, home-quarantine and isolation faced challenges in high-density regions due to cramped living conditions [55]. The legal measures and disciplinary systems put in place to enforce the lockdown and the state governments' resource utilization in the form of a police force and facility scale up to ensure compliance to restrictions sufficed the cost and feasibility considerations.

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Supplementary Tables

Supplementary Table 1: Relief measures by GoI during the lockdown corresponding to the policy indicators under the reciprocity principle.

I. General Measures
<ol style="list-style-type: none"> 1. 26th March 2020- The Finance Minister announced an Indian Rupee (INR) 1.70 trillion relief package under the Pradhan Mantri Garib Kalyan Yojana (PMGKY) for the poor [56]. 2. 9th April 2020- GoI sanctioned INR 150 billion for India COVID-19 emergency response and health system preparedness package [57]. 3. 15th May 2020- GoI and the World Bank signed a United States Dollar (USD) 750 million of the proposed USD 1 billion for accelerating India's COVID-19 Social Protection Response Programme to support India's efforts at providing social assistance to the poor and vulnerable households, severely impacted by the COVID-19 pandemic [58].
II. Employment-related measures
<ol style="list-style-type: none"> 1. Food-related <ol style="list-style-type: none"> A. 31st March 2020- Army Wives Welfare Association (AWWA) provided 3700 food packets to the needy in Delhi [59]. B. 20th May 2020- Cabinet approved Atma Nirbhar Bharat Abhiyaan package to allocate foodgrains to the migrant workers and stranded migrants [60]. C. Starting 28th March 2020, the Indian Railways distributed 140,000 cooked meals to the needy during the lockdown [61]. 2. Healthcare-related <ol style="list-style-type: none"> A. 29th March 2020- PMGKY package was announced to provide an insurance cover of INR 5 million for 90 days to about 2.2 million public healthcare providers, including community health workers, who were at high risk for COVID-19 infection. It also included compensation for accidental loss of life on account of contracting COVID-19 [62]. 3. Migrant worker related <ol style="list-style-type: none"> A. 1st April 2020- Around 21,500 relief camps were set up for migrant workers. More than 0.675 million people were provided shelter, and around 2.5 million were provided meals [63]. B. 16th May 2020- Free food grains were distributed to 80 million migrant laborers and their families under the Atma Nirbhar Bharat Abhiyaan [64]. 4. Direct Benefit Transfers related <ol style="list-style-type: none"> A. 31st March 2020- Ministry of Rural Development released INR 44.31 billion to States/Union Territories (UTs) towards Mahatma Gandhi National Rural Employment

Guarantee Scheme (MG-NREGS) wages & material arrears. The government hiked MG-NREGS wages in the wake of the COVID-19 pandemic, an average national increase of INR 202 per person focused on benefiting small marginal farmers, SC, ST, women-headed, and other poor households [56,65,66].

- B. 30th March 2020- The government extended the benefit of 2% interest subvention to banks and 3% prompt repayment incentive to all farmers up to 31st May 2020 for crop loans up to INR 300,000 given by banks between 1st March and 31st May 2020 [67].
- C. 2nd April 2020- The Ministry of Rural Development released the lump sum amounts at INR 500 per woman to Pradhan Mantri Jan-Dhan Yojana (PMJDY) account holders, and the same has been credited to the designated accounts of individual banks on 2nd April 2020 [68].
- D. 13th April 2020- INR 0.17 trillion were released under Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme to 83.1 million farmer families [69].
- E. 18th April 2020- Compensation of INR 1 million was given to all postal employees succumbing to the disease while on duty [70].
- F. 19th April 2020- More than INR 0.36 trillion transferred by using Direct Benefit Transfer (DBT) through Public Financial Management System (PFMS) in the bank accounts of 0.16 billion beneficiaries during COVID 2019 lockdown [71].
- G. 20th April 2020- INR 4.8 billion disbursed to 40,826 members by exempted Provident Fund (PF) trusts under PMGKY [72].
- H. 28th April 2020- INR 5 million compensation was declared for the port employees and workers in case of loss of life due to COVID-19 [73].
- I. 16th May 2020- Union Power Ministry extended INR 0.9 trillion package under Atma Nirbhar Bharat Abhiyaan to assist stressed electricity distribution companies (DISCOMs) [74].
- J. 21st May 2020- 68 million free liquefied petroleum gas (LPG) cylinders were distributed among the Pradhan Mantri Ujjwala Yojana (PMUY) beneficiaries so far [75].
- K. Collateral-free loans of up to INR 200,000 were provided for 630,000 Self-help groups (SHGs) that helped 70 million households [76,77].
- L. State governments were directed to use the welfare fund for assisting unorganized construction workers. The District Mineral Fund, worth about INR 0.31 trillion, was used to help construction workers who are facing economic disruption due to the lockdown [66,77,78].
- M. 5th May 2020- Employees' Provident Fund Organisation (EPFO) released INR 7.64 billion to its pensioners [79].

III. Economic stimulus measures

1. 27th March 2020- Reserve Bank of India (RBI) Governor cut the repurchasing option (repo) rate by 75 basis points to 4.4% and lending institutions were permitted to allow a 3-month moratorium on all payments of loan installments as of 1st March 2020 to boost economic growth and mitigate the impact of the lockdown [77,80,81].
2. 17th April 2020- The reverse repo rate was reduced from 4.0% to 3.75% to preserve financial stability by the Ministry of Finance [82].

IV. Tax and loan payment concessions

1. All lending institutions were permitted to allow a moratorium of three months on repayment of installments for term loans outstanding as of 1st March 2020 [77,80].
2. The income tax return deadline for the 2018-2019 tax year was postponed to 30th June 2020 from 31st March 2020 [83].
3. The rate of interest was reduced for certain tax payments made by 30th June 2020 and late-filing penalties were waived off [83].
4. Deadlines for filing of goods and services tax (GST) returns and related payments of GST were postponed [83].
5. The extension of the date for certain tax procedural actions was postponed to 30th June 2020 [83].
6. A new tax dispute resolution scheme was introduced that allowed for subsidizing tax disputes at a reduced rate if the taxpayer settles before the fiscal year ends on 31st March 2020 [84].
7. To provide immediate relief, the government directed to instantly issue all the unfinished income-tax refunds of up to INR 0.5 million [77,81,85].

Supplementary Table 2: Food and shelter security measures by the GoI during the lockdown corresponding to the policy indicators under the equity principle.

I. Migrant workers and pilgrims
<ol style="list-style-type: none"> 1. The Ministry of Home Affairs (MHA) [86] approved the states to use the State Disaster Response Fund to line up relief camps and supply food and shelter to traveling pilgrims and migrant workers. 2. Provision of free foodgrains was announced for 80 million migrant workers and their families who did not have ration cards, for two months. 3. The ‘One Nation One Ration card’ policy was enforced to allow access to ration from any Fair Price Shop (FPS) in India [87]. Before the implementation of this policy, ration cardholders could buy foodgrains only from the assigned neighborhood FPS.
II. Below Poverty line (BPL)
<ol style="list-style-type: none"> 1. GoI directed states and union territories to ensure adequate arrangements of temporary shelters, provision of food, etc. for people in the BPL group stranded due to lockdown [40].
III. Homeless/Beggars and Destitute
<ol style="list-style-type: none"> 1. The Ministry of Social Justice and Empowerment directed municipal corporations across 10 cities- Bengaluru, Chennai, Delhi, Hyderabad, Indore, Kolkata, Lucknow, Mumbai, Nagpur, and Patna to run feeding centers for beggars, homeless, and destitute till 15th April 2020 [40]. 2. The Ministry of Housing and Urban Affairs directed all states and union territories to provide three meals a day to all homeless persons living in shelters constructed under the scheme - Shelters for the Urban Homeless under the National Urban Livelihoods Mission [40]. 3. The state governments additionally took steps to provide food and shelter to the BPL people [40].

Supplementary Figures

[Insert Supplementary Figure 1 here]

Supplementary Figure 1: Timeline of the movement restrictive Indian policies leading up to the national lockdown (most restrictive measure).