



# DIWALI **AIR** QUALITY

AN IMMINENT DISASTER IN THE MAKING



A Comprehensive Analysis of Pre, During  
and Post-Diwali Periods in Eastern Indian  
Cities by SwitchON Foundation ●●●



## ABSTRACT

This report by SwitchON Foundation examines air quality during the Diwali festival across cities in eastern India, emphasizing the persistent challenge of deteriorating air quality. Despite regulatory efforts, the pre-Diwali period witnessed varying trends, with Kolkata experiencing a surge, Ranchi maintaining moderate levels, and Bhubaneswar facing fluctuations. During Diwali, Kolkata saw a notable decline, Ranchi's air quality rapidly deteriorated to "Very Poor" levels, and Bhubaneswar registered its poorest air quality. The findings underscore the need for stringent enforcement of regulations and citizens' compliance to mitigate air pollution. Recommendations include promoting green crackers and robust law enforcement. The report concludes with a call for sustained efforts to ensure a cleaner, healthier environment during festive celebrations.

**Keywords:** Diwali air pollution, Festive season air quality, Eastern India air pollution, Pre-Diwali air quality, During Diwali pollution, Post-Diwali air quality, SwitchON Foundation report, Air quality monitoring, Green crackers, Regulatory efforts on air pollution



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## INTRODUCTION

The observance of Diwali, renowned as the festival of lights, consistently raises apprehensions regarding air pollution. Particularly in the initial days of winter, when the air near the surface becomes denser and stabilizes in correlation with the cold atmosphere, Diwali exacerbates atmospheric pollution significantly. Despite concerted efforts by authorities and specific civil society groups to regulate firecrackers, environmentalists' concerns about the festival's impact on air quality persist. This underscores the ongoing challenges in mitigating Diwali's environmental footprint, emphasizing the imperative for sustained endeavours to address air quality issues during festive celebrations. This paper elucidates the SwitchON Foundation's initiative to examine the periods preceding, during, and following Diwali in cities across eastern India, shedding light on the nuanced dynamics of air quality during this festive season.

## AIM & OBJECTIVES

This study aims to raise awareness about the declining air quality during the Diwali season. To achieve this goal, the study objective is focused on examining the air quality conditions in cities across eastern India during the Diwali period.

## METHODOLOGY

This study is founded on ongoing air quality research and is tailored to its defined objectives. A quantitative analysis, relying on data, has been executed to evaluate air quality throughout the Diwali season. The dataset, crucial for this study, was procured from diverse sources such as the CPCB-CAAQMS platform, the Sameer App of CPCP, and the Jharkhand State Pollution Control Board website. The designated data collection period spans from October 29th to November 13th, 2023, encompassing crucial parameters like AQI, PM2.5, and PM10. To enhance clarity, the acquired dataset is visually presented in graphical formats, and a meticulous analysis has been conducted, substantiated by ample justifications and insights derived from the data.

City	Stations
Kolkata	Ballygunge, Kolkata - WBPCB, Bidhannagar, Kolkata - WBPCB, Fort William, Kolkata - WBPCB, Jadavpur, Kolkata - WBPCB, Rabindra Bharati University, Kolkata - WBPCB, Victoria, Kolkata - WBPCB, Rabindra Sarobar, Kolkata - WBPCB
Ranchi	Jharkhand State Pollution Control Board Website Day Wise Data: <a href="https://jsac.jharkhand.gov.in/pollution/Index.aspx">https://jsac.jharkhand.gov.in/pollution/Index.aspx</a> Vendor: Environment SA India Pvt. Ltd Industry: Van Bhavan CAAQMS-1_Ranchi_JSPCB_TSL_JsrStation ID: Van Bhavan_Ranchi_CAAQMS-1
Dhanbad	Sardar Patel Nagar, Dhanbad - JSPCB
Bhubaneswar	Lingaraj Mandir and Patia of the Central Pollution Control Board (CPCB)
Angul	Hakimapada Angul - OSPCB



# Findings

## PRE-DIWALI AIR QUALITY

### • Stringently Worsening AQI with the advancement of Diwali in Kolkata

In Kolkata, Post Durga Puja, daily mean AQI, PM<sub>2.5</sub>, and PM<sub>10</sub> persist in the Moderate zone. On November 7th, a peak reached a mean AQI of 208, with PM<sub>2.5</sub> at 92.31  $\mu\text{g}/\text{m}^3$  and PM<sub>10</sub> at 167.97  $\mu\text{g}/\text{m}^3$ , exceeding limits. Winter onset, increased vehicular emissions, and Diwali firecrackers contribute to this surge. A Times of India report on 04.11.2023 notes a 40.2% rise in October's PM<sub>2.5</sub> from 2022. Times Now on 04.11.2023 highlights alarming pollution amid Diwali and winter. On October 8th, 8 am recorded a worrying AQI of 249, PM<sub>2.5</sub> at 104.65, and PM<sub>10</sub> at 188.58  $\mu\text{g}/\text{m}^3$ .

### Kolkata: AQI, PM<sub>10</sub> & PM<sub>2.5</sub>

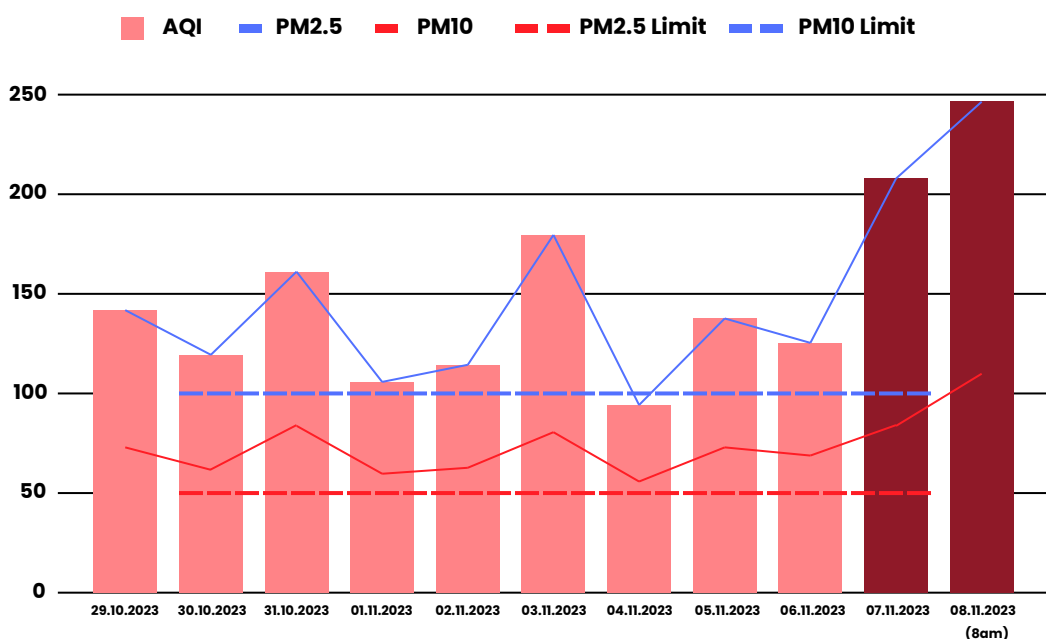


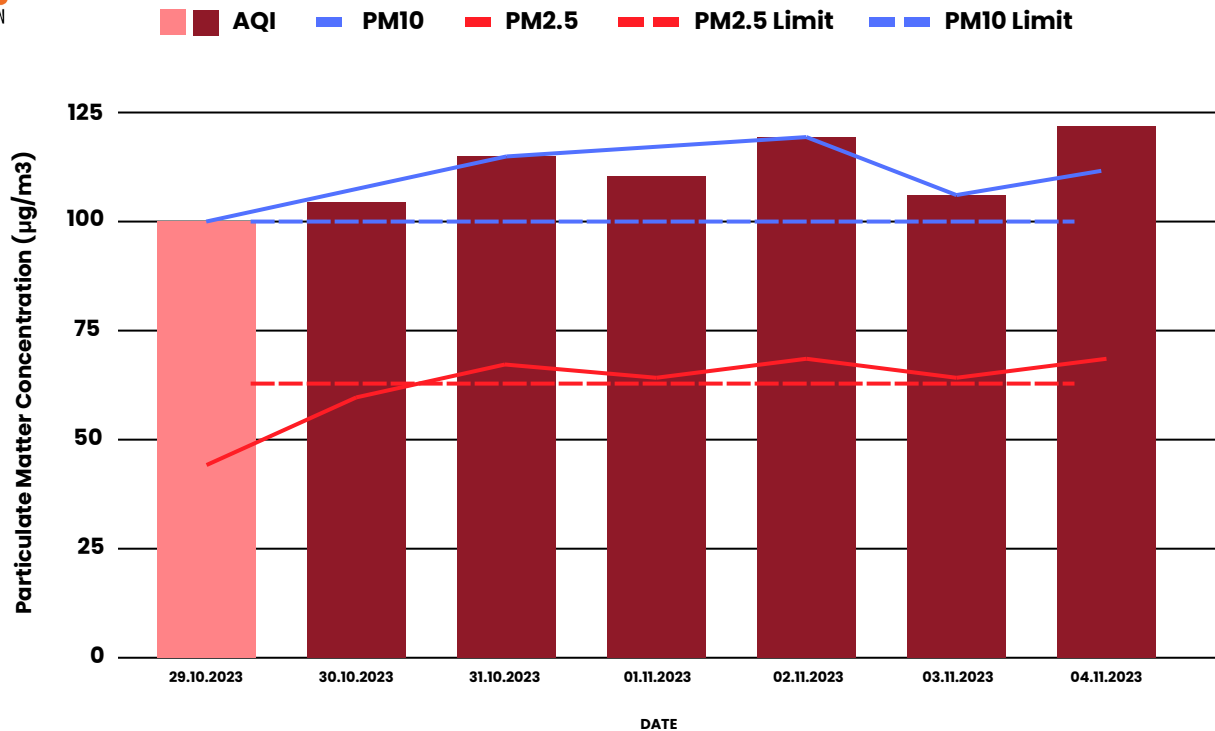
Figure 1: Air Quality in the pre-Diwali period in Kolkata

Data Source: CPCB

### • Ranchi's Moderate Air Quality

In Ranchi, it is observed that in the past seven days from 29th October to 4th November the air quality of the city remained mostly in the Moderate category (Figure 2). In between the post-Durga puja and pre-Diwali period, the average PM concentration has remained relatively close to the permissible limits and the week ended with deteriorating air quality, possibly compromised due to increased Diwali firecracker bursting, and rising PM and SO<sub>2</sub> levels, a critical concern with the approaching winter.

## Ranchi Air Quality



**Figure 2: Air Quality in the pre-Diwali period in Ranchi**

**Data Source: JSPCB**

### Decreasing AQI in Dhanbad with the advancement of Diwali

In Dhanbad, the AQI was mostly moderate (135 on average) during the same time frame except on the 3rd of November when it reached a satisfactory level (Figure 2). From November 4th the AQI has started rising to indicate an alarming level of AQI in the city in the pre-Diwali period. Simultaneously, there has been a discernible increase in the levels of PM2.5 and PM10 in the ambient air. This escalation in air pollution, coupled with the rise in particulate matter concentrations, underscores the need for vigilant monitoring and prompt measures to mitigate the deteriorating air quality conditions, especially with the upcoming festivities of Diwali and the onset of winter.



## Dhanbad: AQI, PM10 & PM2.5

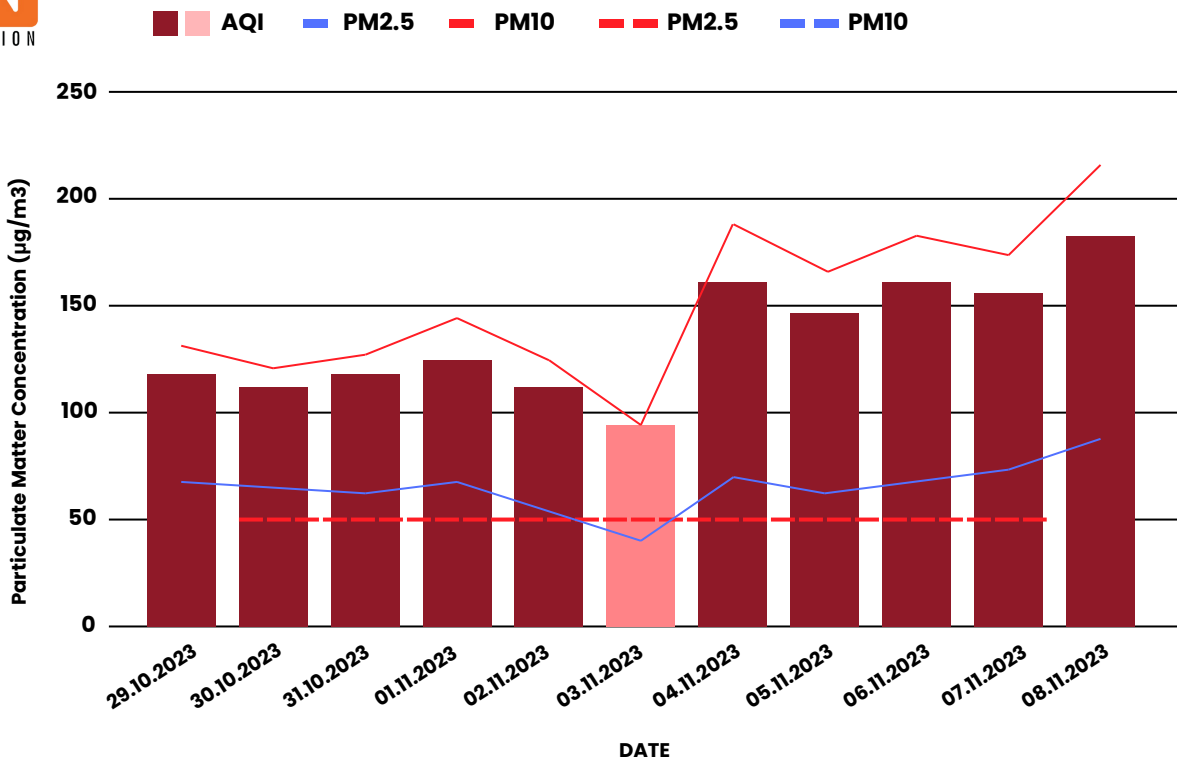


Figure 3: Air Quality in the pre-Diwali period in Dhanbad Data Source: JSPCB

### Fluctuating air quality in Bhubaneswar and Angul before Diwali

Bhubaneswar consistently maintained a Moderate range for its daily Air Quality Index (AQI), PM2.5, and PM10 levels, except for a brief spike due to overcast weather. On October 31st, the peak mean AQI hit 183, with PM2.5 and PM10 averaging 84.97 µg/m³ and 136.81 µg/m³ – exceeding the 50 µg/m³ and 100 µg/m³ limits. Winter's onset, routine city activities, and firecracker use likely contribute to increased pollution. On October 8th at 8 a.m., the recorded AQI reached 171, the second-highest during the study, with PM2.5 and PM10 at 81.37 µg/m³ and 139.62 µg/m³, respectively.

## Bhubaneswar : AQI, PM10 & PM2.5

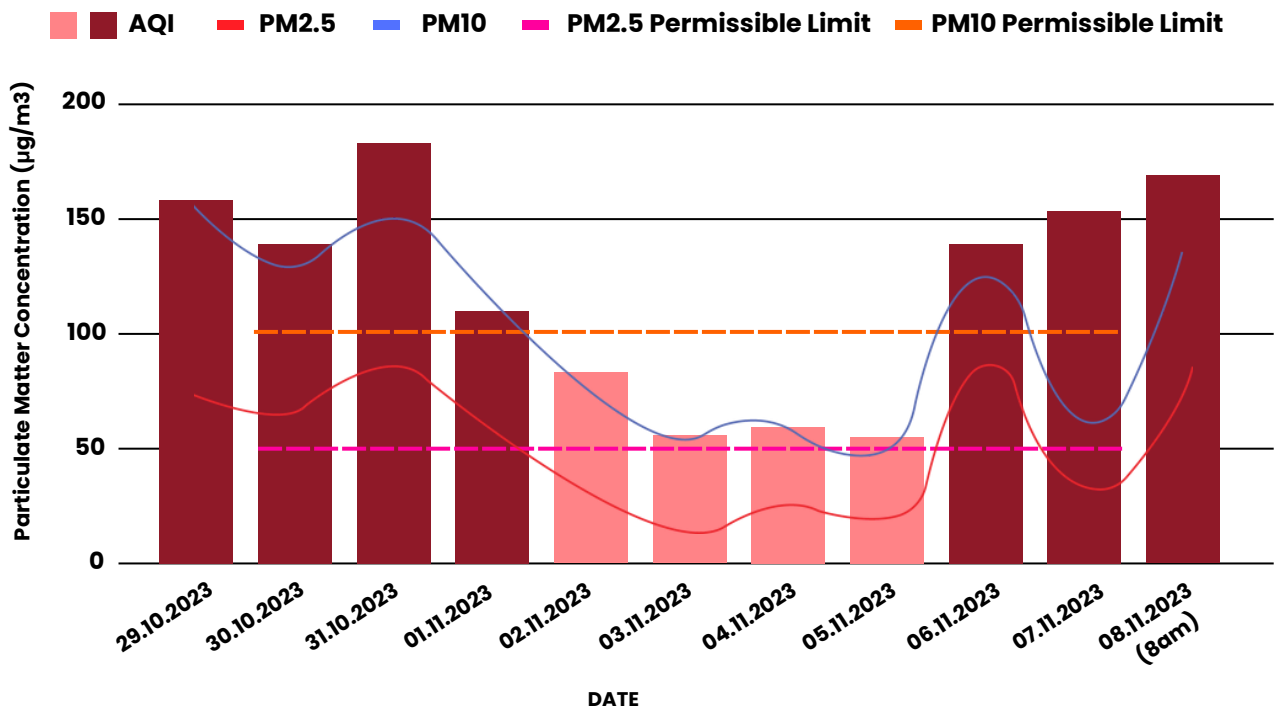


Figure 4: Air Quality in the pre-Diwali period in Bhubaneswar Data Source: CPCB

## PM2.5, PM10, AQI

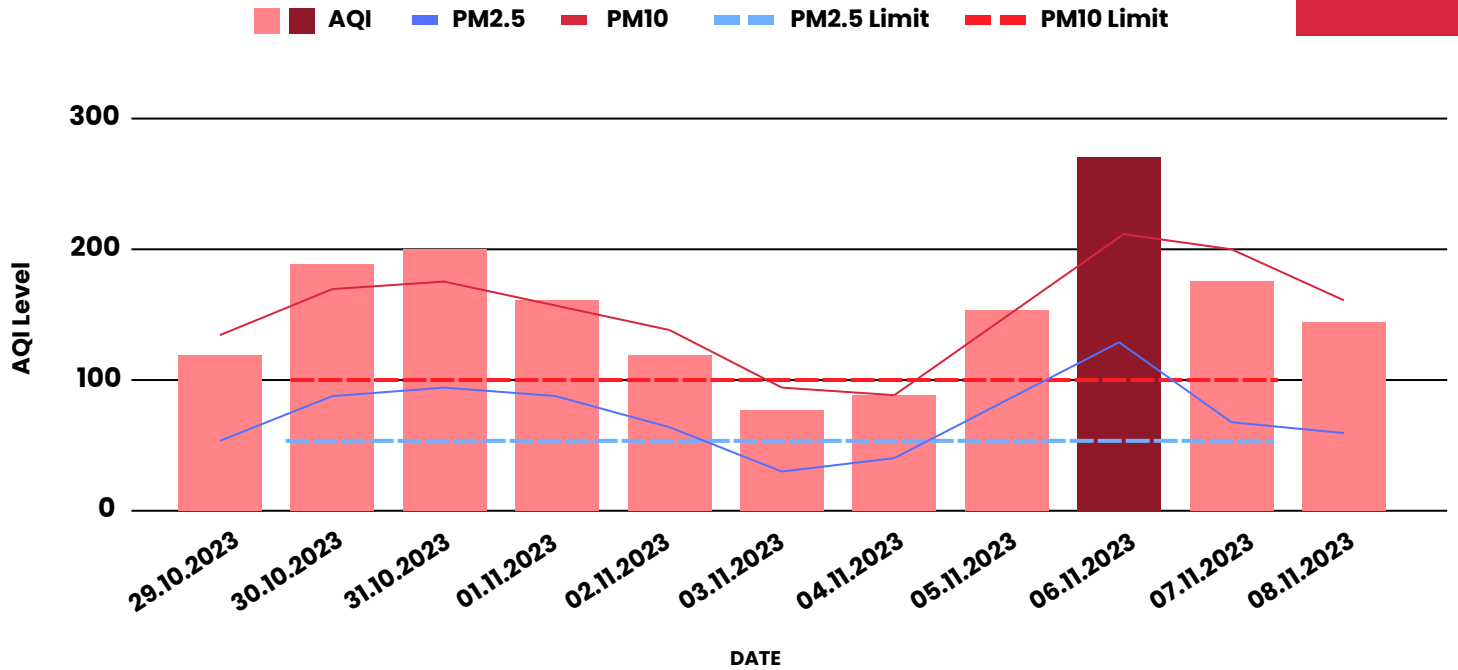


Figure 5: Air Quality in the pre-Diwali period in Angul

Data Source: CPCB

The air pollution risks in other cities within the state are relatively consistent. Just two days ago, on November 6th, Angul experienced a Poor Air Quality Index (AQI) of 273. The data for Wednesday at 10 a.m. in cities such as Talcher, Baripada, Angul, and Cuttack has raised concerns, with AQI readings of 307, 196, 190, and 183, respectively.

### During and post-Diwali Air Quality

Victoria area: worst AQI during Diwali in Kolkata

## Temporal Comparison of AQI During and Post-Diwali

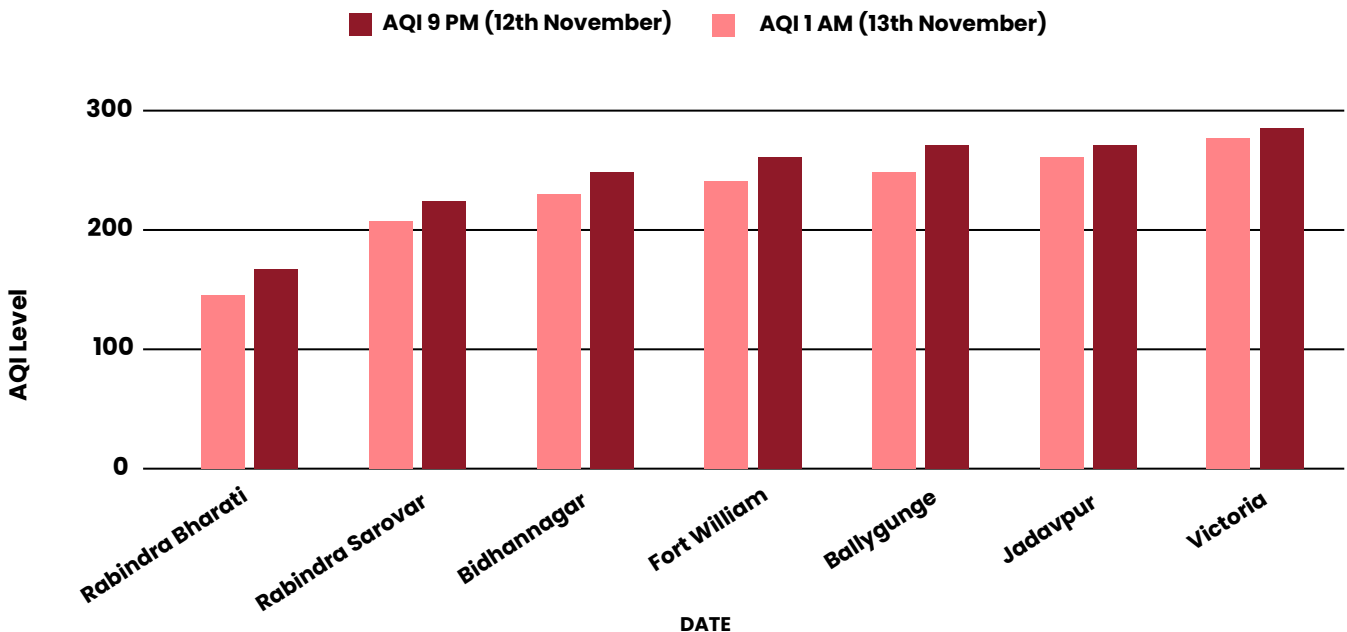


Figure 6: Air quality status of Kolkata 09:00 pm (12th November) and 01:00 am (13th November)

Data Source: CPCB



Figure 6 illustrates a notable increase in the Air Quality Index (AQI) from 9:00 PM to 1:00 AM on Diwali night, indicating a consistent deterioration in air quality across various locations in Kolkata. Rabindra Bharati experienced a 10.00% rise, with AQI increasing from 160 to 176. Similarly, Rabindra Sarobar, Bidhannagar, Fort William, Ballygunge, Jadavpur, and Victoria showed AQI elevations ranging from 3.85% to 8.05%. The consistent AQI surge suggests a common factor—firecracker bursting—contributing to the observed decline in air quality during this timeframe, aligning with the well-established link between firecrackers and air pollution.



### Ranchi's Very Poor Air in Diwali

Ranchi witnessed a continuous decline in air quality from "Moderate" to "Very Poor" over five days, covering both pre and post-Diwali periods. The JSPCB station documented the city's most severe air quality on November 13th, registering an AQI of 315, signalling a "Very Poor" level (Figure 7). Noteworthy is the substantial 45% increase in AQI on November 11th and 13th, indicating a rapid deterioration aligned with Diwali celebrations.

### Ranchi AQI

AQI

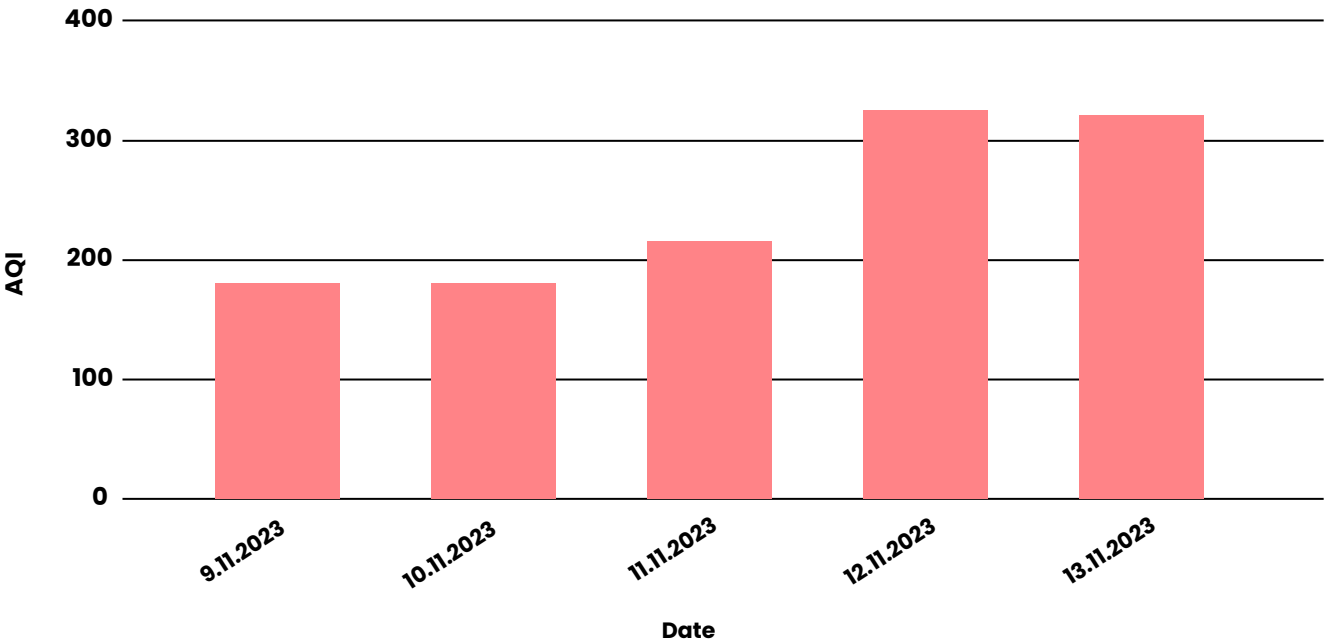


Figure 7: Air quality status of Ranchi between 9th November and 13th November Data Source: JSPCB

## Deteriorated AQI during Diwali at Bhubaneswar

### Bhubaneswar AQI from CPCB Stations – Patia & Lingaraj Mandir

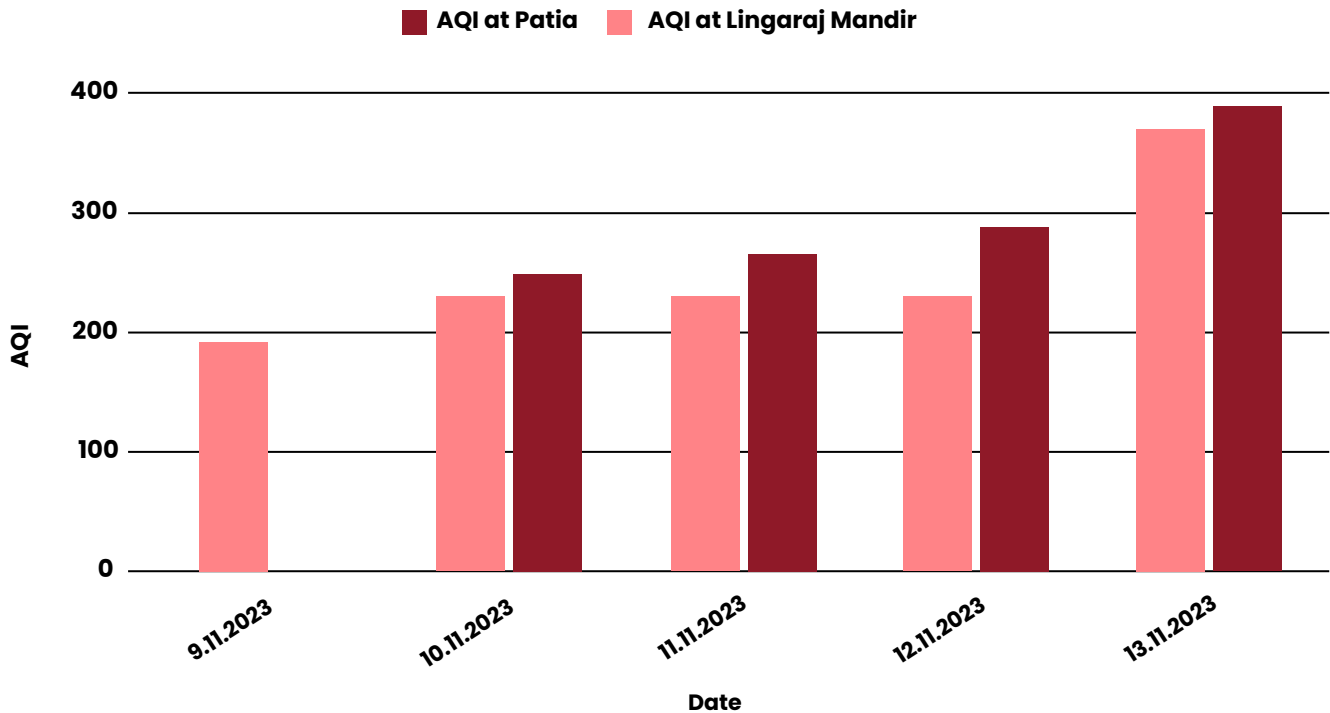


Figure 8: Air quality status of Bhubaneswar between 9th November and 13th November Data Source: CPCB

In Bhubaneswar, the air quality consistently declined from "Moderate" to "Very Poor" over five days, encompassing both pre and post-Diwali periods. Lingaraj Mandir's CPCB station registered the city's poorest air quality on November 13th, with an AQI of 389, while the Patia station reported a slightly lower but concerning AQI of 371, both indicating a "Very Poor" level (Figure 8). On November 12th and 13th, Patia and Lingraj Mandir stations documented a substantial 60.61% and 34.60% increase in AQI, showcasing a swift deterioration during Diwali.

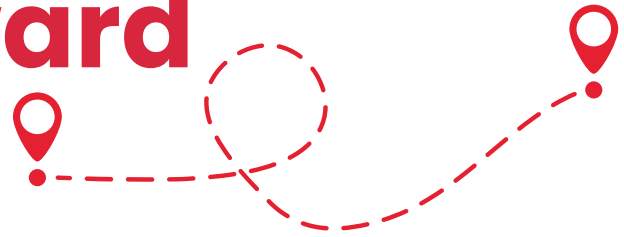
Amidst the Diwali period, the cities have witnessed a notable shift in circumstances during late autumn. The prevalent cause for the declining air quality is attributed to ground-level evidence of illicit firecracker usage. The residents have failed to adhere to the guidelines established by the Hon'ble Supreme Court regarding both the permissible types of firecrackers and the designated timing for their ignition. Consequently, there is a looming concern that citizens will endure highly polluted air in the days to come, posing a significant environmental challenge.

## Recommendations

- To reduce the air pollution from firecrackers by at least 30% in terms of particulate pollution as per the [CSIR-NEERI](#) web portal, the government and authorities must ensure market saturation by green crackers only, well in advance of Diwali and other festivals, leaving no room for the manufacturing, supply, sale and purchase of traditional crackers.
- Stringent law enforcement is imperative, given that only a handful of people were arrested for the unauthorized use of firecrackers and violations of designated timeframes. The number does not correspond with the actual severity of the firecracker bursting on Diwali night.
- Citizens will have to earnestly adhere to judicial regulations, as non-compliance could be construed as a violation of the court's directives. Such transgressions empower the court to intervene, potentially leading to the suspension of the event, and impacting the sentiments of millions of people.



# Conclusion & Way Forward



In conclusion, the study underscores the persistent challenge of deteriorating air quality during Diwali, despite regulatory efforts. The pre-Diwali period saw varying air quality trends across cities, with Kolkata experiencing a surge and Ranchi maintaining moderate levels. During Diwali, Kolkata witnessed a notable decline, reflecting a common factor—firecrackers. Ranchi's air quality rapidly deteriorated, reaching "Very Poor" levels. Bhubaneswar also faced a decline, with Lingaraj Mandir registering the poorest air quality. The findings highlight the need for stringent enforcement of regulations and citizens' compliance to mitigate air pollution. The way forward involves promoting green crackers, robust law enforcement, and public awareness to ensure a cleaner, healthier environment during festive celebrations.





# Annexure

2.5

## 29th October Air Quality Data for Kolkata, retrieved from CPCB

<b>Date:</b>	29.10.2023		
<b>Station</b>	Parameter (ug/m3)		
	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>
<b>Ballygunge, Kolkata - WBPCB</b>	88.87	143.09	40.27
<b>Bidhannagar, Kolkata - WBPCB</b>	71.76	126.93	9.44
<b>Fort William, Kolkata - WBPCB</b>	85.76	109.97	6.45
<b>Jadavpur, Kolkata - WBPCB</b>	73.69	138.98	3.93
<b>Rabindra Bharati University, Kolkata - WBPCB</b>	42.26	101.5	14.14
<b>Rabindra Sarobar, Kolkata - WBPCB</b>	67.7	89.47	7.84
<b>Victoria, Kolkata - WBPCB</b>	76.12	124.65	5.61

Follow the [link](#) for the entire dataset



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