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Analysis Report: Maharashtra NCAP Cities $PM_{2.5}$ Levels (2019-2024)

Overview

The National Clean Air Programme (NCAP) has been an integral step towards addressing air pollution in India, focusing on reducing $PM_{2.5}$ levels in urban areas. This report analyses the $PM_{2.5}$ levels across various cities in Maharashtra from 2019 to 2024, based on available annual average data.

The data from the Central Pollution Control Board monitoring stations across the 19 non-attainment cities in Maharashtra was compared with National Ambient Air Quality Standards (NAAQS) and World Health Organisation (WHO) air quality standards, providing region-wise observations and analysis by Respirer Living Sciences Pvt. Ltd. (Respirer).

The **AtlasAQ Project** was created to provide accessible, validated air quality data for Indian cities, both in real-time and historically, sourced from government-operated Continuous Ambient Air Quality Monitoring Stations (CAAQMS). Launched in 2019, it focuses on enabling long-term trend analysis of air quality with particular attention to the 132 NCAP cities. The platform, originally known as NCAPTracker, was developed to assist researchers, media professionals, policymakers, and citizens in understanding and tracking the air quality of cities across India.

This report utilises data collected through the **AtlasAQ Platform**, offering a comprehensive analysis of $PM_{2.5}$ levels in Maharashtra from 2019 to 2024. The platform's reliable data has empowered communities and decision-makers to access key air quality insights and has been featured in leading publications for its groundbreaking analysis of pollution levels in Indian cities.

Under the NCAP, **non-attainment cities** do not meet the prescribed air quality standards set by the NAAQS. These cities are the focus of special intervention measures to improve air quality.

Maharashtra has **19 non-attainment cities** identified by the NCAP, including Akola, Amravati, Aurangabad, Badlapur, Chandrapur, Jalgaon, Jalna, Kolhapur, Latur, Nagpur, Navi Mumbai, Pune, Sangli, Ulhasnagar, Mumbai, Solapur, Nashik, Thane and Vasai Virar. These cities have consistently exceeded the NAAQS $PM_{2.5}$ levels, requiring more targeted interventions.

Significance of Non-Attainment Status

Non-attainment cities face significant air quality challenges due to a combination of factors, including industrial emissions, vehicular pollution, and construction activities. The **National Clean Air Programme (NCAP)** initially aimed to reduce $PM_{2.5}$ levels in these cities by **20-30% by 2024**. However, in 2022, the target was **revised** with a new goal of achieving a **40% reduction in particulate matter concentrations by 2026**, compared to 2017 levels

The analysis focuses on improvements and persistent challenges, aiming to provide media-friendly insights highlighting the effectiveness of air pollution control measures and areas requiring urgent action.

Key Findings

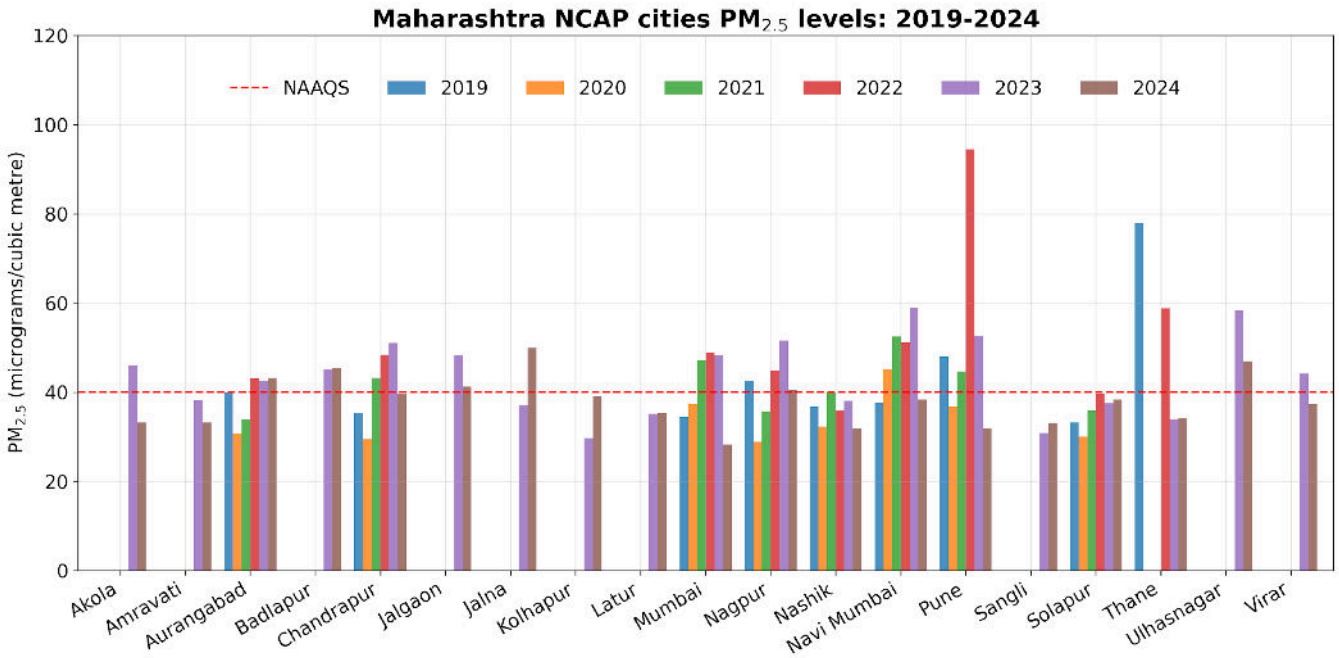
Overall $PM_{2.5}$ Trend (2019-2024):

- The data reflects significant variation across cities, with some cities showing improvement in air quality, while others still face challenges in maintaining $PM_{2.5}$ levels below the National Ambient Air Quality Standards (NAAQS) threshold of 40 µg/m³.

- Several cities such as **Nagpur**, **Mumbai**, **Navi Mumbai**, and **Pune** have consistently recorded $PM_{2.5}$ levels above the NAAQS standards in multiple years, highlighting the ongoing pollution crisis in urban Maharashtra.

Comparison with WHO Standards: The WHO's revised air quality guideline (2021) recommends that annual mean $PM_{2.5}$ levels should not exceed **5 µg/m³**. Compared to this global benchmark, all Maharashtra cities, without exception, exceed the safe limits. Even cities showing improvement under the NAAQS framework still fall far short of the WHO's stringent guidelines.

- For instance, **Mumbai's** $PM_{2.5}$ levels from Jan-Sept 2024 (28.19 µg/m³) may seem acceptable under NAAQS but are nearly **6 times** the WHO-recommended limit.
- **Navi Mumbai**'s $PM_{2.5}$ level of 58.84 µg/m³ in 2023 is over **11 times** higher than the WHO guideline, showcasing a severe pollution problem.
- Even in cities like **Amravati** and **Solapur**, which are relatively better performers under the NAAQS, their average annual $PM_{2.5}$ levels are still more than **6 times** the WHO standard.



Maharashtra-Specific Regional Insights

Mumbai Metropolitan Region (MMR):

"Navi Mumbai Faces Unrelenting Pollution Crisis While Mumbai levels stagnate."

- **Navi Mumbai**'s pollution levels have continued to rise over the past five years (2019-2023), but have begun subsiding in 2024
- **Mumbai**'s levels have remained above NAAQS and stagnated at around 48 µg/m^3 for the last 3 years (2021-2023), however, there is a reduction in 2024 bringing the average $PM_{2.5}$ levels below the NAAQS limit.
- **Ulhasnagar** was found to be more polluted than **Thane, Navi Mumbai, and Mumbai while remaining above the NAAQS limit**.
- **Vidarbha Region:**

"Nagpur and Chandrapur Lead Vidarbha's Fight Against Air Pollution, but WHO Guidelines Remain a Distant Goal."

- **Nagpur** and **Chandrapur** have shown notable improvements, particularly considering the period from Jan-Sept 2024. However, both cities have struggled with fluctuating $PM_{2.5}$ levels.

Western Maharashtra:

"Pune's Air Quality Fluctuations Raise Alarm Despite Recent Decline."

- **Pune** experienced a drastic spike in 2022 (70.8 µg/m^3), far exceeding both NAAQS and WHO standards. Although levels improved in 2023, they remain well above the safe limit. While from Jan-Sept 2024, the levels have been within the safe limit.

Marathwada Region:

"Marathwada's Air Quality in Decline: Aurangabad and Jalna Show Rising Pollution Trends."

- **Aurangabad** and **Jalna**: Aurangabad's $PM_{2.5}$ levels rose sharply in the period of Jan-Sept 2024 (43.21 µg/m^3), indicating growing pollution concerns. Additionally, from 2022-2024, Aurangabad has recorded consistently higher levels than NAAQS. Jalna also recorded worrying levels in 2024 and has gone above the NAAQS after being within the limit for the year 2023.

Cities with Notable Declines in $PM_{2.5}$ Levels:

- **Chandrapur**: After remaining above the NAAQS for three consecutive years from 2021-2023, $PM_{2.5}$ levels dropped below NAAQS (37.25 µg/m³) in Jan-Sept 2024, showing a clear improvement.

- **Mumbai**: While $PM_{2.5}$ levels fluctuated, the city saw a significant reduction in 2024 (28.19 µg/m³) compared to previous years, indicating effective pollution control measures.

- **Nagpur**: Though the city crossed the NAAQS limit in several years, there was a drop from 51.5 µg/m³ in 2023 to 40.54 µg/m³ in 2024.

Cities Close to Meeting NAAQS Standards:

- **Amravati** and **Nashik** consistently recorded $PM_{2.5}$ levels near or below the NAAQS limit, with slight fluctuations but overall better air quality than other cities in the state.

**City-wise data is shared as an annexure to this report.*

Key Takeaways and Insights:

1. **Maharashtra's Pollution Hotspots: 19 Cities Remain Non-Attainment Under NCAP:** Despite progress in some areas, Maharashtra continues to struggle with air quality in its non-attainment cities, where $PM_{2.5}$ levels remain stubbornly high.

2. **WHO vs NAAQS: Maharashtra's Cities Still Far From Global Air Quality Standards:** A stark contrast between WHO's air quality guidelines and India's NAAQS shows that even the 'cleanest' cities in Maharashtra are far from achieving truly safe air.

3. **Nagpur and Mumbai Lead the Way in Air Quality Improvements Under NCAP:** Nagpur and Mumbai have seen notable reductions in their $PM_{2.5}$ levels, showcasing the positive impact of pollution control measures.

4. **Pune's Air Quality Crisis: 2022 Spike Raises Concerns:** Pune recorded alarming $PM_{2.5}$ levels in 2022, far exceeding NAAQS standards, emphasizing the need for focused intervention in the region.

5. **Navi Mumbai and Aurangabad Continue to Battle High Pollution Levels:** Both Navi Mumbai and Aurangabad remain hotspots for $PM_{2.5}$ pollution, with consistently high levels over the last five years, demanding urgent attention.

6. **Mixed Results for Maharashtra Cities: Progress in Some, Persistent Challenges in Others:** While cities like Chandrapur and Mumbai show progress, other urban centres like Aurangabad and Navi Mumbai continue to struggle with poor air quality, underlining the uneven success of NCAP efforts.

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Conclusion:

Maharashtra's progress under the NCAP is a story of mixed success. While some cities have shown promising improvements in $PM_{2.5}$ levels, others continue to struggle with high pollution, particularly when compared to WHO standards. The state's 19 non-attainment cities need sustained and aggressive intervention if these cities are to meet air quality targets and protect public health.

Achieving WHO's stringent guidelines will require a fundamental transformation in air pollution management, encompassing industrial regulation, vehicle emissions control, and community-level initiatives. As Maharashtra's cities continue to expand, ensuring clean air will be critical to sustainable urban development and public well-being.

Annexure

	2019	2020	2021	2022	2023	2024*
Akola					46.02	33.20
Amravati					38.21	33.17
Aurangabad	39.92	30.60	33.78	43.07	42.61	43.21
Badlapur					45.07	45.43
Chandrapur	36.16	29.92	43.13	46.73	46.98	37.25
Jalgaon					48.23	41.26
Jalna					37.07	49.91
Kolhapur					29.64	39.01
Latur					35.16	35.26
Mumbai	34.45	37.38	47.07	48.93	48.23	28.19
Nagpur	42.62	28.86	35.70	44.83	51.50	40.54
Nashik	36.68	32.30	40.00	35.99	38.07	31.99
Navi Mumbai	37.66	45.17	52.48	51.19	58.84	38.30
Pune	47.92	65.57	42.52	70.80	55.62	28.55
Sangli					30.82	33.08
Solapur	33.20	30.00	35.87	39.72	37.49	38.33
Thane	77.99			58.80	33.88	34.06
Ulhasnagar					58.36	46.90
Virar					44.15	37.34

These are $PM_{2.5}$ levels in micrograms per cubic meter ($\mu g/m^3$).

- **NAAQS (India) safe standard for annual average $PM_{2.5}$**: 40 $\mu g/m^3$
- **WHO safe standard for annual average $PM_{2.5}$**: 5 $\mu g/m^3$

- *Average for the year 2024 is from Jan-Sept

About Respirer Living Sciences Pvt. Ltd.

Respirer Living Sciences Pvt. Ltd. is a leading climate-tech startup in India, dedicated to achieving cleaner air and accelerating the transition to cleaner energy. Established in 2017, Respirer provides scientifically validated, scalable air quality monitoring devices and real-time air pollution analytics platforms. These solutions deliver accurate and actionable data to governments, industries, and citizens, empowering them to address air pollution and methane emissions effectively. Respirer's network includes over 2,500 air quality devices deployed across more than 25 Indian cities and several international locations. The company collaborates with prestigious institutions such as IIT Kanpur and Duke University and is part of the Centre of Excellence ATMAN on Clean Air Technologies, supported by the Government of India. For more details, visit the Respirer

About AtlasAQ Platform:

The **AtlasAQ Platform** enables access to authenticated, real-time, and historical air quality data for cities across India, focusing on long-term trends from government-managed CAAQMS stations. It supports rankings, analysis, and reporting, offering stakeholders—from researchers to journalists and policymakers—critical insights into air pollution. Initially launched as the NCAPTracker project, AtlasAQ now integrates additional datasets such as Land Use/Land Cover and heat stress data to further enhance urban livability studies.

The impact of the **AtlasAQ Platform** is evident in the mainstream media's growing reliance on its data for reporting on air quality trends. The platform, developed by Respirer with support from climate-focused philanthropic funding, continues to expand its scope, ensuring that air quality insights contribute meaningfully to the ongoing efforts for cleaner air in India.

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