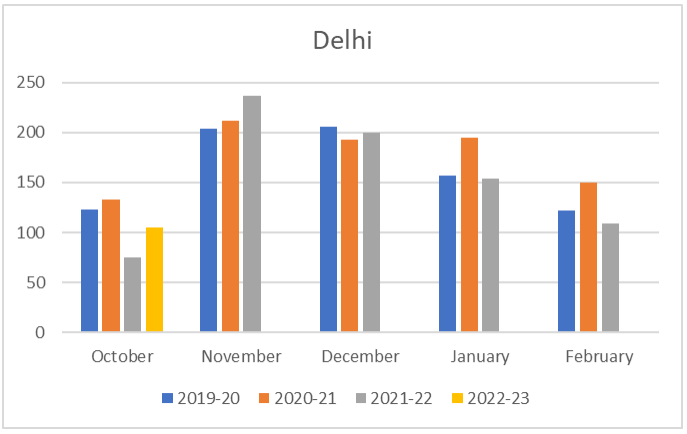
Air pollution in October 2022 higher than 2021 in many cities across the Indo-Gangetic belt

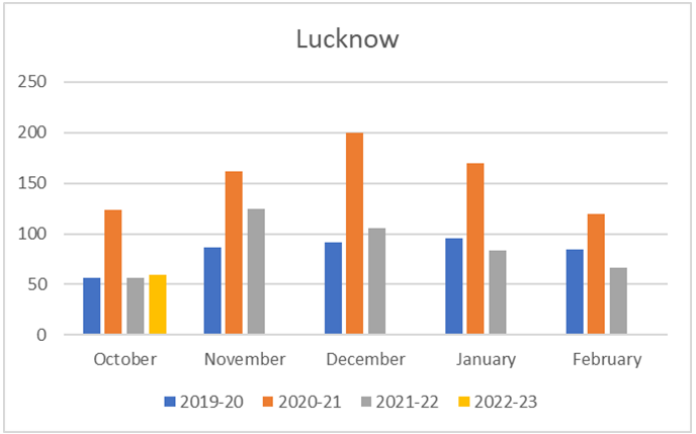
'The worst of the pollution season may be ahead of us'

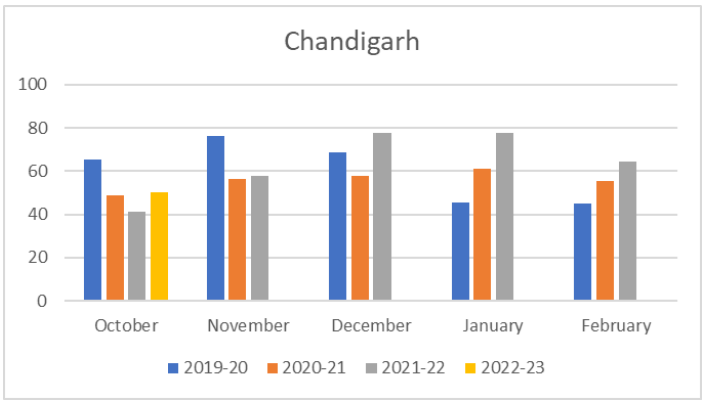
November 3, New Delhi: Diwali is the start of the air pollution season in the Indo-Gangetic Plain states, and the worst of the season may be ahead of us, shows data from the Central Pollution Control Board's (CPCB) Continuous Ambient Air Quality Monitoring Station (CAAQMS). Local emissions, coupled with winter meteorology and increased stubble burning in the region, are some of the leading causes of the high pollution levels during this season.

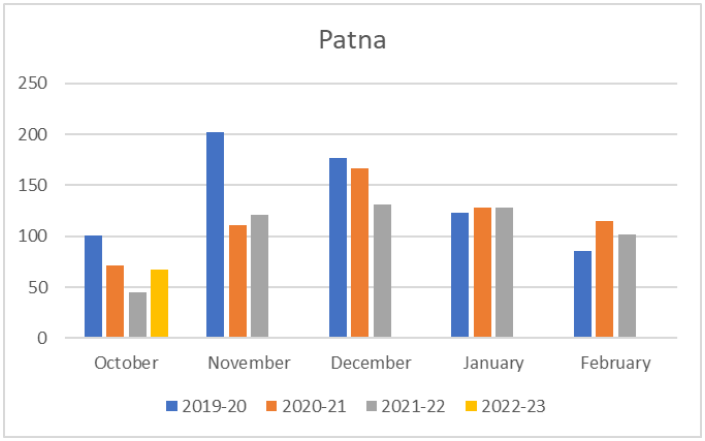
According to the analysis by NCAP Tracker, average PM 2.5 levels in October this year were higher as compared to 2021 in capital cities of Delhi, Chandigarh, Lucknow and Patna. The PM2.5 levels in October 2022 have surpassed those in October 2021, despite delayed withdrawal of monsoon and a cleaner Diwali in comparison across the last 5 years. The rains also delayed the stubble burning season this year. The only exception was Kolkata which saw a decrease in levels in comparison to last year.

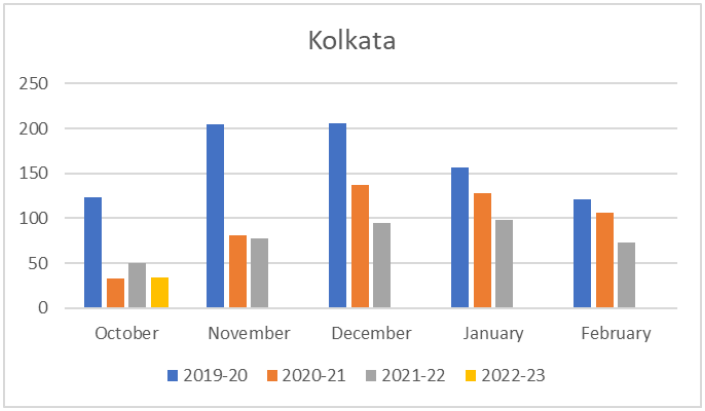
The five capital cities were selected for the analysis as representatives of the IGP. Jharkhand's capital Ranchi couldn't be included due to the unavailability of a Continuous Ambient Air Quality Monitoring Station (CAAQMS) in the city. Data for the months of October to February was considered representative of the winter season.











Source: CPCB

The average PM 2.5 levels for October 2022 in Delhi, Patna, Lucknow and Chandigarh were higher despite the meteorological conditions and cleaner Diwali indicating that that the last few days of October 2022 saw higher pollution levels in comparison to those in the same month in 2021, thereby increasing the monthly average in. The PM 2.5 levels for October 2022 in Delhi and Patna remained above CPCB's daily safe limits of 60 ug/m3. Delhi recorded an average PM 2.5 of 105 ug/m3 in October 2022 as opposed to 74.88 ug/m3 in the previous year. The rains also meant a delayed stubble burning season which meant its share in the PM 2.5 levels in Delhi was around 7% until October 28. Similarly, Patna's PM 2.5 concentration breached the safe limits to 67 ug/m3 from 2021

when it was 45.25 ug/m3. It was only Kolkata which saw its PM 2.5 levels dip in comparison with 2021.

City	Avg PM 2.5 levels in ug/m3	
	Oct-21	Oct-22
Delhi	74.88	105
Patna	45.25	67
Chandigarh	41.2	50
Lucknow	56.76	59.9
Kolkata	50.02	33.8

Source: CPCB

Aarti Khosla, director, Climate Trends said, *"In October 2021, there was a slump in the economy and Covid restrictions in place too. However, this year a lot more activity resumed which could be a reason for higher PM levels. For years, the action against air pollution have included ad-hoc measures during the winter season. The government's have also resorted to a blame game as air pollution levels spike in the national capital and around. What we need are long term solutions like switching to clean energy, managing vehicular pollution and strengthening monitoring to tackle emissions all year round so we can avoid such hazardous levels of pollutions during winter. The extremely high PM 2.5 levels for nearly four months over the years are causing long term adverse impacts on health of the citizens in these cities."*

"It is important to note that both Delhi and Patna have reported an increase of over 40% in their PM2.5 levels of Oct 2022 as compared to the same time last year, while Kolkatta has recorded a reduction of 34%. These are cities with a reasonably dense city-wide monitoring. Some cities improving and others getting worse point to a combination of metrological conditions and ground policies which need to be understood better to know what improvements to make to clean our air. The analysis clearly indicates that enough has not been done and it might get worse in the next 2-3 months. While the measurements and science is giving us better insights in the problem, we still need very close monitoring of the situation to make large-scale improvements at the city-level," said **Ronak Sutaria, Founder and CEO, Respirer Living Sciences.**

It also showed that the months of November and December in Delhi over the past three years have the highest concentration of PM 2.5. The levels of 205.58 ug/m3 in December 2019 were over three times more than the CPCB daily average safe limit of 60 ug/m3 for PM2.5 levels. November 2020 and 2021 were even higher in comparison, despite the complete lockdown in 2020 and reduced economic activity over the last two years.

Similarly, in November 2019, Patna recorded a PM 2.5 concentration of 201.77 ug/m3. While it was lower in the following years, the highest levels were more than double the safe limits. Lucknow, too, sees the highest PM 2.5 levels in the months of November and December. In December 2020, the PM 2.5 levels inched to almost 200 ug/m3.

PM 2.5 levels peaked in Kolkata later than the rest of the IGP capitals. In the winter season of 2019-2020, the highest PM 2.5 levels of 95.21 ug/m3 were recorded in January. The most polluted in the next winter season was December 2020, and January 2022 the following year.

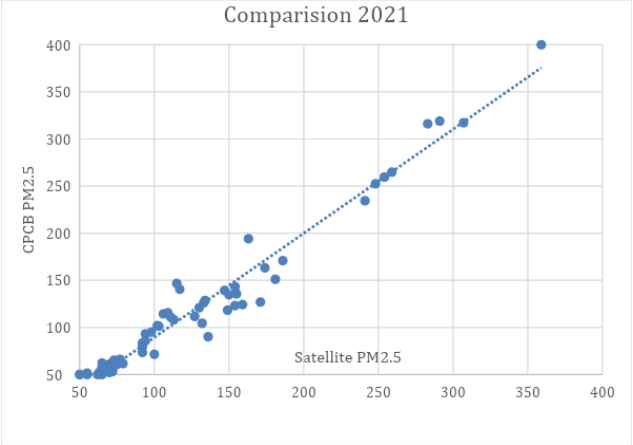
Prof. Ravindra Khaiwal from the Department of Community Medicine and School of Public Health, PGIMER, Chandigarh, said, *"Air Pollution is governed by four factors - emissions, meteorology, atmospheric reactivity and the geographic location of a city. Winds during this season blow from Punjab to West Bengal and Delhi is at a major disadvantage. With increased vehicular and local emissions, small and mid sizes urban centres are also becoming hotspots as seen in the air quality levels they are reporting. We need to plan not only for crop residue burning but also other sources for the rest of the year so we can effectively manage pollution during this time when the atmospheric reactivity in play. It is extremely important to prioritise this since air pollution is a major risk to various health issues including respiratory and cardiovascular ailments."*

Pollution trends which start setting around Diwali for the last 5 years

Despite the rains and delayed stubble burning season, the same IGP capital cities showed a spike in PM 2.5 levels the days after Diwali. Air pollution data derived from the satellite for the years 2017 to 2021 and from the CPCB for 2022 show that the only exception was the year 2020 for cities Delhi, Lucknow and Chandigarh, which all received rains the day after Diwali.

An analysis of air pollution data for seven consecutive days before and after Diwali since 2017 showed that despite all policy measures, PM 2.5 levels were way above the Central Pollution Control Board's permissible limits of 60 ug/m3 in most cities. Data also reveals that PM 2.5 levels were highest in Delhi as compared to other capital cities during the period. This year, while meteorology helped keep pollutants under check, the following days have seen a spike in air pollution levels.

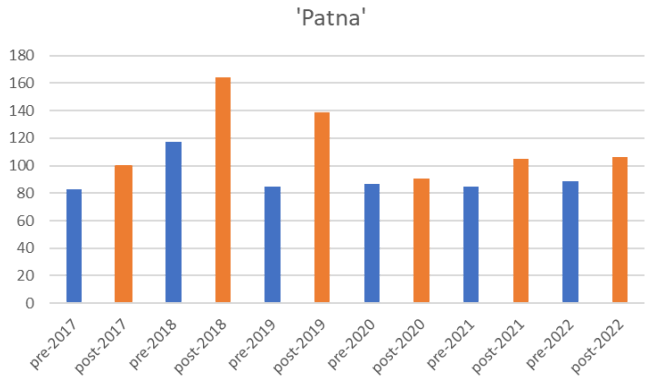
Because SAANS data is unavailable in real-time, CPCB data was used for 2022 values. The chart below shows that the satellite data and CPCB are not very different in 2021 during Diwali time. Hence, we have compared the trends of 2022 using CPCB data with satellite data for the other years.



Source: Satellite-Based Application For Air Quality Monitoring and Management at National Scale (SAANS) and CPCB

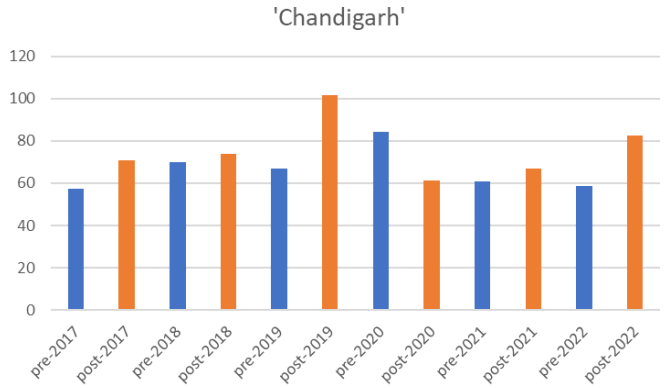
Find below the pre-Diwali and post-Diwali air pollution levels in the capital city

Patna, Bihar



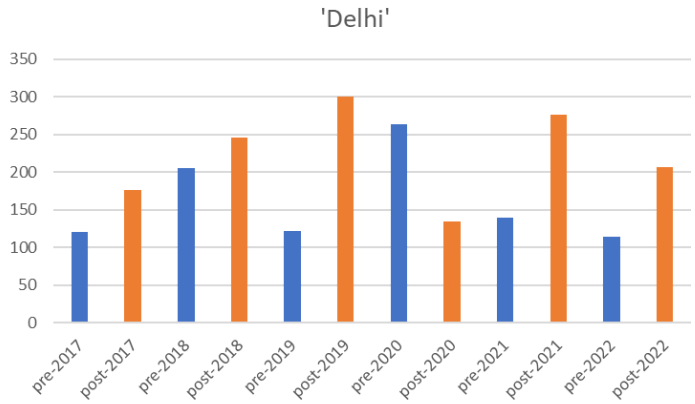
Source: Satellite-Based Application For Air Quality Monitoring and Management at National Scale (SAANS) and CPCB

Chandigarh, Punjab



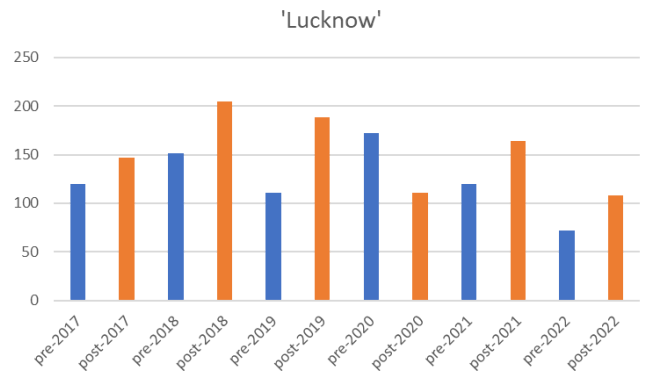
Source: Satellite-Based Application For Air Quality Monitoring and Management at National Scale (SAANS) and CPCB

Delhi



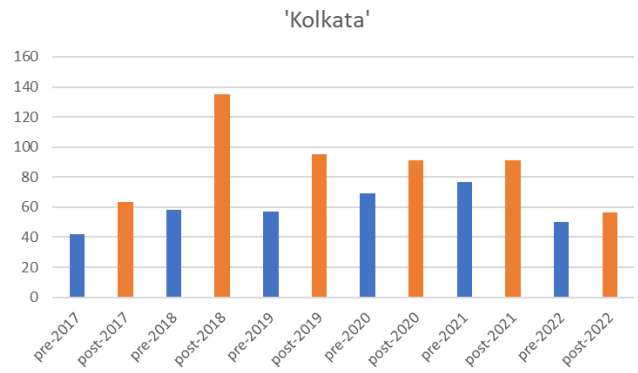
Source: Satellite-Based Application For Air Quality Monitoring and Management at National Scale (SAANS) and CPCB

Lucknow, Uttar Pradesh



Source: Satellite-Based Application For Air Quality Monitoring and Management at National Scale (SAANS) and CPCB

Kolkata, West Bengal



Source: Satellite-Based Application For Air Quality Monitoring and Management at National Scale (SAANS) and CPCB

"Data showed that this year during Diwali, air pollutants were reduced, and it was a cleaner Diwali compared to the past 4 or 5 years. Though PM 2.5 increased on the night of Diwali (24th Oct), concentration and emission were less by a factor of 2-3 at most of the observation sites. Favourable meteorological conditions prevailed the next day, and the wind speed increased. This was sufficient to disperse most of the pollutants accumulated during the night," said **Dr. S. K. Dhaka, Professor, Rajdhani College, University of Delhi.**

Pollution levels however picked up soon after Diwali adding to the month's average. "*The heavy and prolonged rainfall during the second week of October in entire northern India, covering a large area of Punjab and Haryana. These episodic rainfall events delayed the stubble burning and did not coincide with the Diwali festival. Since the last few days, fire counts have increased rapidly, and the wind has become calm, resulting in the accumulation of pollutants in the Delhi NCR region. It is learnt*

that stubble burning will continue this week, and Delhi NCR will experience more severe air quality, which will deteriorate into the hazardous category," he added.

Cities in comparison: Every year, Delhi saw the highest levels of PM 2.5 compared to other capital cities in the Indo-Gangetic Plain region. Find below the graph for 2022. October 24 was Diwali and all cities saw a spike in pollution levels the next day.

Source: Satellite-Based Application For Air Quality Monitoring and Management at National Scale (SAANS) and CPCB

Fire count

City	pree-2022	post-2022
Delhi	7	5
Punjab	3495	11831
Haryana	1180	888
Ranchi	8	10
Lucknow	0	1

Source: VIIRS Active fire 375m resoulation

About NCAP Tracker

NCAP Tracker is a joint project by Climate Trends and Respirer Living Sciences to create an online hub for the latest updates on India's clean air policy, the National Clean Air Programme (NCAP). It is designed to track India's progress in achieving the 2024 clean air targets set under the NCAP. The NCAP Tracker enables this by compiling and evaluating various levels of air quality data and closely tracking the effectiveness of the clean air policy. The tracker compiles and analyses information on air quality and budget allocation that is publicly available or provided by the government of India.

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