

Preparedness, Response and Assessment of First Phase Lockdown Impact Amid COVID-19 Pandemic – India Scenario

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Report

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Preparedness, response and assessment of first phase lockdown impact amid COVID-19 pandemic – India Scenario

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Abstract

The Corona Virus Disease (COVID-19) pandemic has been created due to the infection by novel coronavirus. Globally, countries have taken measures to reduce social contact to slow down the spread of the virus. Social (physical) distancing via lockdown and awareness on personal hygiene are mitigating measures to prevent transmission of disease. Indian government has implemented the first phase of national lockdown for 21 days (March 24 to April 14, 2020) to reduce the transmission of COVID-19. This study is performed in two stages. First, review of Indian scenario till the end of the first phase of national lockdown and second the impact assessment of the first phase of social lockdown on doubling rate of COVID-19 cases in different Indian states and overall India. The timeline of activities, health care facilities, schemes and services by government and private organizations in combating COVID-19 in India are presented. Analysis is performed using the 3-day moving average daily growth statistical technique. The states are categorized based on the improved doubling rate during third week (Category 1) and second week (Category 2). The overall Indian scenario is analysed to assess the consequences of social lockdown on the transmission rate of the virus. Kerala and Orissa handled the pandemic effectively by drawing lessons from earlier epidemics and disasters. Telangana, Andhra Pradesh, Uttara Pradesh, West Bengal and Maharashtra has improved doubling rate during second week of lockdown. The average doubling rate of coronavirus cases in India improved after lockdown, account for 7.5 days compared to 3.4 days before lockdown. Lockdown played a key role in reduction of increasing rate of confirmed cases. The stringent lockdown combined with rapid testing led the nation in yielding positive outcomes. The discussions presented in this article will equip the council's authorities and regulatory bodies globally in designing the mechanisms for handling present and future epidemics or pandemics.

Keywords: *COVID-19; Lockdown; Pandemic; Healthcare facilities; Testing facilities; Doubling rate; Statistical analysis*

1. Introduction

Pneumonia of unknown cause detected in the city of Wuhan is reported to the World Health Organization (WHO), in China on 31st December 2019. Investigations on the cluster of pneumonia cases in Wuhan are initiated on 4th January 2020 by WHO, and first guidance on novel coronavirus is issued on 10th January 2020. The first case of novel coronavirus outside China is reported on 13th January 2020 in Thailand. Novel coronavirus is renamed as Corona Virus Disease (COVID-19) on 11th February, 2020. Assessing the situation globally, COVID-19 is characterised as pandemic on 11th March, 2020 by WHO. Although the cause of pneumonia is quickly identified as a new coronavirus named SARS-CoV-2, the scientific knowledge of this novel virus remains very limited [1].

COVID-19 resembles SARS in terms of viral replication in the lower respiratory tract. It generates secondary viremia, followed by an extensive attack against target organs that express angiotensin-converting enzyme 2 (ACE2), such as heart, kidney, gastrointestinal tract and vast distal vasculature. The main transmission route is through direct or indirect respiratory tract exposure [2]. WHO does not recommend any specific vaccine for the treatment of COVID-19. However, hydroxychloroquine, lopinavir, ritonavir and other identified drugs are being applied contextually in treatment. The investigations and clinical trials are still underway to identify specific vaccine due to mutation in strain [3].

Social (physical) distancing via lockdown and awareness on personal hygiene are mitigating measures to ensure personal safety and prevent transmission of disease to others [4]. Globally, countries have taken measures to reduce social contact to slow down the spread of the virus, such as closing workplaces, food services, public transport and events [5]. The complete lockdown has implemented by China, India, France, and Britain while Spain, Italy, and Germany imposed partial lockdown; Turkey and Iran implemented conditional lockdown and US confines to social distancing measures [6].

India is a low-income country with 1.38 billion population and a population density of 464 per square kilometre [7]. Cumulative data specify that 10363 individuals are infected out of which 339 deceased as on 14th April 2020 in India [8]. With 0.7 hospital beds per 100 people (recommended 5) and doctor to population ratio of 1: 1800 (recommended 1:1000), combating global health catastrophe such as this pandemic is a challenge in the Indian scenario. Given the lack of facilities, for India, it is better to prevent rather than cure. Indian government, therefore, implemented nation-wide lockdown from 24th March 2020, for 3 weeks to prevent the spread of COVID-19. Essential and emergency services such as health, security, sanitation, and food supply are made available during that period. Social lockdown

is aimed to reduce stress on health care facilities through containing the rate of transmission in affected areas and secure the non-affected areas [9]. The present study is aimed to assess the impact of social lockdown on the doubling rate of transmission in Indian states. The outcomes of this study will assist authorities in decision-making and regulatory bodies in development of policy directives on social lockdown during present and future pandemics or epidemics, especially in the developing nations.

2. Methodology

The present study is done in two stages. First, review of Indian scenario till the end of first phase of national lockdown and second the impact of the first phase of social lockdown on doubling rate of COVID-19 cases in different Indian states and for the country as a whole. The primary data associated with confirmed cases, recovered cases and mortalities is retrieved from the Ministry of Health and Family Welfare (MoHFW), Government of India. The data associated with series activities amid COVID-19 in India, health care facilities, role of self-help groups and non-government organisations and other facilities is collected from online news websites and twitter handles of various organisations.

Analysis of the COVID-19 data is performed using 3-day moving average daily growth statistical technique. This technique helps to smoothen out the high-frequency fluctuations of the COVID-19 infection data. Daily registered COVID-19 cases in Indian states and cumulative cases were collected during the first phase of lockdown from MoHFW website. From the moving average values, daily percentage growth was calculated for each major state across India with comparing overall country' moving average. Based on the moving average daily percentage growth for each state, the states were categorised in two categories to assess the impact of lockdown. The first category includes the states with improved doubling rate during the third week of the first phase lockdown. The second category includes the states with improved doubling rate during the second week and small uplift during last week of lockdown. Finally, the overall Indian scenario was analysed to assess the consequences of social lockdown on the doubling rate of COVID-19.

3. Current situation of COVID-19 in India

3.1. Timeline of activities

Responding to the outbreak of coronavirus in China (by the end of December 2019), Government of India released advisory against travel to China on 17th January 2020. Thermal screening of passengers from China was initiated at major airports across the country on 18th January. The first case of novel coronavirus was identified in Thrissur, Kerala state on 30th January 2020. Responding to this, electronic visas of travellers from China were suspended

from 3rd February 2020 followed by the suspension of visas for China, South Korea, Iran, Iraq from 26th February 2020. Ministry of Health and Family Welfare (MoHFW), the Government of India, announced compulsory screening for all international passengers from 4th March 2020. The Indian government invoked legal provisions under Epidemic Diseases Act, 1897 on 11th March and declared pandemic as “notified disaster” under Disaster Management Act, 2005, on 14th March 2020. The borders to Bangladesh, Myanmar, Bhutan, Nepal and Pakistan were closed on the same day. Social distancing as a measure of prevention was implemented across the country from 17th March 2020. Directorate General of Civil Aviation issued a notice on 19th March to suspend international passenger flights from 23rd March to 29th March. The country observed lockdown (Janata curfew) on 22nd March, 2020. Nation-wide lockdown for 21 days (24th March to 14th April) was declared to combat the spread of COVID-19. The domestic flights and passengers’ trains were also suspended. The national lockdown was extended till 3rd May 2020, on 14th April.

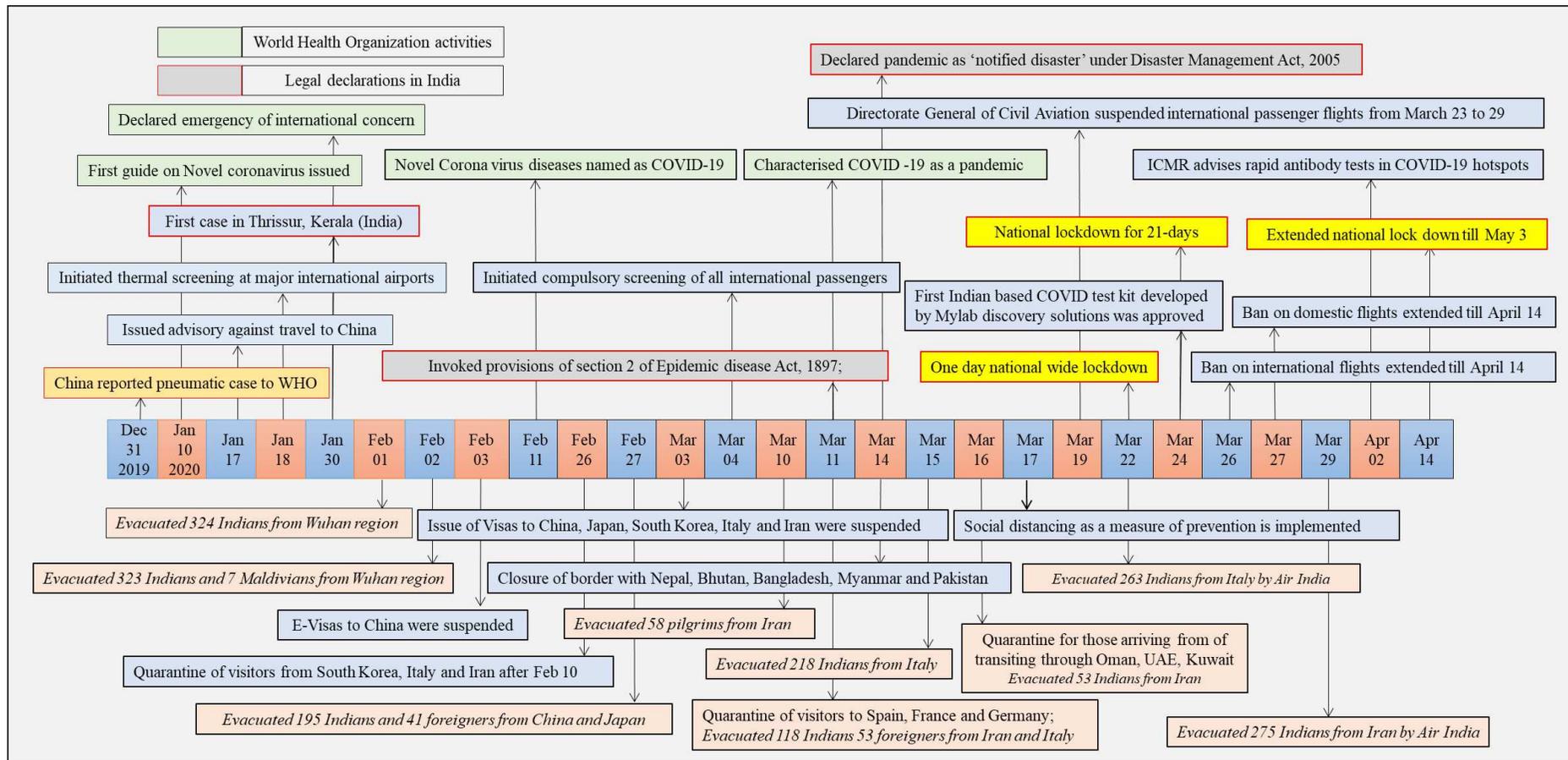


Figure 1 Timeline activities amid COVID-19 with focus on Indian scenario

3.2. Registered cases

According to MoHFW, Government of India, confirmed cases of COVID-19 were 10363, recovered cases were 2230 and mortalities were 339 as on 14th April, 2020. The active cases and deaths per every one million population were 12 and 0.4 as reported by MoHFW as on 14th April, 2020. State-wise confirmed corona cases in the country is shown in Figure 2(a). The confirmed cases in Maharashtra, Delhi, Tamil Nadu, Madhya Pradesh, Rajasthan and Gujarat constitute up to 70% with the maximum percentage of cases in Maharashtra (23%) followed by Delhi (11%). Uttar Pradesh, Telangana, Andhra Pradesh, Karnataka and Kerala constitute up to 20% of cases and with rest of the states contributing to 10% of the cases. The lowest number of cases in north-eastern states compared to other states can be attributed to transport connectivity. State-wise recovered corona cases in the country is shown in Figure 2(b). The maximum percentage of recovered cases to the confirmed cases is observed in Andaman and Nicobar Islands (91.6%) followed by Goa (85.7%), Ladakh (77.7%), Chhattisgarh (66.6%), Kerala (64.3%), Tripura and Manipur with 50%. Chandigarh, Himachal Pradesh and Bihar reported a recovery rate between 40-50%, Odisha between 30-40%, Tamil Nadu, Uttarakhand, Telangana and Karnataka between 20 -30% and rest of the states below 20%. State-wise registered mortalities in the country is shown in Figure 2(c). The percentage of mortalities to the confirmed cases in states of Madhya Pradesh, Maharashtra, Jharkhand, Punjab, and Meghalaya is more than 5%. Telangana, Bihar, Andhra Pradesh, Delhi, Himachal Pradesh, Assam, West Bengal, Karnataka and Gujarat reported mortality rate more than 2.5 to 5%. Tamil Nadu, Haryana, Jammu and Kashmir, Uttar Pradesh and Odisha reported mortality rate between 1 to 2%. Kerala and Rajasthan reported mortality rate between 0.5 to 1%.

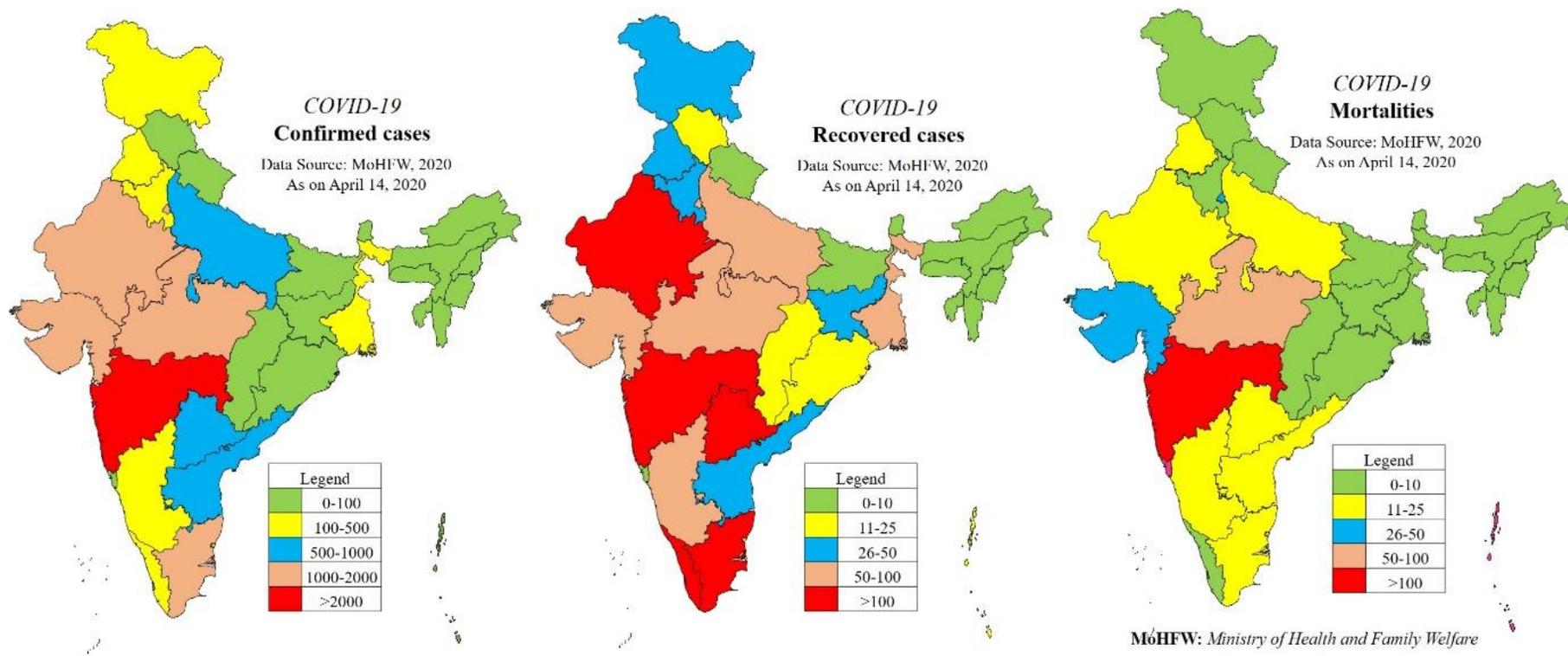


Figure 2 COVID-19 Confirmed cases, recovered cases and mortalities in India as on 14th April 2020.

3.3. Health care facilities

3.3.1. Hospitals

Government of India identified 1,919 hospitals with isolation beds (1,73,746) and Intensive Care Unit (ICU) beds (21,806) across the country as on 18th April 2020. Out of these, 672 are allocated to treat severe cases and 1,247 for mild cases. The health care facilities are classified into three categories. The first set of facilities are dedicated to preliminary testing and isolation of suspected person. The ventilator systems and life-supporting ambulance facility are classified under the second category. Intensive care units with stringent infection control mechanisms are categorised under third level. There are approximately 19 lakhs hospital beds, 95 thousand ICU beds and 48 thousand ventilators available in both public and private health sectors. Uttar Pradesh (UP) state has highest beds and ventilators capacity with 14.8%. Next to UP, follows Karnataka (13.8%), Maharashtra (12.2%), Tamil Nadu (8.1%), West Bengal (5.9%), Telangana (5.2%) and Kerala (5.2%). Uttar Pradesh state has highest number of both public and private hospitals with 4,635 and 12,468 respectively whereas Manipur state has least number of hospitals in both sectors with 30 and 8 respectively. Uttar Pradesh has highest capacity of hospital beds (2,81,408), ICU beds (14,070) and ventilators (7,035). Manipur has a smaller number of hospital beds (1,790), ICU beds (90) and ventilators (45) [10].

3.3.2. Quarantine units

The first quarantine facility was developed by Indian army on 31st January 2020 in Manesar in the National capital region, later Ministry of Defence arranged quarantine centres in seven locations (Suratghar, Jhansi, Jodhpur, Jaisalmer, Deolali, Kolkata and Chennai) with a combined capacity of 5000 beds. Indian Navy converted INSH Asvini (Indian Naval Hospital Ship), Mumbai (Maharashtra) into isolation centre to treat the COVID-19 infected patients. Indian Navy also established eight quarantine centres in Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir with basic medical facilities. The defence hospitals and laboratory facilities extended their services in COVID-19 hotspots. Army medical personnel were being trained to treat COVID-19 patients. The travellers arriving from China, South Korea, Italy, Iran, Spain, France, Germany and transiting through Oman, UAE, Kuwait were quarantined for the designated time. The airlifted people (by Indian Air Force roped with Air India) from different countries were quarantined in the quarantine centres facilitated by the Indian army. Indian Railways extended their helping hand by converting train coaches into quarantine centres.

3.3.3. Testing kits

The rapid transmission of the novel coronavirus in the country urged the need for huge importation of testing kits. Research activities to manufacture the kits were in progress to meet the demand of the nation on the side. The testing kits produced by Mylab discovery solutions, located in the city of Pune, Maharashtra state, became the first one to be approved by the Government of India. Influenced by South Korea's "Phone Booth" testing system, India adapted the same to test the COVID-19 suspected persons. This was started during the last week of 21-day lockdown and was adapted by Kerala and Jharkhand states immediately. This method of testing is cost-effective and easily portable to remote locations. The first booth was installed at a Government hospital in Ghaziabad, Uttar Pradesh. As of April 13th, the testing capacity per million was found to be 105. A study was done by taking the data of number of COVID-19 tests done in different states from different news reports, health bulletins and open source platforms. In the first category the states with population in-between 0.5 million to 7.5 million were listed (Sikkim, Nagaland, Mizoram, Manipur, Arunachal Pradesh, Tripura, Chandigarh, Goa, Andaman and Nicobar and Himachal Pradesh). Andaman and Nicobar had highest tests per million (1311) done due to its smaller area and less population and Nagaland had least testing per million (32). Second category includes states like Uttarakhand, Jharkhand, Assam, Jammu and Kashmir, Haryana, Chhattisgarh, Punjab, Delhi and Kerala with a population of 11 to 37 million. Delhi and Kerala were the states with highest number of tests per million, 696 and 425 respectively and Kerala was the best state to flatten the curve of COVID-19 cases. West Bengal, Odisha, Bihar, Andhra Pradesh, Karnataka, Madhya Pradesh, Tamil Nadu, Gujarat, Uttar Pradesh, Rajasthan and Maharashtra states with population between 43 to 230 million were under third category. Rajasthan and West Bengal were the highest and least states with tests per million 365 and 25 respectively. Maharashtra ranked second with tests per million 289 in the study.

3.3.4. Other facilities (include government schemes):

The carrier of COVID-19, the novel coronavirus is expected to be transmitted through droplets. Stringent social distancing was implemented nation-wide by the Indian government to prevent the transmission. Police, public health authorities implemented social distancing at an individual level along with controls at the community level to break the chain of transmission. The self-help groups, Non-governmental organizations (NGO's), start-ups and voluntary organisations worked with local authorities to meet the requirements of people during the lockdown period. An amount of USD 22 billion was announced as relief package by Government of India on March 26th, 2020. Under Pradhan Mantri Garib Kalyan Yojana, Ujjwal scheme, Divyang pension scheme, **PM KISAN** scheme, Jan Dhan scheme, the needy

and poor were supported during the crisis of pandemic. With 'Atal Bimit Vyakti Kalyan Yojana' Government extended its helping hand to insurers who lost employment during COVID-19 in the form of pension. Foreign nationals whose visa expired between February 1st, 2020 to April 30th, 2020 during the first phase of lock down were exempted from overstay penalty with an extension of visa.

Countrywide NGO's, self-help groups, youth organisations and volunteer communities provided food parcels, hand sanitisers, masks, gloves, soaps, dry rations, personal care products and other necessities to the needy. Research laboratories, start-up's, research and development centres of established companies and engineering institutions had come up with low-cost innovations for ventilators, ultra-violet sterilisation boxes, sanitisers, floor disinfectants, mobile disinfectant chambers, rapid antibody testing kits and anti-viral surface coatings.

With its 28 fixed-wing and 21 helicopters, the defence wing had supplied medicines, medical equipment's and 60 tons of essential supplies across the country. 2.6 lakh meals were being supplied by Indian railways to the needy across the country. 10,000 water bottles were daily supplied to Delhi police by Indian railways. Indian Railways also ensured all-in-one transportation of medicines during the lockdown period. Ministry of Civil Aviation launched "Lifeline Udan" scheme to supply essential goods such as medical equipment's, testing kits, PPE, masks, gloves and enzymes as applicable by the state and UT governments under which 552 tonnes of goods were delivered as on 20th April 2020.

4. Assessment of the impact of first phase lockdown on Indian states

The daily growth percentage of COVID-19 cases in different states with improved doubling rate during the third week of the first phase of lockdown is shown in Figure 3. Kerala made the biggest gain in combating COVID-19 and registered a slow rate of new infections during the lockdown. The daily growth rate (three day moving average) is 59.52% on the first day of lockdown. At the end of first week it is 6.77%, second week -3.33% which reduced to -15.38% at the end of first phase lockdown. It has drawn its experience with Nipah virus epidemic in 2018 for extensive testing, contact tracing and community mobilisation to contain the virus and maintain a very low mortality and new infection rate. Integration of rapid testing with the regional medical practices added to reduction in transmission from 59.52% prior to lockdown to an overall daily growth rate of -4.71% after the lockdown. The growth rate of new infections in Kerala is the lowest among all Indian states. Kerala reported the lowest 7-day average growth rate among all the states with 500 confirmed cases as on May 9, 2020. Kerala has remarkably less virus transmission (503 confirmed cases) compared

with countries that have similar population Canada (67,674), Peru (61,847), Malaysia (6,535), Australia (6,927). Kerala's model of containing virus includes smart testing, effective contact tracing and isolation. Under smart testing method, the number of tests done never exceeded 1000 in the beginning of May and recorded average number of tests are 687 when the active cases raised to 100, resulting in optimal testing. Nearly 1.7 lakh people are isolated at the peak of the outbreak and when the active cases increased remarkably. They have achieved effective isolation by isolating more than 500 suspected people for one active case. These smart testing, effective isolation and contact tracing helped in reducing the burden on hospitals [11].

In Orissa, the daily growth rate prior to lockdown and during first week is nil. During the second week the growth rate was -85.71%, which reached to 0% at the end of first phase lockdown. The registered cases are below 5 during in maximum number of days. The past experience on handling cyclones helped authorities in prior preparation to combat COVID-19. In fact, it is the first state to implement 70% lockdown including its capital. Quarantining the people with foreign travel history after March 4th 2020, incentives for self declaration, contact tracing and home quarantine systems equipped in controlling transmission of COVID-19. Application of social media platforms helped in awareness creation, dissemination of updates and appeals on COVID-19. This helped authorities to eliminate the unnecessary spread of false news reducing panic among people [12].

Rajasthan, Tamil Nadu, Delhi, Karnataka and Jammu & Kashmir reported good improvement in reducing the transmission rates. In Rajasthan, the daily growth rate is 125% on the first day of lockdown. At the end of first week it is -11.47%, second week -14.59% which reduced to -34.09% at the end of first phase lockdown. In Tamil Nadu, the daily growth rate is 17.64% on the first day of lockdown. At the end of first week it is 31.52%, second week -18.53% which reduced to -45.10% at the end of first phase lockdown. In Delhi, the daily growth rate is 66.67% on the first day of lockdown. At the end of first week it is 145%, second week 26.71% which reduced to -17.27% at the end of first phase lockdown. In Karnataka, the daily growth rate is 4.54% on the first day of lockdown. At the end of first week it is 33.33%, second week -3.22% which reduced to -37.77% at the end of first phase lockdown. Bihar and Gujarat reported zero cases in the week previous to lockdown, but the number of cases increased during the lockdown period. The average daily growth rate of registered cases of 31.70% and 17.3% is observed during the first phase lockdown [13]. The impact of lockdown in the reduction of new cases is observed in the last week of lockdown.

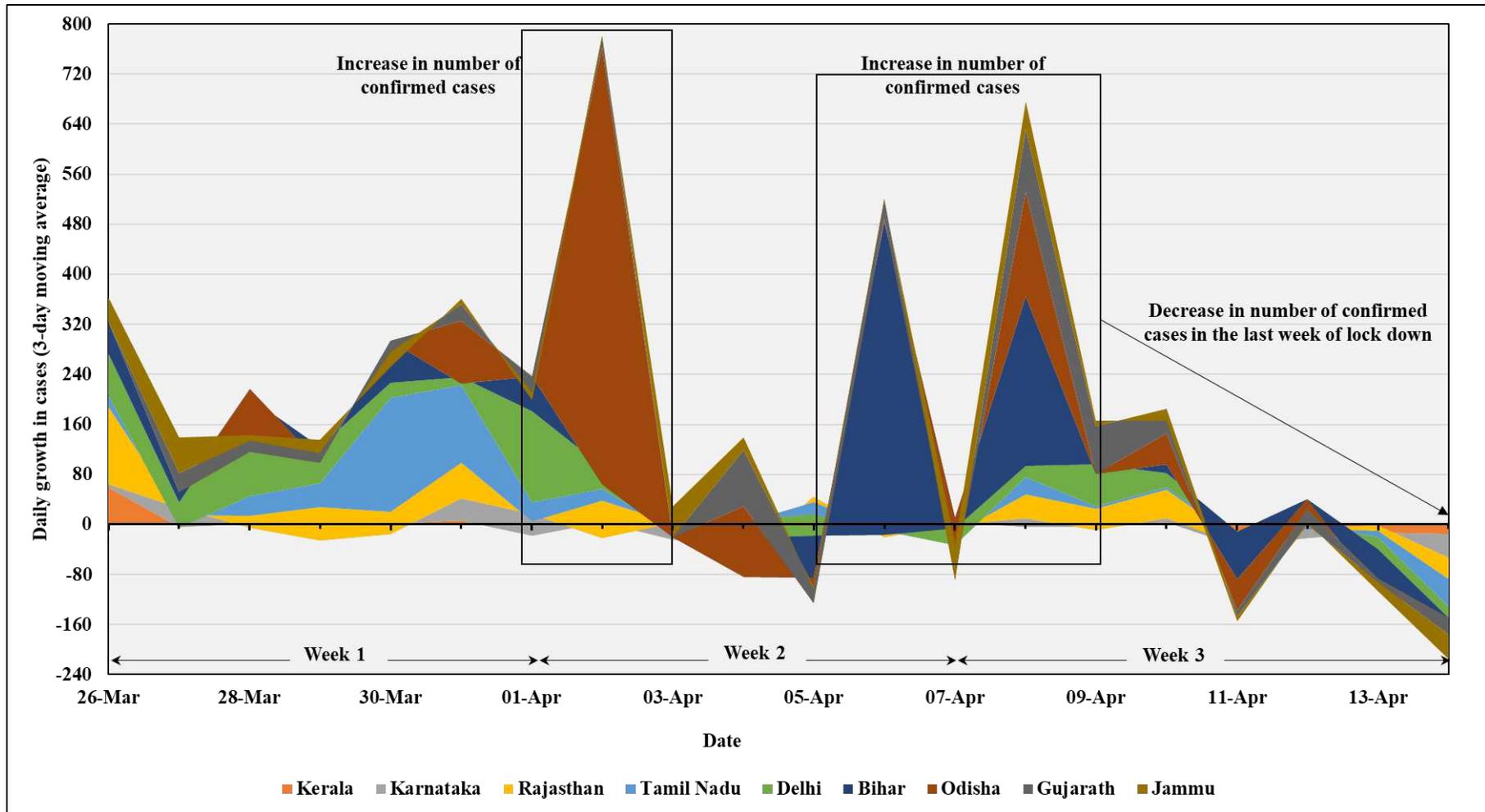


Figure 3. Daily growth percentage of COVID-19 cases in different states with improved doubling rate during the third week

The second category includes the states with improved doubling rate in the second week but small uplift during third week of lockdown, which is a worrying factor. The daily growth percentage in these states during the lockdown phase is shown in Figure 4.

In Maharashtra, the daily growth rate (three day moving average) is 75% on the first day of lockdown. At the end of first week it is 53.78%, second week 1.31% which decreased to -24.04% at the end of first phase lockdown. The average number of daily registered cases during first 10 days is 35.45 while during the last ten days is 199.36. The majority of the cases are registered in Mumbai. Implementation of physical distancing and lock down measures was a challenging task due to high density areas and shanty settlements in the city. The council authorities enforced social distancing in slums confining residents to their airless and congested dwellings. Reports by civic authorities revealed that in some of the most infected slum clusters in Mumbai, up to 25% of samples tested have come positive [14].

In Telangana, the daily growth rate is 100% on the first day of lockdown. At the end of first week it is 35.08%, second week -9.84% which increased to 34.28% at the end of first phase lockdown. In Andhra Pradesh, the daily growth rate (three day moving average) is 25% on the first day of lockdown. At the end of first week it is 40%, second week -24.59% which increased to 36.20% at the end of first phase lockdown. In Uttara Pradesh, the daily growth rate (three day moving average) is 40% on the first day of lockdown. At the end of first week it is -28.88%, second week -15.30% which increased to 66.4% at the end of first phase lockdown. The highest case load in these states during the second week is attributed to the Markaz event in Delhi [15]. Although, these states witnessed upsurge in confirmed cases in the third week of lockdown, overall, they are partially benefitted with lockdown measures. The number of new cases increased steeply to as high as 118%, 260% and 90% daily growth rate in Uttar Pradesh, Andhra Pradesh and Telangana respectively. The impact of lockdown in lowering the confirmed cases during second week and up to mid of third week in all the second category states can be observed. The rapid testing and identification of infected people in the third week of lockdown contributed to the increase in the number of new cases from negative daily growth rate to as high as 22% average daily growth rate in these states. Madhya Pradesh and West Bengal has zero cases in the week before the lockdown but the number of cases increased during three weeks of lockdown [13]. They have registered cases at an average daily growth rate of 17% and 26% respectively during the first phase lockdown. Reports from central govt. revealed that Mumbai and Pune in Maharashtra, Indore in Madhya Pradesh, Kolkata in West Bengal, Hyderabad in Telangana are marked as emerging hotspots and constituted Inter-ministerial central teams (IMCTs) to assess the serious COVID-19

situations. Incidents ranging from violence on frontline healthcare professionals, attacks on police personnel, violations of social distancing norms in market places and opposition to setting up of quarantine centres are reported as reasons for lockdown violations in these areas [16].

The daily growth rate during the period of lockdown in India is shown in Figure 5. The lowering in the growth rate of new cases is observed at the end of lockdown in India. During the first ten days of lockdown, confirmed cases increased, but daily percentage growth reduced in the second week of lockdown. Lockdown played a key role in lessening the increasing rate of confirmed cases. Apparently, stringent lockdown combined with rapid testing led the nation in yielding positive outcomes. The average daily increase of confirmed cases in Madhya Pradesh and Bihar is greater compared to the national average. Mitigation measures along with lockdown has implemented to reduce the rate of transmission in these states. About 90% of the COVID-19 cases in India are registered among 12 states namely Maharashtra, Gujarat, Delhi, Rajasthan, Tamil Nadu, Madhya Pradesh, Uttar Pradesh, Telangana, Andhra Pradesh, Kerala, West Bengal and Karnataka. The number of international tourists, citizens with travel history to infected countries and highly populated areas are the reasons for a greater number of confirmed cases in these 12 states.

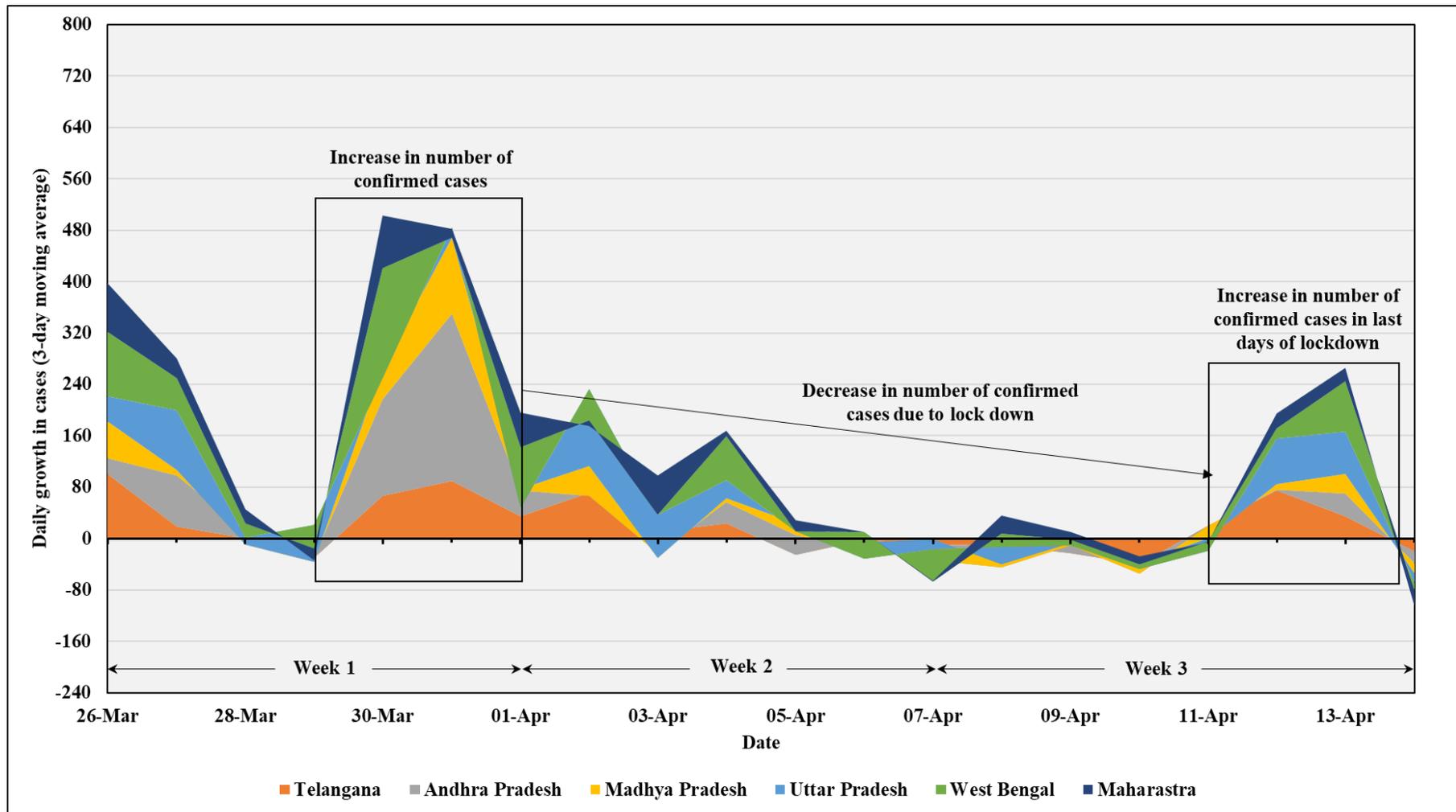


Figure 4: Daily growth percentage of COVID-19 cases in states with improved doubling rate second week but small uplift in third week

Mumbai (Maharashtra) and Ahmedabad (Gujarat) registered more than 65% of the state's total cases. Indore and Bhopal (Madhya Pradesh) registered more than 77% of its state's total cases. Jaipur and Jodhpur (Rajasthan), Hyderabad (Telangana), Ranchi (Jharkhand), Korba (Chhattisgarh) and Khurda (Odisha) accounted for more than 50% of the state's total cases.

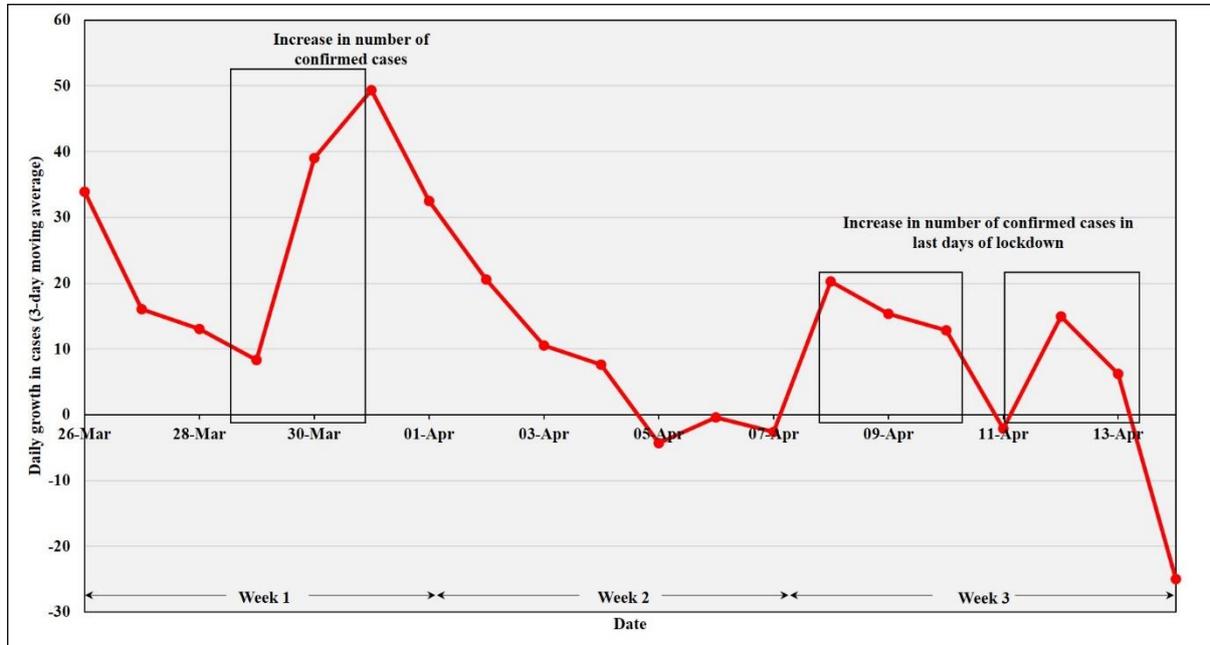


Figure 5. Nationwide cumulative daily growth percentage of COVID-19 cases during the first phase of lockdown in India

Coming to Indian lockdown implementation in its first phase, states allowed people to buy essential daily commodities only during specified timings with proper social distancing norms. During the remaining hours, a strict lockdown is enforced with no movement of the public. Police patrolling, allotment of police at every junction, blocking and closing of roads, allowing emergency service personals only, use of drones to check the public movement in major cities helped in reduction of cases. The sanitation department worked on an emergency basis in clearing the waste and cleaning public places to maintain hygiene. Disinfectants are sprayed at regular intervals to control the transmission of the virus in public spaces.

At the end of the first phase of lockdown, the districts in India are classified into three zones, namely, red, orange, and green based on the number of registered cases by the union health ministry. Among 718 districts in India, about 152 districts (21%) are designated as red zone (districts with the highest-burden). Red zone districts are those in which new infections double in less than every four days. Total 207 districts are designated as orange zones (non-hotspot districts) with less reported cases and 359 districts (50% of districts) are declared as

green zones (non-infected districts/COVID free zones). Approximately 40% of Maharashtra's districts, 84.6% of Andhra Pradesh districts and 10 of 11 Delhi's districts are in Red Zone. The transmission rate can be well studied by the doubling rate of a number of new cases. Doubling rate means the time taken for the number of cases to double. A low doubling rate denotes a fast spread of infection and vice versa. The doubling rate of different states in India is shown in Figure 6. The average doubling rate of coronavirus cases in India improved after lockdown, account for 7.5 days compared to 3.4 days before lockdown. In comparison with India, the doubling rate in US 2 days, Germany and Spain 3 days, UK, France and Italy (4 days) and Canada (6 days) as on 14th April 2020. The doubling rate in 18 states of India is better than the national average [13].

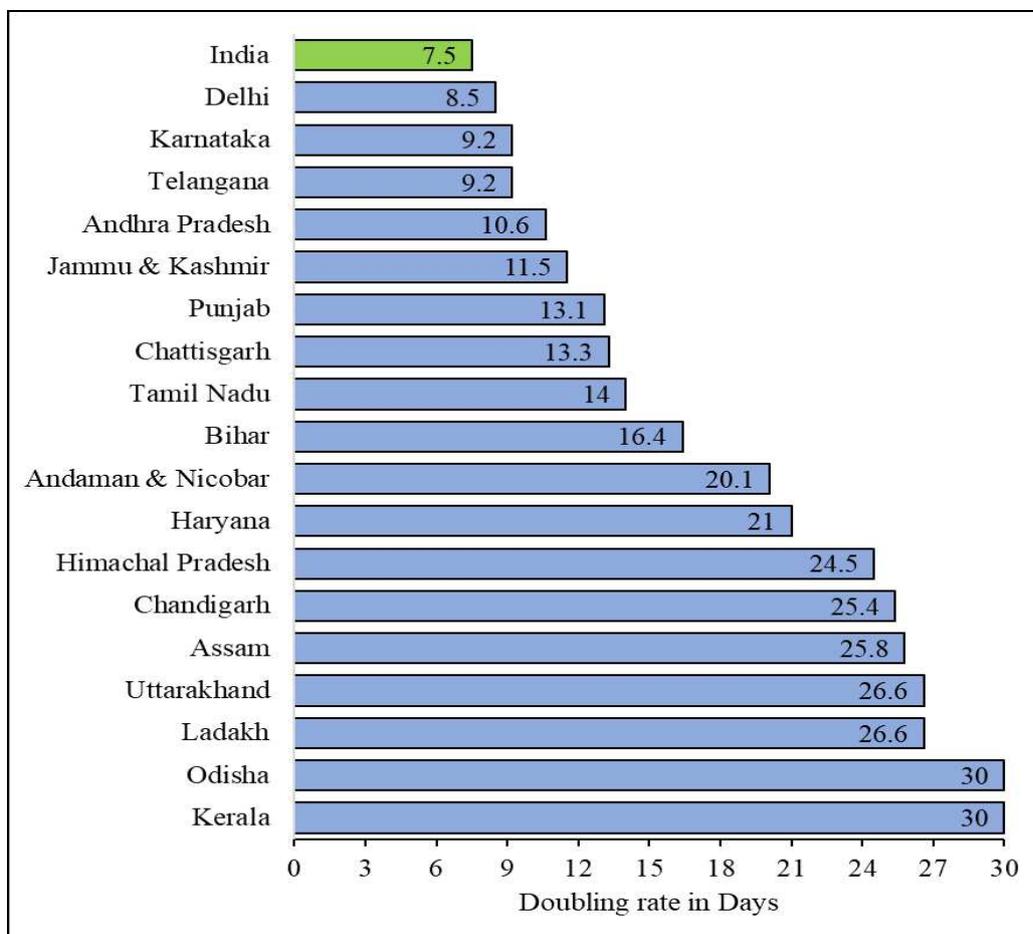


Figure 6. Doubling rate of different states in India during first phase of lockdown in India

The Lancet [17], reported that in India's favour are its young population (65% aged < 35 years), will help in lowering the severity of pandemic than it is feared. Implementation of lockdown will have the desired effect on flattening the epidemic curve. Many public health professionals and doctors say India's grinding lockdown, which has lasted more than a month, could have kept infection and deaths in check. Others believe that India's predominantly

young population is helping to keep fatalities low, while older people have an elevated risk of death from the infection. Nevertheless, others talk about the possibilities of the presence of a less virulent strain of the virus in India, along with the possibility that its hot weather is diminishing the contagion. Both these claims are not backed by any evidence. Doctors treating critical COVID-19 patients have said to BBC that the contagion is as virulent here as has been reported elsewhere in the world.

Social distancing via lockdown is observed to be the best way to minimize the transmission rates with no vaccine or specific medicines in place. Importing testing kits, development of indigenous testing kits and implementation of rapid testing systems from global cities improved the rate of testing in India. Severe lockdown estimates combined with an expansion in the quantity of testing led the nation in yielding positive outcomes. India should likewise give a lot more noteworthy consideration to the health sector and perceive the significance of having strong public sector capacity, particularly in primary care at the region level. Across the country, medical infrastructure and healthcare systems need to be strengthened to handle the current and future epidemics [17]

In lieu of the concurrent events, the human kind is at its testing times and bearing repercussions of its unpreparedness. The GDP on healthcare is nowhere in the rise of foresight. The doctor to patient ratio is 10 times more in India, than the WHO predictions [18]. As India is crawling towards universal health coverage in the name of Pradhan Mantri Jan Arogya Yojana, it is still in infant stage. Though India is equipped with manpower, many of them are unskilled and absorbed by unorganized sectors. Most of them emigrate to nearby metros in search of livelihood, this resulted in huge migrant labour stranding. As the JAM (Jandhan-Aadhar-Mobile) is still ongoing, many of the unorganized workers need awareness to reap fruits of DBT (Direct Benefit transfer) schemes [19]. Skilled manpower is prerequisite now, though 'National skill India mission' [20] is doing good, but more efforts are required to curb the rural emigrates totally. India's economic survey highlights 'Thanlinomics' [21], is stating that the affordability of a thali (plate of food) increased by 29%, and we have a huge population under BPL statistics. So, India is in need to revamp its schemes integrating evidence-based studies, local systems, economic conditions and visions in order to save lives and to sustain globally.

Conclusion

COVID-19 caused by corona virus is one of the most dangerous pandemics being faced by whole world. Social distancing is a key mitigating measure to combat the pandemic with no specific medicine. India implemented nation-wide lockdown for a period of three

weeks to control the transmission of the disease attributing to its poor hygienic conditions and health care facilities. The lockdown with stringent social distancing equipped local authorities in controlling transmission of disease during different weeks of the lockdown. Experiences from earlier epidemics and disasters helped Kerala and Orissa in combating effectively. Telangana, Andhra Pradesh, Uttara Pradesh, West Bengal and Maharashtra has improved doubling rate during second week of lockdown. Overall, the average doubling rate of coronavirus cases in India improved after lockdown, account for 7.5 days compared to 3.4 days before lockdown. Rapid testing and research on development of specific medicines and vaccine will facilitate the health care systems in controlling the disease and infected. At this stage individual management with proper protective care and hand cleaning are effective approaches in combating COVID-19.

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1. Sai Kumar Andra – Conceptualization, Methodology, Formal Analysis, Writing – original draft
2. Shravani Adibhatla – Conceptualization, Resources, Writing – original draft
3. Sai Praneeth D – Formal Analysis, Writing – original draft
4. Aditya Srinivas Kandaala – Resources, Writing – original draft
5. Rani Susmitha – Validation, Writing – review & editing
6. Harihara Sukumaran – Validation, Review & editing
7. VR Sankar Cheela – Conceptualization, Methodology, Writing – review & editing
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Figures

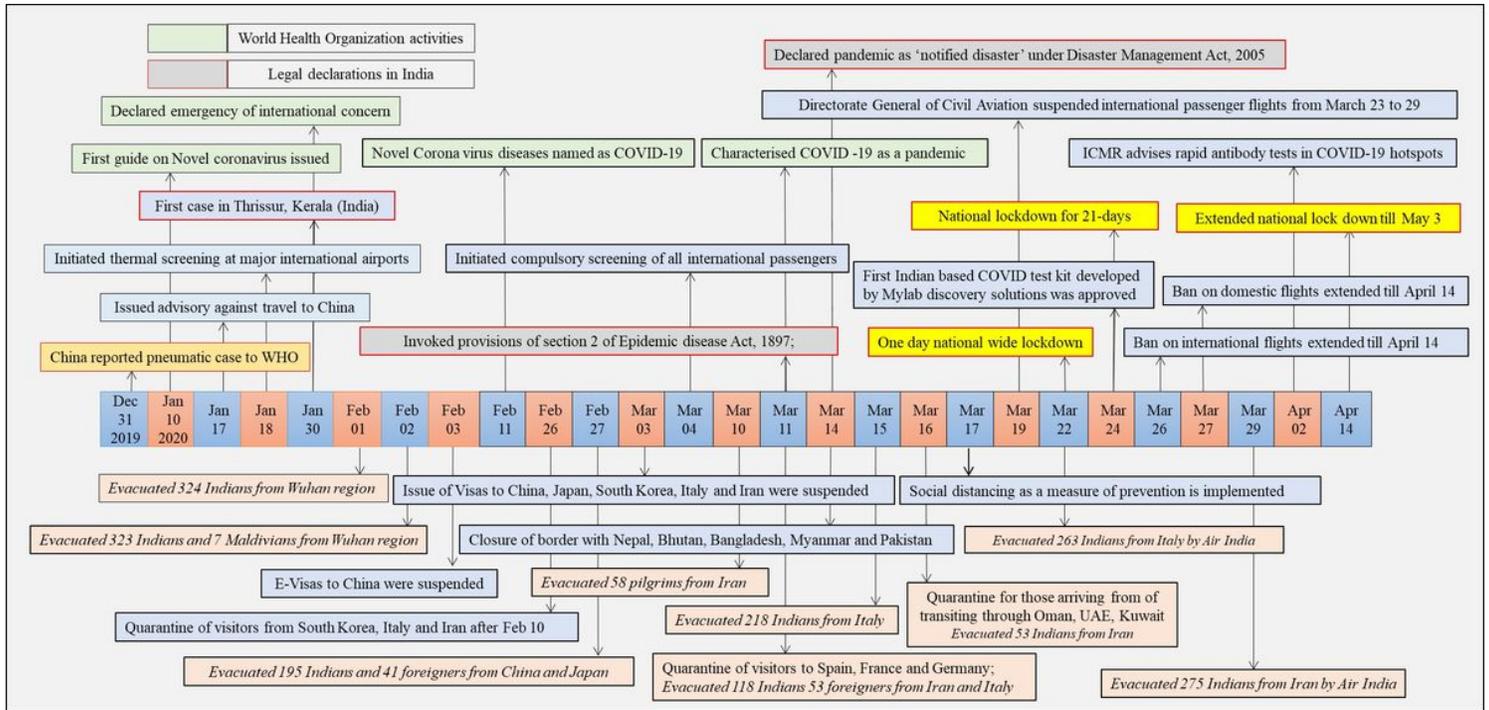


Figure 1

Timeline activities amid COVID-19 with focus on Indian scenario

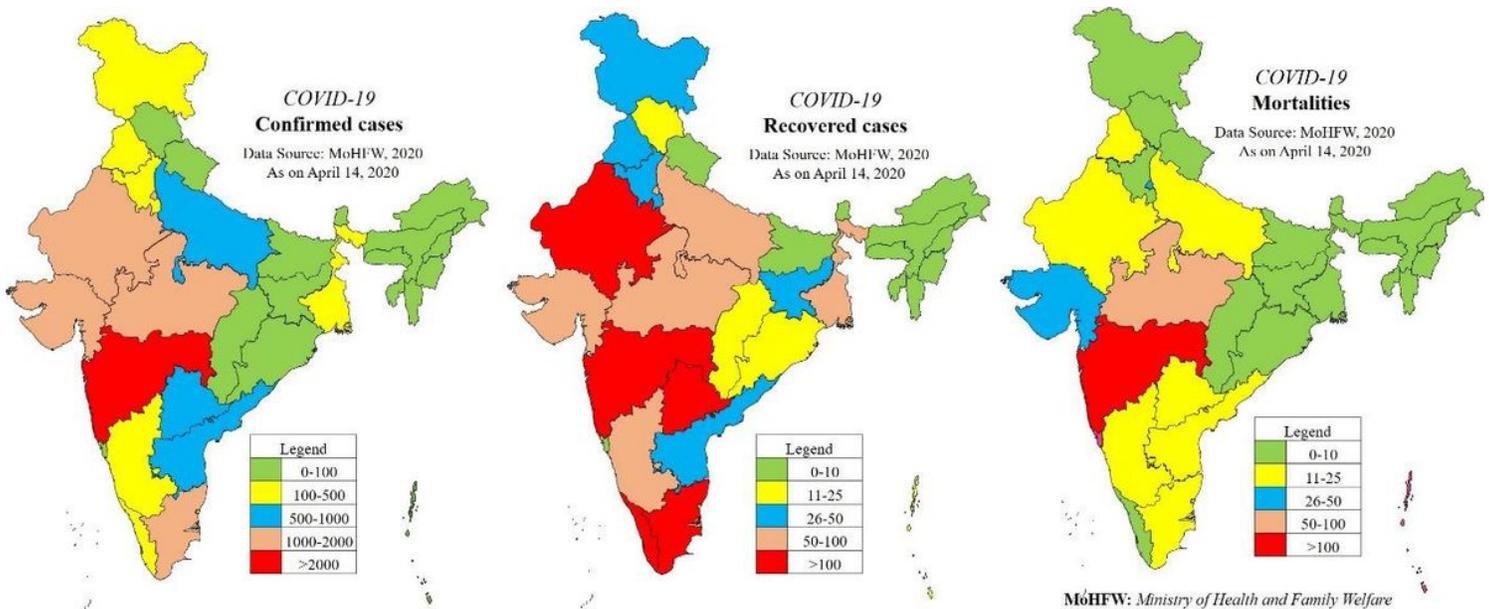


Figure 2

COVID-19 Confirmed cases, recovered cases and mortalities in India as on 14th April 2020.

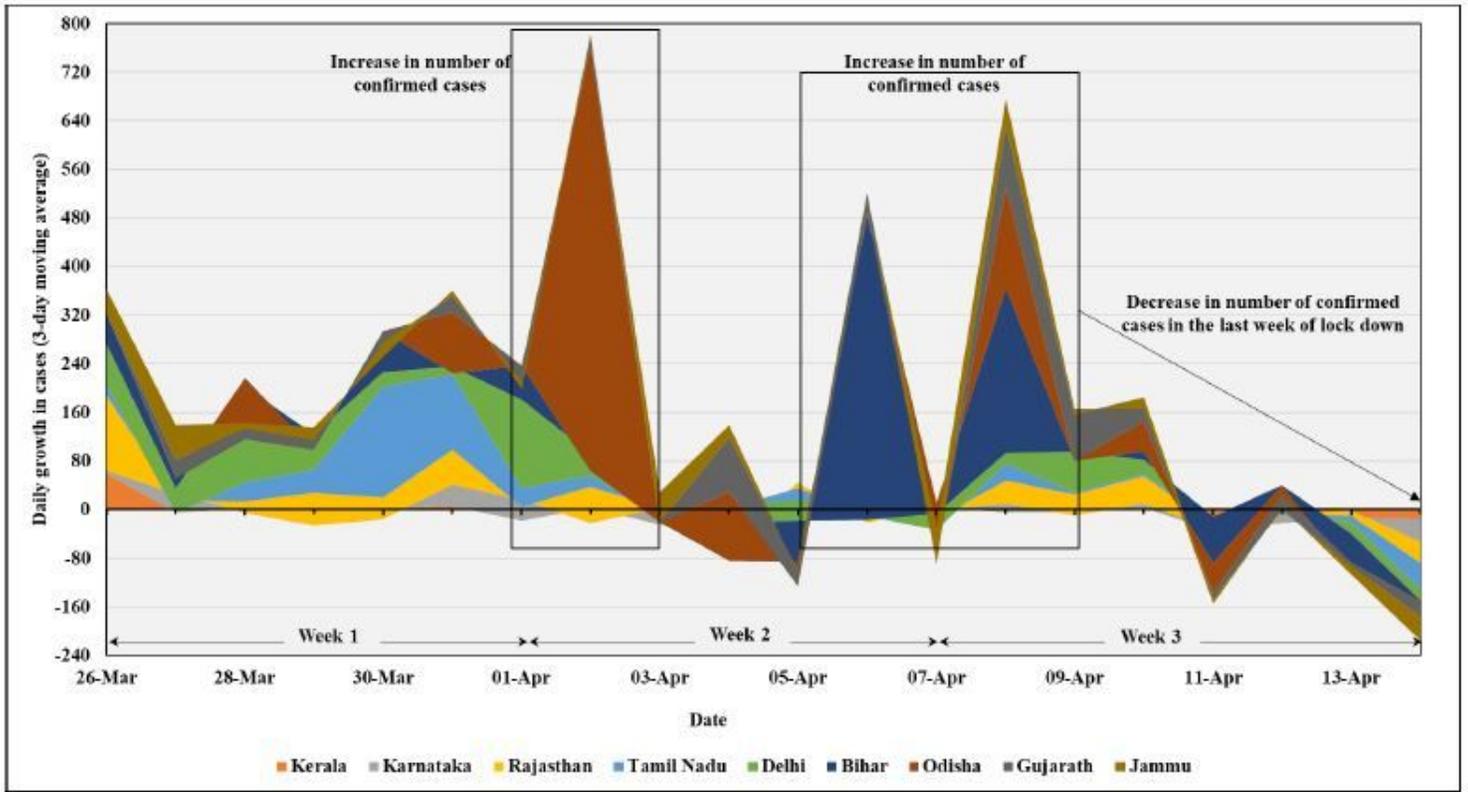


Figure 3

Daily growth percentage of COVID-19 cases in different states with improved doubling rate during the third week

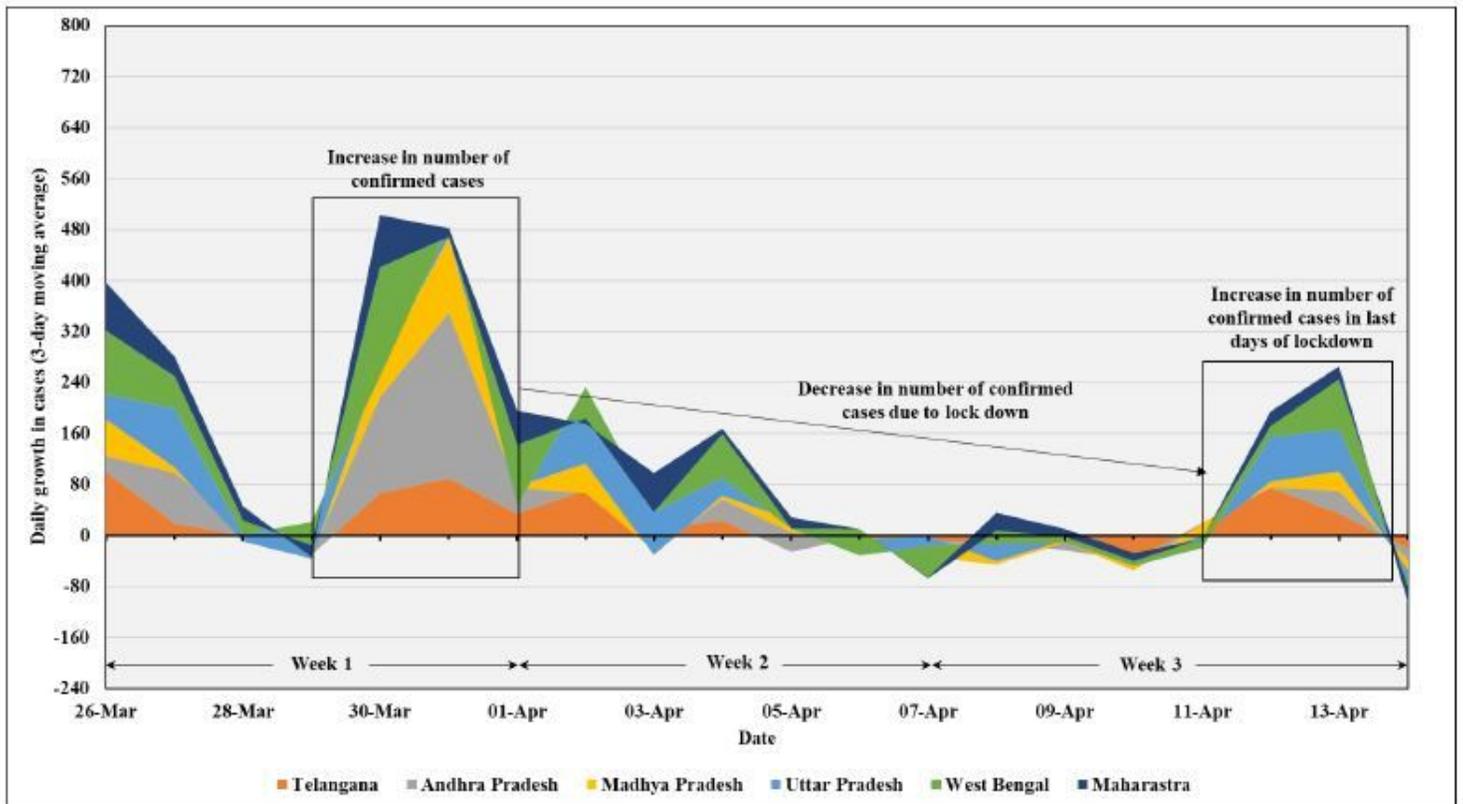


Figure 4

Daily growth percentage of COVID-19 cases in states with improved doubling rate second week but small uplift in third week

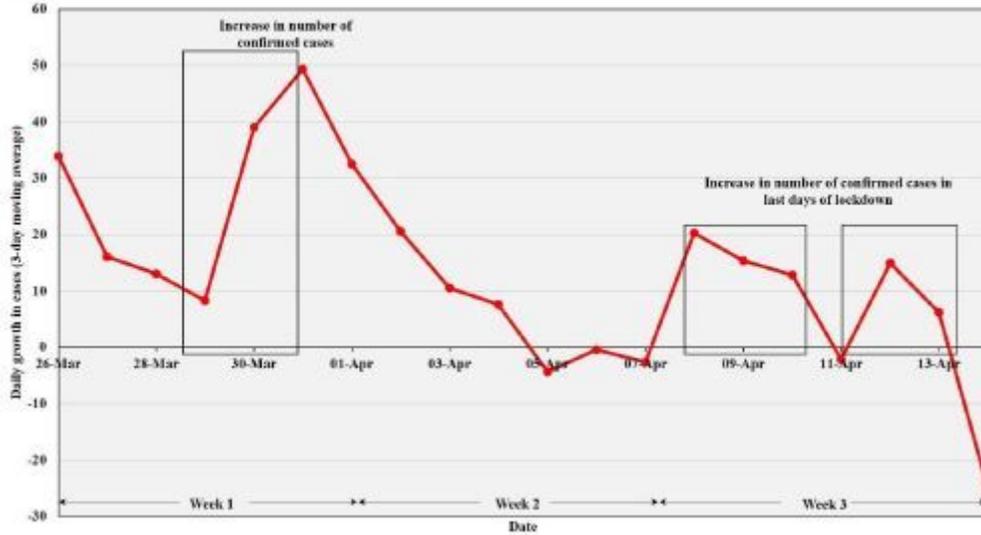


Figure 5

Nationwide cumulative daily growth percentage of COVID-19 cases during the first phase of lockdown in India

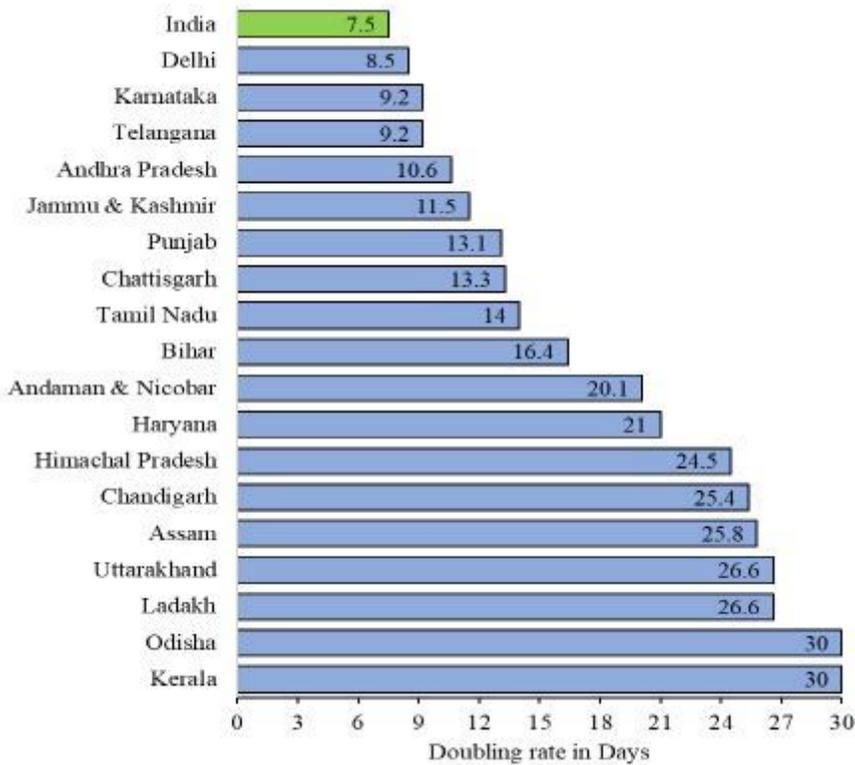


Figure 6

Doubling rate of different states in India during first phase of lockdown in India