

# REPORT ON IMPACT OF LOCKDOWN DUE TO COVID-19 PANDEMIC ON AMBIENT AIR QUALITY OF RAJASTHAN (Part IV)



RAJASTHAN STATE POLLUTION CONTROL  
BOARD

## CONTRIBUTIONS

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The unprecedented outbreak of COVID-19 has affected the globe in every aspect. Various measures have been adopted to contain the spread of the dreading pandemic. 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> March, 2020 by the Hon'ble Chief Minister of Rajasthan, Sh Ashok Gehlot which has been subsequently extended 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 dynamics has been substantially been influenced 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, 24.04.2020 and 08.05.2020 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, during lockdown periods from 22.03.2020 to 7.04.2020, 08.04.2020 to 19.04.2020 and modified lockdown period i.e. from 20.04.2020 to 03.05.2020 respectively.

In this fourth series of the report, air quality data generated during Lockdown-I (22.03.2020-14.04.2020), Lockdown-II (15.04.2020-03.05.2020) and Lockdown-III (04.05.2020-17.05.2020) have been compared with the Pre-lockdown period (15.03.2020-21.03.2020) 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 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. Lockdown-I (22.03.2020-14.04.2020), Lockdown-II (15.04.2020-03.05.2020) and Lockdown-III (04.05.2020-17.05.2020) have been compared with the Pre-lockdown period (15.03.2020-21.03.2020) 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.



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Monitoring Stations↓	Monitoring Dates→	Average AQI				Percentage Fluctuation in %		
		During Pre-Lockdown	During Lockdown I	During Lockdown II	During Lockdown III	Between Pre-Lockdown & Lockdown I	Between Pre-Lockdown & Lockdown II	Between Pre-Lockdown & Lockdown III
		15.03.2020 to 21.03.2020	22.03.2020 to 14.04.2020	15.04.2020 to 03.05.2020	04.05.2020 to 17.05.2020			
<i>Ajmer- Civil lines</i>	<b>Air Quality Index</b>	99	76	72	84	-23	-27	-15
<i>Alwar- Moti Doongari</i>		82	59	52	60	-28	-36	-26
<i>Bhiwadi- RIICO Ind. Area III</i>		229	83	99	122	-64	-57	-47
<i>Jaipur- Adarsh Nagar</i>		91	68	83	88	-26	-9	-4
<i>Jaipur- Police Commissionerate</i>		131	69	85	96	-47	-35	-27
<i>Jaipur- Shastri Nagar</i>		100	80	95	120	-20	-5	21
<i>Jodhpur Collectorate</i>		173	99	101	107	-43	-42	-38
<i>Kota - ShriNath Puram</i>		93	73	62	63	-21	-33	-32
<i>Pali, Indira Colony Vistar</i>		101	79	83	87	-22	-18	-14
<i>Udaipur- Ashok Nagar</i>		88	63	66	70	-28	-25	-20

Note:

AQI	Remark	Colour Code	Possible Health Impacts
0-50	Good	Green	Minimal impact
51-100	Satisfactory	Light Green	Minor breathing discomfort to sensitive people
101-200	Moderate	Yellow	Breathing discomfort to the people with lungs, asthma and heart diseases
201-300	Poor	Orange	Breathing discomfort to most people on prolonged exposure
301-400	Very Poor	Red	Respiratory illness on prolonged exposure
401-500	Severe	Dark Red	Affects healthy people and seriously impacts those with existing diseases

Table 1:Comparative Statement of Average Air Quality Index of Continuous Ambient Air Quality Monitoring Stations in Rajasthan

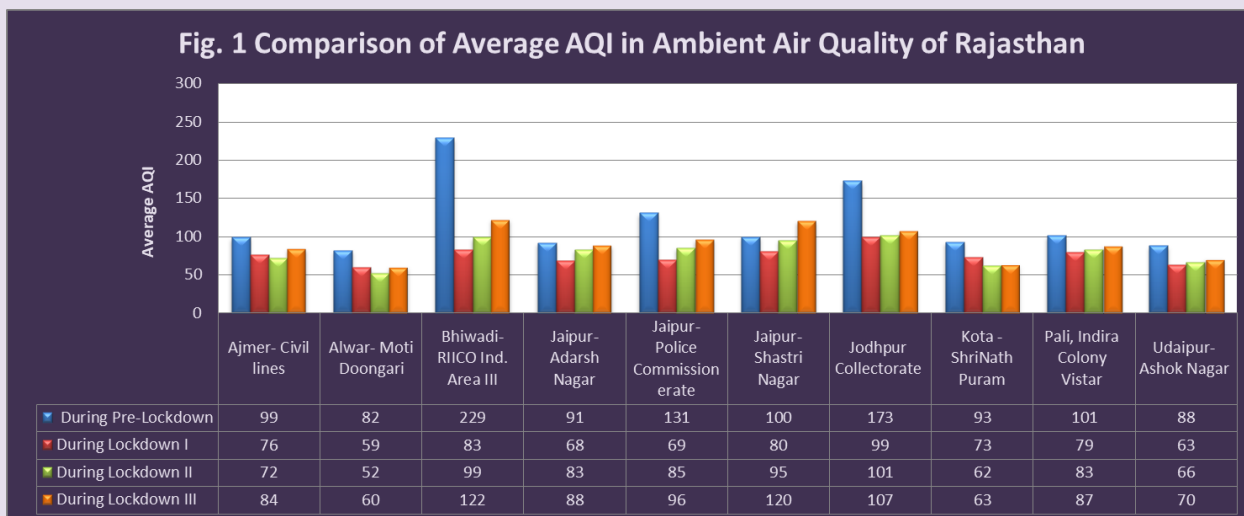


Fig. 1 Comparison of Average AQI between period of Pre-lockdown, Lockdown I, II and III in Rajasthan



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A comparison of Air quality Index among the three phases of Lockdown in comparison with the period of Pre-Lockdown reflects that the air quality has improved at all the stations during the lockdown. During Lockdown-I, the air quality index at all monitoring stations had moved to ‘Satisfactory’ level. Further, during Lockdown-II, the air quality had remained in ‘Satisfactory’ level except at Jodhpur where the air quality had moved to ‘Moderate’ level, whereas, during Lockdown-III, the air quality has remained ‘Satisfactory’ at all monitoring stations except at Bhiwadi, Jaipur (Shastri Nagar) and Jodhpur where the air quality had moved to ‘Moderate’ level. Thus, air quality at most of the stations is still better than pre-lockdown period despite many relaxations in industrial and other activities.

However, if we compare the air quality between all the phases of lockdown with the period of Pre-lockdown, it is observed that there has been a decrease in the percentage of AQI between Pre-lockdown and Lockdown-I which has ranged between 20 % to 64 % at all the cities. On comparison of air quality between Pre-lockdown and Lockdown-II, the decrease in air quality index has ranged between 5 % to 57%. During Lockdown-III the air quality index is recorded to be low at all monitoring stations except at Jaipur (Shastri Nagar) and the percentage decrease has been recorded between 4 % to 47% in comparison to the pre-lockdown period.

Further, air quality has deteriorated at most of the stations as we progress from lockdown-I to lockdown-III if a comparison of all the lockdown periods is made. This may be due the fact that more economic and other activities were opened during the subsequent lockdowns.

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

As compared to the Period of Pre-lockdown, substantial decrease in air quality parameters has been observed during the three phases of lockdown. Data from all the cities reflect that the concentration of all the three parameters i.e. PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> has decreased during lockdown I, II and III in comparison to the period of pre-lockdown (except at Pali during Lockdown-III where it has remained unchanged).



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Table-3: Average concentration of PM<sub>10</sub>, PM<sub>2.5</sub> and NO<sub>2</sub> during lockdown I, II and III in comparison to period of Pre-lockdown in the ten CAAQMS of Rajasthan

Comparative Statement of Air Quality Parameters of Continuous Ambient Air Quality Monitoring Stations in Rajasthan												
	Pre-lockdown			Lockdown I			Lockdown II			Lockdown III		
Monitoring Dates	(15.03.2020 to 21.03.2020)			(22.03.2020 to 14.04.2020)			(15.04.2020 to 03.05.2020)			(4.05.2020 to 17.05.2020)		
	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	76	36	13	60	25	12	69	35	14
Alwar (Moti Doongri)	92	45	39	52	25	27	43	21	26	58	24	25
Bhiwadi (Riico Ind. Area III)	205	117	85	81	41	23	100	48	18	122	62	31
Jaipur (Police Commissionerate)	109	63	47	66	30	17	87	38	15	92	44	17
Jaipur (Adarsh Nagar)	82	31	32	53	21	12	68	25	11	63	27	16
Jaipur (Science Park)	89	38	32	61	26	14	82	33	14	46	18	9
Jodhpur (Collectorate)	163	86	63	97	51	21	104	52	22	108	52	20
Pali (Indra colony)	107	42	27	75	33	19	82	31	10	99	42	10
Udaipur (Ashok Nagar)	79	41	24	53	26	6	57	27	7	61	31	10
Kota (Shrinath puram)	98	43	31	72	30	13	60	28	12	34	16	11

Table-4: Percentage Fluctuation of PM<sub>10</sub>, PM<sub>2.5</sub> and NO<sub>2</sub> during lockdown I, II and III in comparison to period of Pre-lockdown in the ten CAAQMS of Rajasthan

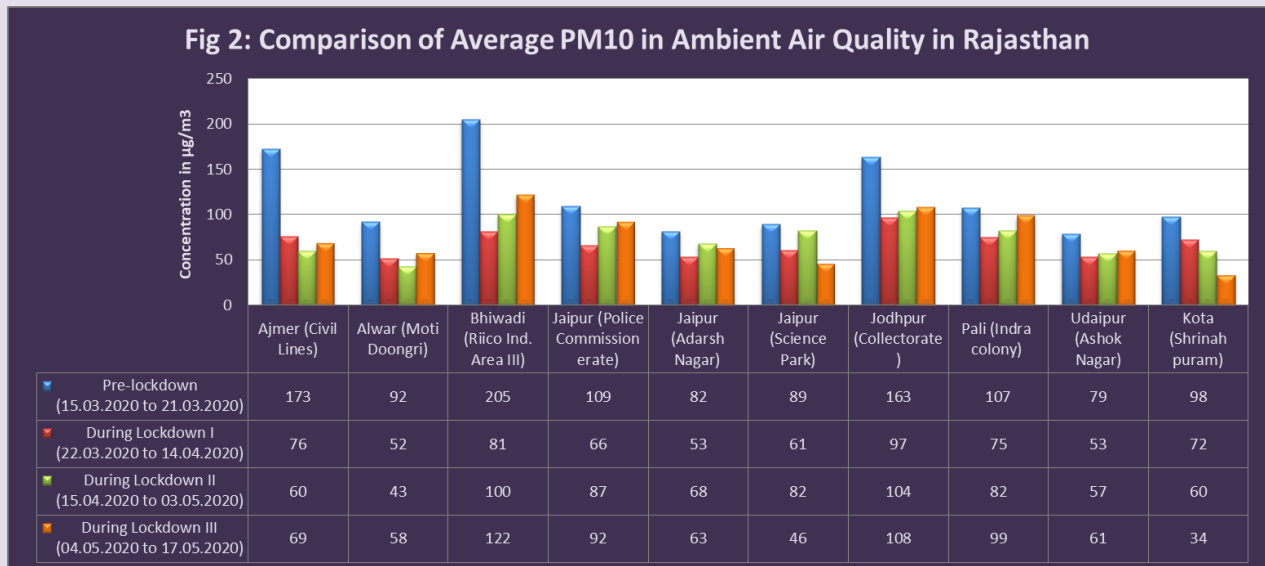
Comparative Statement of Air Quality Parameters of Continuous Ambient Air Quality Monitoring Stations in Rajasthan									
	Percentage Increase/decrease w.r.t.Pre-Lockdown								
Monitoring Dates	Between Pre-Lockdown & Lockdown I			Between Pre-Lockdown & Lockdown II			Between Pre-Lockdown & Lockdown III		
	PM 10	PM2.5	NO2	PM 10	PM2.5	NO2	PM 10	PM2.5	NO2
Ajmer (Civil Lines)	-56	-53	-77	-65	-67	-79	-60	-54	-75
Alwar (Moti Doongri)	-44	-44	-31	-53	-53	-33	-37	-46	-36
Bhiwadi (Riico Ind. Area III)	-60	-65	-73	-51	-59	-79	-40	-47	-64
Jaipur (Police Commissionerate)	-40	-53	-64	-20	-40	-68	-16	-31	-64
Jaipur (Adarsh Nagar)	-35	-32	-63	-17	-18	-66	-23	-12	-50
Jaipur (Science Park)	-32	-31	-56	-8	-13	-56	-48	-53	-72
Jodhpur (Collectorate)	-41	-40	-67	-36	-39	-65	-34	-39	-68
Pali (Indra colony)	-30	-21	-30	-23	-26	-63	-8	0	-63
Udaipur (Ashok Nagar)	-33	-37	-75	-28	-35	-71	-22	-25	-59
Kota (Shrinath puram)	-26	-31	-58	-39	-36	-61	-65	-63	-65



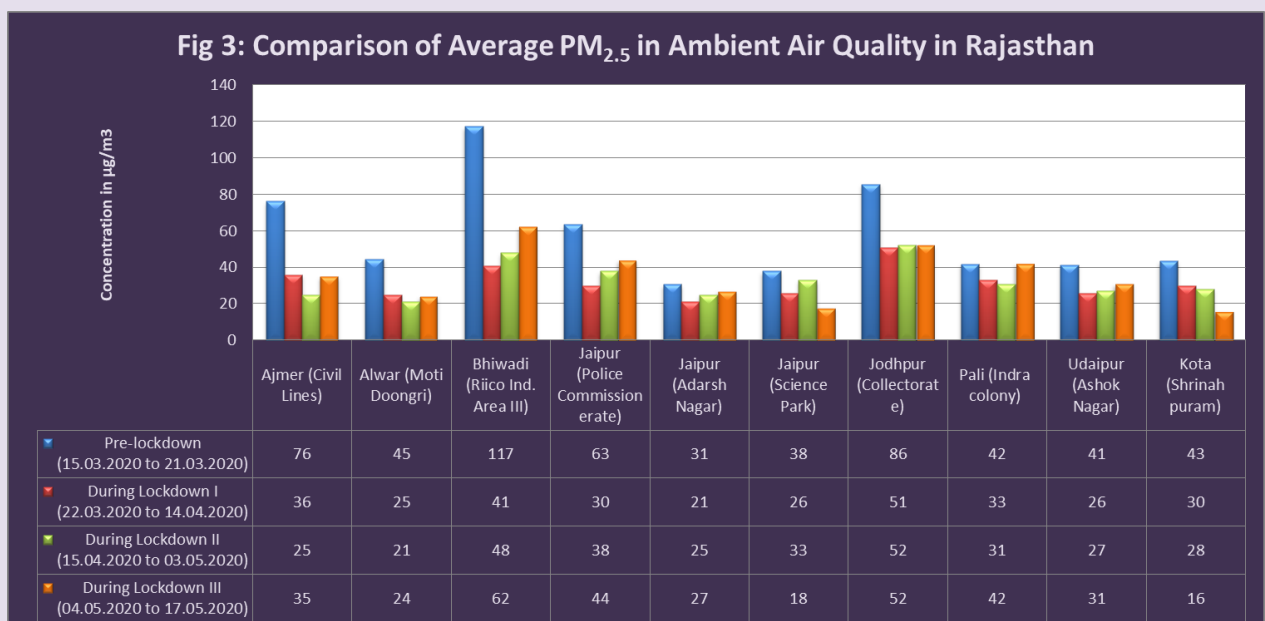
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As per Fig.2, the percentage decrease of PM<sub>10</sub> at these stations between the period of pre-lockdown and lockdown-I has been recorded from 26 % (Kota) to 60 % (Bhiwadi), between the period of pre-lockdown and lockdown-II has been recorded from 8 % (Jaipur-Science Park) to 65 % (Ajmer) and between the period of pre-lockdown and lockdown-III has been recorded from 8 % (Pali) to 65 % (Kota).



As per Fig.3, the percentage decrease of PM<sub>2.5</sub> at these stations between the period of pre-lockdown and lockdown-I has been recorded from 21 % (Pali) to 65 % (Bhiwadi), between the period of pre-lockdown and lockdown-II has been recorded from 13 % (Jaipur-Science Park) to 67 % (Ajmer) and between the period of pre-lockdown and lockdown-III has been recorded from 0 % (Pali) to 63 % (Kota).

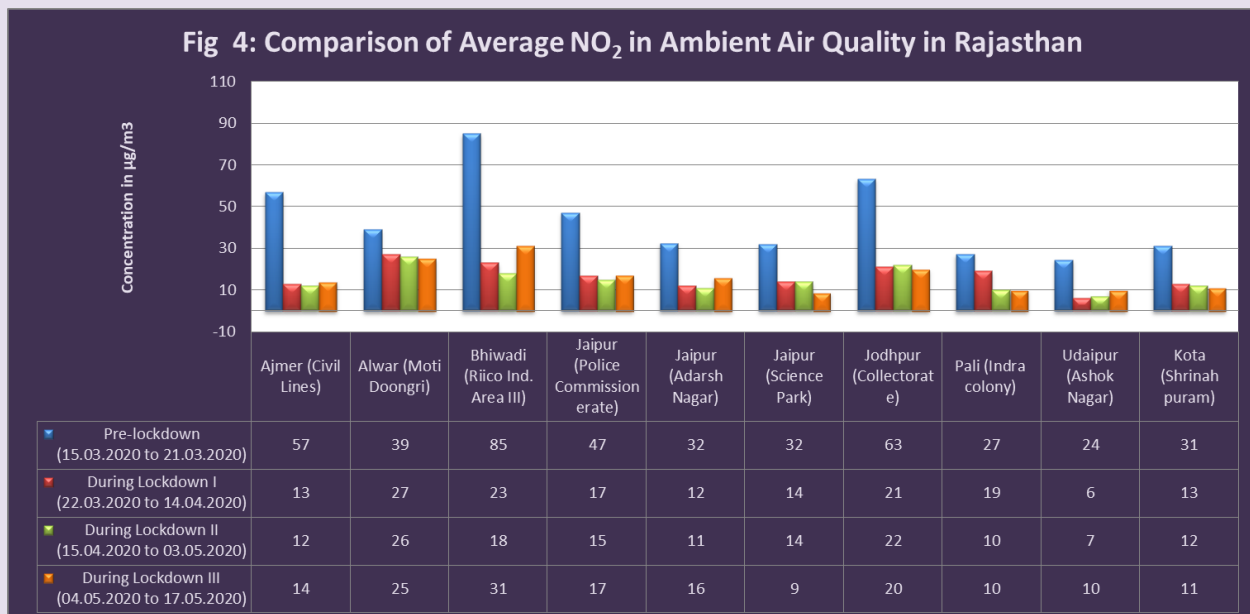




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As per Fig.4, the percentage decrease of NO<sub>2</sub> at these stations between the period of pre-lockdown and lockdown-I has been recorded from 30 % (Pali) to 77 % (Ajmer), between the period of pre-lockdown and lockdown-II has been recorded from 33 % (Alwar) to 79 % (Ajmer and Bhiwadi) and between the period of pre-lockdown and lockdown-III has been recorded from 36 % (Alwar) to 75 % (Ajmer).



It can be observed that the data from all the cities reflect that the concentration of all the three parameters i.e. PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> has decreased during lockdown I, II and III in comparison to the period of pre-lockdown due to restrictions in movement. Although there has been ease in restrictions in the later stages of lockdown, yet the concentration of the pollutants has remained much below the levels observed before the period of lockdown.

### III. Conclusions and Major Highlights

- i. It is evident that as compared to the period of pre-lockdown, air quality in terms of Air Quality Index has improved at all monitoring stations during all the three phases of Lockdown, except at Jaipur – Shastri Nagar (during Lockdown-III).
- ii. As compared to the period of pre-lockdown, air quality in terms of Air Quality Index has remained ‘Satisfactory’ during the three phases of Lockdown, except at Jodhpur (Lockdown II & III), Bhiwadi (Lockdown III) and Jaipur – Shastri Nagar (Lockdown-III) where it has degraded to ‘Moderate’ Category.
- iii. Maximum decrease in percentage of air quality index was reported at Bhiwadi during Lockdown-I. Similarly, maximum decrease in percentage of PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> has been recorded at 65 % (Ajmer during Lockdown-II and Kota





during Lockdown-III) 67% (Ajmer during Lockdown-II) and 79 % (Ajmer and Bhiwadi during Lockdown-II) respectively.

- iv. It can be observed that the data from all the cities reflect that the concentration of all the three parameters i.e. PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> has decreased during lockdown I, II and III in comparison to the period of pre-lockdown due to restrictions in movement.
- v. Although there has been ease in restrictions in the later stages of lockdown, yet the concentration of the pollutants has remained much below the levels observed before the period of lockdown.
- vi. If we compare all the lockdown periods, it is observed that the air quality has deteriorated at most of the stations as we progress from Lockdown-I to Lockdown-III. This may be due the fact that more economic and other activities were opened during the subsequent phases of lockdowns and resuming of normalization.

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