



## **Part-III**

### **BRIEF REPORT ON IMPACT OF LOCKDOWN DUE TO COVID-19 PANDEMIC ON AMBIENT AIR QUALITY OF RAJASTHAN**

In order to combat with the threatening spread of COVID-19 pandemic, lockdown in the state of Rajasthan was imposed from 22<sup>nd</sup> to 31<sup>st</sup> March, 2020 by the Hon'ble Chief Minister of Rajasthan, Sh Ashok Gehlot and subsequently nation-wide Lockdown from 24<sup>th</sup> March, 2020 had been imposed in the country. As a result of stringent travel restrictions and shutting down of non-essential activities including those of air polluting sectors, air quality improvement has been noted in many towns and cities across the State.

Rajasthan State Pollution Control Board has a network of ten continuous ambient air quality monitoring stations (CAAQMS) in the state namely, three stations at Jaipur and one station each at Alwar, Ajmer, Bhiwadi, Jodhpur, Kota, Pali & Udaipur. Rajasthan State Pollution Control Board had earlier published reports on 15.04.2020 and 24.04.2020 in which impact of lockdown on ambient air quality of the state was analysed using the data generated from the CAAQMS for pre-lockdown period from 15.03.2020 to 21.03.2020 and during lockdown period from 08.04.2020 to 19.04.2020 respectively.

In this third series of the report, air quality data generated during lockdown period from 20.04.2020 to 03.05.2020 has been studied and further analysis has been made with respect to the Air Quality Index (AQI) and prominent pollutants such as PM<sub>10</sub>, PM<sub>2.5</sub> and Nitrogen Dioxide for all the three periods i.e. pre-lockdown period, during lockdown period i.e. from 22.03.2020 to 19.04.2020 and modified lockdown period i.e. from 20.04.2020 to 03.05.2020.

The Noise levels during the period of Pre-lockdown and lockdown in Jaipur city have also been studied and analysed in the report to draw useful conclusions.

#### **I. Analysis of Air quality Data in terms of Air Quality Index (AQI)**

To study the impact of lockdown on Air Quality Index (AQI), data of AQI of all the three periods i.e. pre-lockdown period, during lockdown period i.e. from 22.03.2020 to 19.04.2020 and modified lockdown period i.e. from 20.04.2020 to



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03.05.2020 was analysed and a comparative statement of Average Air Quality Index of the Monitoring Stations during period of pre-lockdown, lockdown and modified lockdown periods is summarized at Table -1. Similarly, the trend of Average AQI in these stations has been depicted in Figure-1.

Comparative Statement of Average Air Quality Index of Continuous Ambient Air Quality Monitoring Stations in Rajasthan					
Monitoring Stations ↓	Monitoring Dates →	Average AQI			Percentage Increase in %
		During Pre-Lockdown	During Lockdown	During Modified Lockdown	
		15.03.2020 to 21.03.2020	22.03.2020 to 19.04.2020	20.04.2020 to 03.05.2020	Between Lockdown & Modified Lockdown
<i>Ajmer- Civil lines</i>	<b>Air Quality Index</b>	99	76	70	<b>-8</b>
<i>Alwar- Moti Doongari</i>		82	57	54	<b>-5</b>
<i>Bhiwadi- RIICO Ind. Area III</i>		229	87	97	<b>11</b>
<i>Jaipur- Adarsh Nagar</i>		91	73	77	<b>5</b>
<i>Jaipur- Police Commissionerate</i>		131	75	78	<b>4</b>
<i>Jaipur- Shastri Nagar</i>		100	84	91	<b>8</b>
<i>Jodhpur Collectorate</i>		173	98	103	<b>5</b>
<i>Kota - ShriNath Puram</i>		93	71	62	<b>-13</b>
<i>Pali, Indira Colony Vistar</i>		101	82	78	<b>-5</b>
<i>Udaipur- Ashok Nagar</i>		88	61	70	<b>15</b>
<b>Note:</b>					
<b>AQI</b>	<b>Remark</b>	<b>Colour Code</b>	<b>Possible Health Impacts</b>		
0-50	Good		Minimal impact		
51-100	Satisfactory		Minor breathing discomfort to sensitive people		
101-200	Moderate		Breathing discomfort to the people with lungs, asthma and heart diseases		
201-300	Poor		Breathing discomfort to most people on prolonged exposure		
301-400	Very Poor		Respiratory illness on prolonged exposure		
401-500	Severe		Affects healthy people and seriously impacts those with existing diseases		

Table 1: Percentage increase in Average Air Quality Index between the period of lockdown and modified lockdown in Rajasthan.



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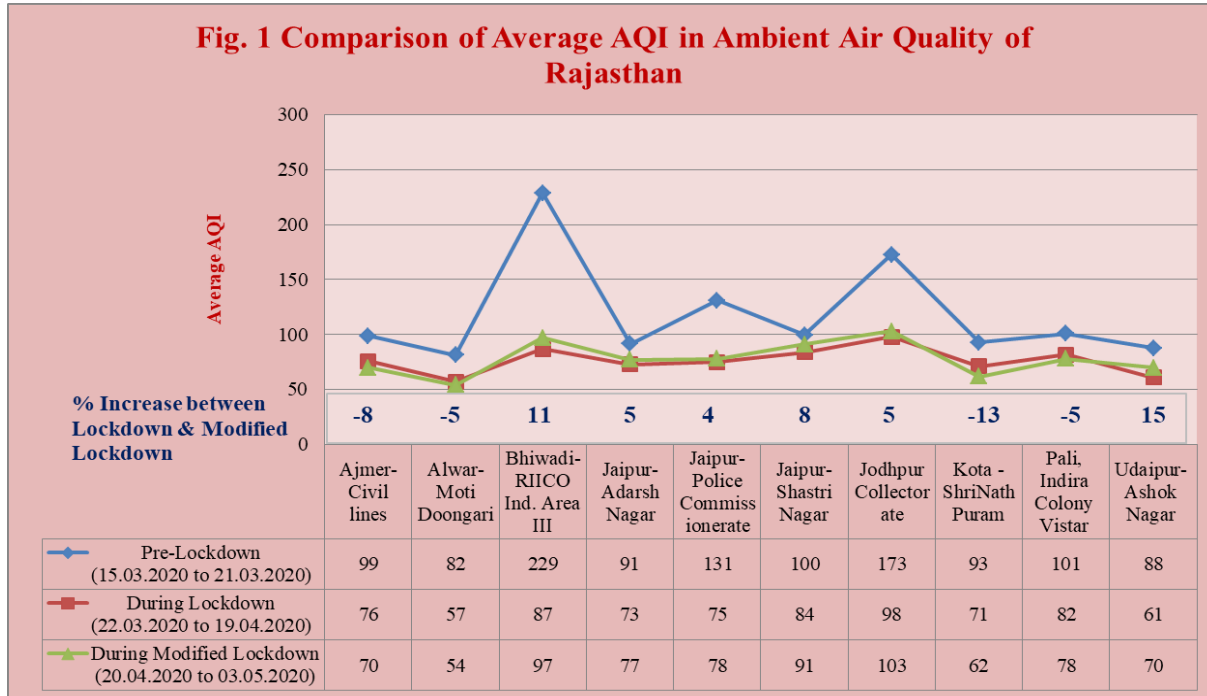


Fig. 1 Comparison of Average AQI between periods of Pre-lockdown, lockdown and Modified Lockdown in Rajasthan

A comparison of Air quality Index among the periods of pre-lockdown, lockdown and modified lockdown reflects that air quality has improved at all the stations during the lockdown and modified lockdown periods as compared to pre-lockdown period. Further, except at Jodhpur, the air quality has remained in ‘Satisfactory’ category in both lockdown and modified lockdown periods. In case of Jodhpur, the air quality deteriorated from ‘Satisfactory’ to ‘Moderated’ category in modified lockdown period.

However, if we compare the air quality between the periods of lockdown and modified lockdown, it is observed that except Ajmer, Alwar, Kota and Pali, air quality has worsened as an increase in Average Air Quality Index has been recorded at all other remaining stations. The overall percentage increase in AQI between period of lockdown and during modified lockdown has ranged between 4 % (Jaipur-Police Commissionerate) to 15 % (Udaipur). However, at Ajmer, Alwar, Kota and Pali, improvement in air quality in modified lockdown period has been noticed as compared to lockdown period which ranges from 5% (Pali) to 13% at (Kota).

## II. Analysis of Air Quality Data in Terms of Specific Pollutants

As compared to the Period of lockdown, significant percentage increase in air quality parameters has been observed during modified lockdown. Increase in average concentrations of all the three parameters i.e. PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> was observed at



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Jaipur (Science Park), Jodhpur and Udaipur whereas at Bhiwadi and Jaipur (Police Commissionerate), increase in average concentrations of PM<sub>10</sub>, PM<sub>2.5</sub> has been observed. However, air quality has improved in terms of all the three parameters at Alwar and at Pali

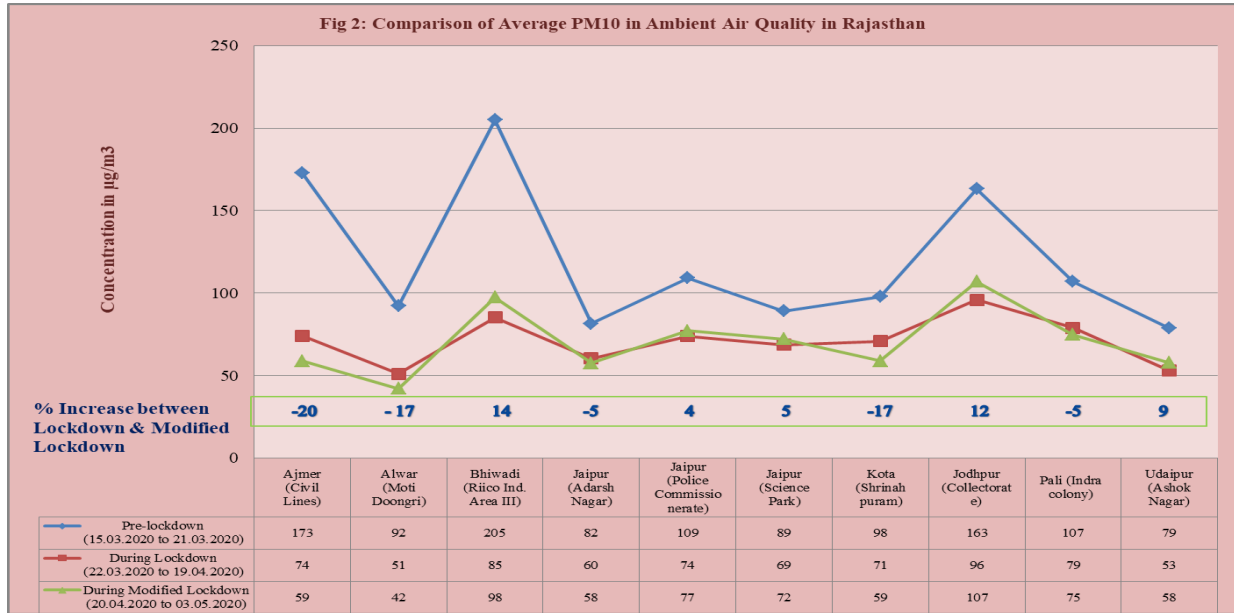
Table-3: Average concentration of PM<sub>10</sub>, PM<sub>2.5</sub> and NO<sub>2</sub> for pre lockdown, during period of lockdown and modified lockdown in the ten CAAQMS of Rajasthan

Comparative Statement of Air Quality Parameters of Continuous Ambient Air Quality Monitoring Stations in Rajasthan												
	Pre-lockdown			During Lockdown			During Modified Lockdown			Percentage Increase in %		
Monitoring Dates	(15.03.2020 to 21.03.2020)			(22.03.2020 to 19.04.2020)			(20.04.2020 to 03.05.2020)			Between Lockdown & Modified Lockdown		
	PM 10	PM2.5	NO2	PM 10	PM2.5	NO2	PM 10	PM2.5	NO2	PM 10	PM2.5	NO2
Ajmer (Civil Lines)	173	76	57	74	35	12	59	24	15	-20	-31	22
Alwar (Moti Doongri)	92	45	39	51	26	26	42	21	26	-17	-20	0
Bhiwadi (Riico Ind. Area III)	205	117	85	85	43	22	98	47	18	14	9	-16
Jaipur (Adarsh Nagar)	82	31	32	60	23	11	58	23	12	-5	0	2
Jaipur (Police Commissionerate)	109	63	47	74	33	16	77	34	15	4	3	-5
Jaipur (Science Park)	89	38	32	69	28	14	72	31	15	5	12	3
Kota (Shrinath puram)	98	43	31	71	30	13	59	27	14	-17	-9	4
Jodhpur (Collectorate)	163	86	63	96	51	21	107	53	22	12	5	6
Pali (Indra colony)	107	42	27	79	33	18	75	30	10	-5	-9	-45
Udaipur (Ashok Nagar)	79	41	24	53	26	6	58	27	8	9	5	32

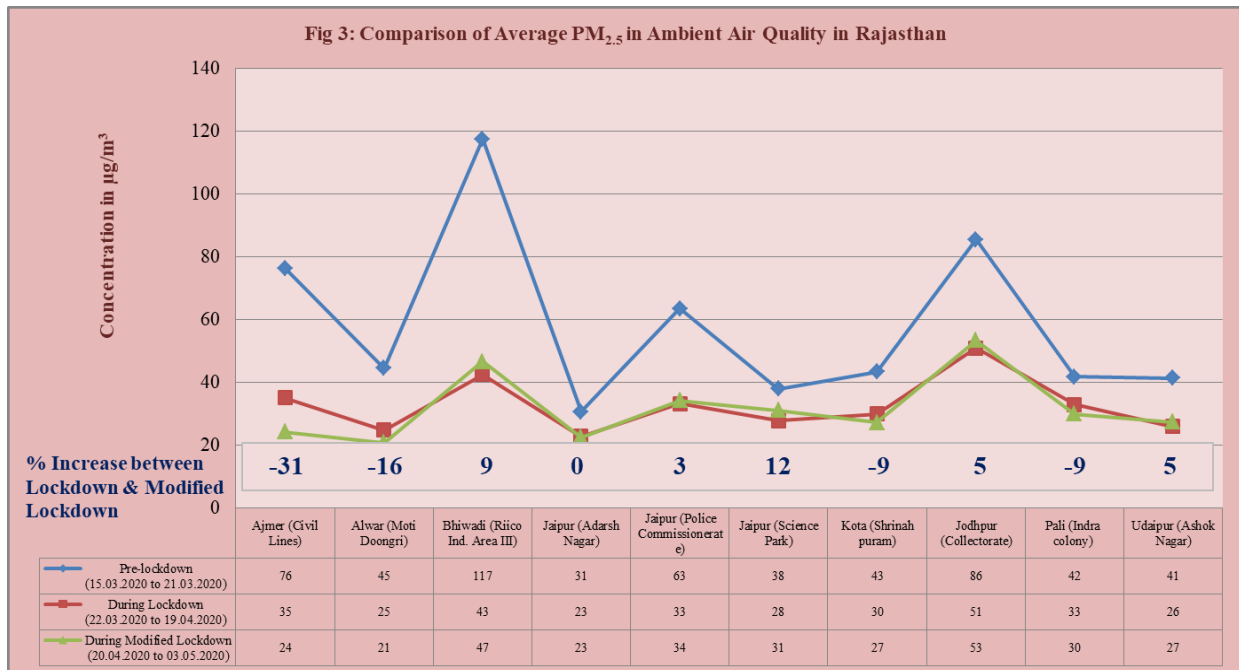
As per Fig.2, the percentage increase of PM<sub>10</sub> between period of lockdown and modified lockdown at these stations ranges between -20% (Ajmer-Civil Lines) to 14% (Bhiwadi-RIICO Ind Area III).



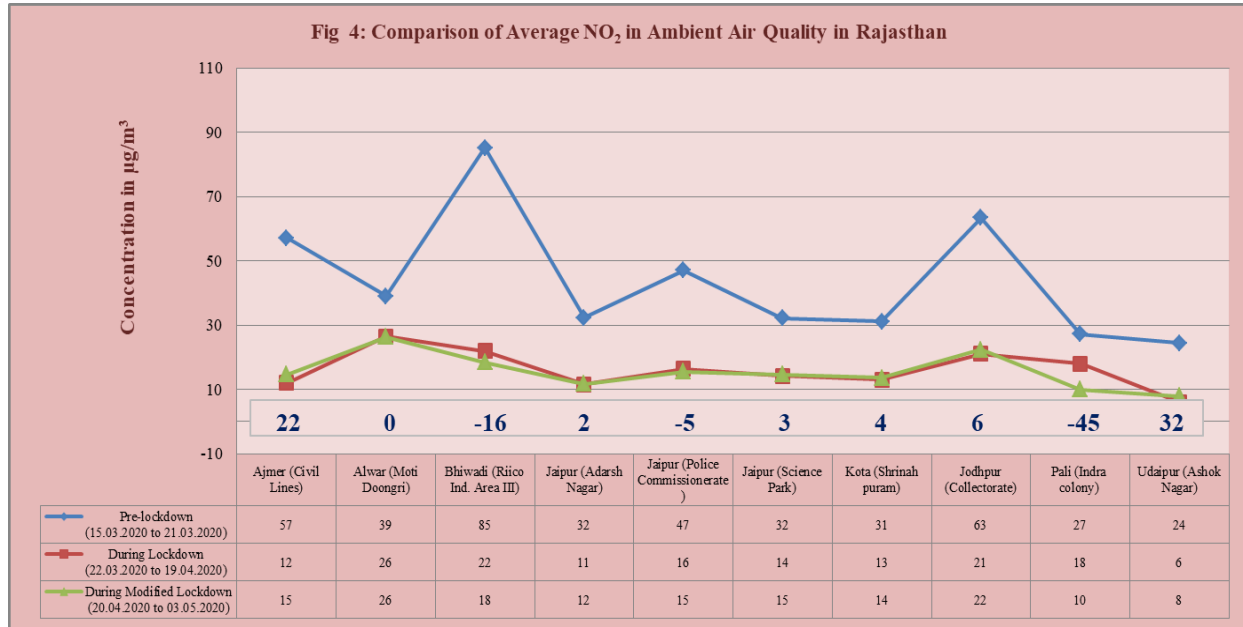
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As per Fig. 3, the percentage increase of PM<sub>2.5</sub> at these stations between period of lockdown and modified lockdown at these stations ranges between -31% (Ajmer-Civil Lines) to 12% (Jodhpur Collectorate).



As per Fig. 4, the percentage increase of NO<sub>2</sub> at these stations between period of lockdown and Modified Lockdown at these stations ranges between -45% (Pali-Indira Colony) to 32% (Udaipur-Ashok Nagar).



It can be observed that concentration of PM<sub>10</sub> and PM<sub>2.5</sub> during the period of modified lockdown has increased at Bhiwadi, Jaipur (Police Commissionerate), Jaipur (Science Park), Jodhpur and Udaipur whereas it has decreased at Ajmer, Alwar, Kota and Pali. However, in case of NO<sub>2</sub>, the concentration under modified lockdown has increased at all the stations except at Bhiwadi, Jaipur (Police Commissionerate) and Pali.

### III. Analysis of Ambient Noise Level in Jaipur City

An analysis has also been made to examine the impact of lockdown on the Ambient Noise Level in Jaipur city. In order to assess the impact of predominating Noise Level in Jaipur city, Noise Level Monitoring was conducted at 6 different locations in Jaipur City in March, 2020 i.e. Pre-Lockdown Period and April, 2020 i.e. during Lockdown Period. The Noise level monitoring was conducted in day time (1100 hrs to 2200 hrs) and night time (2200 hrs onwards) for half hour interval at each location with sampling frequency of one second.

In order to maintain uniformity in monitoring, Residential, Commercial, and Silence zones were selected in respect of Noise Standards prescribed under the provisions of Noise Pollution (Regulation & Control) Rules, 2000. The monitoring network consisted of a total of 6 noise monitoring locations in Jaipur City.

Data related to Noise level in dB (A) in these six monitored locations compared for pre lockdown and during post lockdown period is tabulated in Table-4.



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Table 4: Comparative statement of noise level monitoring conducted in Jaipur City during Pre-Lockdown and Lockdown period

Monitoring Period	Monitoring Locations											
	Garden Behind Governor House, Civil Lines		SDMH (near OPD)		Nagar Nigam Office, Patel Marg, Mansarovar		Science Park, Shastri Nagar		Gali No. 3, Raja Park		Near Kotwali Thana, ChhotiChoupar	
	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time
	Silence Zone				Residential Zone				Commercial Zone			
Pre-Lockdown (March, 2020)	59.8	48.3	64.4	63.8	62.3	50.2	62.5	46.5	66.6	67.8	69.3	66.5
During Lockdown (April, 2020)	51.3	42.1	59.4	54.4	53.3	49.2	54.7	51.2	59.9	52.1	60.2	53.6
<b>STANDARD</b>	<b>50</b>	<b>40</b>	<b>50</b>	<b>40</b>	<b>55</b>	<b>45</b>	<b>55</b>	<b>45</b>	<b>65</b>	<b>55</b>	<b>65</b>	<b>55</b>

It is evident that the noise level during lockdown period has decreased at all monitored locations except at Science Park, Shastri Nagar during night time. Further, it may also be noted that despite the lockdown, the Noise level has exceeded the prescribed standards at all locations except Nagar Nigam Office, Patel Marg, Mansarovar (Day time), Science Park, Shastri Nagar (day time), Gali No. 3, Raja Park (Day & night time), and Near Kotwali Thana, Chhoti Chaupar (day & night time).

## IV. Conclusions and Major Highlights

- i. It is evident that as compared to lockdown period, air quality in terms of Air Quality Index has remained ‘Satisfactory’ during modified lockdown period at all the towns except at Jodhpur where it has worsened to ‘Moderate’ Category.
- ii. In comparison to the periods of lockdown, air quality has worsened during the period of modified lockdown at Bhiwadi, Jaipur (Adarsh Nagar), Jaipur (Police Commissionerate), Jaipur (Science Park), Jodhpur and Udaipur. However, at Ajmer, Alwar, Kota and Pali, improvement in air quality in modified lockdown period has been noticed as compared to the lockdown period.



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- iii. Likewise, the concentration of  $PM_{10}$  and  $PM_{2.5}$  under modified lockdown has also increased at Bhiwadi, Jaipur (Police Commissionerate), Jaipur (Science Park), Jodhpur and Udaipur.
- iv. The concentration of  $NO_2$ , under modified lockdown has increased at all the stations except at Bhiwadi, Jaipur (Police Commissionerate) and Pali.
- v. The noise level during Lockdown period has decreased at all monitored locations except at Science Park, Shastri Nagar during night time.
- vi. Despite the lockdown, the Noise levels have exceeded the prescribed standards at all locations except Nagar Nigam Office, Patel Marg, Mansarovar (Day time), Science Park, Shastri Nagar (day time), Gali No. 3, Raja Park (Day & night time), and Near Kotwali Thana, Chhoti Chaupar (day & night time).