



Part-II

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, nation-wide lockdown in the state of Rajasthan was imposed from 22nd to 31st March, 2020 by the Hon'ble Chief Minister of Rajasthan, Sh Ashok Gehlot and subsequently nation-wide Lockdown from 24th 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.

The major sectors contributing to air pollution are transport, industries, power plants, construction activities, biomass & refuse burning, road dust re-suspension and residential activities. In addition, certain activities such as operation of DG sets, restaurant, landfill fires, etc. also contribute to air pollution.

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 a report on 15.04.2020 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 post lockdown period from 22.03.2020 to 07.04.2020

In this second part of the report, air quality data generated for the post lockdown period from 08.04.2020 to 19.04.2020 has been studied and further analysis has been made with respect to the Air Quality Index (AQI) and prominent pollutants such as PM₁₀, PM_{2.5} and Nitrogen Dioxide for all the three periods i.e pre-lockdown period, post lockdown period from 22.03.2020 to 7.04.2020 (Lockdown Period-I) and post lockdown period from 8.04.2020 to 19.04.2020 (Lockdown Period-II).



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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 for pre-lockdown and during lockdown periods i.e from 22.03.2020 to 07.04.2020 and 08.04.2020 to 19.04.2020 was analysed and a comparative statement of Average Air Quality Index of the Monitoring Stations during period of Pre-Lockdown and post lockdown periods from 22.03.2020 to 7.04.2020 (Lockdown Period-I) and post lockdown period from 8.04.2020 to 19.04.2020 (Lockdown Period-II) 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

		Pre-Lockdown	Lockdown		Percentage Decrease between Period of Pre-Lockdown and Period of Lockdown (in %)	
Monitoring Stations↓	Monitoring Dates→	15.03.2020 to 21.03.2020	22.03.2020 to 07.04.2020	08.04.2020-18.04.2020	22.03.2020 to 07.04.2020	08.04.2020-18.04.2020
<i>Ajmer- Civil lines</i>	Air Quality Index	99	75	77	24	22
<i>Alwar- Moti Doongari</i>		82	62	49	24	40
<i>Bhiwadi- RIICO Ind. Area III</i>		229	72	108	68	53
<i>Jaipur- Adarsh Nagar</i>		91	65	85	29	7
<i>Jaipur- Police Commissionerate</i>		131	62	94	53	28
<i>Jaipur- Shastri Nagar</i>		100	79	92	21	8
<i>Jodhpur Collectorate</i>		173	98	97	43	44
<i>Kota - ShriNath Puram</i>		93	72	70	23	25
<i>Pali, Indira Colony Vistar</i>		101	75	93	26	8
<i>Udaipur- Ashok Nagar</i>		88	60	64	32	27

Note:

AQI	Remark	Colour Code	Possible Health Impacts
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: The percentage decrease Average Air Quality Index between period of Pre-lockdown and during the period of post lockdown I and II in Rajasthan.



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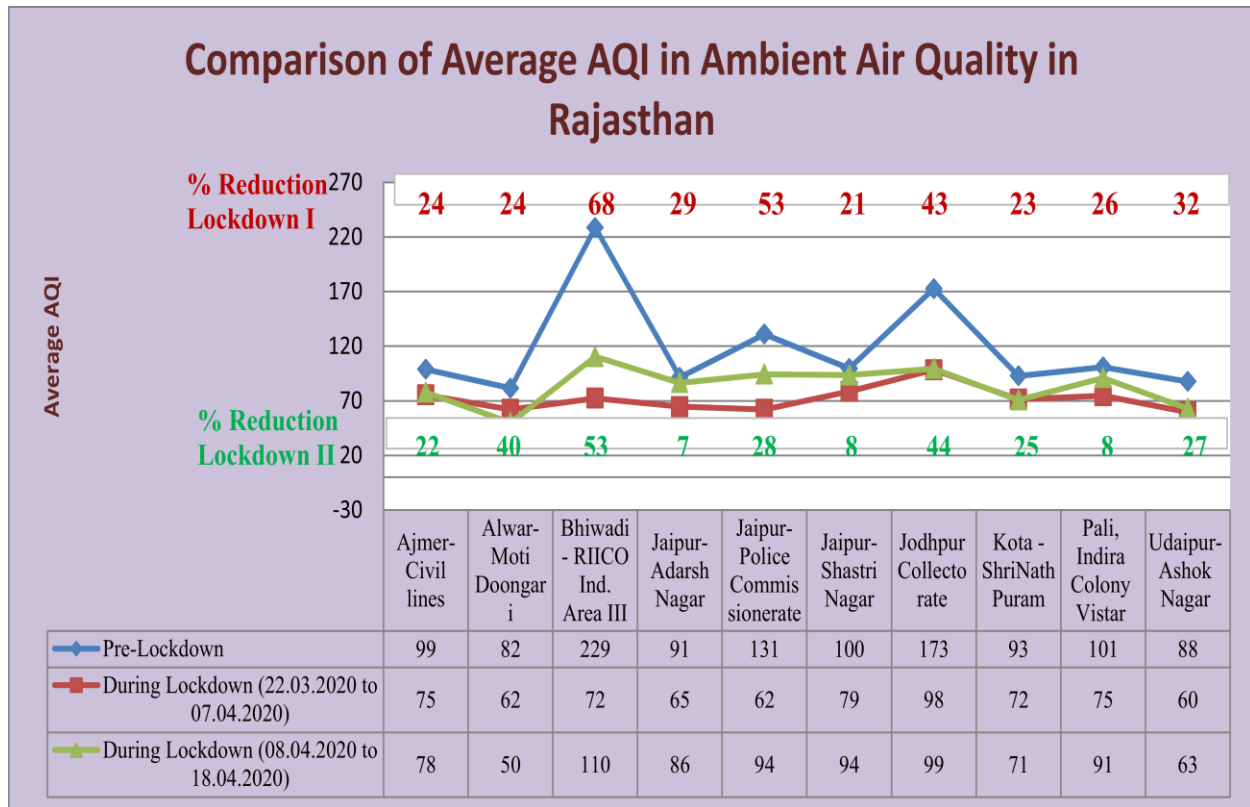


Fig. 1 Comparison of Average AQI between period of Pre-lockdown and Post-lockdown of Rajasthan

A comparison between the pre-lockdown and post lockdown periods reflects that reduction in Average Air Quality Index at all the ten continuous ambient air quality monitoring stations has been recorded during period of lockdown as compared to the Period of pre-lockdown. The percentage decrease at these stations has ranged between 21% (Shashtri Nagar, Jaipur) to 68 % (Bhiwadi- RIICO Ind. Area III) during the Lockdown Period-I whereas the same has ranged between 7% (Adarsh Nagar, Jaipur) to 53 % (Bhiwadi- RIICO Ind. Area III) during Lockdown period-II from 08.04.2020 to 19.04.2020.

It is also evident that as compared to lockdown period-I, air quality in terms of Air Quality Index has deteriorated at all the towns except at Alwar & Kota in post lockdown period-II. In Alwar and Kota there is an improvement in air quality as compared to lockdown period-I by the margin of about 2 to 18 %.

As compared to pre-lockdown period, the air quality has moved to satisfactory in all the towns during the lockdown period-I. In the lockdown period-II, the average Air quality index of all the cities except Bhiwadi and Alwar has remained in satisfactory category. In case of Alwar, it has further improved and moved to good from earlier satisfactory category, however, in case of Bhiwadi the air quality has moved to moderate from earlier satisfactory category.



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

An analysis has also been made to examine the impact of lockdown on specific important pollutants such as PM₁₀, PM_{2.5} and Nitrogen Dioxide. Data related to average concentration of these parameters for pre lockdown and during post lockdown periods I & II is tabulated in Table-3. As compared to the Period of Pre-Lockdown (15.03.2020 to 21.02.2020), significant percentage decrease in air quality parameters such as PM₁₀, PM_{2.5} and Nitrogen Dioxide has been observed during the Lockdown period-I & II at all monitored stations in the state except at Adarsh Nagar and Science Park in Jaipur City for which PM₁₀ concentration during lockdown period-II has not decreased.

Table-3: The average concentration of PM₁₀, PM_{2.5} and NO₂ for pre lockdown and post lockdown periods in the ten CAAQMS of Rajasthan

Monitoring Dates	Pre-lockdown			During Lockdown						Percentage Decrease between Period of Pre-Lockdown and Period of Lockdown (in %)					
	(15.03.2020 to 21.03.2020)			(22.03.2020 to 07.04.2020)			(08.04.2020 to 19.04.2020)			(22.03.2020 to 07.04.2020)			(08.04.2020 to 19.04.2020)		
	PM 10	PM2.5	NO2	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	79	40	15	67	28	7	54	48	73	62	63	87
Alwar (Moti Doongri)	92	45	39	56	26	27	44	23	26	39	41	32	52	49	33
Bhiwadi (Riico Ind. Area III)	205	117	85	63	34	24	116	54	19	69	71	72	43	54	78
Jaipur (Adarsh Nagar)	82	31	32	45	19	11	82	29	11	45	38	64	0	7	65
Jaipur (Police Commissionerate)	109	63	47	57	27	16	98	42	16	48	57	65	10	34	65
Jaipur (Science Park)	89	38	32	52	24	14	92	34	15	42	38	57	-4	11	55
Kota (Shrinath puram)	98	43	31	71	28	14	70	31	11	27	34	55	29	28	66
Jodhpur (Collectorate)	163	86	63	94	52	22	99	49	19	42	39	65	39	43	70
Pali (Indra colony)	107	42	27	68	31	22	96	37	13	37	27	21	10	13	53
Udaipur (Ashok Nagar)	79	41	24	47	23	6	62	29	6	40	43	76	21	29	76

As per Fig.2, 3 and 4, the percentage decrease of PM₁₀ at these stations ranges between 27% (Kota- Shrinath Puram) to 69 % (Bhiwadi- RIICO Ind. Area III) for lockdown period-I and between -4% (Science Park, Jaipur) to 62% (Civil Lines, Ajmer) during lockdown period-II.

The percentage decrease of PM_{2.5} at these stations has ranged between 27% (Pali-Indira Colony) to 71 % (Bhiwadi- RIICO Ind. Area III) for lockdown period-I and between 7% (Adarsh Nagar, Jaipur) to 63% (Civil Lines, Ajmer) during for lockdown period-II.



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The percentage decrease of NO₂ at these stations has ranged between 21% (Pali-Indira Colony) to 76 % (Udaipur- Ashok Nagar) during for lockdown period-I and between 33% (Moti Doongri, Alwar) to 87% (Civil Lines, Ajmer) during for lockdown period-II.

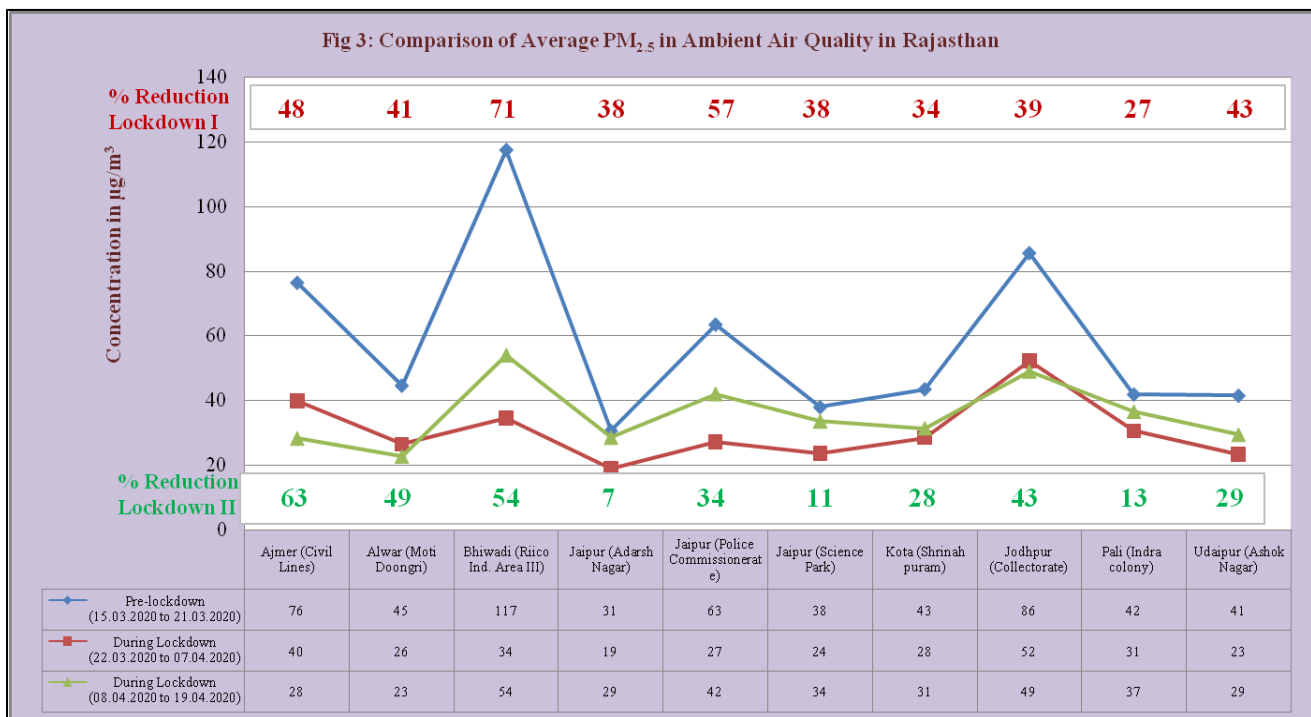
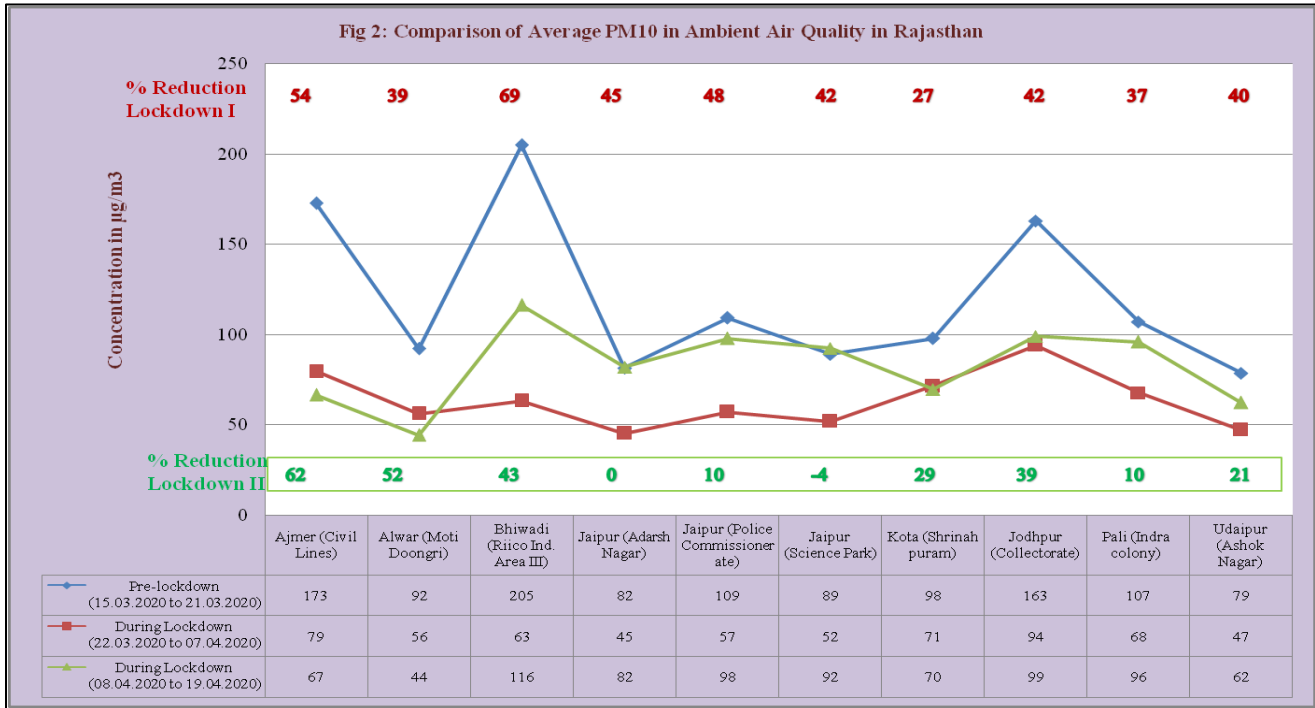
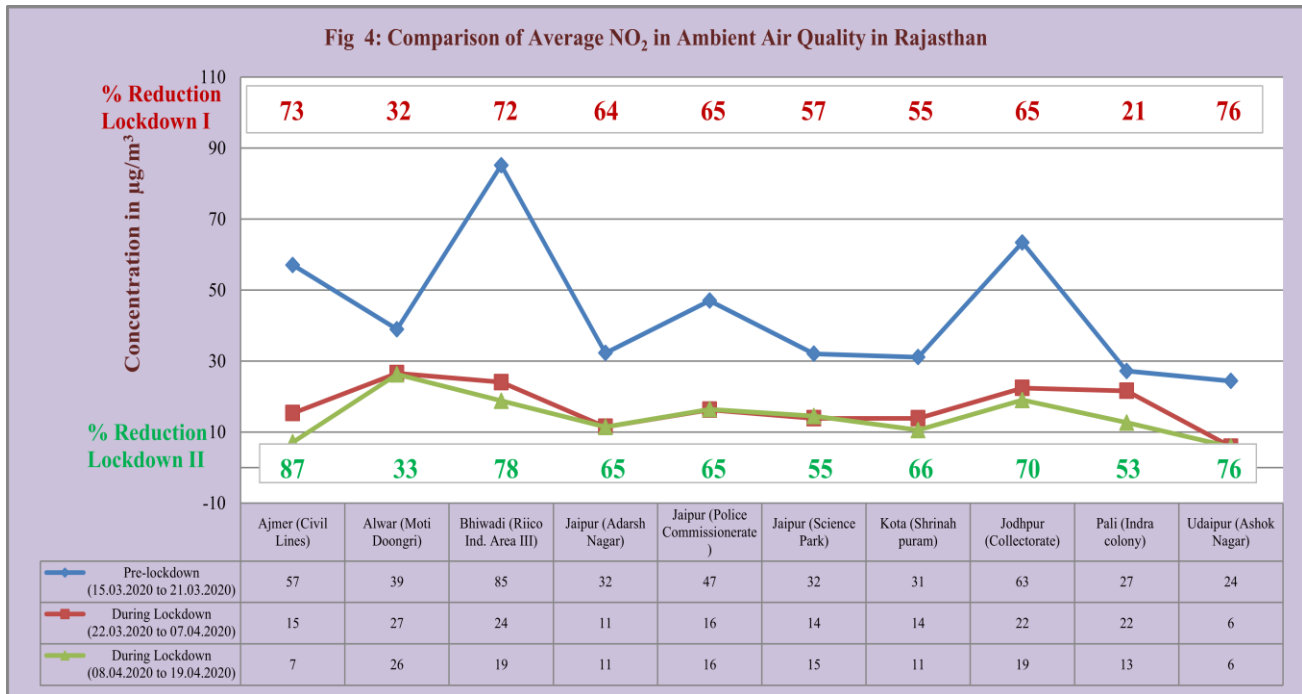




Fig 4: Comparison of Average NO₂ in Ambient Air Quality in Rajasthan



It can be observed that concentration of PM₁₀ under lockdown-II has generally increased at all the stations except at Ajmer, Alwar and Kota as compared to lockdown period-I. In case of PM_{2.5} also, the concentration under lockdown Period-II has generally increased at all the stations except at Ajmer, Alwar and Jodhpur. However, in case of NO₂, the concentration has reduced at all the places except at Jaipur (Shastri Nagar) where it has increased marginally.

III. Conclusions and Major Highlights

- i. It is evident that as compared to lockdown period-I, air quality in terms of Air Quality Index has deteriorated at all the towns except at Alwar & Kota in post lockdown period-II.
- ii. The average Air quality index of all the cities except Bhiwadi has still remained in satisfactory/Good categories even in the lockdown period-II. However, in case of Bhiwadi the air quality has moved to moderate from earlier satisfactory category, though it is still better than the pre-lockdown period air quality which was in poor category.
- iii. In terms of individual pollutants, Ajmer has noticed very high reduction of 87% for Oxides of Nitrogen and around 60 % in the concentration of PM₁₀ and PM_{2.5} during the lockdown period-II.



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- iv. Concentration of PM_{10} under lockdown-II has generally increased at all the stations except at Ajmer, Alwar and Kota as compared to lockdown-I. In case of $PM_{2.5}$ also, the concentration under lockdown Period-II has generally increased at all the stations except at Ajmer, Alwar and Jodhpur.
- v. In case of NO_2 , the concentration has reduced at all the towns in the lockdown period-II as compared to Lockdown period-I except at Jaipur (Shastri Nagar) where it has increased marginally.

