



More Heat, More Air Pollution – A Recap of Summer 2022

While it is commonly assumed that air pollution is a winter problem, government data shows otherwise. A deep dive into air pollution data of the Central Pollution Control Board (CPCB) from the [CAAQMS dashboard](#) of the [NCAP Tracker](#) across 10 cities showed that monthly PM 2.5 and PM 10 levels during the summer months breached the annual CPCB safe limits of 40 ug/m³ and 60 ug/m³ respectively during most months.

Despite alarming high levels, air pollution continues to be perceived as a winter problem. Policy decisions and actions focus on the problem for the few months of winter. It is the prolonged exposure to high pollution levels throughout most of the year that impacts human health. According to a recent study commissioned by the Energy Policy Institute (EPIC) at the University of Chicago, air pollution has shortened life expectancy in New Delhi by up to 10 years, and across the country by five years.

Adding to the existing meteorological factors that keep the air pollution levels high during summer, this year also saw multiple heatwaves and a poor show of pre-monsoon showers, especially in the northwestern plains.

About the analysis

For the purpose of this analysis, 10 non-attainment cities – Agra, Bengaluru, Chandigarh, Chennai, Delhi, Kolkata, Jodhpur, Mumbai, Lucknow and Patna – were selected and average PM 2.5, PM 10 and NO₂ levels were analysed for the months of March, April, May and June. While the Indian Meteorological Department considers June as a monsoon month, it is mostly dry in several parts of the country and hence part of our summertime pollution analysis. The CPCB's annual average permissible limits for PM 2.5, PM 10 and NO₂ are 40 ug/m³, 60 ug/m³ and 40 ug/m³ respectively. The World Health Organisation's safe limits are lower at 5 ug/m³, 15 ug/m³ and 10 ug/m³ for the three pollutants respectively.

Detailed data can be accessed [here](#).

How did the cities fare in the summer months this year?

According to the data, all cities except Chennai recorded higher than permissible PM 2.5 levels in March 2022 and all cities breached permissible limits for PM 10 levels. In April, levels improved only in Kolkata and it joined Chennai in the cities which did not breach safety limits for PM 2.5. Chennai was also the only city with PM 10 levels within safe limits during April. Similar trends continued in May when only Chennai, Bengaluru and Kolkata saw PM 2.5 levels within safe limits and no city met the safety standard for PM 10 levels. With some parts of the country receiving rains in June 2022, five cities – Agra, Bengaluru, Chennai, Kolkata and Mumbai saw their PM 2.5 levels improve and within the CPCB safety limits. PM 10 levels were under 60 ug/m³ during June in Bengaluru, Chennai and Mumbai.

Unlike winters, the atmospheric boundary layer that keeps the pollutants close to the surface is much higher during the summer. This gives more space for the pollutants to disperse but if air pollution levels are higher despite that, is a cause for concern.

| Month | Cities with PM 2.5 levels above safe limits | Cities with PM 10 levels above safe limits |
|--------|---|--|
| Mar-22 | Agra, Bengaluru, Chandigarh, Delhi, Kolkata, Jodhpur, Mumbai, Lucknow and Patna | Agra, Bengaluru, Chandigarh, Chennai, Delhi, Kolkata, Jodhpur, Mumbai, Lucknow and Patna |
| Apr-22 | Agra, Bengaluru, Chandigarh, Delhi, Jodhpur, Mumbai, Lucknow and Patna | Agra, Bengaluru, Chandigarh, Delhi, Kolkata, Jodhpur, Mumbai, Lucknow and Patna |
| May-22 | Agra, Chandigarh, Delhi, Jodhpur, Mumbai, Lucknow and Patna | Agra, Bengaluru, Chandigarh, Chennai, Delhi, Kolkata, Jodhpur, Mumbai, Lucknow and Patna |
| Jun-22 | Chandigarh, Delhi, Jodhpur, Lucknow and Patna | Agra, Chandigarh, Delhi, Kolkata, Jodhpur, Lucknow and Patna |

Figure 1: Cities which breached safe limits for PM levels in summer this year. Source: NCAP Tracker

2021 vs 2022

This year, the country was reeling under multiple heatwaves from as early as March with record-breaking temperatures all across. March was the warmest in 121 years and the country recorded an average maximum temperature of 33.1 degrees Celsius, an all-time-high and 1.86 degrees Celsius above normal levels. Similar trends continued in the following months.

With the extreme heat also came a power crisis that resulted in more coal burning, a primary source of pollution. On June 10, India's power demand peaked at [211 GW](#) against the peak requirement of [186 GW in 2021](#) and [75%](#) of this was provided by coal-fired thermal power plants. Extreme heat combined with stagnant air during a heatwave increases not only the amount of ozone pollution but also particulate pollution. The Westerly winds from Balochistan, central Pakistan and Thar desert also carry dust adding to the PM 10 levels. Locally, these prolonged dry spells during the summer months also mean more dust resuspension in the air. Adding to the summer woes was the poor show of pre-monsoon, especially for northwestern plains which are also hotspots for some of the highest levels of air pollution. Between March and May, Northwest India saw a large rainfall deficit of 63%, followed by Central India with a 39% deficit rainfall. In June, there was an 8% deficit in the countrywide cumulative rainfall.

Evidently, the PM 2.5 and PM 10 levels were higher this year compared to 2021 in most of the cities during summer. For instance, Delhi's PM 2.5 and PM 10 levels were higher in 2022 as compared to 2021 across the four months except in the case of PM 10 levels in March. Similar was the case in Patna. In both cities, the levels are over five times higher than CPCB standards. (Data for other cities analysed is available in the data sheet.)

| City | PM 2.5 (ug/m3) | | | | PM 10 (ug/m3) | | | |
|------------|----------------|--------|-------|-------|---------------|--------|--------|--------|
| | March | April | May | June | March | April | May | June |
| Delhi 2021 | 95.67 | 87.43 | 54.47 | 53.6 | 248.57 | 227.94 | 143.97 | 157.43 |
| Delhi 2022 | 98.98 | 105.19 | 81.48 | 60.73 | 231.4 | 291.12 | 246.51 | 230.74 |
| Patna 2021 | 100.49 | 88.88 | 38.83 | 31.78 | 243.95 | 194.68 | 94.54 | 80.6 |
| Patna 2022 | 106.52 | 107.4 | 66.42 | 58.07 | 223.47 | 254.98 | 155.91 | 158.78 |

Figure 2: PM 2.5 & PM 10 levels for Delhi & Patna during the summer months. Source: NCAP Tracker

The pollutant share during summers

While the PM 2.5 levels are more than permissible limits in the 10 cities, the PM 10 levels are significantly higher and are the prominent pollutant. Data analysed shows that eight of the 10 cities did not see PM 10 levels in the safe limits throughout the four months in 2022. Bengaluru’s PM 10 concentration of 58.49 ug/m3 in June 2022 barely met the safety standard when the city had already received over 200 mm of rainfall. Similarly, Chennai’s PM 10 concentration met the safe limits in April and June this year.

Among the 10 cities, Nitrogen dioxide (NO2) breached annual safety limits of 40 ug/m3 in the cities of Patna and Delhi during March and April this year and in Chandigarh from April to June. An [NCAP Tracker analysis](#) of Delhi’s NO2 levels in winter revealed that between 2013 and 2020, the city’s average annual NO2 levels ranged from 61-73 ug/m3, always above safe limits. While within permissible limits in other cities, several of them like Agra, Chennai, Jodhpur and Kolkata saw an increase in levels as compared to the previous year. NO2 is an irritant gas, which at high concentrations causes inflammation of the airways.

Prolonged exposure day after day

The [calendar heatmap](#) on the NCAP Tracker that gives the average PM 2.5 and PM 10 levels for each day shows that several cities have continuous streaks of highly polluted days. CPCB’s 24-hour safe limits for PM 2.5 and PM 10 are 60 ug/m3 and 100 ug/m3 respectively. The World Health Organisation’s [24-hour safe limits](#) are lower at 15 ug/m3 and 45 ug/m3 for the two pollutants respectively.

In April 2022, Delhi did not have a single day when PM 2.5 met the CPCB’s 24-hour safe limit of 60 ug/m3. Similarly, a coastal city like Mumbai had only nine days when PM 2.5 concentration didn’t breach the safe limits. You can find month-on-month heatmaps for all cities [here](#). Such prolonged exposure to high levels of air pollution can have an impact on human health.

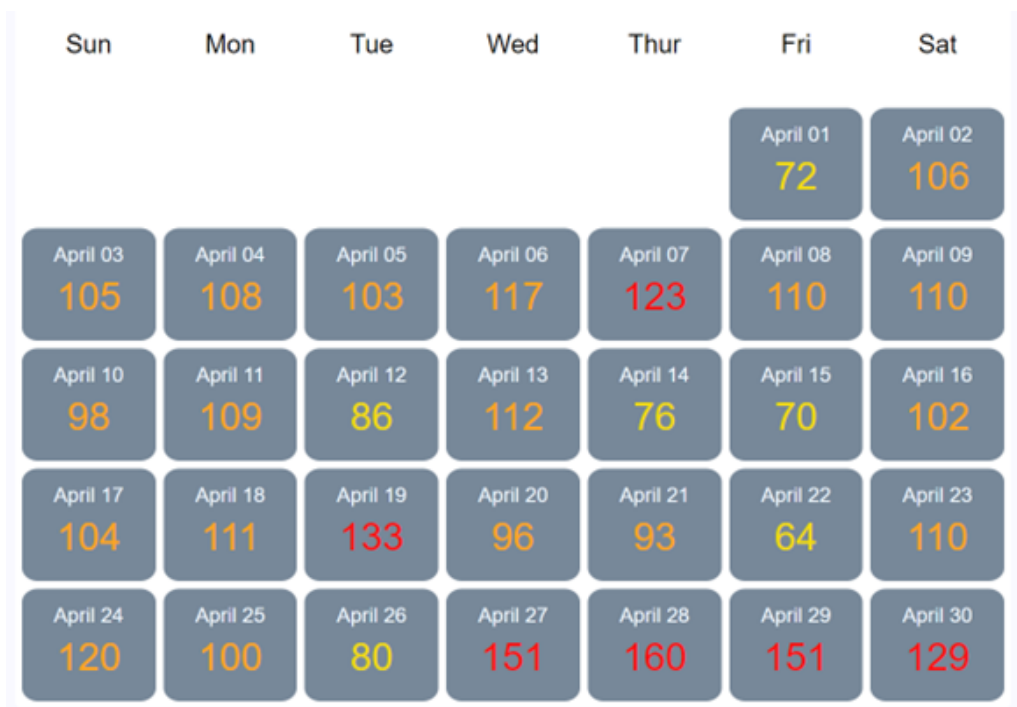


Figure 3: Delhi's PM 2.5 concentration each day in April 2022

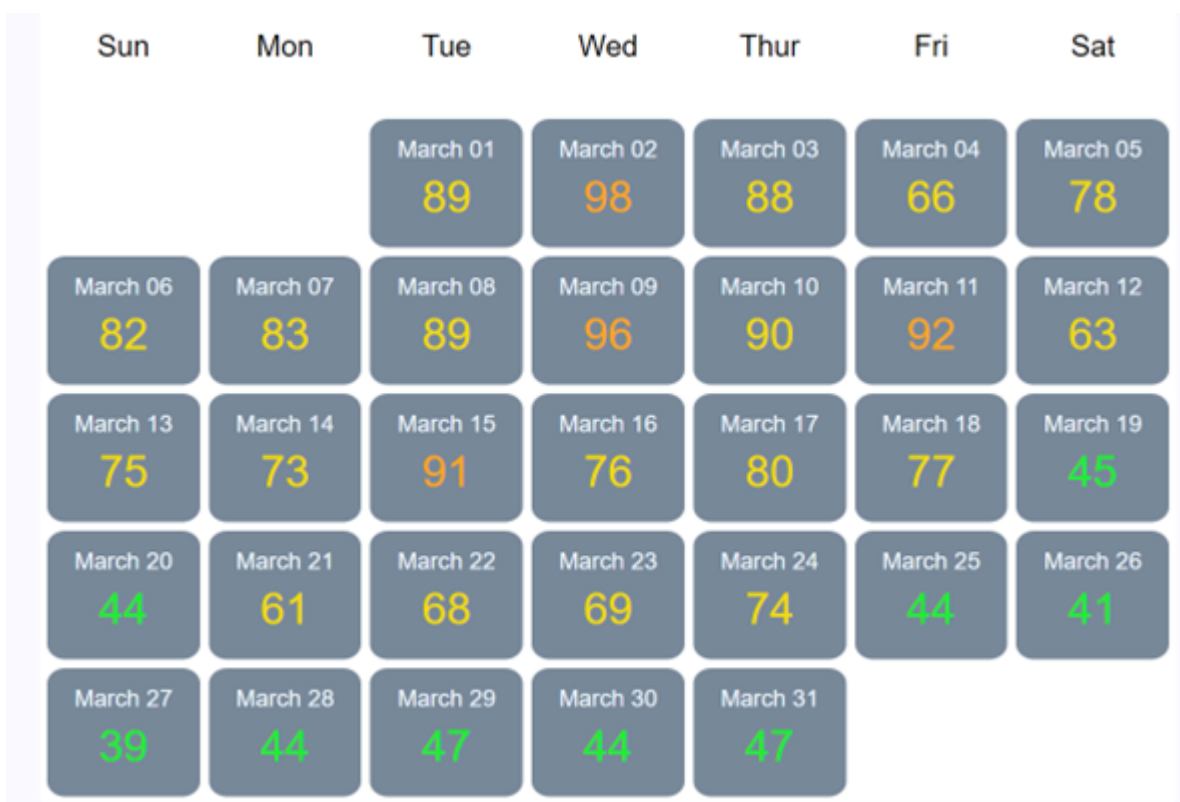


Figure 4: Mumbai PM 2.5 concentration each day in March 2022

The progress of the National Clean Air Programme (NCAP)

Over the years, with the NCAP it is clear that the government too acknowledges the air pollution crisis in the country and policies are being put in place. Recently, the Delhi government also announced that the national capital would get a [summer action plan](#) to deal with high air pollution levels. Similarly, air pollution is one of the sectors that the [Mumbai Climate Action Plan](#) will focus on.

The finance of NCAP

In 2020 XV Finance Commission (FC) recommended allocating Rs 4,400 crores to 42 urban agglomerations with a million-plus population. In November 2020, a total of Rs 2,200 crores was released as a first tranche of the FC budget to the respective states from where the largest urban local bodies (ULBs) of the 42 cities would have received the grants and subsequently, sub-grants would have been made to other ULBs in the cities. The [minutes of the 4th meeting of the steering committee of NCAP](#) available on the CPCB's Prana portal also state that Rs 1,833 crore has been further released for 2021-22. It further states that the quantum of funds to be released in 2022-2023 will be based on Performance evaluation on improvement in air quality with respect to targets specified by the CPCB. It outlines the year-on-year PM 10 reduction targets for 82 cities up to 2026. The reduction is expected to range between 25-40% for the cities.

More details on state and city-wise targets and spending are available [here](#).

For the next year, NCAP and the XV finance commission funds will be disbursed based on the performance indicators set under the programmes. This indicates that the onus rests on the ULBs which are the implementing agencies. [Recent ground research proves that there is a disconnect in the understanding of the relevance and scale of the problem in the ULBs and their role and awareness in tackling this crisis](#). The gaps in these linkages towards effective ground implementation are one of the key factors which require strengthening.

Experts speak

Prof S N Tripathi, Steering Committee member, NCAP, MoEFCC; Coordinator, National Knowledge Network; Civil Engineering dept, IIT Kanpur

"This year was climatologically one of the hottest summers that we have seen in a long time. Extremely hot weather combined with winds has led to the resuspension of coarse particles which is clearly visible in the high PM 10 values across most cities. The rising temperatures during the heatwave have also pushed up the demand for air conditioning resulting in higher coal consumption and hence this is reflected in higher PM 2.5 levels."

Ronak Sutaria, Co-Founder and CEO, Respirer Living Sciences

"Several continuous days of high air pollution is far more damaging to human health than a few days of very high peak pollution. As can be seen from the Delhi data, the entire second week of April reported levels above 100 ug/m³. A cumulative PM_{2.5} load of over 700 ug/m³ in a week for a city is

quite unprecedented during summer days. While regulatory standards are based on 24hr and annual means, it is evident that weekly averages and the cumulative load of air pollution need to be tracked closely too."

Mahesh Palawat, VP, Meteorology and Climate Change, Skymet Weather

"This year, pre-monsoon rains were almost nil during March and April. Heatwave conditions also started to affect many parts of the country as early as the second week of March. Usually, during such continuous dry spells, the air pollution increases as rains don't wash away the pollutants and the dust particles which constitute PM10, continue to remain suspended in the lower levels of the atmosphere. The westerly winds from Balochistan, Central Pakistan and Thar desert also continued for long over the Indo-Gangetic plains, parts of Central India of Marathwada and Vidarbha and even affected the South Peninsula i.e. Telangana etc. This meant that the pollution remained in the poor category during the summer months. Usually, by the second half of June, several parts of the country get pre-monsoon showers which clean up the air but that hasn't been the case this year. This year, the dust storms increased over the middle east region and the winds have carried the dust to places like Mumbai, Madhya Maharashtra and central parts of the country. Such incidents will continue to rise due to climate change and furthermore impact the air pollution levels as well."

Atul Goyal, President, United Residents Joint Action (URJA) of Delhi

"In cities, especially in hotspots like Wazirpur in Delhi where we have closely worked, largely contributing to the local pollutants are unregulated industries operating and flouting emission norms, burning of waste in open and rampant construction around the city. While the construction activity seems to be taking place under covers, no use of water during demolition is a major source of PM 10 and PM 2.5 in Delhi's AQI. Unless the Delhi Pollution Control Committee tightens its act with citizen participation no corrective measures will be visible anywhere."

Bhavreen Malhotra Kandhari, Environmentalist, Co-Founder, Warrior Moms

"With the NCAP, the government acknowledges the problem but enough needs to be done. The science is established but we need studies to evaluate the impact of the measures undertaken by the government, especially on ad-hoc policies like odd-even. A lot of announcements have been made but we need to ensure its implementation."

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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.