PROJECT REPORT: AIR QUALITY INDEX (AQI) ANALYSIS (2015-2025)

Focus Region: Delhi NCR & North India

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Executive Summary

The Big Picture

Breathing clean air is a fundamental right, but the data suggests it has become a luxury. This report analyzes air quality trends over a decade (2015–2025) to understand how pollution is evolving in India's most critical zones.

The focus of this study is the Year 2025, where we see alarming trends. Delhi, the national capital, recorded a Maximum AQI of 397, which falls into the "Very Unhealthy" category. This isn't just a "bad day"; it's a systemic health hazard.

Key Highlights:

- Danger Zone: Delhi's average AQI for 2025 stands at 208, consistently staying in the "Unhealthy" bracket.
- The Main Villain: The primary pollutant is PM2.5 (Particulate Matter), which appeared as the dominant toxin on 68 days.
- Regional Crisis: Delhi is not alone. Cities like Hajipur (197) and Gurugram (190) are breathing almost the same toxic air.

Introduction & Data Methodology

Why This Analysis Matters?

We often hear about pollution in the news, but data gives us the truth without sensationalism. The objective of this project was to:

1. Quantify the severity of pollution in 2025.
2. Identify which cities outside Delhi are equally dangerous.
3. Pinpoint exactly *what* we are breathing (PM2.5 vs PM10 vs Ozone).

The Dataset

- Source: Central Pollution Control Board (CPCB) & Monitoring Stations.
- Timeline: 10 Years (May 2015 to June 2025).
- Scope: Daily AQI records across multiple Indian states, filtered to focus on high-impact zones like Delhi NCR.

Delhi 2025 – A Deep Dive

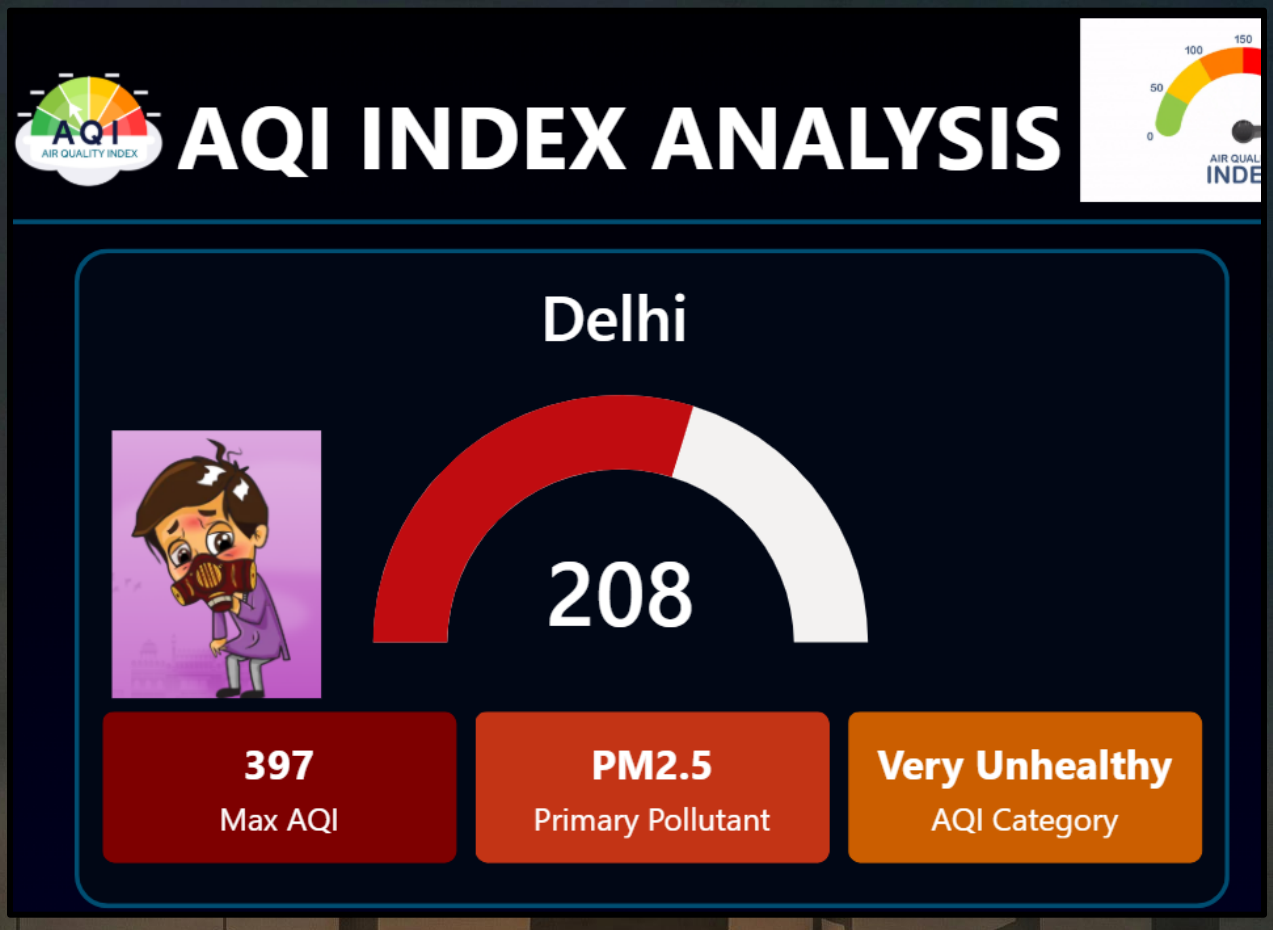
Living in the "Red Zone"

Focusing specifically on Delhi in the year 2025, the metrics are concerning.

- Max AQI: 397 (This is dangerously close to the "Severe" 400+ mark).
- Average AQI: 208 (Anything above 100 is bad for sensitive groups; 208 affects everyone).

What does 397 AQI mean?

An AQI of 397 means that even healthy individuals will experience respiratory issues, and those with asthma or heart conditions are at critical risk. The dashboard shows that 10% of the days in Delhi were "Very Unhealthy".



The "Toxic Corridor" (Regional Analysis)

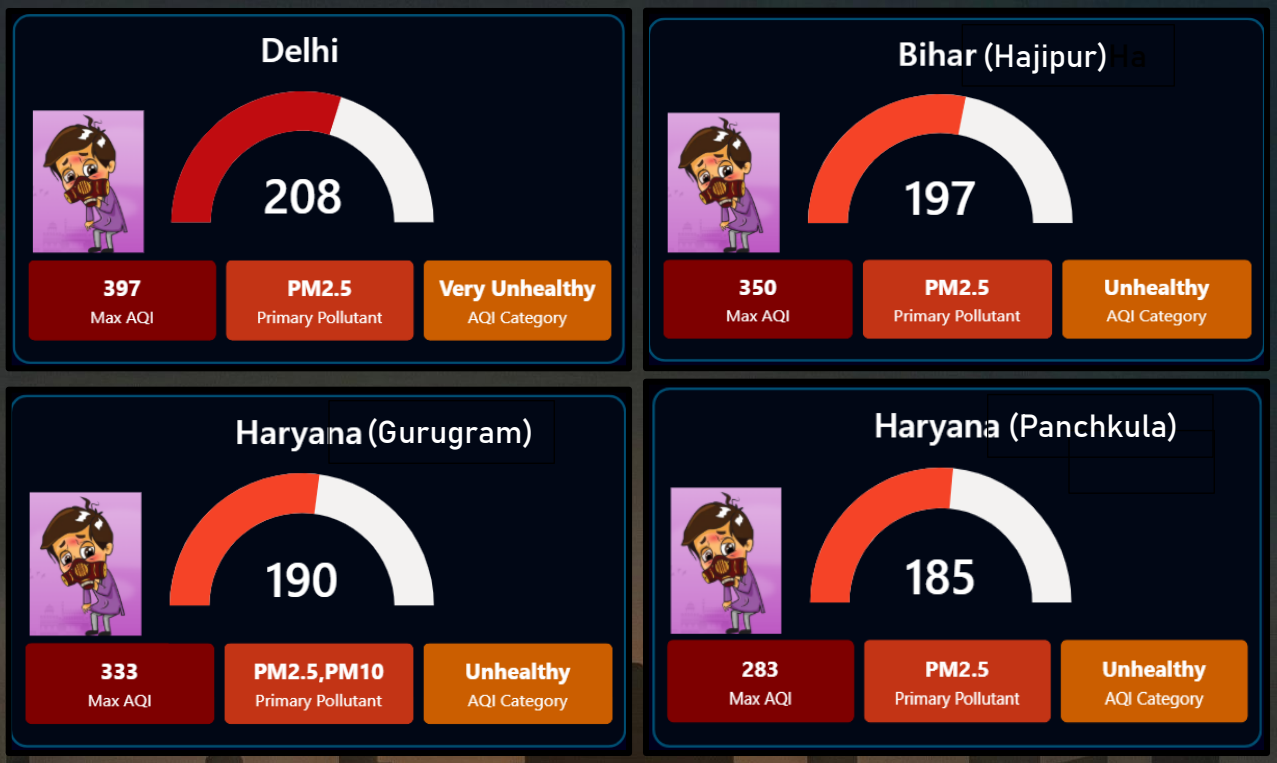
It's Not Just Delhi

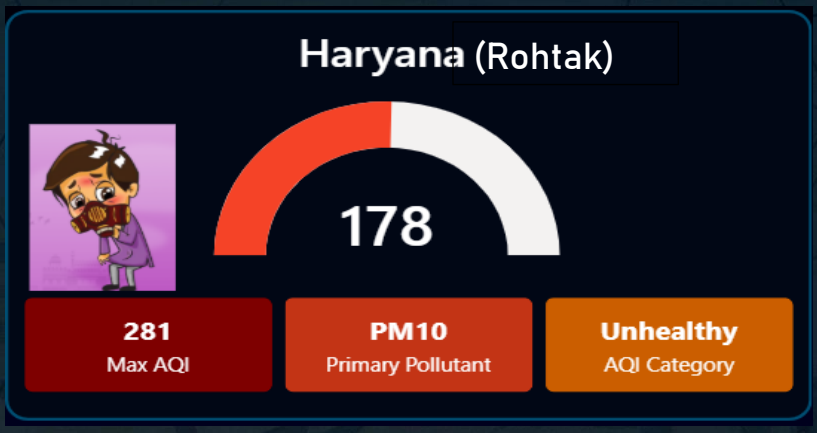
One of the biggest findings of this analysis is that pollution ignores borders. The data from your dashboard's "AQI by City" chart reveals a "Pollution Belt" across North India.

Top 5 Polluted Cities (Avg AQI 2025):

1. Delhi: 208
2. Hajipur (Bihar): 197
3. Gurugram (Haryana): 190
4. Panchkula: 185
5. Rohtak: 178

Insight: Gurugram is an industrial and corporate hub, while Rohtak is agricultural. The fact that both have high AQI suggests a mix of Industrial Smoke + Stubble Burning + Vehicular Traffic is creating a blanket of smog across the entire region.





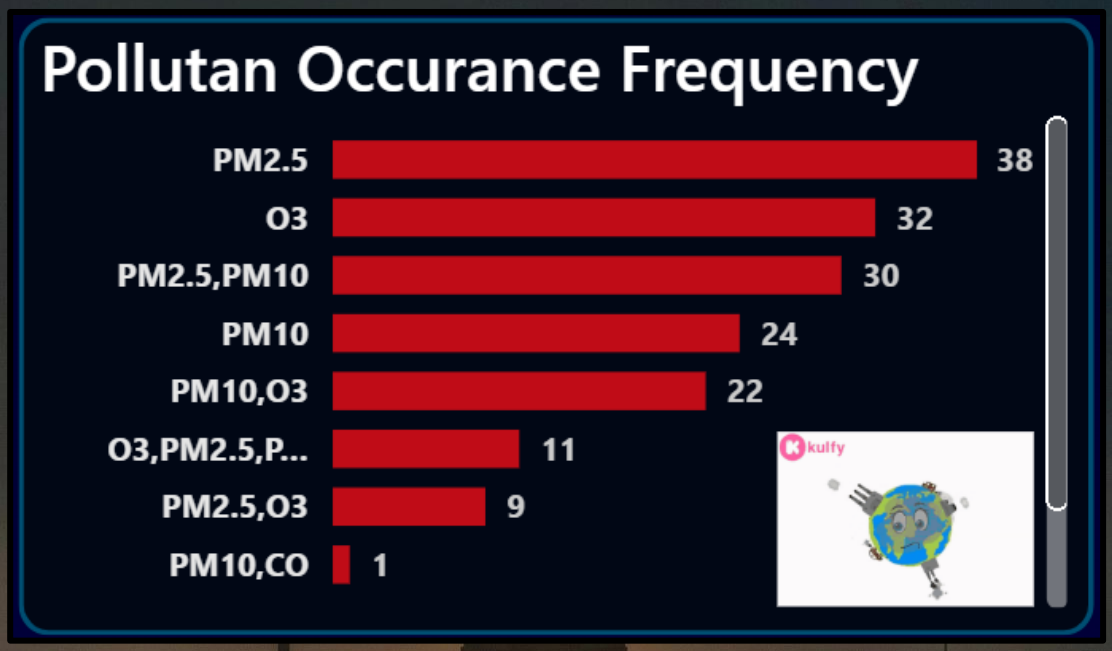
The Invisible Killer (Pollutant Analysis)

PM2.5 vs PM10

The report identifies PM2.5 as the primary enemy.

- Frequency: PM2.5 was the prominent pollutant on 68 days (combining PM2.5 & Mixed categories).
- Why is this scary? PM10 is dust (like road dust). But PM2.5 is combustion particles (from cars, factories, burning). PM2.5 is small enough to enter your bloodstream.

Verdict: The high prevalence of PM2.5 proves that Dust Control (sprinkling water) is not enough. We need Combustion Control (reducing car use, stopping fires).



Trend Analysis (2015-2025)

A Decade of Data

Looking at the timeline from 2015 to 2025, we see seasonal spikes. The "AQI Trend Over Time" chart typically peaks during winter months (November-January).

- Observation: Despite 10 years of policy changes (BS-VI engines, Odd-Even rule), the baseline AQI in 2025 remains high (208 Avg). This indicates that while we manage the *peaks* better, the *average* daily air quality has not improved significantly.

Actionable Recommendations

Based on the data, here is what needs to be done:

1. Unified Action Plan: Delhi, Gurugram, and Rohtak cannot work in silos. Since the AQI is 190+ across all of them, a unified "NCR Air Shed" policy is needed.
2. Target PM2.5: Stop focusing only on dust. The data screams PM2.5. We need stricter controls on diesel vehicles and waste burning.
3. Health Advisory Automations: With Max AQI hitting 397, schools should have an automated "Work From Home" or "Holiday" trigger when AQI crosses 300 to protect children.

Conclusion

The analysis of the 2025 dataset serves as a wake-up call. An Average AQI of 208 is not "Normal"- it is a slow poison. While Delhi grabs the headlines, cities like Hajipur and Gurugram are suffering silently. The solution lies in treating this not as a "Delhi Problem" but as a "Regional Health Emergency."

End of the Report