



# PRODUCT-MARKET FIT FOR AIR PURIFIERS

LEVERAGING AQI ANALYTICS FOR DEVELOPMENT

Presented by : Niladri Halder

Focus Area

Function : Market Research Analytics

Domain : Consumer Appliances

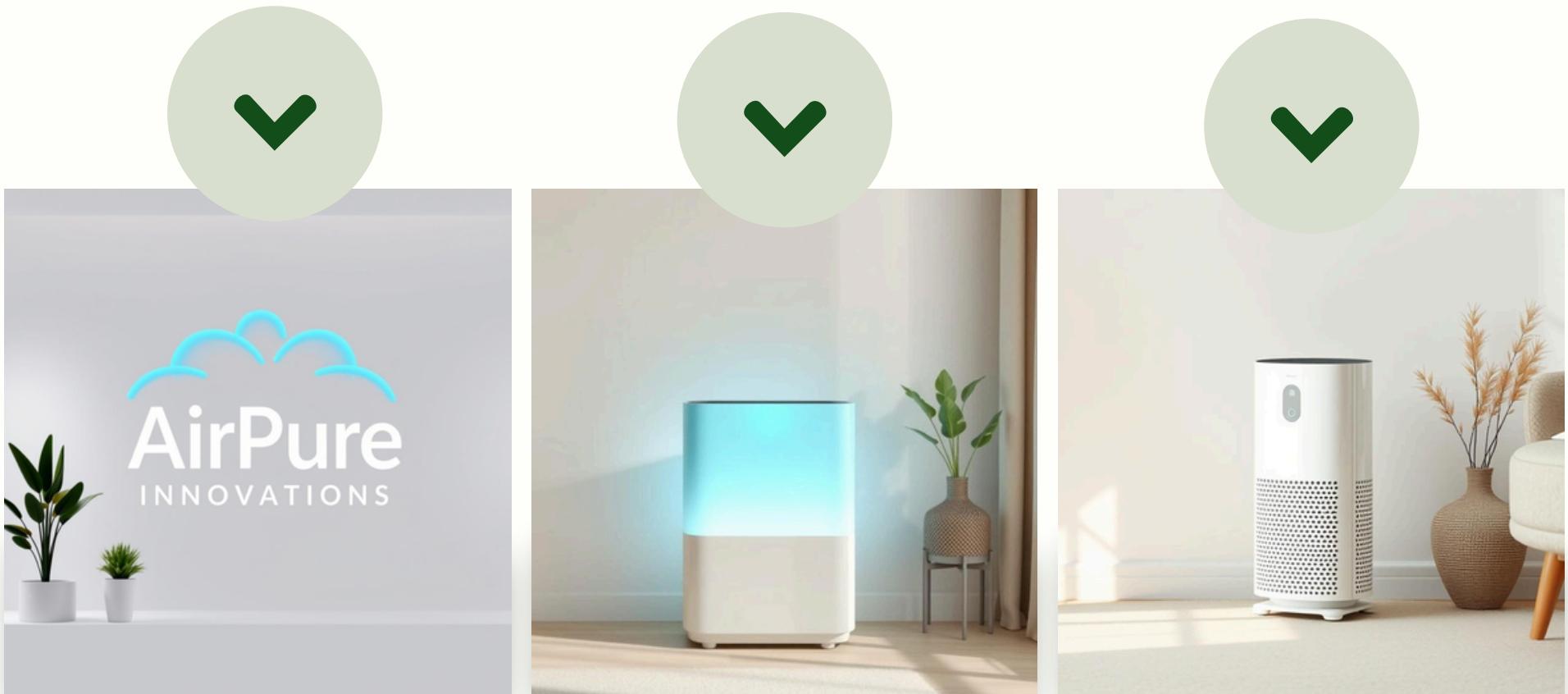


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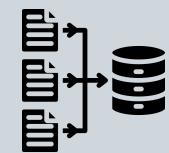


# AGENDA

- ✓ Basic Details
- ✓ An Overview of AirPure Innovation
- ✓ Research Questions
- ✓ Primary Research Questions
- ✓ Secondary Research Questions
- ✓ Recommendations
- ✓ References



# Basic Details



## Data Source

- Dataful datasets  
(<https://dataful.in/challenges/>)
- NAMP data  
(<https://cpcb.nic.in/namp-data/>)
- Ken Research  
(<https://www.kenresearch.com/industry-reports/india-air-purifiers-market>)
- IQAIR  
(<https://www.iqair.com/in-en/india?>)



## Tools Used

- SQL (40 %)
- Power BI (35 %)
- Python (18 %)
- MS Excel (2 %)
- Canva (5 %)



## Objectives

- How can R&D be aligned with localized pollution patterns.
- What pollutants or particles should air purifier target.
- Which cities have the highest demand for air purifiers etc...



## Report

- Market Analysis of the Product
- Visualizations and dashboards
- Insights and Analytics
- Recommendations
- References

# Overview of AirPure Innovation



**Founded:** 2025 (Early-Stage Startup)

**Headquarters:** India

**Core Product:** Smart Air Purifier (under development)

**Mission:** To provide accessible, intelligent, and effective air purification solutions tailored to the unique pollution patterns of Indian cities.

## Background & Context :

AirPure Innovations was founded in response to India's worsening air quality crisis. With 14 Indian cities among the 20 most polluted in the world, urban residents are facing alarming health risks tied to airborne pollutants. The startup recognizes the growing consumer awareness around air quality, highlighted by recent events—such as public figures avoiding polluted environments and luxury hotels publicly displaying AQI levels to reassure guests.

# Research Questions



## Primary Research Questions

- List the top 5 and bottom 5 areas with highest average AQI. (Consider areas which contains data from last 6 months: December 2024 to May 2025)
- List out top 2 and bottom 2 prominent pollutants for each state of southern India. (Consider data post covid: 2022 onwards)
- Does AQI improve on weekends vs weekdays in Indian metro cities (Delhi, Mumbai, Chennai, Kolkata, Bengaluru, Hyderabad, Ahmedabad, Pune)? (Consider data from last 1 year)
- Which months consistently show the worst air quality across Indian states – (Consider top 10 states with high distinct areas)
- For the city of Bengaluru, how many days fell under each air quality category (e.g., Good, Moderate, Poor, etc.) between March and May 2025?
- List the top two most reported disease illnesses in each state over the past three years, along with the corresponding average Air Quality Index (AQI) for that period.
- List the top 5 states with high EV adoption and analyse if their average AQI is significantly better compared to states with lower EV adoption.

Canva

## Secondary Research Questions

- Which age group is most affected by air pollution-related health outcomes – and how does this vary by city?
- Who are the major competitors in the Indian air purifier market, and what are their key differentiators (e.g., price, filtration stages, smart features)?
- What is the relationship between a city's population size and its average AQI – do larger cities always suffer from worse air quality? (Consider 2024 population and AQI data for this)
- How aware are Indian citizens of what AQI (Air Quality Index) means – and do they understand its health implications?
- Which pollution control policies introduced by the Indian government in the past 5 years have had the most measurable impact on improving air quality – and how have these impacts varied across regions or cities?



## Product-Market Fit for Air Purifiers Dashboard

...

**Primary Problems**  
[ Part 1 ]

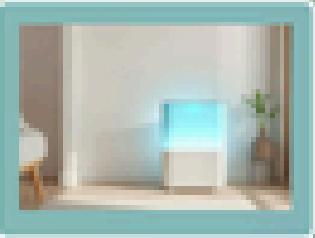


**Primary Problems**  
[ Part 2 ]



**Secondary  
Problems**

# AirPure Innovations



## Primary Problems (Part 1)

states

|                             |                   |
|-----------------------------|-------------------|
| Andaman and Nicobar Islands | Himachal Pradesh  |
| Andhra Pradesh              | Jammu and Kashmir |
| Arunachal Pradesh           | Jharkhand         |
| Assam                       | Karnataka         |
| Bihar                       | Kerala            |
| Chhattisgarh                | Madhya Pradesh    |
| Delhi                       | Maharashtra       |
| Gujarat                     | Manipur           |
| Haryana                     | Meghalaya         |

111.13

Average of aqi value

## Product-Market Fit for Air Purifiers Dashboard

code

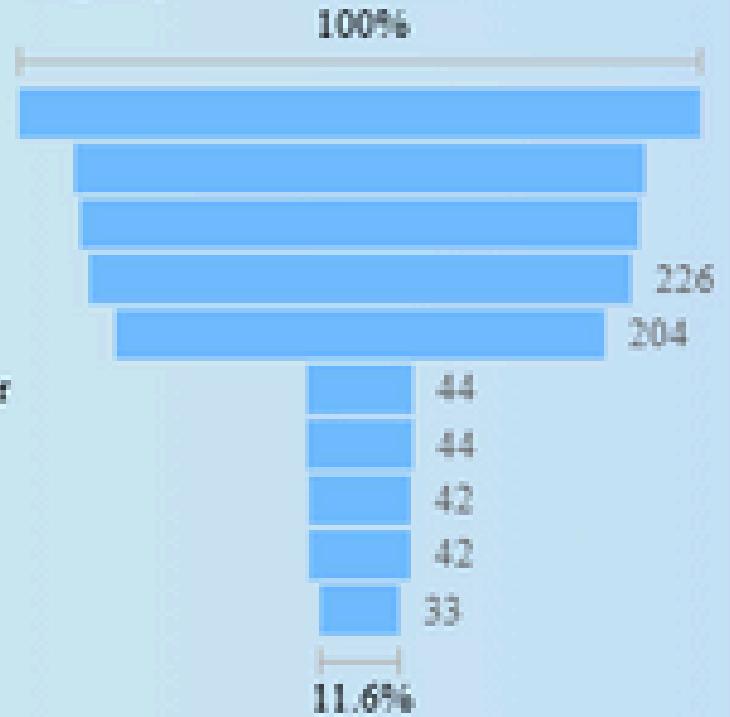
32

Count of State & UT's

### Air Qlty Category of Bangalore



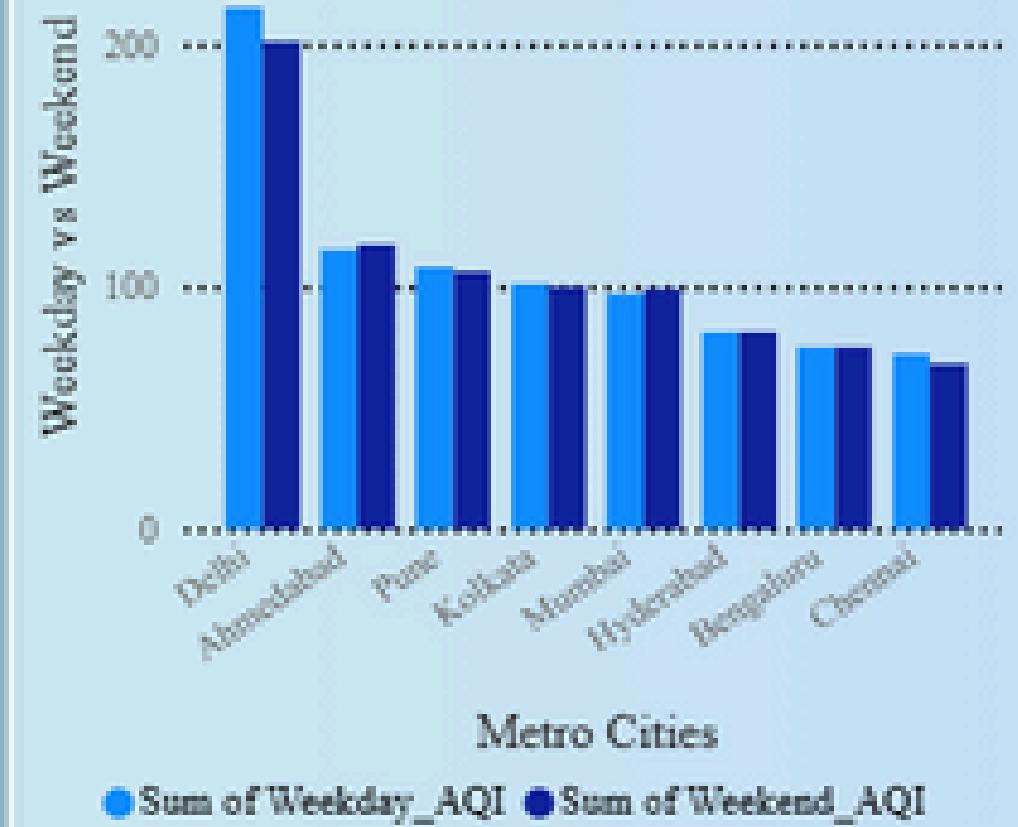
### Avg AQI value by Area



### Top & Least Pollutants from Southern India

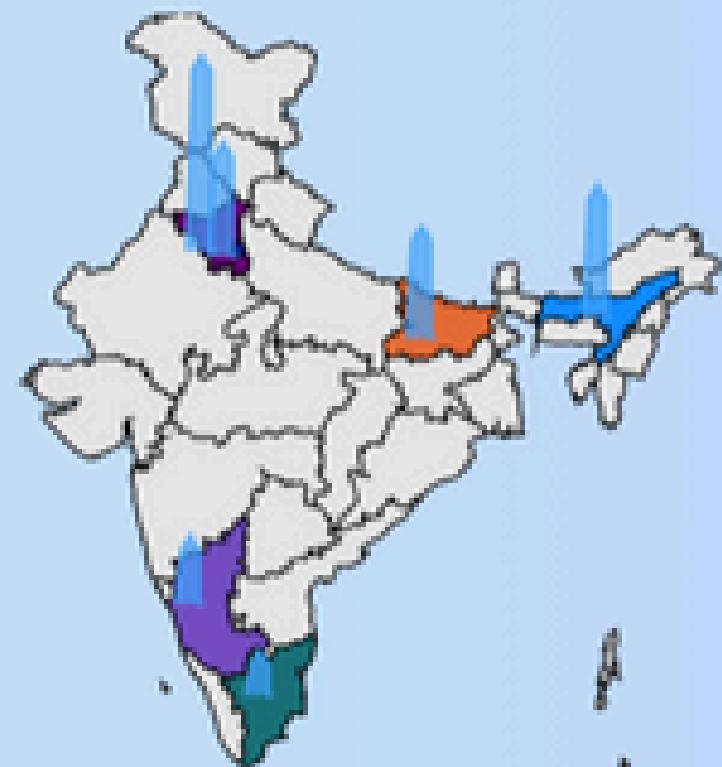
| state          | Pollutant | Occurence | Intensity |
|----------------|-----------|-----------|-----------|
| Andhra Pradesh | NO2       | 259       | Least     |
| Andhra Pradesh | PM10      | 3606      | Most      |
| Andhra Pradesh | PM2.5     | 2244      | Most      |
| Andhra Pradesh | SO2       | 11        | Least     |
| Karnataka      | CO        | 3456      | Most      |
| Karnataka      | NH3       | 34        | Least     |
| Karnataka      | PM10      | 14572     | Most      |
| Karnataka      | SO3       | 1         | Least     |
| Kerala         | NH3       | 10        | Least     |
| Kerala         | PM10      | 3538      | Most      |
| Kerala         | PM2.5     | 1344      | Most      |
| Kerala         | SO2       | 7         | Least     |
| Tamil Nadu     | NH3       | 11        | Least     |
| Tamil Nadu     | NO2       | 500       | Least     |
| Tamil Nadu     | PM10      | 7187      | Most      |
| Tamil Nadu     | PM2.5     | 3016      | Most      |
| Telangana      | NO2       | 119       | Least     |
| Telangana      | O3        | 152       | Least     |
| Telangana      | PM10      | 1002      | Most      |
| Telangana      | PM2.5     | 590       | Most      |

### AQI on Weekday vs Weekend at Metro Cities



### State with Most & Least AQI's

- Bahad... (purple)
- Byrnihat (blue)
- Cham... (purple)

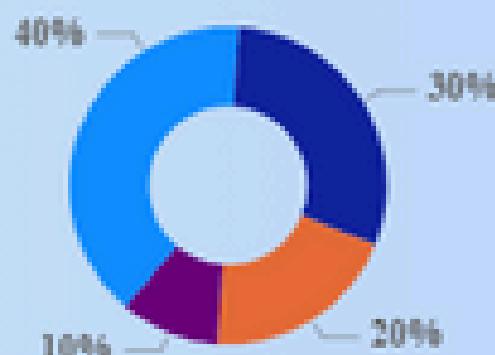


Squillion

### Months Consistently shows Worst AQI

Month Name

- November (light blue)
- January (dark blue)
- February (orange)
- December (purple)



## Primary Question

1. List the top 5 and bottom 5 areas with highest average AQI. (Consider areas which contains data from last 6 months: December 2024 to May 2025)



## Insights

### 1. High Pollution Concentration in North and East India :

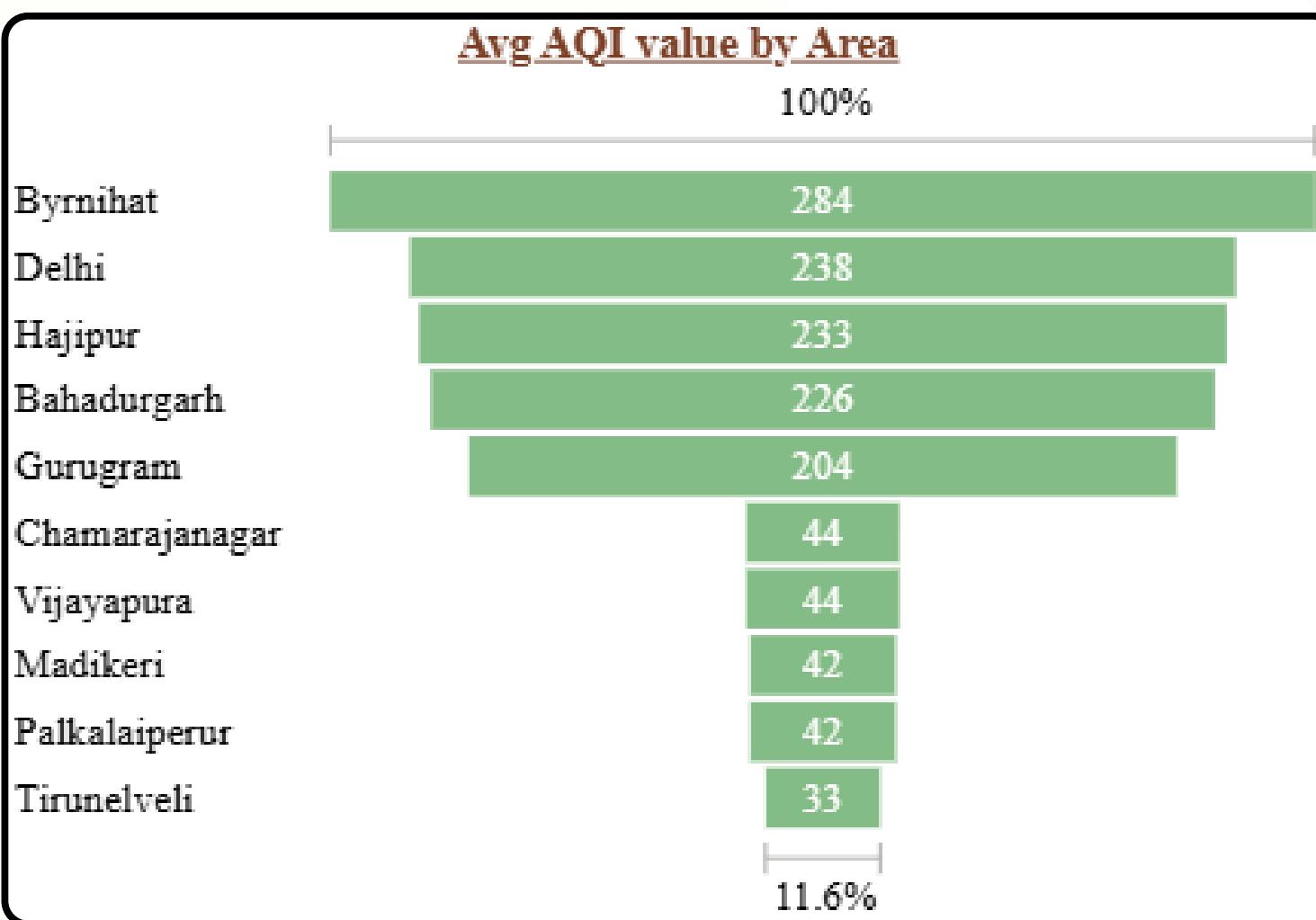
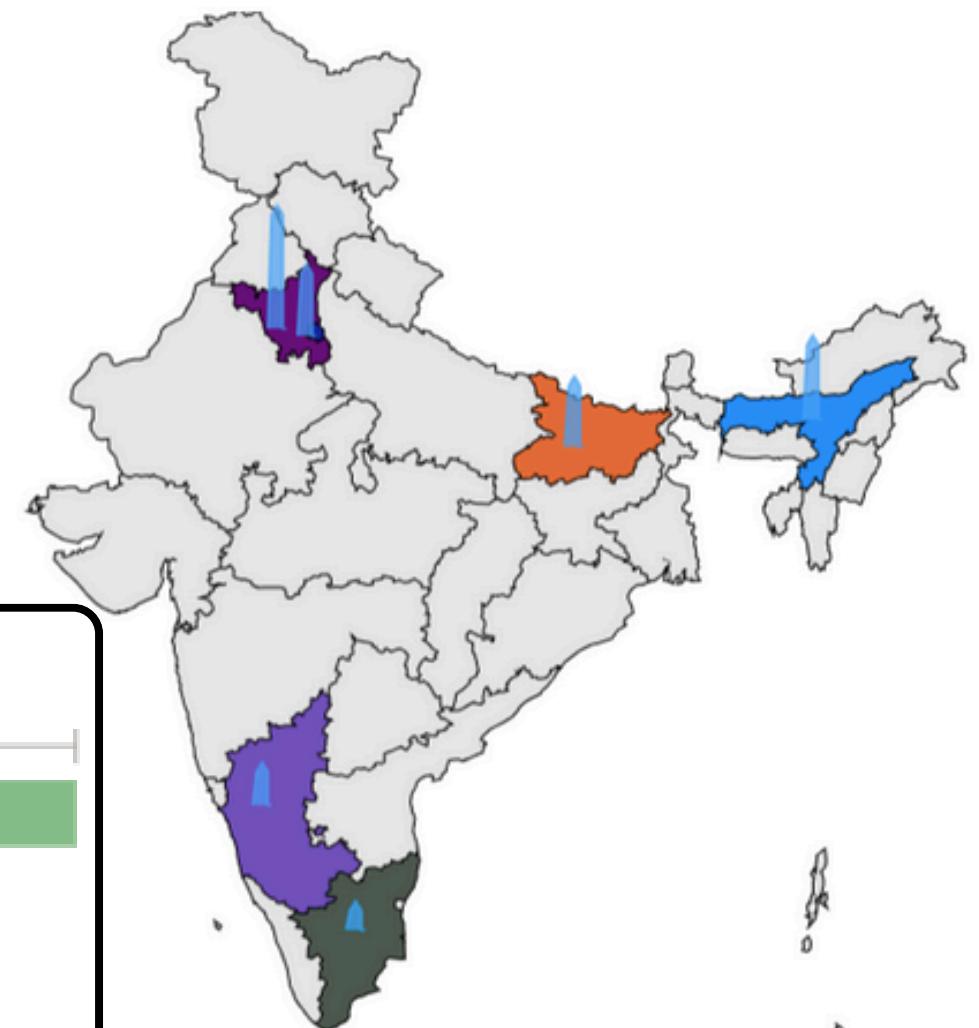
- The worst-affected areas are in Assam, Delhi, Bihar, and Haryana, suggesting industrial activity, high vehicular density etc.
- Byrnihat (Assam)** topping the list might be due to industrial clusters (cement and manufacturing plants) and cross-border pollution from nearby regions.

### 2. Clean Air Zones in Southern India :

- Predominantly located in Tamil Nadu and Karnataka, which may reflect better green cover, less industrial pollution, and efficient local environmental policies.

State with Most & Least AQI's

- Bahadurgarh
- Byrnihat
- Chamarajanagar
- Delhi
- Gurugram
- Hajipur
- Madikeri
- Palkalaiperur
- Tirunelveli



[IQAir Website](#)



## Primary Question

2. List out top 2 and bottom 2 prominent pollutants for each state of southern India. (Consider data post covid: 2022 onwards)
3. Which months consistently show the worst air quality across Indian states – (Consider top 10 states with high distinct areas)



| Top & Least Pollutants from Southern India |           |            |           |
|--|-----------|------------|-----------|
| state                                      | Pollutant | Occurrence | Intensity |
| Andhra Pradesh                             | NO2       | 259        | Least     |
| Andhra Pradesh                             | PM10      | 3606       | Most      |
| Andhra Pradesh                             | PM2.5     | 2244       | Most      |
| Andhra Pradesh                             | SO2       | 11         | Least     |
| Karnataka                                  | CO        | 3456       | Most      |
| Karnataka                                  | NH3       | 34         | Least     |
| Karnataka                                  | PM10      | 14572      | Most      |
| Karnataka                                  | SO3       | 1          | Least     |
| Kerala                                     | NH3       | 10         | Least     |
| Kerala                                     | PM10      | 3538       | Most      |
| Kerala                                     | PM2.5     | 1344       | Most      |
| Kerala                                     | SO2       | 7          | Least     |
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| Telangana                                  | PM10      | 1002       | Most      |
| Telangana                                  | PM2.5     | 590        | Most      |

## Insights

### Pollutant

PM10

### Common Status

Most prominent in all states – core issue

PM2.5

Highly common – fine particulate challenge

SO2, NO2, NH3

Least prominent – not a priority

CO

Prominent only in Karnataka

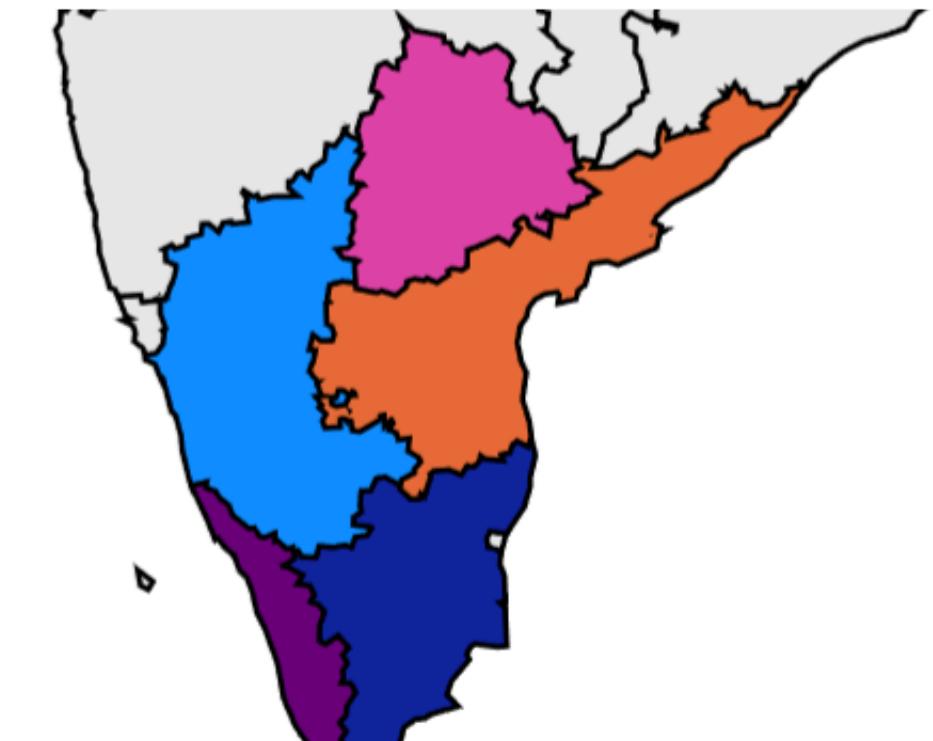
## Insights

### 1. High-Risk Season: November to January

- November appears most frequently (4 out of 10 states) as the worst month.
- December has the worst average AQI (339) – even though it appears only once, the pollution spike is alarming.
- Frequency and AQI drop significantly in February (only 2 times worst; AQI = 98), indicates the beginning of seasonal air improvement

South Indian States

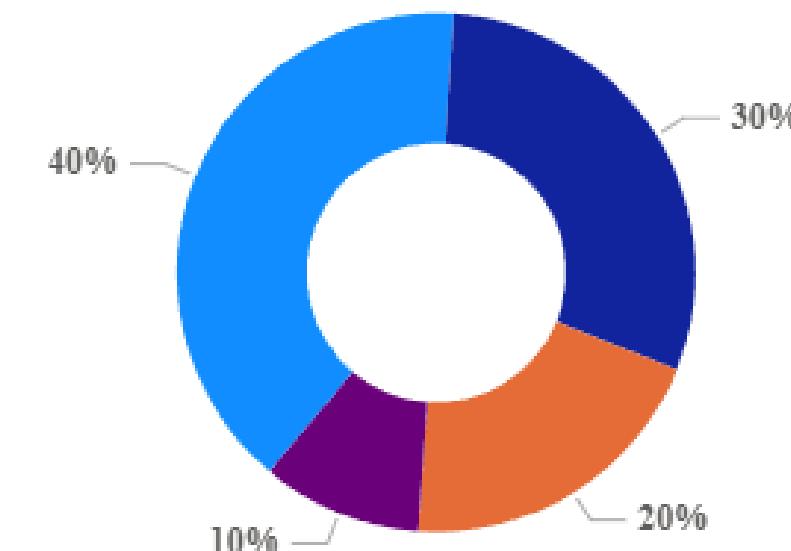
● Andhra Pradesh ● Karnataka ● Kerala ● Tamil Nadu ● Telangana



### Months Consistently shows Worst AQI

Month Name

- November
- January
- February
- December



## Primary Question

4. Does AQI improve on weekends vs weekdays in Indian metro cities (Delhi, Mumbai, Chennai, Kolkata, Bengaluru, Hyderabad, Ahmedabad, Pune)? (Consider data from last 1 year)
5. For the city of Bengaluru, how many days fell under each air quality category (e.g., Good, Moderate, Poor, etc.) between March and May 2025?



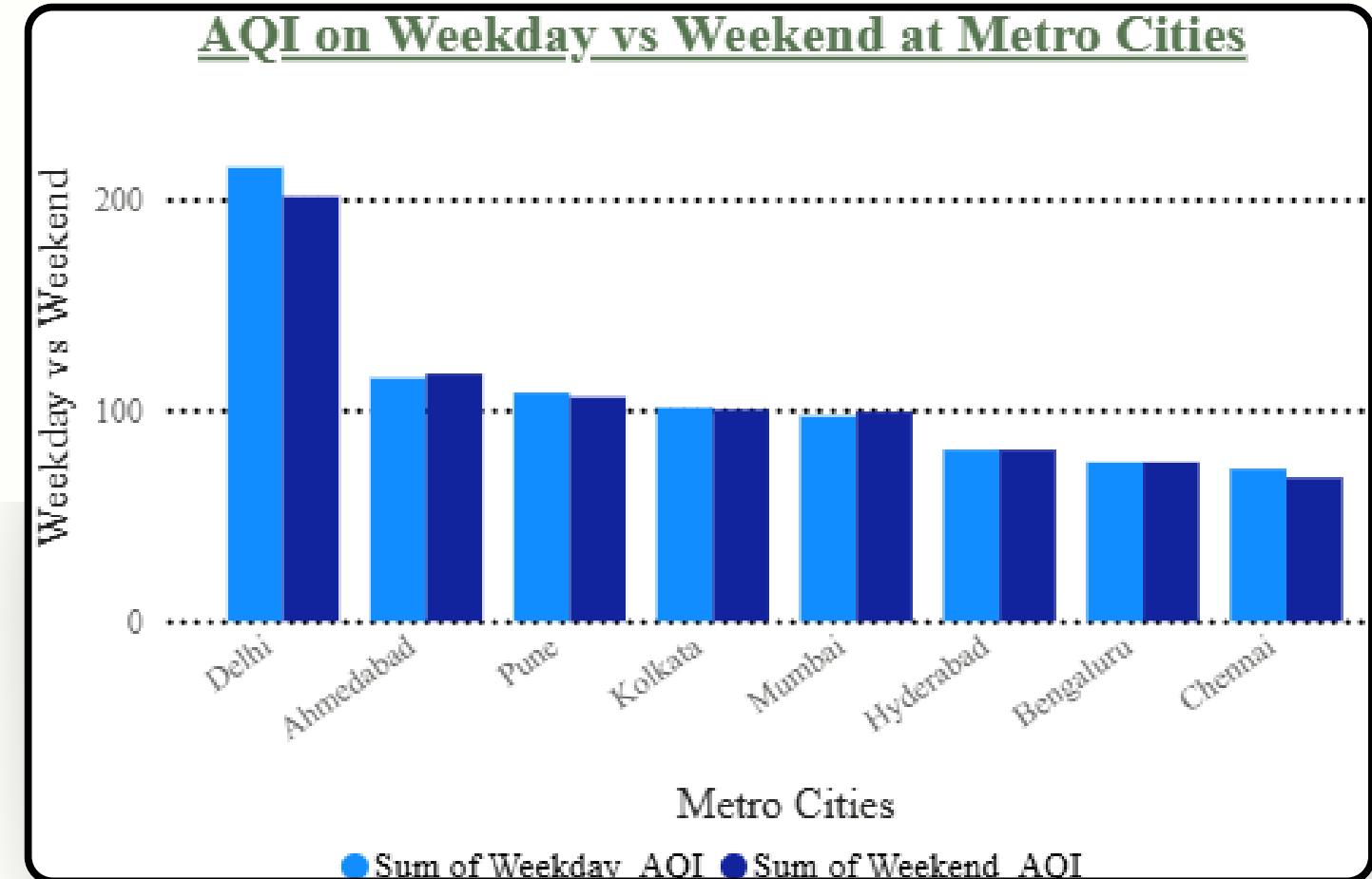
## Insights

### 1. Cities Where AQI Improves on Weekends :

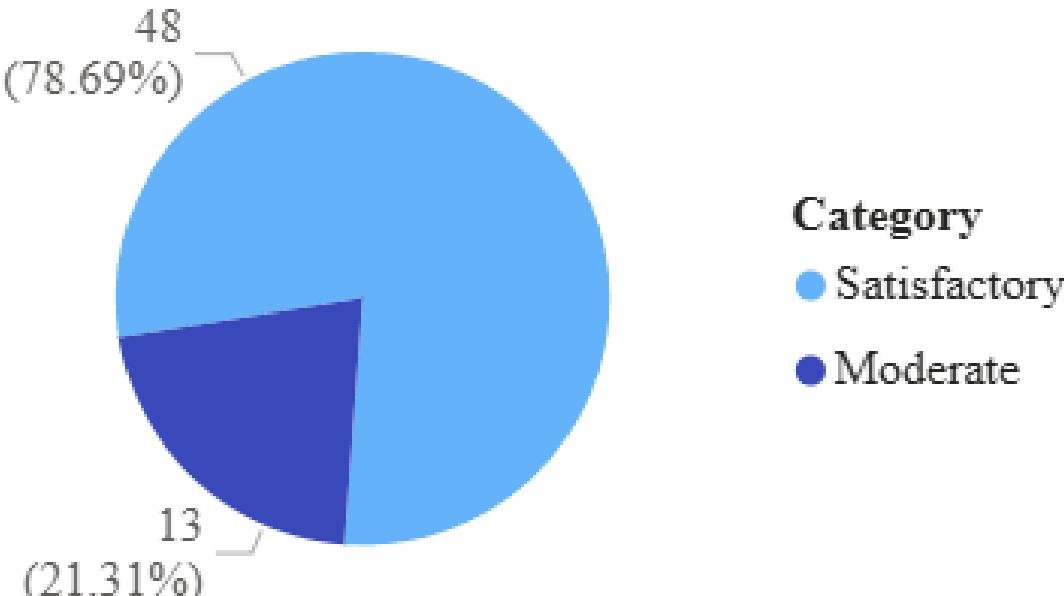
- Delhi (+15) strong drop on weekends – likely due to reduced traffic, industrial activity, and construction.
- Chennai, Pune, Kolkata minor improvements. Likely fewer emissions during weekends but overall air quality remains moderate.

### 2. Cities Where AQI Worsens on Weekends :

- Ahmedabad, Mumbai slight increase in pollution over weekends, possibly due to increased leisure traffic, open burning, or port or industrial operations.



## Air Qlty Category of Bangalore



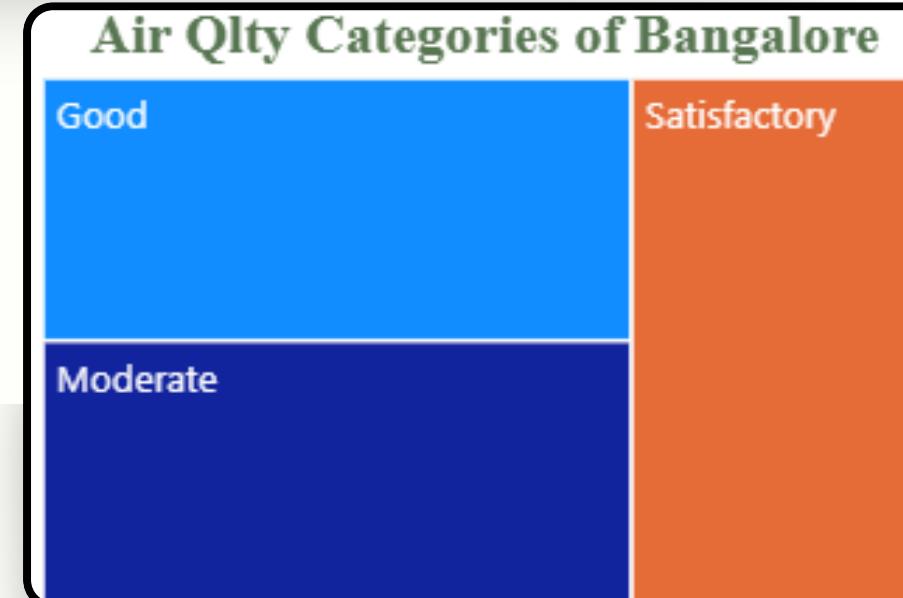
## Insights

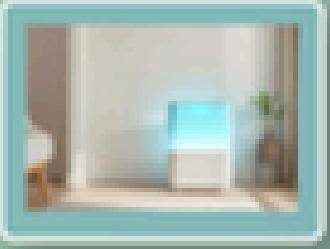
### 1. Clean Air Majority :

- Over 78% of the days (48 out of 61) had Satisfactory air quality.
- Suggests Bengaluru continues to rank among India's better air quality metros, especially in summer months.

### 2. Moderate Air on 13 Days :

- Roughly 21% of the days were under the Moderate category





## Primary Problems (Part 2)

### states

|                             |                   |
|-----------------------------|-------------------|
| Andaman and Nicobar Islands | Himachal Pradesh  |
| Andhra Pradesh              | Jammu and Kashmir |
| Arunachal Pradesh           | Jharkhand         |
| Assam                       | Karnataka         |
| Bihar                       | Kerala            |
| Chhattisgarh                | Madhya Pradesh    |
| Delhi                       | Maharashtra       |
| Gujarat                     | Manipur           |
| Haryana                     | Meghalaya         |

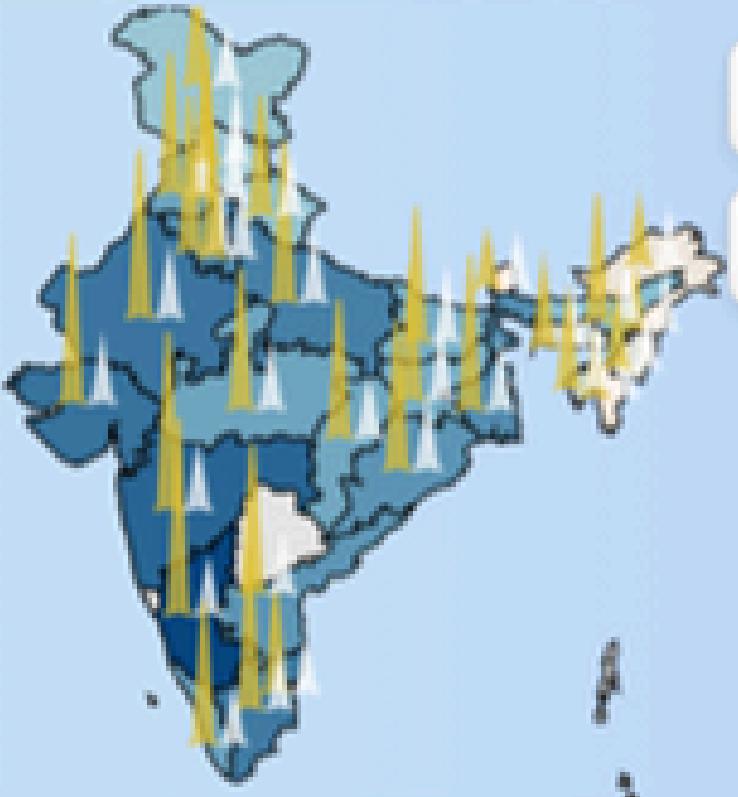
2000

## Product-Market Fit for Air Purifiers Dashboard

### Most reported disease illness in each States & UT's

| state                       | disease_illness_name    | Avg_aqi_value | Occurrence | Total_Cases |
|-----------------------------|-------------------------|---------------|------------|-------------|
| Andaman and Nicobar Islands | Acute Diarrheal Disease | 57            | 3          | 117         |
| Andaman and Nicobar Islands | Fever with Rash         | 57            | 1          | 8           |
| Andhra Pradesh              | Acute Diarrheal Disease | 78            | 57         | 2180        |
| Andhra Pradesh              | Food Poisoning          | 78            | 17         | 710         |
| Arunachal Pradesh           | Acute Diarrheal Disease | 54            | 6          | 175         |
| Arunachal Pradesh           | Shigellosis             | 54            | 2          | 145         |
| Assam                       | Acute Diarrheal Disease | 115           | 79         | 2646        |
| Assam                       | Food Poisoning          | 115           | 47         | 1924        |
| Bihar                       | Acute Diarrheal Disease | 158           | 49         | 1315        |
| Bihar                       | Fever with Rash         | 158           | 52         | 688         |
| Chhattisgarh                | Acute Diarrheal Disease | 79            | 175        | 8051        |
| Chhattisgarh                | Cholera                 | 79            | 11         | 745         |

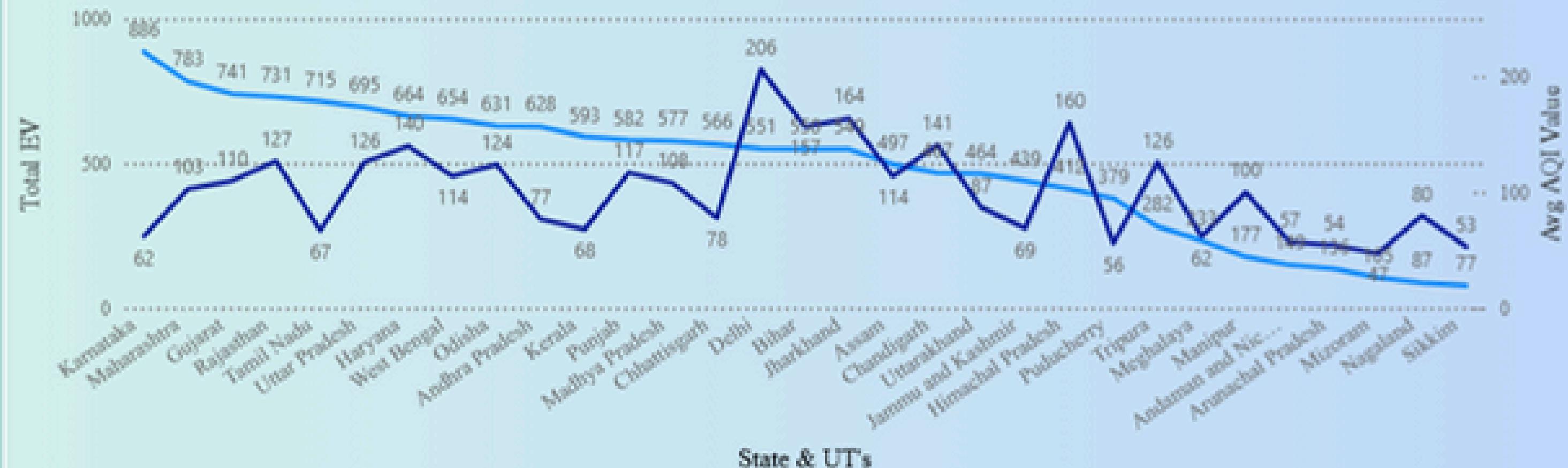
EV Adoption rate and Avg AQI per States



Squillion

### High EV vs Lower EV adoption rate along with corresponding Avg AQI

Indicator : ● Sum of Total\_EV ● Sum of Avg\_AQI\_Value



## Primary Question

6. List the top two most reported disease illnesses in each state over the past three years, along with the corresponding average Air Quality Index (AQI) for that period.



### Most reported disease illness in each States & UT's

| state                       | disease_illness_name    | Avg_aqi_value | Occurrence | Total_Cases |
|-----------------------------|-------------------------|---------------|------------|-------------|
| Andaman and Nicobar Islands | Acute Diarrheal Disease | 57            | 3          | 117         |
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| Chhattisgarh                | Acute Diarrheal Disease | 79            | 175        | 8051        |
| Chhattisgarh                | Cholera                 | 79            | 11         | 745         |
| Delhi                       | Dengue                  | 206           | 1          | 40          |
| Delhi                       | Measles                 | 206           | 1          | 2           |
| Gujarat                     | Acute Diarrheal Disease | 110           | 84         | 4783        |
| Gujarat                     | Food Poisoning          | 110           | 51         | 2934        |
| Haryana                     | Acute Diarrheal Disease | 137           | 13         | 721         |
| Haryana                     | Cholera                 | 137           | 4          | 972         |
| Himachal Pradesh            | Acute Diarrheal Disease | 161           | 9          | 990         |
| Himachal Pradesh            | Hepatitis A             | 161           | 5          | 559         |
| Jammu and Kashmir           | Acute Diarrheal Disease | 71            | 22         | 838         |
| Jammu and Kashmir           | Hepatitis A             | 71            | 64         | 1013        |
| Jharkhand                   | Acute Diarrheal Disease | 164           | 64         | 1338        |
| Jharkhand                   | Chickenpox              | 164           | 79         | 907         |
| Karnataka                   | Acute Diarrheal Disease | 62            | 178        | 6798        |
| Karnataka                   | Cholera                 | 62            | 53         | 4111        |
| Kerala                      | Acute Diarrheal Disease | 69            | 88         | 4852        |
| Kerala                      | Food Poisoning          | 69            | 167        | 9662        |
| Madhya Pradesh              | Acute Diarrheal Disease | 107           | 182        | 5959        |
| Madhya Pradesh              | Dengue                  | 107           | 59         | 1874        |
| Maharashtra                 | Acute Diarrheal Disease | 103           | 110        | 6918        |

## Insights

### Most reported disease illness in each States & UT's

| state         | disease_illness_name    | Avg_aqi_value | Occurrence | Total_Cases |
|---------------|-------------------------|---------------|------------|-------------|
| Maharashtra   | Food Poisoning          | 103           | 47         | 4457        |
| Manipur       | Acute Diarrheal Disease | 104           | 3          | 82          |
| Manipur       | Food Poisoning          | 104           | 3          | 173         |
| Meghalaya     | Chickenpox              | 65            | 9          | 275         |
| Meghalaya     | Measles                 | 65            | 11         | 422         |
| Mizoram       | Food Poisoning          | 46            | 10         | 365         |
| Mizoram       | Scrub Typhus            | 46            | 2          | 233         |
| Nagaland      | Acute Diarrheal Disease | 81            | 3          | 72          |
| Nagaland      | Dengue                  | 81            | 3          | 292         |
| Odisha        | Acute Diarrheal Disease | 125           | 213        | 5606        |
| Odisha        | Cholera                 | 125           | 14         | 3504        |
| Puducherry    | Acute Diarrheal Disease | 57            | 3          | 193         |
| Puducherry    | Typhoid                 | 57            | 2          | 42          |
| Punjab        | Acute Diarrheal Disease | 117           | 19         | 1107        |
| Punjab        | Cholera                 | 117           | 6          | 531         |
| Rajasthan     | Acute Diarrheal Disease | 127           | 10         | 1166        |
| Rajasthan     | Food Poisoning          | 127           | 8          | 569         |
| Sikkim        | Chickenpox              | 54            | 1          | 32          |
| Sikkim        | Hepatitis A             | 54            | 1          | 25          |
| Tamil Nadu    | Acute Diarrheal Disease | 68            | 76         | 3030        |
| Tamil Nadu    | Mumps                   | 68            | 102        | 1380        |
| Telangana     | Acute Diarrheal Disease | 80            | 22         | 934         |
| Telangana     | Food Poisoning          | 80            | 4          | 67          |
| Tripura       | Acute Diarrheal Disease | 135           | 5          | 235         |
| Tripura       | Food Poisoning          | 135           | 1          | 85          |
| Uttar Pradesh | Acute Diarrheal Disease | 124           | 84         | 3650        |
| Uttar Pradesh | Food Poisoning          | 124           | 34         | 1821        |
| Uttarakhand   | Acute Diarrheal Disease | 87            | 11         | 549         |
| Uttarakhand   | Food Poisoning          | 87            | 4          | 472         |
| West Bengal   | Acute Diarrheal Disease | 117           | 74         | 3255        |
| West Bengal   | Food Poisoning          | 117           | 36         | 2586        |

- **Most widespread :** Acute Diarrheal Disease occurred in 90% of states, also Food Poisoning occurs in 15+ states.
- **Average AQI (100-160+):** Many states with avg AQI show a high number of reported cases of Acute Diarrheal Disease, Cholera, Hepatitis A

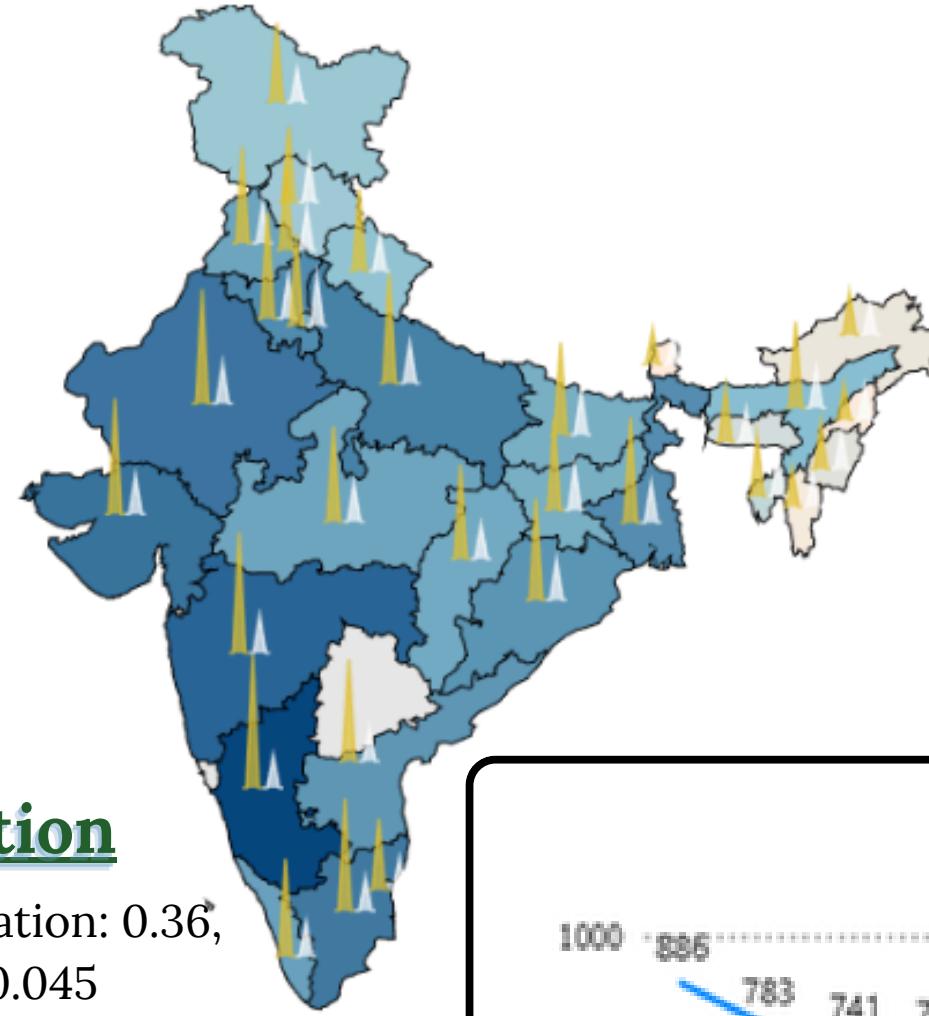
## Primary Question

7. List the top 5 states with high EV adoption and analyze if their average AQI is significantly better compared to states with lower EV adoption.



### EV Adoption rate and Avg AQI per States

Min Mid Max



### Correlation

Pearson Correlation: 0.36,  
P-value: 0.045

- AQI isn't immediately impacted by EVs due to other dominant pollution sources (industry, construction, etc.).
- **EV registration** is rising, but internal combustion engine vehicles still dominate.
- Since  $p < 0.05$ , the correlation is **statistically significant** at the 95% confidence level.

### Insights

#### 1. Significantly better AQI :

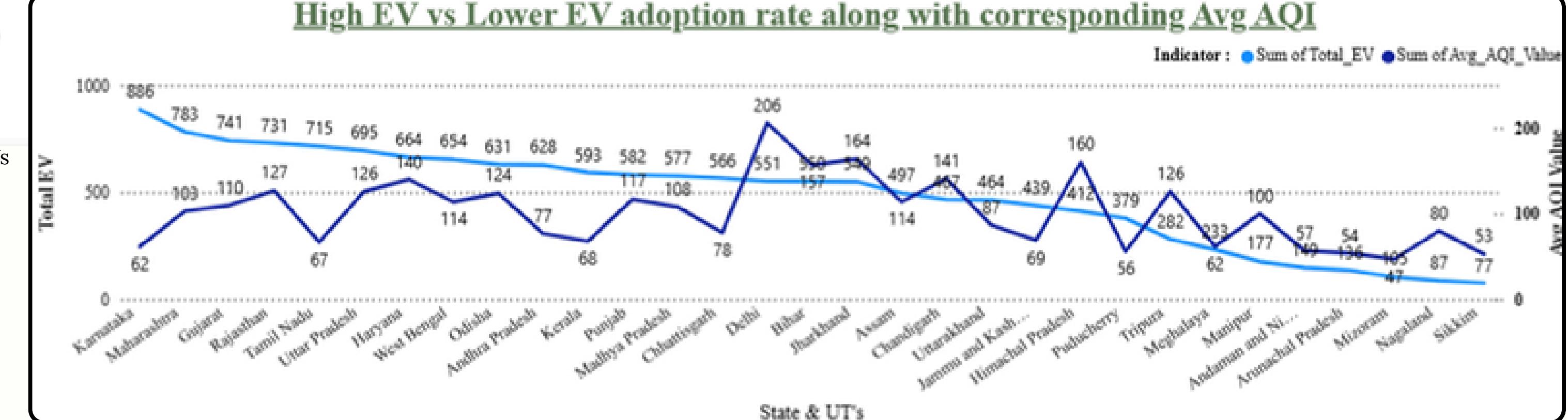
- 3 out of 5 high EV states have significantly better AQI than national averages.
- Karnataka (AQI 62) and Tamil Nadu (AQI 67) outperform most other states, showing a strong inverse relationship between EV adoption and pollution.

#### 2. High EV States vs Other States :

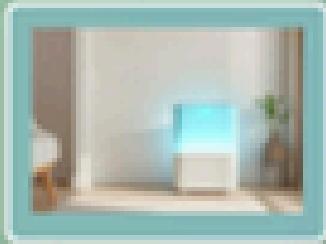
- High EV Group AQI mostly under 110 – relatively clean air
- Other States Several states over 140–200+ (Delhi, Bihar, Haryana)

### High EV vs Lower EV adoption rate along with corresponding Avg AQI

Indicator : ● Sum of Total\_EV ● Sum of Avg\_AQI\_Value



AirPure Innovations



## Secondary Problems

100

**Andaman and Nicobar Islands**

**Andhra Pradesh**

**Jharkhand**

Assam Karnataka

Ether Kernal

Madlyn  
Fischer

Digitized by srujanika@gmail.com

100%  

#### Operat

### Percentage Understand AQI

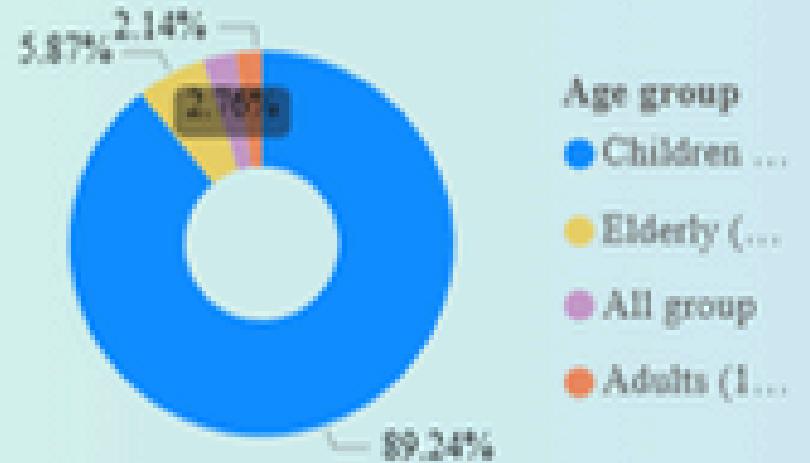
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# Product-Market Fit for Air Purifiers Dashboard

## Percentage Took Actions

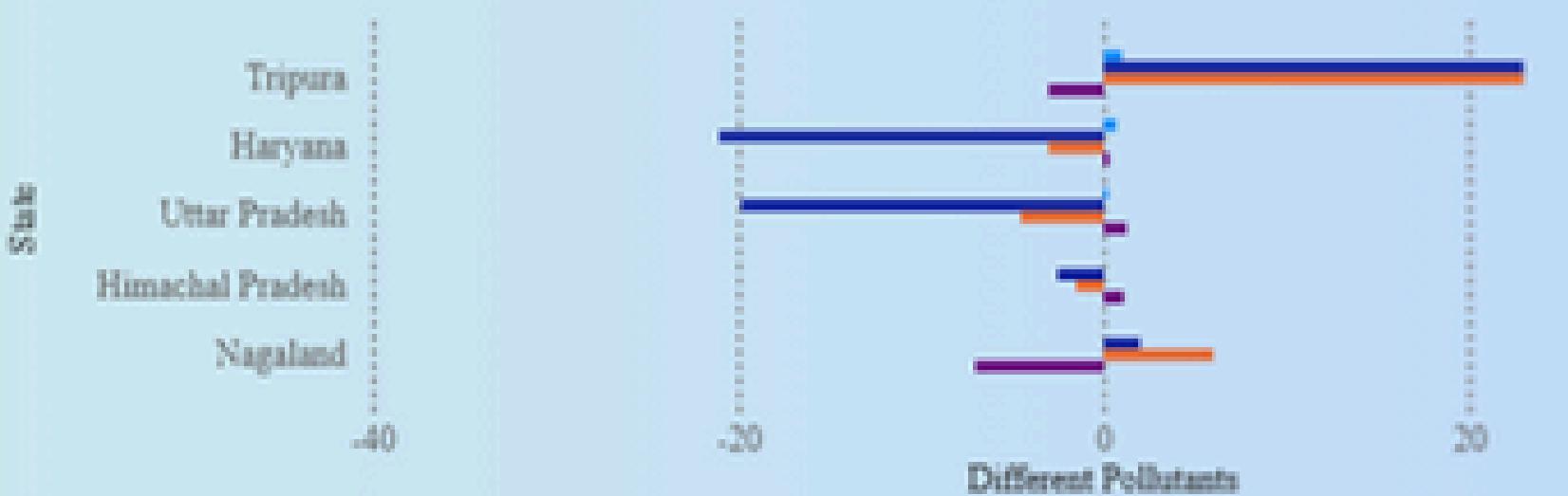
70

### Most Affected Age Group



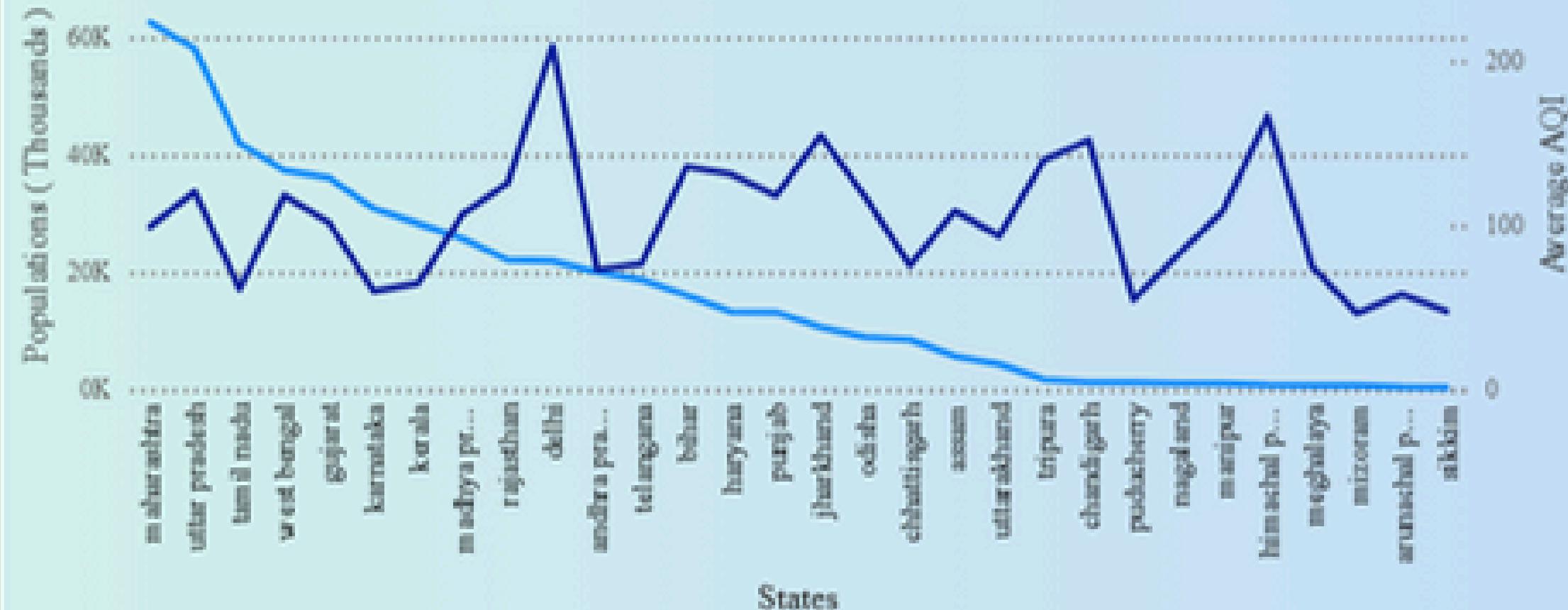
Annual Air Quality Comparison across Indian States : 2022 vs 2023

Indicator : ● Sum of NO2\_Diff ● Sum of PM10\_Diff ● Sum of PM2.5\_Diff ● Sum of SO2\_Diff

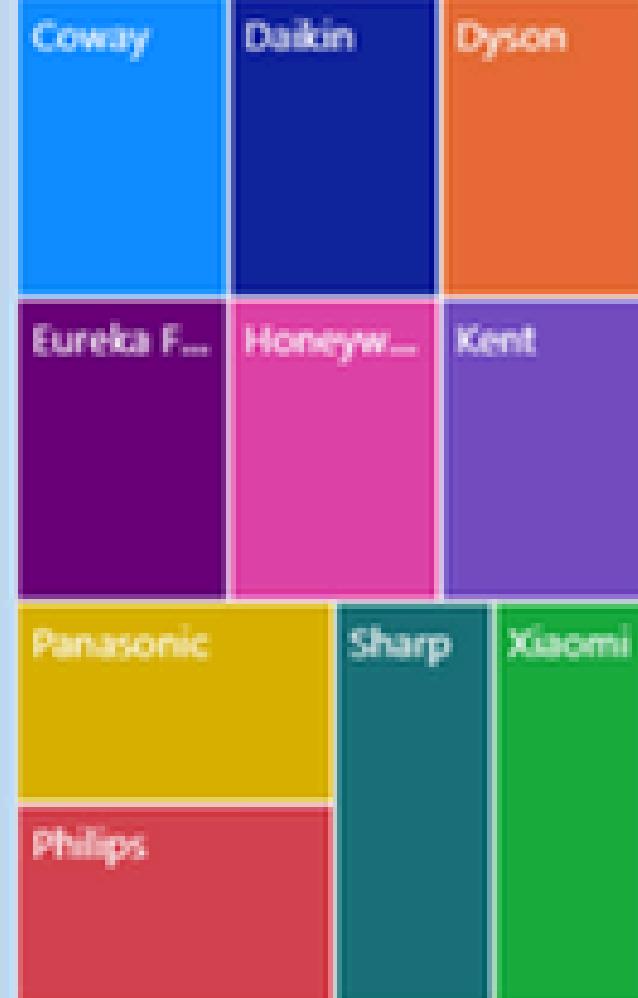


## Population vs Avg AQI by States

Indicator : ● Sum of population ● Sum of avg\_sqi



### **Major Competitor in India**



## Secondary Question

1. Which age group is most affected by air pollution-related health outcomes – and how does this vary by city?



|    | state                | age_group | Contributing_Diseases | Total_Affected | Description     |
|----|----------------------|-----------|-----------------------|----------------|-----------------|
| 1  | Jharkhand            | C         | 4                     | 1554           | Children (0-14) |
| 2  | Kerala               | C         | 4                     | 1470           | Children (0-14) |
| 3  | Madhya Pradesh       | C         | 6                     | 1081           | Children (0-14) |
| 4  | Meghalaya            | C         | 3                     | 937            | Children (0-14) |
| 5  | Uttar Pradesh        | C         | 4                     | 895            | Children (0-14) |
| 6  | Chhattisgarh         | C         | 4                     | 835            | Children (0-14) |
| 7  | Tamil Nadu           | C         | 4                     | 828            | Children (0-14) |
| 8  | Jammu and Kashmir    | C         | 3                     | 778            | Children (0-14) |
| 9  | Odisha               | C         | 5                     | 774            | Children (0-14) |
| 10 | Karnataka            | C         | 7                     | 749            | Children (0-14) |
| 11 | Bihar                | C         | 3                     | 680            | Children (0-14) |
| 12 | Assam                | C         | 6                     | 670            | Children (0-14) |
| 13 | Gujarat              | C         | 4                     | 529            | Children (0-14) |
| 14 | Karnataka            | E         | 3                     | 336            | Elderly (65+)   |
| 15 | Karnataka            | A         | 1                     | 278            | Adults (15-64)  |
| 16 | Haryana              | C         | 3                     | 270            | Children (0-14) |
| 17 | Kerala               | E         | 3                     | 264            | Elderly (65+)   |
| 18 | Punjab               | C         | 2                     | 240            | Children (0-14) |
| 19 | Arunachal Pradesh    | C         | 3                     | 228            | Children (0-14) |
| 20 | Maharashtra          | C         | 4                     | 195            | Children (0-14) |
| 21 | Uttarakhand          | C         | 3                     | 167            | Children (0-14) |
| 22 | West Bengal          | C         | 2                     | 167            | Children (0-14) |
| 23 | Manipur              | C         | 2                     | 127            | Children (0-14) |
| 24 | Odisha               | E         | 1                     | 127            | Elderly (65+)   |
| 25 | Odisha               | U         | 1                     | 113            | Unknown/Un...   |
| 26 | Uttarakhand          | E         | 1                     | 110            | Elderly (65+)   |
| 27 | Dadra and Nagar H... | U         | 1                     | 101            | Unknown/Un...   |
| 28 | Rajasthan            | C         | 3                     | 96             | Children (0-14) |
| 29 | Madhya Pradesh       | U         | 2                     | 96             | Unknown/Un...   |
| 30 | Mizoram              | C         | 1                     | 71             | Children (0-14) |
| 31 | Jammu and Kashmir    | E         | 1                     | 50             | Elderly (65+)   |
| 32 | Madhya               | C         | 2                     | 43             | Children (0-14) |
| 33 | Uttarakhand          | U         | 1                     | 38             | Unknown/Un...   |
| 34 | Sikkim               | C         | 1                     | 32             | Children (0-14) |
| 35 | Puducherry           | C         | 1                     | 32             | Children (0-14) |
| 36 | Tripura              | C         | 1                     | 25             | Children (0-14) |

## Insights

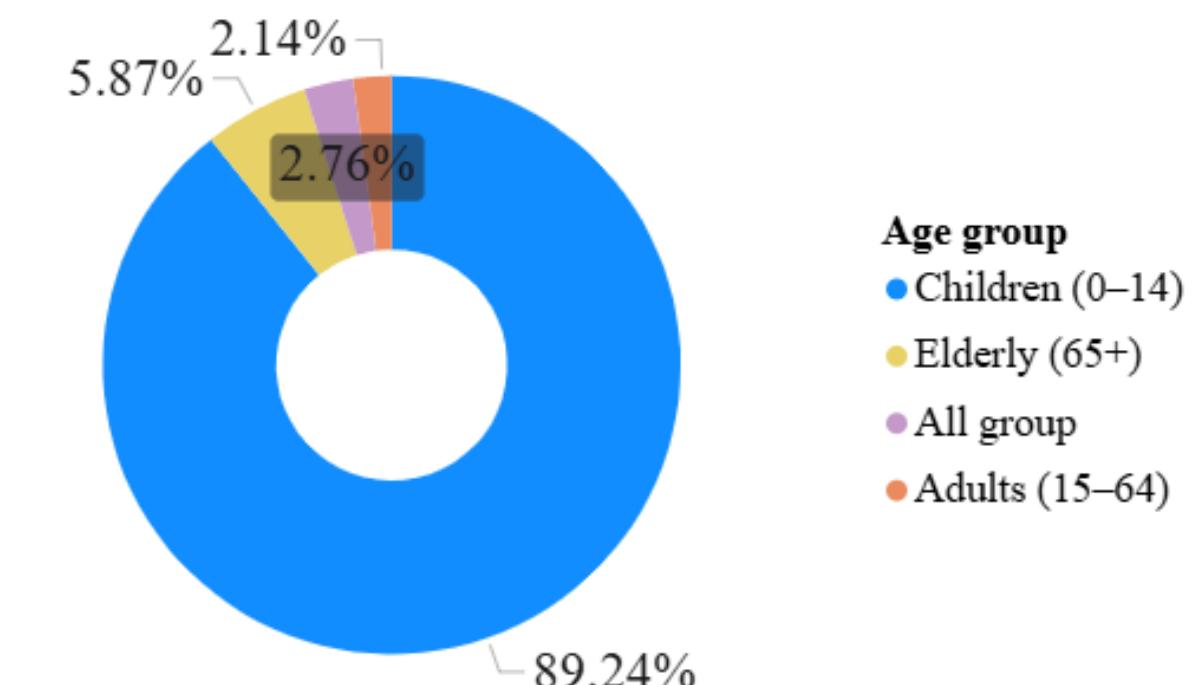
### 1. Most Affected Age Group : Children (0-14 years)

- High contributing diseases include diarrheal diseases, respiratory infections, and asthma triggers.
- Affected states include both urban (Karnataka, Kerala) and rural (Jharkhand, Assam, Chhattisgarh) areas.

### 2. Elderly (65+) Are Also at Risk :

- High contributing diseases include Asthma, COPD, pneumonia etc.
- Affected states include Karnataka, Kerala, Odisha, UK etc.

### Most Affected Age Group



## Secondary Question

2. Who are the major competitors in the Indian air purifier market, and what are their key differentiators (e.g., price, filtration stages, smart features)?



### Insights

- Best budget smart picks :** Xiaomi, Kent
- Best filtration depth :** Coway, Eureka Forbes
- Best premium & design-led :** Dyson, Sharp, Honeywell, Daikin
- Best overall user support :** Coway (warranty & service), Eureka Forbes (local understanding)

| Brand         | Price Range         | Filtration Stages        | Smart & App Features          | Coverage     | Unique Differentiator              |
|---------------|---------------------|--------------------------|-------------------------------|--------------|------------------------------------|
| Philips       | ₹12–15 k            | 3-stage NanoProtect      | Auto mode, sensors, alerts    | Small/medium | Quiet, energy-efficient            |
| Sharp         | Premium             | 2-stage + Ion tech       | Dust/odor sensors             | Small/medium | Plasmacluster ion tech             |
| Honeywell     | ₹17–20 k            | 4- to 5-stage (+UV, ion) | Wi-Fi, real-time PM display   | Large rooms  | High CADR, long filter life        |
| Kent          | ₹18 k               | 3-stage HEPA             | PM2.5 display                 | Medium       | Affordable with smart display      |
| Xiaomi        | ₹11–15 k            | 3-stage True HEPA        | App, voice, LED AQI           | Medium       | Value-for-money smart purifier     |
| Coway         | ₹15–20 k+ (premium) | 3- to 7-stage HEPA       | Smart mode, auto-boost, AQI   | Medium/large | Very quiet, exemplary support &    |
| Eureka Forbes | Mid-range           | 6–9-stage + UV           | Selected Wi-Fi models         | Medium       | Designed for India, strong service |
| Panasonic     | Mid to premium      | Nanoe + HEPA/Carbon      | Compact/efficient             | Small/medium | Deodorization and antibacterial    |
| Daikin        | Premium             | Streamer + Plasma        | Ultra-quiet, lifetime filters | Medium       | HVAC-grade reliability             |
| Dyson         | Premium-high        | HEPA + Carbon + fan      | App control, premium design   | All sizes    | Aesthetic, fan integration         |

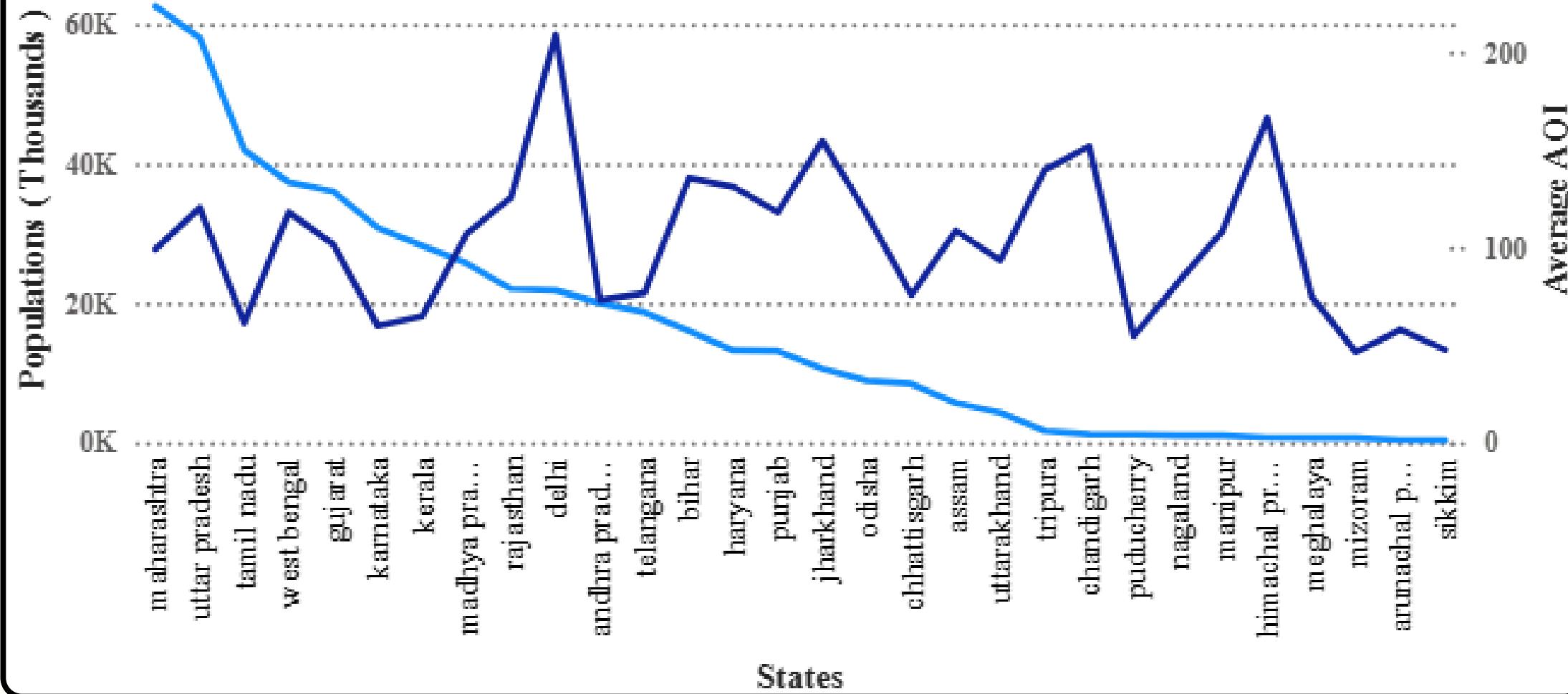
## Secondary Question

3. What is the relationship between a city's population size and its average AQI – do larger cities always suffer from worse air quality? (Consider 2024 population and AQI data for this)



### Population vs Avg AQI by States

Indicator : ● Sum of population ● Sum of avg\_aqi



### Correlation

Pearson Correlation: 0.03, P-value: 0.867

### Insights

- **No direct linear correlation** : High population does not always mean worse AQI (e.g., Maharashtra has the highest population but moderate AQI of 99.17, while Delhi has the highest AQI but a smaller population).
- **Outliers with poor AQI & small population** : States like Himachal Pradesh (AQI: 166.45, Pop: 779) and Tripura (AQI: 139.9, Pop: 1724) show poor air quality despite small populations – likely due to industrial, geographic, or environmental factors.
- **High-risk markets** (High AQI + High Population) : Delhi, Bihar, Rajasthan, UP are top targets due to both high pollution and dense populations – large potential customer base facing acute air quality issues.
- **Growth opportunity** (Clean air + high population) : States like Tamil Nadu, Kerala, and Karnataka show low AQI and high population. These are preventive care markets – target health-conscious consumers.

- While population size might seem like an obvious driver of air pollution, your analysis shows that other factors – such as industrial activity, geography, environmental policies, and vehicular emissions – are likely far more important in determining AQI. But P-value is not statistically significant.

## Secondary Question

### 4. How aware are Indian citizens of what AQI (Air Quality Index) means – and do they understand its health implications?



#### Key Metrics

Percentage Understand AQI

**54**

Percentage Delhiites unaware of AQI

**93**

Percentage Believe pollution affect health

**93**

Percentage Took Actions

**70**

Percentage Aware of AQI (Urban Poor)

**10**

Percentage Aware of AQI (Urban Middle)

**71**

#### Insights

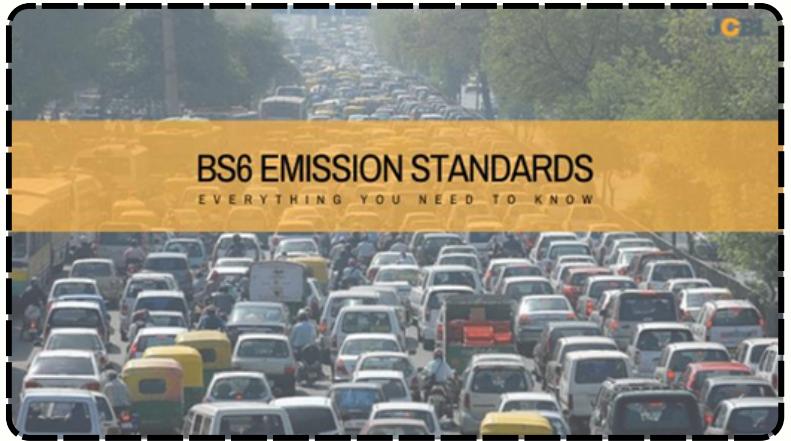
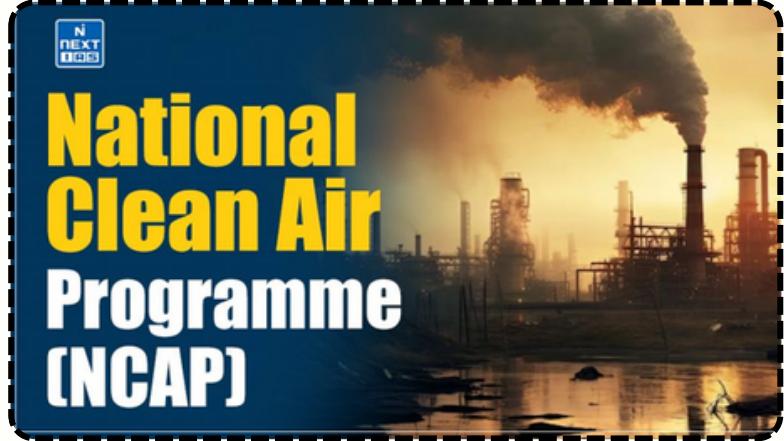
- Awareness of air pollution itself is high, but knowledge of specific terms like AQI, PM2.5, or PM10 remains low, especially among marginalized groups.
- Most people recognize the **health harm** from pollution, but fewer can **translate AQI into actionable insight**
- Many adopt **basic protective behaviors**, but deeper understanding is lagging.

## Secondary Question

5. Which pollution control policies introduced by the Indian government in the past 5 years have had the most measurable impact on improving air quality – and how have these impacts varied across regions or cities?



### Policies



#### 1. National Clean Air Programme (NCAP) – Launched 2019 :

- It launched targeting 131 cities, It aimed for a 20-30% reduction in PM<sub>2.5</sub> and PM<sub>10</sub> concentrations by 2024-25, compared to 2017-18 baseline
- Out of 130 NCAP cities, 103 showed PM<sub>10</sub> reductions compared to 2017-18; Mumbai led the metros with a 44% fall, followed by Kolkata (37%) and Delhi (15%)

#### 2. BS-VI Vehicle Emission Standards – Enforced April 2020 :

- Became mandatory across India for all vehicle types including petrol and diesel models with sulfur limit
- This transition significantly lowered vehicular emissions of NO, PM, CO, and HC across all vehicle categories
- India skipped BS-V entirely and directly adopted BS-VI, leapfrogging from BS-IV to Euro 6-equivalent standards

#### 3. Faster Adoption of Electric Vehicles (FAME II):

- To accelerate EV adoption mainly in public and shared transport segments (e-2W, e-3W, e-4W and to promote deployment of EV public charging stations
- Approximately 69% of the ₹11,500 crore budget was used across the scheme's lifespan.
- EVs accounted for only ~7% of total vehicle sales by FY2023-24.

#### 4. Ban on Single-Use Plastics :

- Ban on carry bags <75 µm since Sept 2021; <120 µm since Dec 2022
- 19 selected SUP products (e.g. cutlery, straws, plates, thermocol) are prohibited
- The banned items account for only ~0.6 million tonnes/year, which is about 11% of India's estimated 5.5 million tonnes of annual SUP waste generation.

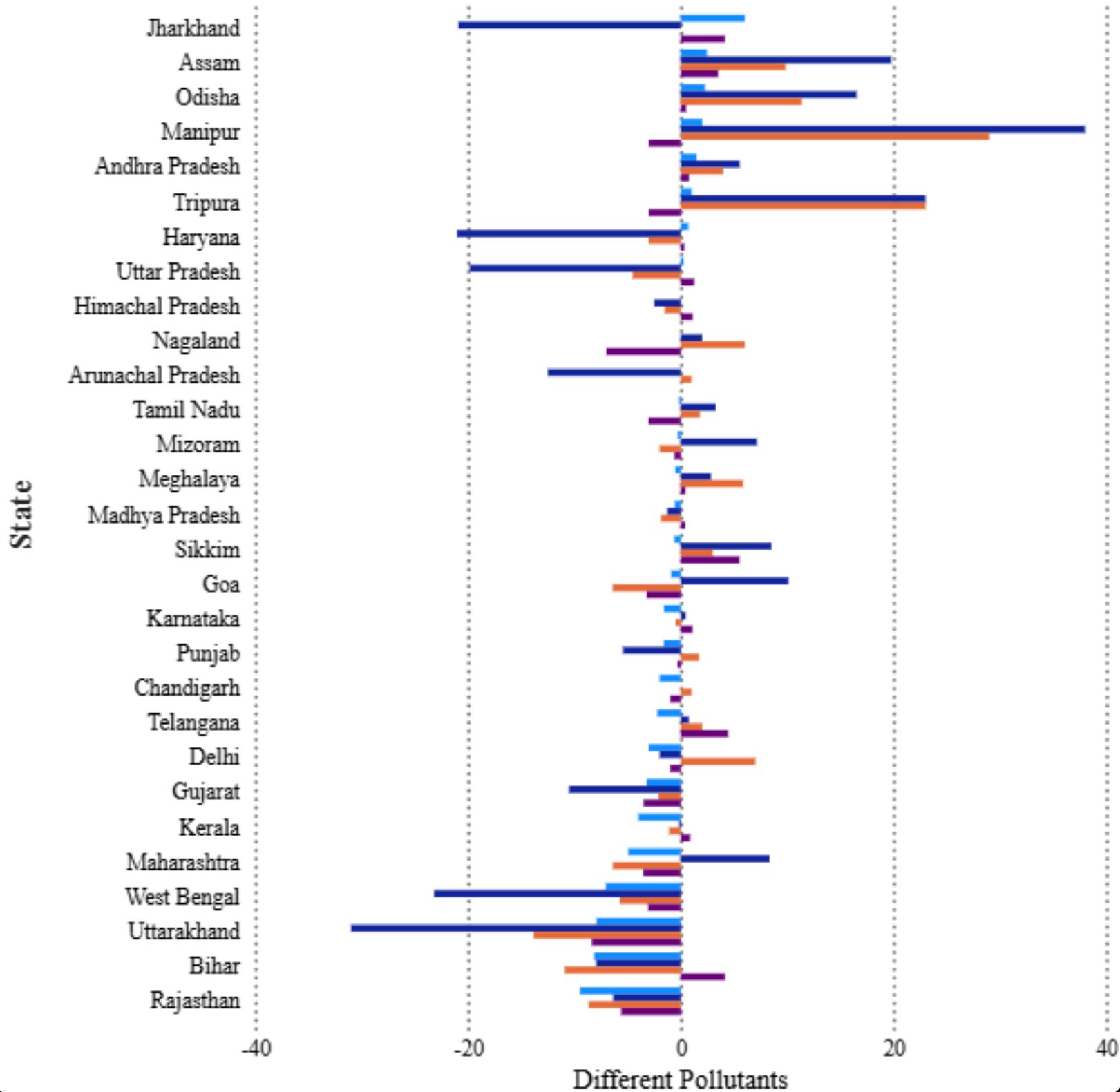
## Secondary Question

5. Which pollution control policies introduced by the Indian government in the past 5 years have had the most measurable impact on improving air quality – and how have these impacts varied across regions or cities?



Annual Air Quality Comparison across Indian States : 2022 vs 2023

Indicator : ● Sum of NO2\_Diff ● Sum of PM10\_Diff ● Sum of PM2.5\_Diff ● Sum of SO2\_Diff



## Insights

- **States Showing Most Improvement in Air Quality (PM2.5 & PM10) :** Bihar, Uttar Pradesh, Delhi, Odisha etc.
- **States Where Air Quality Worsened :** Maharashtra, Assam, Andhra Pradesh etc.
- **North India :** Mixed outcomes; some cities improved due to aggressive NCAP enforcement (Delhi, UP, Bihar) while others (Punjab, Haryana) showed marginal or no gains.
- **Eastern India :** Bihar improved, but Assam & Odisha show mixed trends – need focused campaigns.
- **Western India :** Maharashtra & Gujarat worsened, despite industrial controls – room for air purifier adoption.
- **Southern India :** Small deteriorations in AP, Telangana, Kerala – indicates rising pollution trends in typically “clean” zones.
- **Northeast :** Data is sparse or varied – possibly due to weaker monitoring infrastructure. Potential for CSR-based market entry.

# Recommendations

## 1. North India

- States : Delhi, Haryana, Uttar Pradesh, Punjab, Bihar, Himachal Pradesh
- AQI: 140–207 (very high)

### Product Features

- Medical-grade HEPA H13/H14 filters (capture PM2.5/PM10)
- Activated carbon filters (remove smoke, SO<sub>2</sub>/NO<sub>2</sub>, odors)
- Real-time AQI display (LED + mobile sync)
- Child Lock + Auto mode (for family safety)
- High CADR (Clean Air Delivery Rate) – suited for large urban rooms

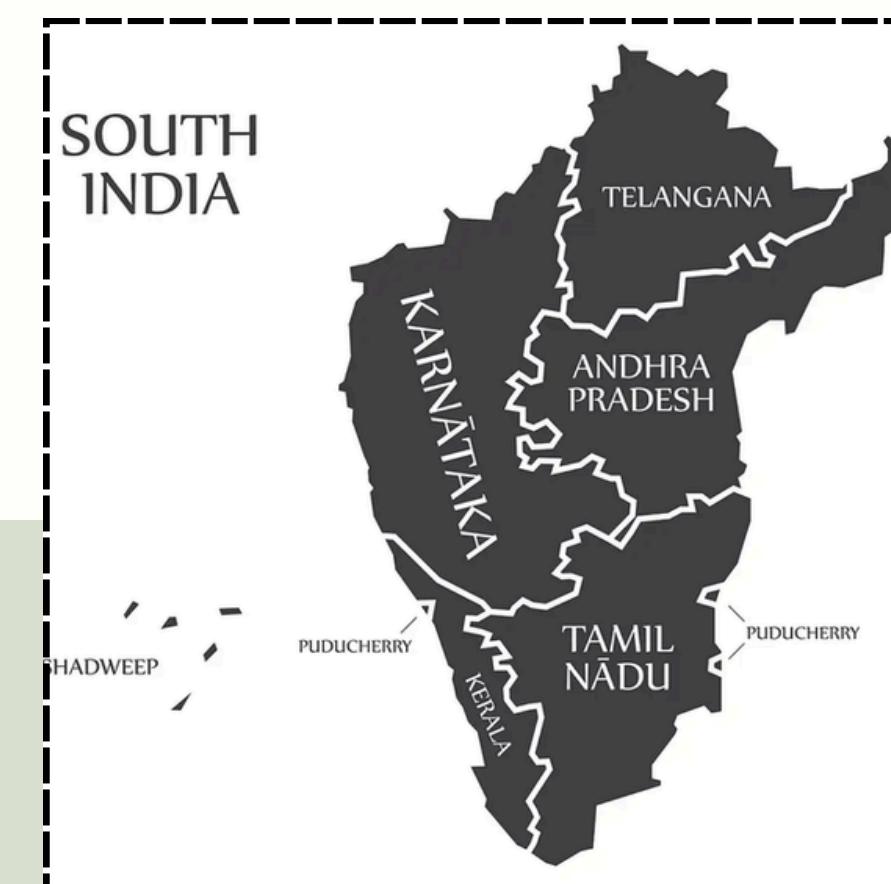


## 2. South India

- States : Karnataka, Tamil Nadu, Kerala, Telangana, Andhra Pradesh
- AQI: Mostly <100 (moderate to clean)

### Product Features

- UV-C sterilization (kills airborne bacteria/viruses)
- Anti-allergen filters (target mold spores, dust mites)
- Silent/Night mode (for bedrooms and children's rooms)
- Smart app control + WiFi connectivity (urban tech-savvy homes)
- Energy-efficient models (aligned with green EV ecosystem)





### 3. East India

- States : Odisha, West Bengal, Assam, Jharkhand, Chhattisgarh, Bihar
- AQI: 115–150 (moderate-high)

#### Product Features

- Multi-layer filters (dust + HEPA + charcoal)
- Low-maintenance design (longer filter life, filter health indicator)
- Rugged body + stable power consumption (for rural/urban mix)
- Rural-specific variants: Battery backup or solar-compatible options



### 4. West India

- States : Maharashtra, Gujarat, Rajasthan, Goa
- AQI: 100–130 (urban high)

#### Product Features

- CO-specific filtration (Carbon Monoxide + VOC sensor)
- Industrial-strength models (for kitchens, workshops, and clinics)
- Dual-Mode (Pollution + Odor) control
- Sleek design with wall-mount options for small apartments



## 5. North-East India

- States : Mizoram, Manipur, Meghalaya, Tripura, Nagaland, Sikkim, Arunachal Pradesh
- AQI: 47–90 (mostly clean)

### Product Features

- Smoke + VOC filtration (for biomass cooking exposure)
- Compact portable units (for smaller rooms)
- Low noise & low power (fit for remote or tier-3 households)
- Affordable Essential Series for preventive care



### ◆ Ideal Product

- Pre-Filter: Captures large dust particles, hair, pet dander
- HEPA Filter (H13/H14): Removes 99.97% of PM2.5, PM10, allergens, bacteria
- Activated Carbon Filter: Absorbs VOCs, smoke, cooking odors, gases like CO & SO<sub>2</sub>
- Real-time AQI Monitoring (with color-coded LED and numeric display)
- Silent Mode (<32 dB) for night use
- Eco Mode to reduce power consumption
- Auto Mode: Automatically adjusts fan speed based on AQI
- Kills airborne viruses, bacteria, mold spores
- Ideal for households with children and elderly, and for hospitals/schools
- Budget friendly



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# THANK YOU!

