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Original Research Article

Effectiveness of lockdown to mitigate the spread of COVID-19 pandemic during its first wave in India

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ABSTRACT

Background: Countries across the globe had adopted various prevention and control measures ranging from social distancing and isolation, to shutting down of nonessential services and countrywide lockdowns. The objective of the study was to assess the effectiveness of the nation-wide lockdown to prevent or delay the spread of COVID-19 in India.
Methods: This was a cross sectional and descriptive study. We used the secondary data from WHO website, from 01 January to 30 October 2020. We calculated mean, median number of new cases, deaths reported per day and case fatality rate, using Microsoft excel spreadsheet.
Results: There was a steady rise in number of cases and deaths in India, during the lockdown and unlock period from phase-1 to phase-4. Approximately 10-fold increase in death was reported in the duration of 68 days of lockdown from phase-1 to Phase 4. The number of cases reported in unlock phase-4 were approximately 6 times more compared to unlock phase 1. The case fatality rate per day had declined during the lockdown period, from 3 .4% to 2 .5% deaths per day. The case fatality rate was lowest during the peak of pandemic, 1.27% in September 2020. Indicating good care of hospitalized patients compared to initial stage of pandemic in India.
Conclusions: Indian government had imposed complete sudden lockdown at the right time. The peak of pandemic was delayed or slowed down. Indicating the timing of lockdown is an essential step to save the lives in pandemic, in resource limited settings.

Keywords: COVID-19, Lockdown, Effectiveness, India

INTRODUCTION

The World Health Organization (WHO) declared the outbreak to be a public health emergency of international concern on 30 January 2020 and on the same day India reported its first confirmed case of COVID -19 along with Finland and Philippines; all cases had travel history to Wuhan City.[1,2]

On 1st February 2020, for the first-time outside China, a healthcare worker in France was diagnosed as being ill with 2019-nCoV acute respiratory disease. The health worker had the history of treating two patients who were later identified as probable cases.[3]

With more evidence gathering on human-to-human transmission and COVID-19 cases were among those returning from China, Ministry of Home Affaires in India issued a travel advisory on 5th February 2020.[4] Later, additional travel restrictions and advice on home isolations were issued by health ministry in India for all those returning to India from the pandemic hit countries.[5] These were the initial responses of government to prevent spread of COVID-19 in India.

On March 11, 2020, WHO had declared the novel coronavirus (COVID-19) outbreak a global pandemic.[6]

Countries across the globe had adopted various prevention and control measures ranging from social distancing and isolation, to shutting down of nonessential services and countrywide lockdowns.[7] Learning the lessons from the developed countries like Spain and Italy, India had put all its machinery and material into motion to curb and/or prevent the disease. What started as one day Janta Curfew on 22nd March 2020 by the Prime Minister of India and lockdowns by some of the state governments, the entire country was declared to be under lockdown from the midnight of 24.03.2020, (Lockdown, phase-1).[8] However, union government issued orders to ensure the supply of the essential goods during the lockdown.[9] The primary objective of this paper was to compare the number of COVID -19 cases and deaths reported during the various phases of the lockdown (phase 1 to phase 4) with the unlock phases and the secondary objective is to assess the effectiveness of the lockdown to prevent or delay or mitigate the spread of COVID-19 in India.

METHODS

This was cross sectional and descriptive study. This study describes situation of COVID-19 pandemic in India. We used the secondary data. We collected and compiled the data from WHO, situational reports available on its website, from 1st January to 30th October 2020.

Day wise total confirmed cases, new cases, new and total death were compiled in the excel sheet and we compared the number of reported cases during the different phases of lockdown and unlock periods. We also compiled the measures taken by government of India during various phases of lockdown and unlock restrictions, from Ministry of Health and Family Welfare, Ministry of Home Affairs and Indian Council of Medical Research. We calculated mean, median number of new cases and death per day, case fatality rate using Microsoft excel spreadsheet.

Following were the lockdown restrictions imposed in India during various phases (Table 1).

Table 1: Phase wise lockdown restrictions in India.

Phase	Lockdown-1	Lockdown-2	Lockdown-3	Lockdown-4
Lockdown period	25th March to 14th April, 2020	15th April to 3rd May, 2020	4th to 17th May 2020	18th -31st May 2020
Duration of phase	21 Days	18 Days	14 days	14 days
Lockdown measures				
1-Restriction on movement/ travel				
Private Non- essential Transport / travel	Closure*	Closure	Closure	Closure
Public transport -buses	Closure		Partial closure	Closure
Public transport -passenger trains			#Closure	#Closure
Urban metro trains			Closure	Closure
Domestic flights			Closure	Partial closure
International flights			#Closure	# Closure
Closure of inter-district borders within states				
Interstate borders	Closure			
International borders	Closure			
2-Prohibition on gatherings				
Religious places, educational and training institutions, academic/sports, cultural activities, cinema halls, restaurants and eateries, gymnasium, yoga centres, shopping malls, local markets	Closure			
Restrictions on gatherings, Marriages and funerals	20 persons allowed			
3-Curfew timings	7 Pm to 7 am			
4-Hospitals, laboratory and essential services	Allowed/open			
5-Social distancing and use of face cover, respiratory etiquette and good hygiene practices including hand hygiene messages were given to all the people, during all the phases of lockdown and unlock periods.				

Note: *Closure means halting the operation of an institution or business. Lockdown 2, only essential and agricultural, and fisheries, planation's work were allowed and other major restrictions to prevent the human interactions and gathering which were imposed in lockdown 1 were continued in lockdown 2.[10] Lockdown 3 continued major restricts, allowed the buses to operate with 59 % capacities in green zone. Industries and construction work was restarted in the urban areas, single shops to open (essential and non- essential) in both rural and urban area.[11] #Only special trains were allowed, for stranded persons in the month of May 2020 to drop migrants, pilgrims, tourists, students and other persons.[12] # Government facilitated domestic air travel for stranded persons in India. Limited domestic travels were allowed by air.[13] Lockdown 4, restrictions were in the containment and buffer zone. Country was demarcation in different colour zones. Sates were asked to take action based on demarcation of areas as per colour zones.[14] Unlock 1 the restrictions remained only in the containment zone and inter-state travel was allowed in unlock 1.[15] Certain activities, i.e., religious places and places of worship for public; hotels, restaurants and other hospitality services; and shopping malls; were permitted from June 8, 2020 outside the Containment Zone in some states. Unlock 1.0, centre revised night curfew timings, prohibits movement of individuals from 9 pm to 5 am.[16] During unlock 3 interstate and intra-state travel was allowed for person and goods.[17] Apart from all this restriction imposed by Government of India, state had imposed additional restrictions or continued the restriction imposed by Government of India, depending on the number of cases reported in their own states.

RESULTS

In India the lockdown was imposed from 25 March 2020 onwards, only 434 cases were reported in India by 24 March 2020. After 55 days of the first case being reported in India, a complete restriction of movement was imposed to halt the spread of COVID-19. There was steady rise in number of cases and death in India, during the lockdown period from phase-1 to phase-4 (Figure 1-4). There number of cases per day increased from 483 cases to 6515 cases per day from lockdown phase 1 to lockdown phase 4 (Table 2). The average number of deaths per day increased from 16 to 164, indicating approximately 10- fold increase in death in the duration of 68 days from phase -1 to phase 4.

However, this rise in number of cases was comparatively very low, to the number of cases reported in unlock periods. The number of cases increased by 169 times from lockdown phase 1 to unlock phase 4.

The number of cases reported in unlock 4 were approximately 63.4 times more compared to unlock phase 1 (Table 3). Indicating that the more the restricts were relaxed, the human interaction had spread the infection.

Similarly, the number of deaths per day had increased by 2.6 times, from 389 in unlock phase-1 to 1034 in unlock phase-4. However, in the month of October 2020, the number of cases per day and number of reported deaths per day in India had declined. Indicating that the peak of pandemic was in September 2020, in India. There after steady decline in the number of cases were reported.

The case fatality rate per day had declined during the lockdown period, from 3.4% to 2 .5% deaths per day. The similar trend was also seen in unlock period. In India the case fatality was never above 3.4%. Figure 5-7 depicts the increase in number of cases and deaths per day during unlock phase 1 to phase 5 in India (from 1 June to 21 September 2020). The cases started declining there after till October last week. In the month of June 2020, for the first time, approximately 2000 deaths were reported in the single day. Indicating the corrections in the underreporting for the previous duration of reporting from India.

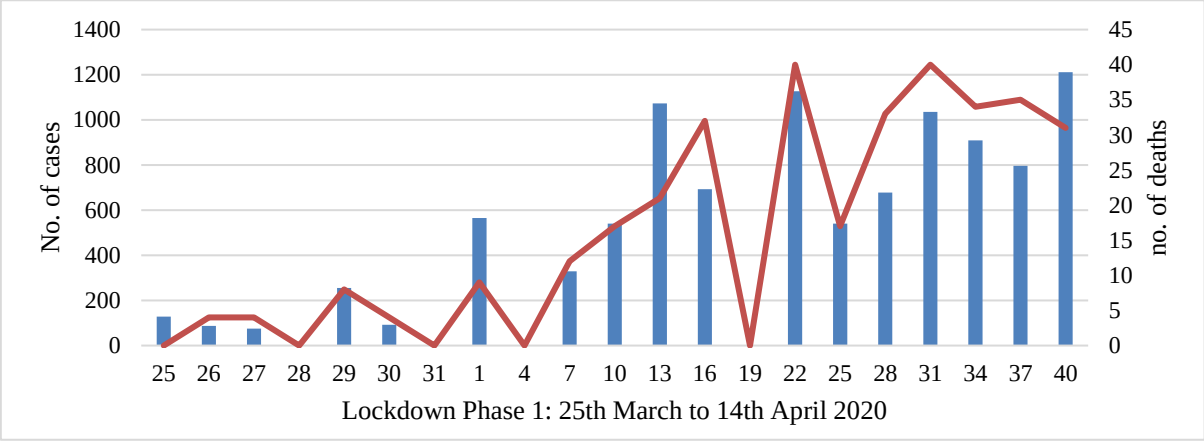

Figure 1: New cases and deaths due to COVID-19 during lockdown phase 1, India.

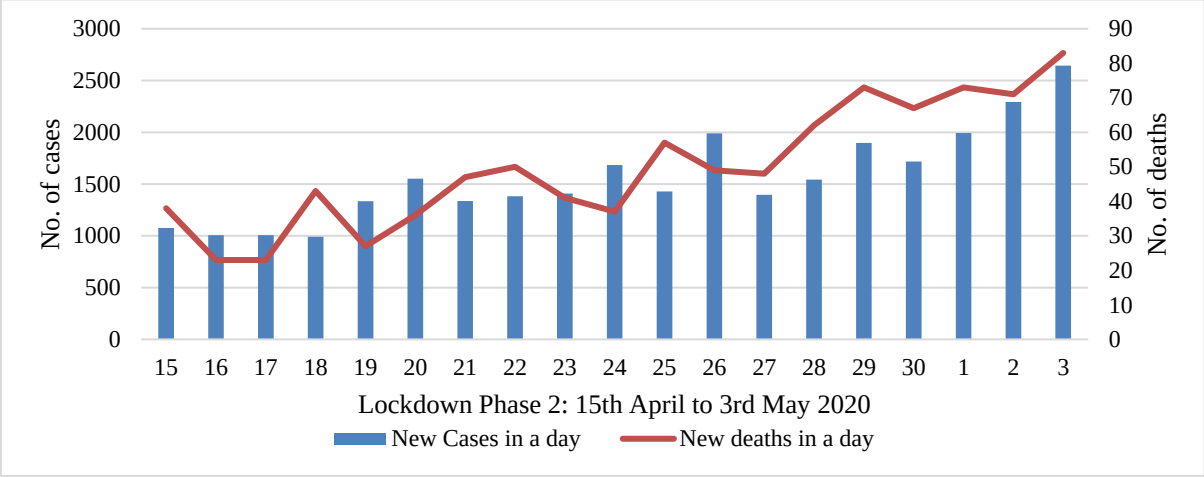

Figure 2: New cases and deaths due to COVID -19 during lockdown phase 2, India.

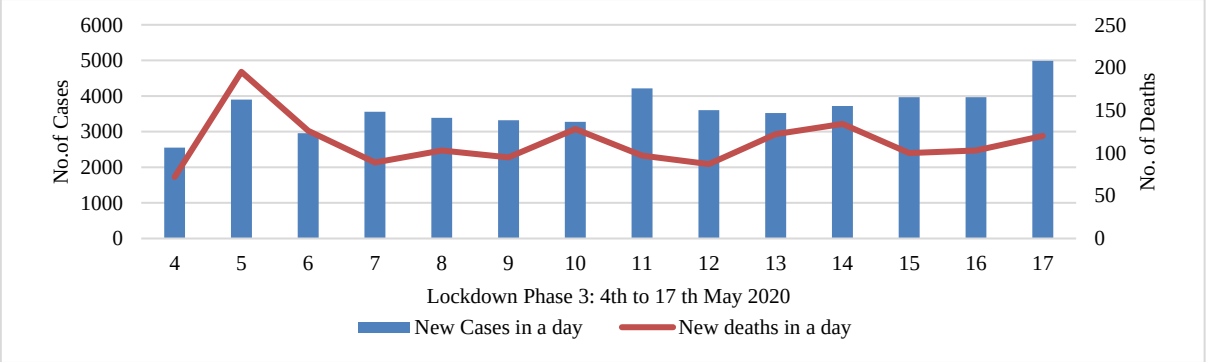

Figure 3: New cases and deaths due to COVID -19 during lockdown phase-3, India.

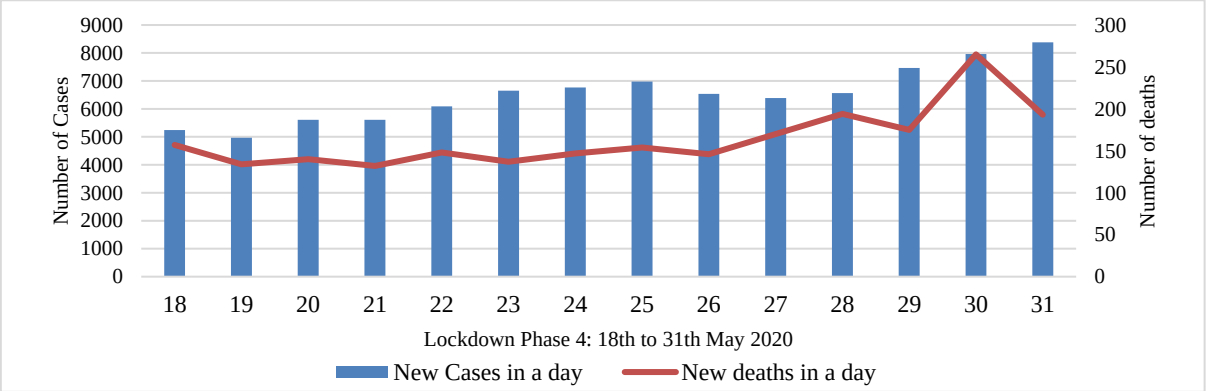

Figure 4: New cases and deaths due to COVID -19 during lockdown phase-4, India.

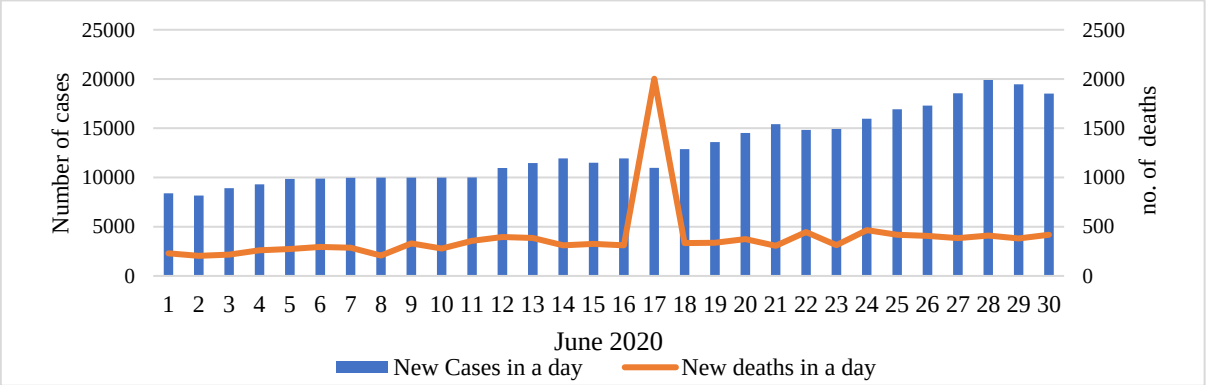

Figure 5: New cases and deaths in a day due to COVID-19 during unlock phase-1, India.

Table 2: COVID-19 cases and deaths reported during lockdown period, in India

Measures	Lockdown				
	Before	1	2	3	4
Duration of phase					
Starting date	01-02-2020	25-03-2020	15-04-2020	04-05-2020	18-05-2020
End date	24-03-2020	14-04-2020	03-05-2020	17-05-2020	31-05-2020
Number of days	55	21	19	14	14
Total number of reported cases	434	10363	39980	90927	182143
Total number of reported deaths	9	1211	1301	2872	5164
New cases during the period		10133	29683	50947	91216
New deaths during the period		341	948	1571	2292
Average number of cases per day		483	1562	3639	6515
Median number of cases per day		540	1429	3583	6550

Continued.

Measures	Lockdown				
	Before	1	2	3	4
Average number of deaths per day		16	50	112	164
Median number of deaths per day		17	48	88	151
Case fatality rate (%)		3.4	3.2	3.1	2.5

Table 3: COVID-19 cases and deaths reported during unlock phases, in India.

Unlock phase	1	2	3	4	5
Lockdown period	June	July	August	September	October
Starting date	01-06-2020	01-07-2020	01-08-2020	01-09-2020	01-10-2020
End date	30-06-2020	31-07-2020	31-08-2020	30-09-2020	31-10-2020
Number of days	30	31	31	30	31
Total number of reported cases	566840	1638870	3542733	5992532	7946429
Total number of reported deaths	16893	35747	63498	94503	119502
New cases during the period	385959	1072030	2212043	2449799	1872279
New deaths during the period	11660	18854	32412	31005	25309
Average number of cases per day	12865	34582	71356	81660	62409
Median number of cases per day	11715	32695	#	#	#
Average number of deaths per day	389	608	1046	1034	844
Median number of deaths per day	332	606	#	#	#
Case fatality rate per day	3.02	1.76	1.47	1.27	1.35

Daily data was not available from 15th August 2020 onwards.

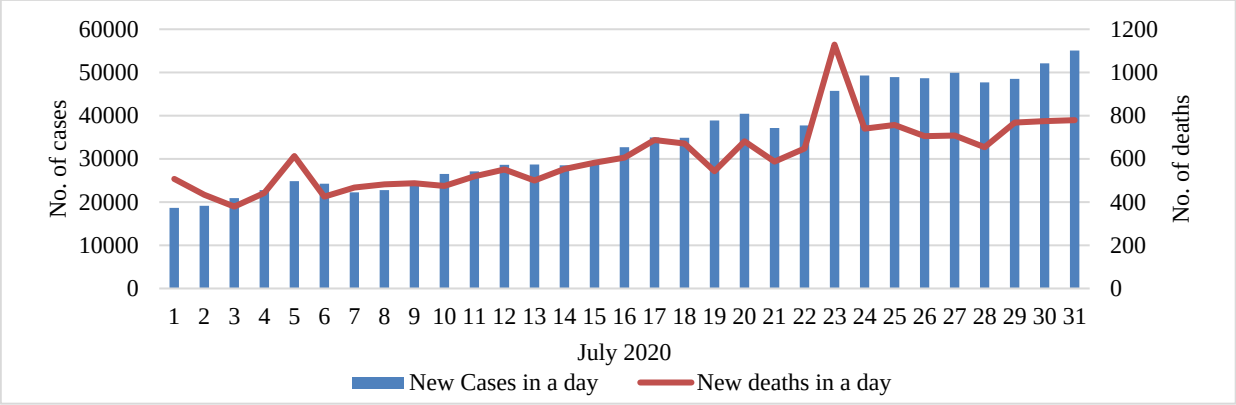

Figure 6: New cases and deaths in a day due to COVID-19 during unlock phase 2, India.

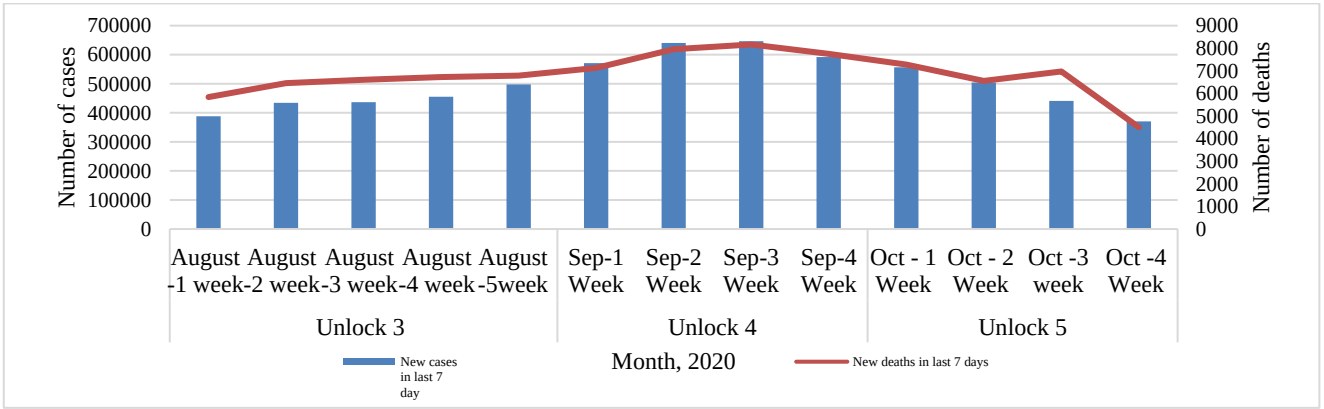

Figure 7: New cases and deaths in a week due to COVID-19 during unlock phase 3 to 5, India.

DISCUSSION

Indian government had imposed complete sudden lockdown, even before the 500 cases were reported in India. This study clearly shows that the number of cases reported during lockdown were far less as compared to that reported in various phases of unlock. Indicating that lockdown was very effective to mitigate the spread of COVID-19 in country.

Similar interpretation of effectiveness of lockdown, reported by COVID group in India. In the absence of robust epidemiological data and amidst predictions of rapid increase in COVID-19 cases, India locked down 'pre-emptively' and 'nation-wide' at extremely short notice. The lockdown slowed down the spread of infection: the case doubling time (7-day moving average) on 25 March was 3.4 days and on 19 April was 6.2 days; however, the number of cases kept increasing.[18]

In our study, we noticed that inspite of having strict lockdown the number of new cases had increased, approximately 13.4-fold increase in cases from lockdown phase 1 to 4. However, these numbers were far less, compared to the number of cases reported per day in the any phases of unlock period.

Indicating the lifting of restrictions and more economic activities, lead to more infections. Globally, South-East Asia had reported the largest week-on-week increase, largely due to increased case detections in India. India had reported nearly 5,00,000 new cases in the fourth week of August 2020. This was a 9% increase compared to the third week of August and the highest numbers of new cases globally.[19]

During lockdown-3 some economic activity started, and epidemiological data was used. Country was delineated in red, green and orange zones.[20] All areas with more cases/clustering of cases (demarcated as red zones) continued to be in lockdown stage, till the area was declared green zone. Economic activities, started in green zones and orange zone, other restrictions in mass gathering continued till unlock- 4, in majority of states. Inspite of all these efforts, by September third week, India was still contributing to 2nd largest number of new cases of COVID-19 in world, in absolute numbers, next to United States of America.[21] Indicating the peak of pandemic for first wave in India occurred in third week of September 2020. Even though restricts were lifted, in the very scientific manner. Thus, indicating the lockdown was a very important intervention, without this intervention country could not have coped up with large number of admissions and management of severe cases in hospitals.

During the lockdown period, tertiary care provision was increased, including access to specialist equipment such as ventilators.[22] Thus, India, fulfilled recommendations of WHO.[23] The government utilized the extra time granted by 'lockdown' measures by doing all they can to build their capacities to detect, isolate, test and care for all cases; trace and quarantine all contacts; engage, empower and enable populations to drive the societal response and more.[24] The same is reflected in our study, as case fatality was dropping over the period of lockdown and unlock period. As government of India, took this opportunity to strengthen the health care system for testing and treating the severe cases at the hospitals. The testing laboratories in India had increased from one laboratory in February to 2096 till 15 November 2020.[25] Indicating, timely lockdown was one of the major interventions among all other interventions in India which, helped country to save many lives.

CONCLUSION

Indian government had imposed complete sudden lockdown at the right time. Inspite of having strict lockdown the number of new cases increased in lockdown and unlock period. However, the peak of pandemic was delayed or slowed down. The government utilized the extra time granted by 'lockdown' measures by doing all they can to build their capacities to detect, isolate, test and care for all cases. Indicating the timing of lockdown is an essential step to save the lives in pandemic, in resource limited setting.

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