
Air Pollution Database Near Schools and Daycares in Île-de-France

Team Members & Roles:

- CEO:
 - HR Director:
 - Software Engineer:
 - Data Scientist:
 - Marketing Director:
 - Communication Director:
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Problem Statement

Children are highly vulnerable to air pollution, especially in urban areas like Paris.

Focus on **NO₂, PM₁₀, PM_{2.5}** from 2012–2017 around schools and daycares.

Questions addressed:

- Which areas are the most affected?
- Are current policies improving air quality?
- Where is it safest to build new schools?





Dataset Description

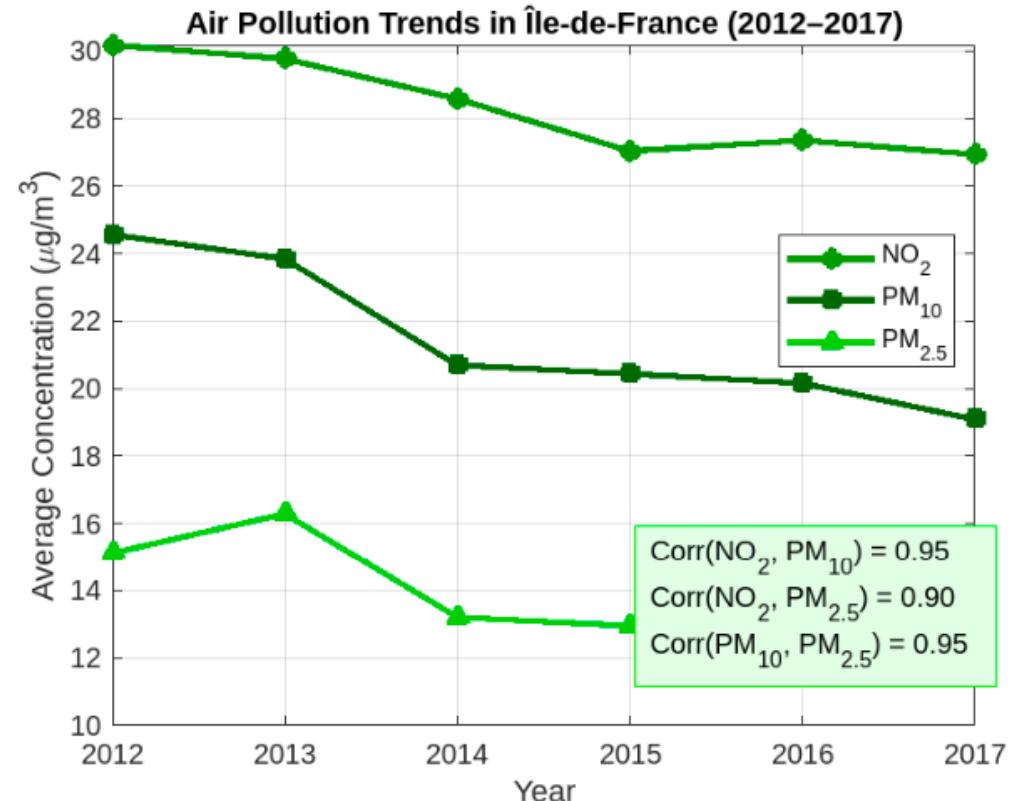
- **Source:** data.gouv.fr
- **Years:** 2012 to 2017
- **Pollutants:** NO₂, PM10, PM2.5
- **Data Format:** Annual average concentrations per address (geo-localized)
- **Combined from:**
 - Childcare institutions database (EAJE)
 - School address database
 - Airparif pollution modeling data



Methodology

- **Data merging** (Python – pandas, geopandas)
- **Correlation analysis** between pollutants
- **Zonal aggregation** by arrondissement
- **Visualization tools:** matplotlib, seaborn, plotly
- **Threshold classification:** safe, marginal, danger zones



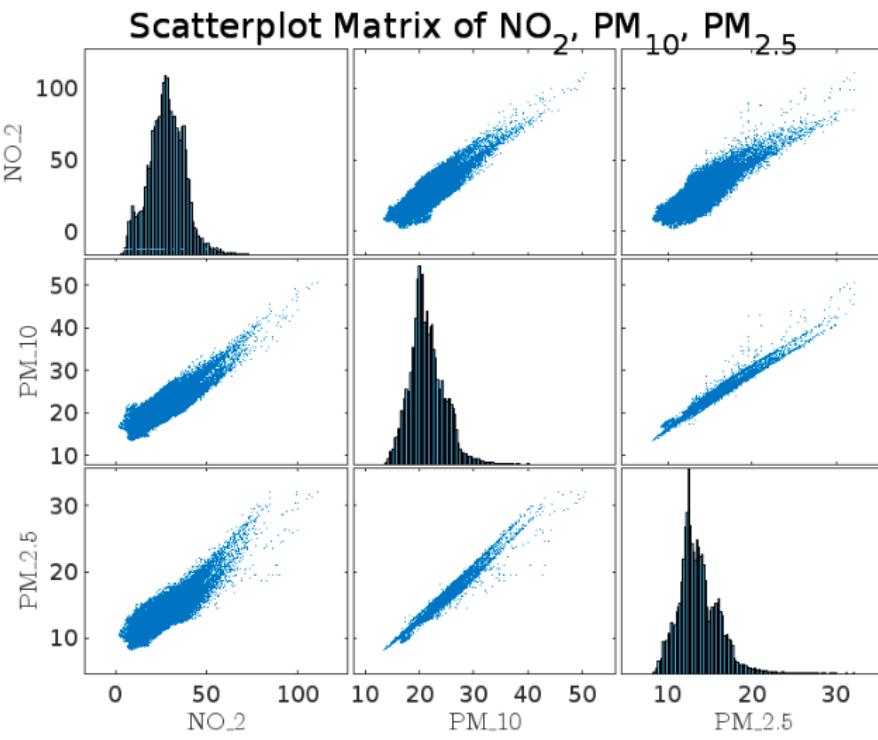


Pollutant Trends Over Time (2012–2017)

Graph 1: Line Plot – NO₂, PM10, PM2.5 Average Levels

- Clear decline in NO₂ and PM10
- PM2.5 fluctuates in 2013, then stabilizes
- *Implication:* Policies are working but PM2.5 needs closer monitoring



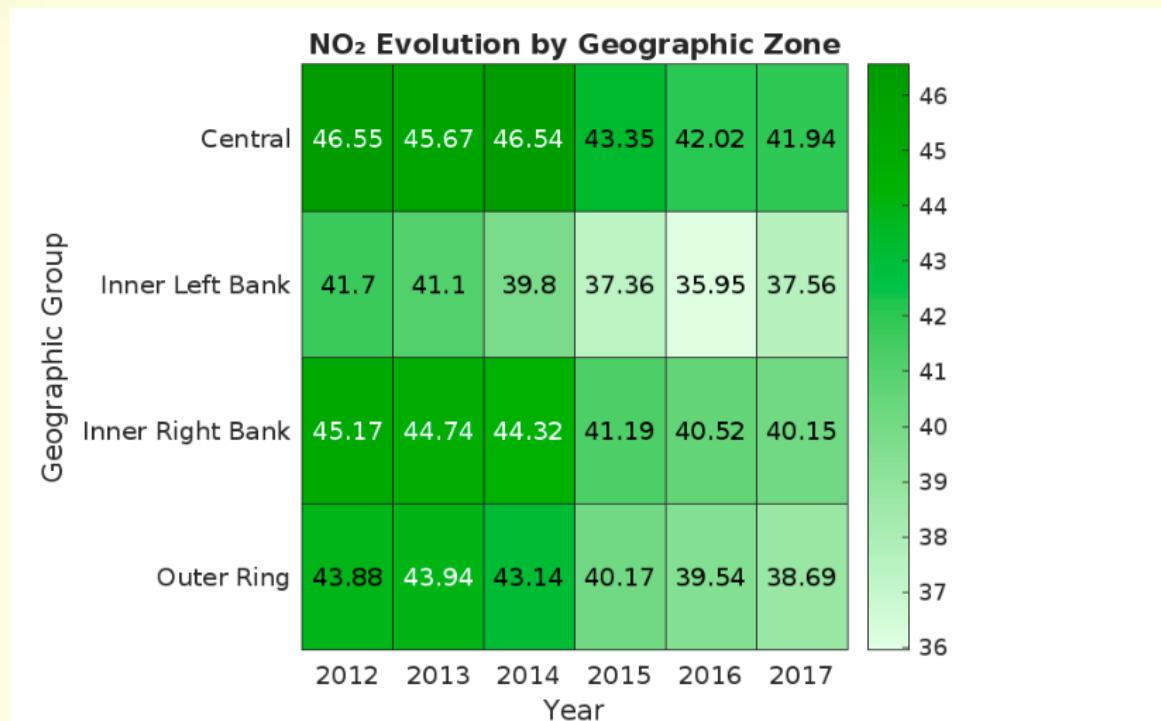




Pollutant Correlation Matrix Graph 2: Scatter Matrix

Strong linear relationships between pollutants

- Correlation coefficients (all > 0.90)
- Implication:* Likely shared sources (e.g., traffic, combustion)



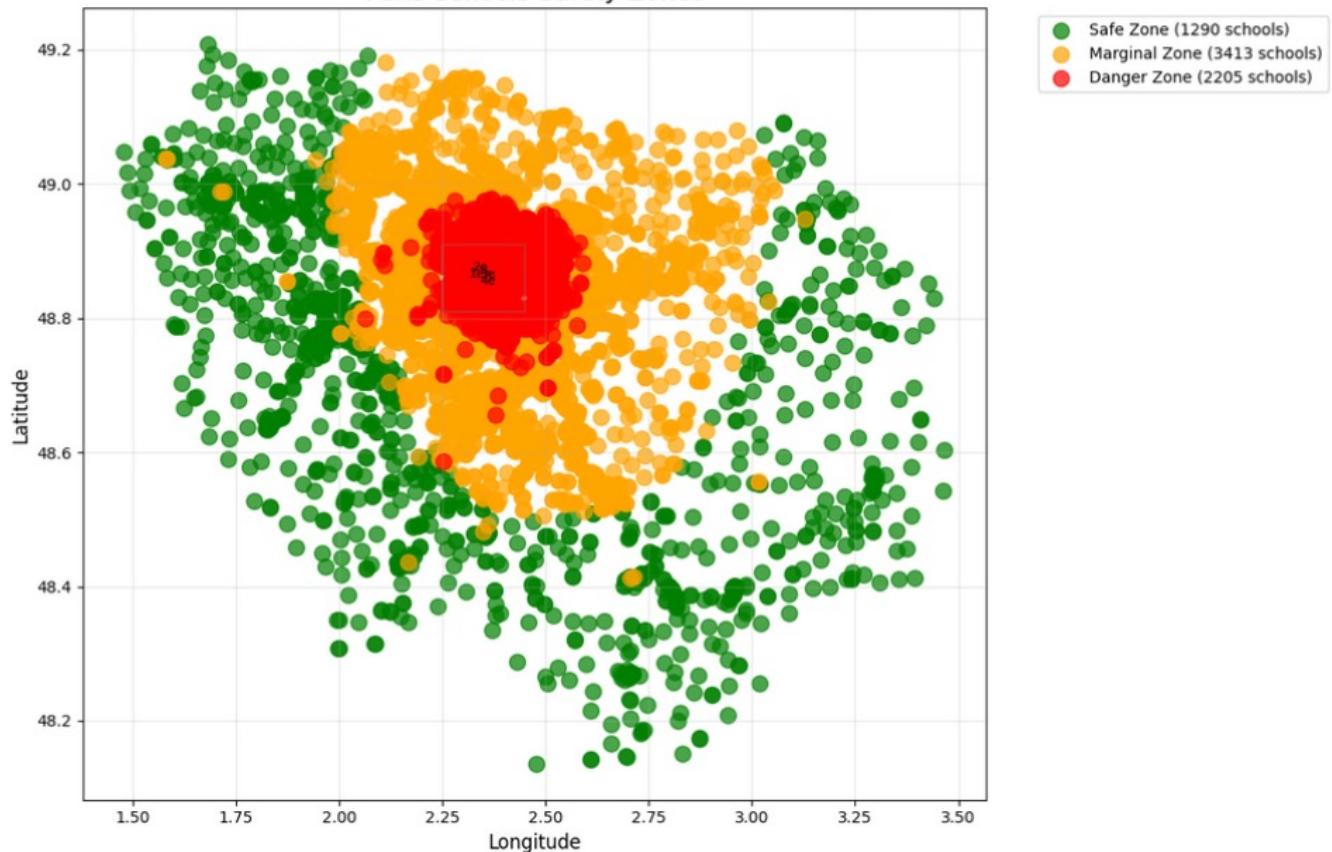
NO₂ by Paris Zones

Line Plot – NO₂ Trends by 4 Zone Groups

- Highest levels in central Paris & right bank
- Overall decline across all zones
- *Implication:* Central traffic zones remain the most affected



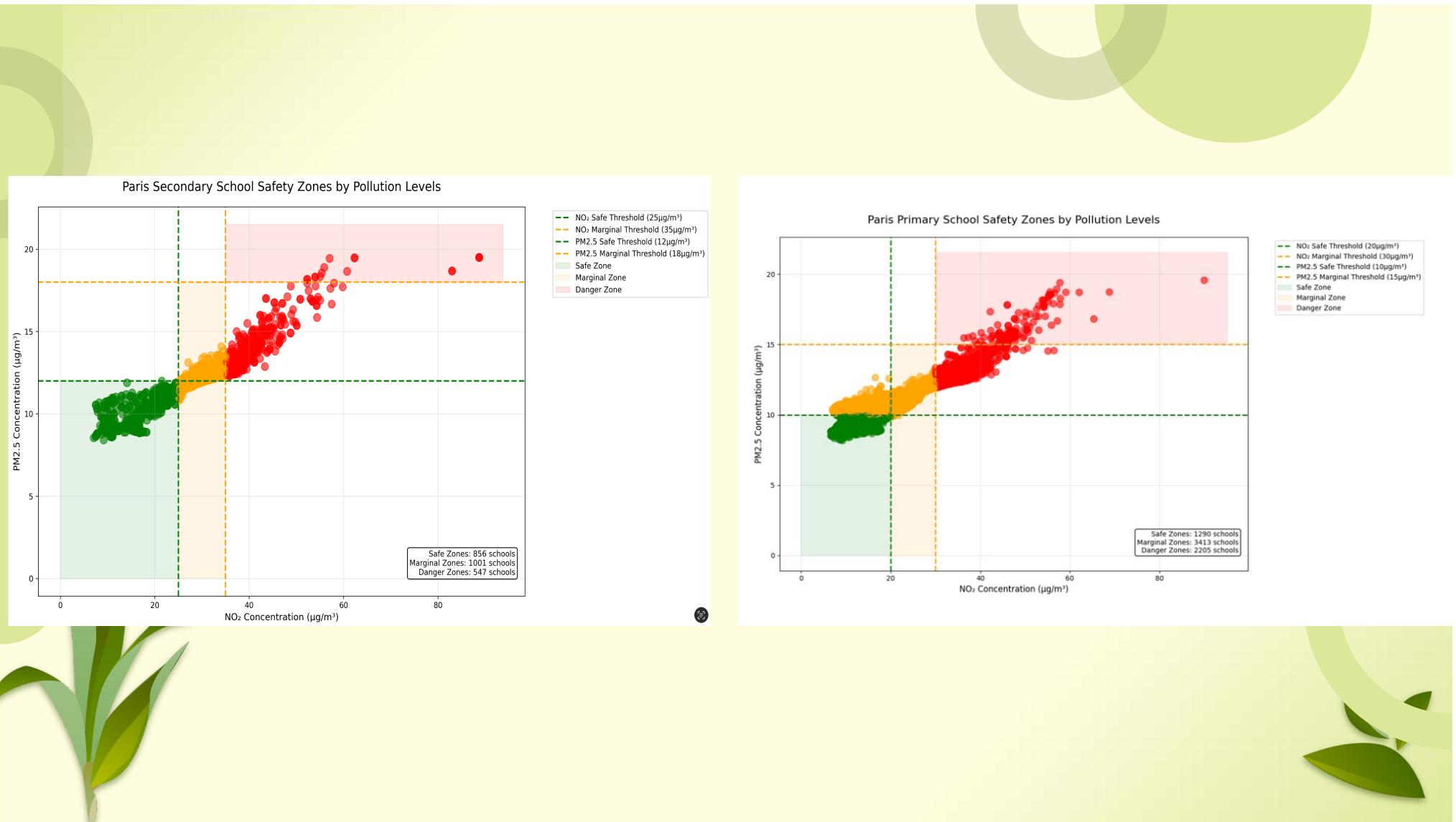
Paris Schools Safety Zones





Geographic Pollution Hotspot Map Color-coded Paris Map

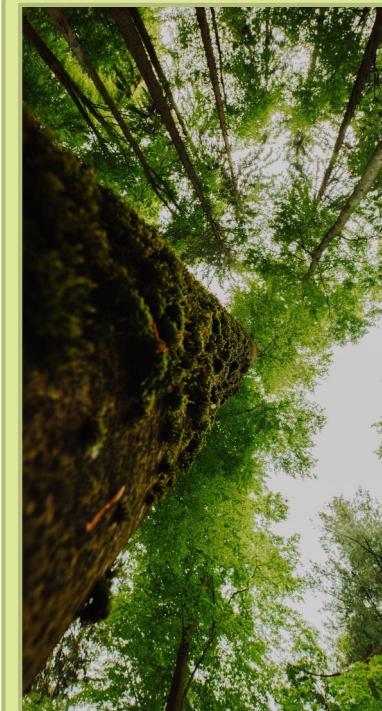
- Red = high risk, Green = safe
- Central/eastern districts (75004, 75020) most affected
- Western districts benefit from lower density and green space

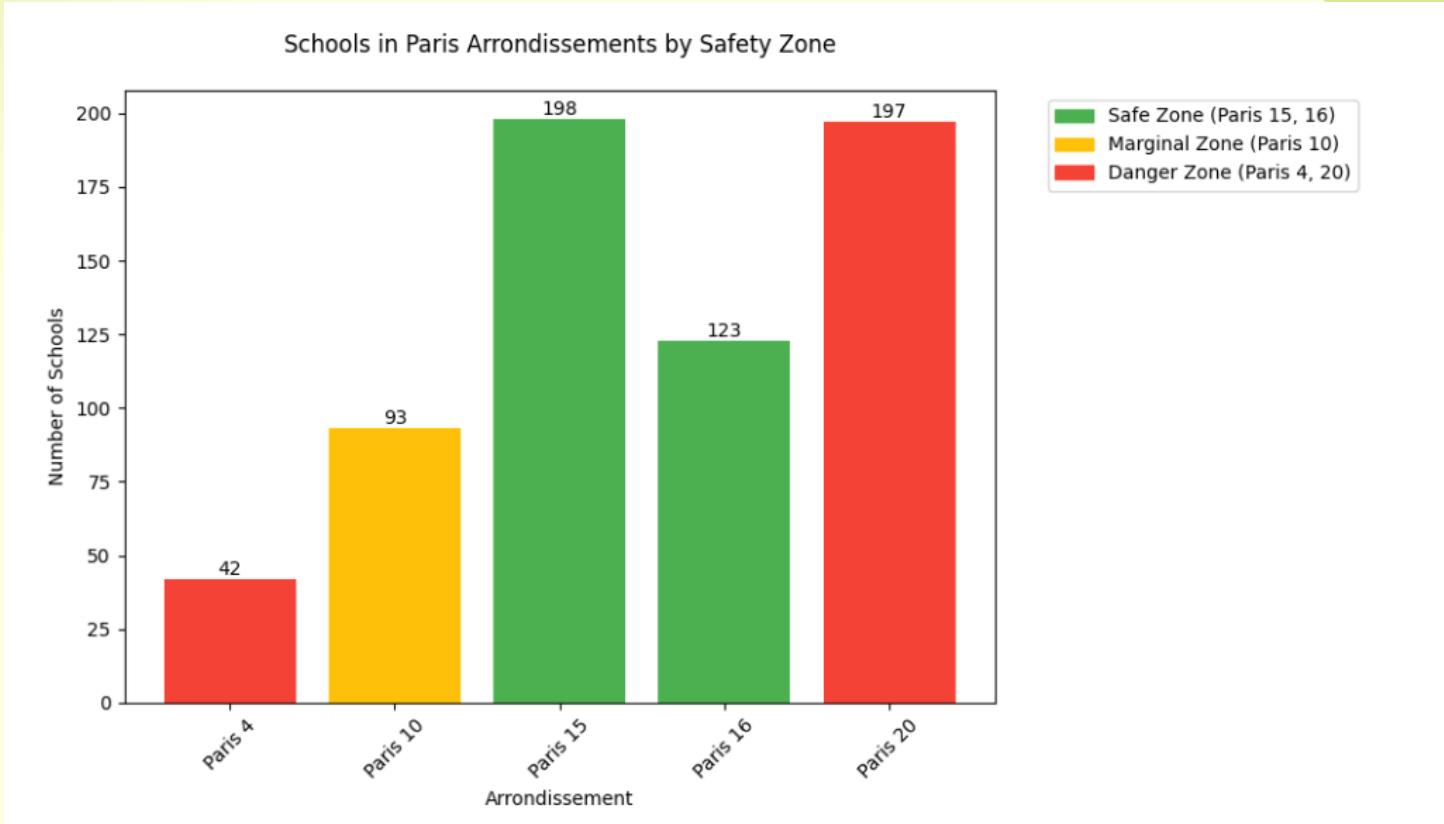


Arrondissement Scatter Plot – 2017

Graph 4: NO₂ vs PM2.5 per Arrondissement

- Green zone: Safe for schools (e.g., 75015, 75016)
- Red zone: Dangerous exposure (75004, 75020)
- *Thresholds used:* NO₂ >15 µg/m³, PM2.5 >8 µg/m³



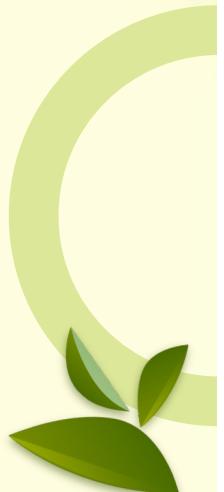




Bar Chart – School Capacity vs Safety

Graph 6: Bar Chart by Arrondissement

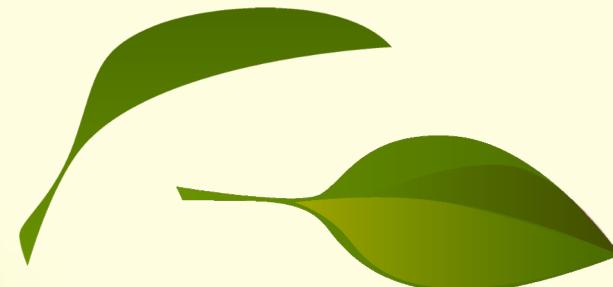
- Segmented by safety classification (Green / Orange / Red)
- *Example:* 75016: 42% of schools in Safe Zone
- *Action:* Expand here, freeze construction in red districts





Summary of Results

- Central Paris = High pollution
- Strong pollutant correlations
- Pollution is decreasing – but action is still needed





Recommendations



- Build in western arrondissements
- Retrofit red zone schools
- Green rooftops, emission controls, HEPA filters
- Policy: Link building permits to air quality



Conclusion

- Data-driven insight for child health policy
 - Target zones for safety
 - Real improvements possible with focused action
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Thank you !