AirPure Innovations Market Fit Research

Market Fit Research Dashboard for Air Purifier Development Using AQI Analytics

"AirPure Innovations" is a startup born out of the air quality crisis in India. The company is in the early stages of product development and is unsure whether there is a strong, sustained demand for its air purifier product. Before committing to production and R&D, the team needs to understand the market.

Major Requirement:

- What pollutants or particles should their air purifier target?
- What are the most essential features that should be incorporated into the air purifier?
- Which cities have the highest demand for air purifiers, and what is the market size in these regions?
- How can R&D be aligned with localized pollution patterns?

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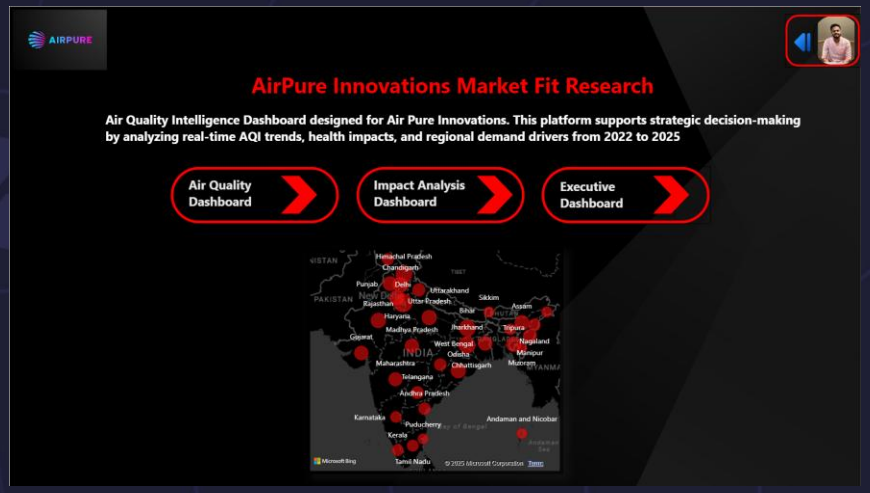
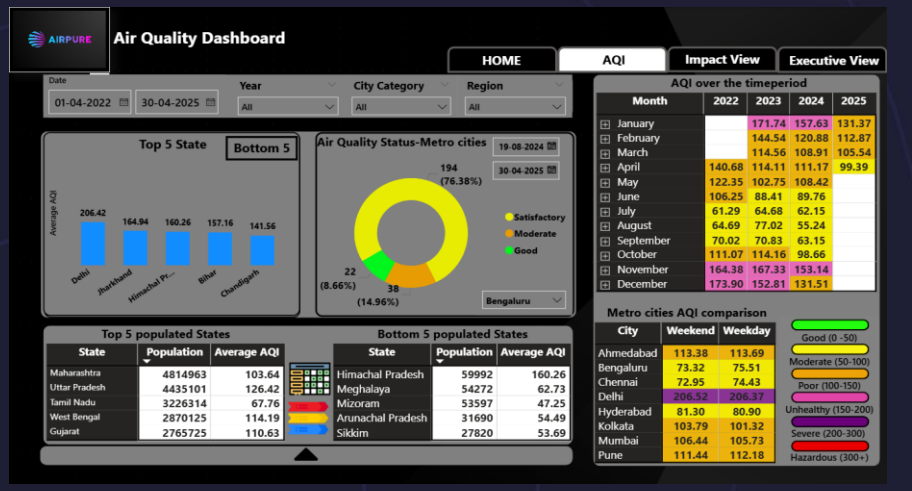
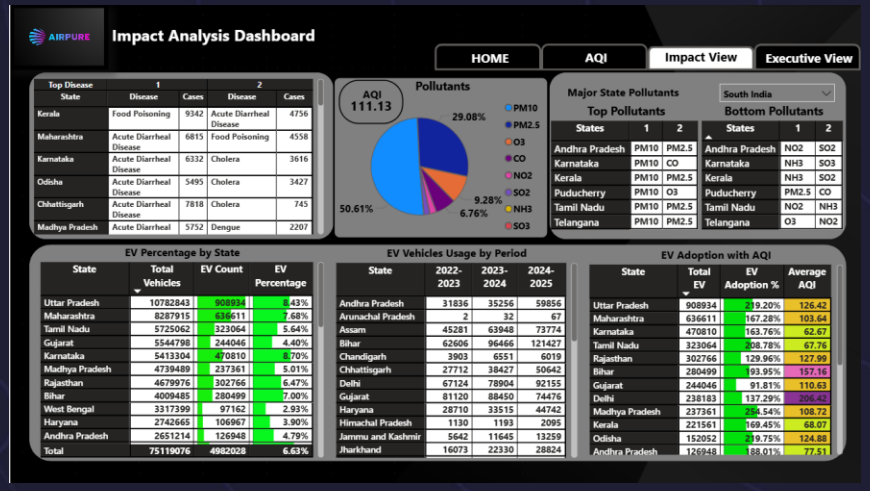
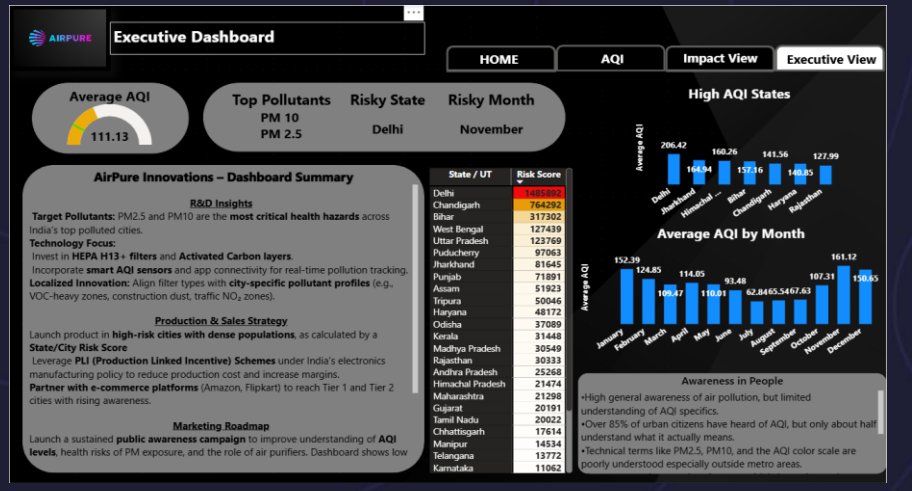
Dashboard Link: AirPure Innovations Market Fit Research Live Dashboard









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Primary Analysis

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)

Top 5 States	Average AQI
Delhi	238.92
Jharkand	165.86
Haryana	161.94
West Bengal	159.86
Himachal Pradesh	159.83

Bottom 5 States	Average AQI
Andaman & Nicobar	57.71
Puducherry	56.51
Arunachal Pradesh	54.49
Sikkim	53.69
Mizoram	47.25

Insight: Sales should be primarily focused on Top Polluted States in which the city having high population.

Primary Analysis

List out top 2 and bottom 2 prominent pollutants for each state of southern India. (Consider data post covid: 2022 onwards)

Major State Pollutants

South India

Top Pollutants

States	1	2
Andhra Pradesh	PM10	PM2.5
Karnataka	PM10	CO
Kerala	PM10	PM2.5
Puducherry	PM10	O3
Tamil Nadu	PM10	PM2.5
Telangana	PM10	PM2.5

Bottom Pollutants

States	1	2
Andhra Pradesh	NO2	SO2
Karnataka	NH3	SO3
Kerala	NH3	SO2
Puducherry	PM2.5	CO
Tamil Nadu	NO2	NH3
Telangana	O3	NO2

Insight: PM10 and PM2.5 are the most common top pollutants across all states

Primary Analysis

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)

Metro cities AQI comparison

City	Weekend	Weekday
Ahmedabad	113.38	113.69
Bengaluru	73.32	75.51
Chennai	72.95	74.43
Delhi	206.52	206.37
Hyderabad	81.30	80.90
Kolkata	103.79	101.32
Mumbai	106.44	105.73
Pune	111.44	112.18

Good (0 -50)
Moderate (50-100)
Poor (100-150)
Unhealthy (150-200)
Severe (200-300)
Hazardous (300+)

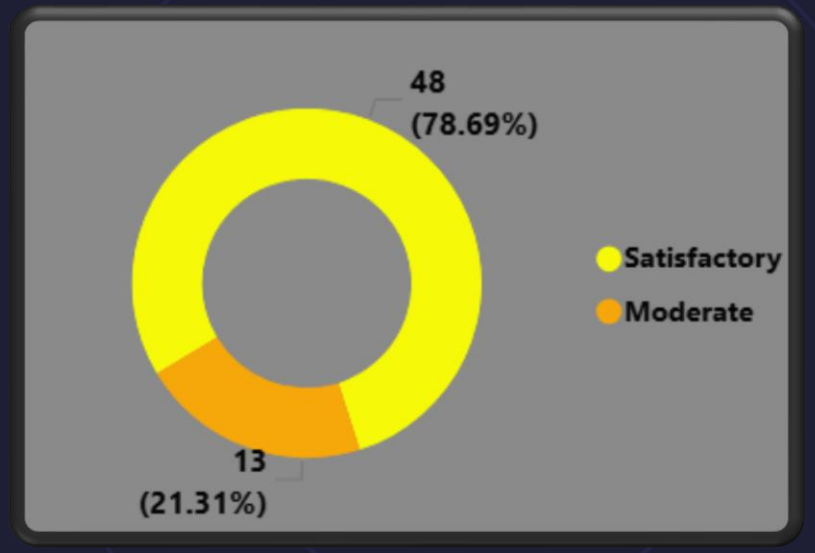
Primary Analysis

Which months consistently show the worst air quality across Indian states — (Consider top 10 states with high distinct areas)

Month	Andhra Pradesh	Chhattisgarh	Gujarat	Karnataka	Madhya Pradesh	Maharashtra	Odisha	Rajasthan	Tamil Nadu	Uttar Pradesh
January	114.74	105.22	131.95	76.64	141.35	141.34	193.61	165.44	90.18	160.45
February	94.38	88.90	137.84	76.64	117.45	128.36	144.89	131.83	81.79	122.91
March	78.55	92.12	120.12	72.73	105.42	122.87	137.73	118.79	69.80	108.84
April	70.89	84.72	101.02	66.46	119.29	104.36	129.21	132.31	61.69	138.23
May	68.96	77.93	104.15	60.23	115.48	99.17	98.81	137.71	61.29	135.87
June	63.19	66.28	84.36	50.31	86.67	70.24	92.40	110.34	55.13	122.77
July	49.71	45.18	69.58	44.99	56.91	51.38	57.66	82.08	56.13	63.50
August	55.24	49.66	69.58	46.61	62.59	53.91	65.73	79.34	55.86	70.23
September	52.96	47.94	80.80	44.73	66.30	59.01	61.35	79.58	50.65	77.51
October	77.19	80.56	120.65	60.51	114.67	108.85	91.33	120.97	59.19	144.28
November	95.25	95.94	147.65	74.96	164.54	158.83	153.51	193.22	71.84	200.61
December	99.07	93.09	144.15	71.61	144.83	138.71	167.74	176.34	77.94	166.22

Primary Analysis

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?



Insight: Between March and May 2025, Bengaluru experienced 48 days of satisfactory air quality and 13 days of moderate air quality.

Primary Analysis

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.

Top Disease	1		2	
State	Disease	Cases	Disease	Cases
Kerala	Food Poisoning	9342	Acute Diarrheal Disease	4756
Maharashtra	Acute Diarrheal Disease	6815	Food Poisoning	4558
Karnataka	Acute Diarrheal Disease	6332	Cholera	3616
Odisha	Acute Diarrheal Disease	5495	Cholera	3427
Chhattisgarh	Acute Diarrheal Disease	7818	Cholera	745
Madhya Pradesh	Acute Diarrheal Disease	5752	Dengue	2207
Gujarat	Acute Diarrheal Disease	4826	Food Poisoning	3008
Jharkhand	Malaria	5795	Acute Diarrheal Disease	1609
Uttar Pradesh	Acute Diarrheal Disease	4140	Food Poisoning	2303
West Bengal	Acute Diarrheal Disease	3276	Food Poisoning	2360
Assam	Acute Diarrheal Disease	2683	Food Poisoning	1984
Tamil Nadu	Acute Diarrheal Disease	3028	Mumps	1407
Andhra Pradesh	Acute Diarrheal Disease	3221	Cholera	1081
Manipur	Dengue	3072	Food Poisoning	173
Himachal Pradesh	Acute Diarrheal	2181	Hepatitis A	559

Insight: Mostly related to waterborne infections like acute diarrheal disease and food poisoning, but the accuracy of the reported case numbers appears questionable and may not reflect the actual disease burden.

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Primary Analysis

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

State	Total EV	EV Adoption %	Average AQI
Uttar Pradesh	908934	219.20%	126.42
Maharashtra	636611	167.28%	103.64
Karnataka	470810	163.76%	62.67
Tamil Nadu	323064	208.78%	67.76
Rajasthan	302766	129.96%	127.99
Bihar	280499	193.95%	157.16
Gujarat	244046	91.81%	110.63
Delhi	238183	137.29%	206.42
Madhya Pradesh	237361	254.54%	108.72
Kerala	221561	169.45%	68.07
Odisha	152052	219.75%	124.88
Andhra Pradesh	126948	188.01%	77.51
Chhattisgarh	116781	182.74%	78.99
Haryana	106967	155.84%	140.85
West Bengal	97162	431.79%	114.19
Punjab	96474	302.95%	117.85
Jharkhand	67227	179.33%	164.94
Uttarakhand	55080	125.74%	87.90
Jammu and Kashmir	30546	235.01%	69.50
Chandigarh	16473	154.21%	141.56
Puducherry	9743	273.53%	56.51
Himachal Pradesh	4418	185.40%	160.26

Insight: The top 5 states with highest EV adoption—West Bengal, Punjab, Madhya Pradesh, Puducherry, and Uttar Pradesh—show mixed AQI outcomes, indicating that higher EV adoption does not consistently correlate with significantly better air quality.

Secondary Analysis

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

City / Region	Age Group	Health Outcomes / Diseases	Most Affected?
All India (district-level study)	Newborns (< 1 month)	Elevated newborn mortality (≈ 86% higher risk)	Very high relative risk
	Infants (under 5 years)	Under-5 mortality doubles (100–120% increase)	Highest among all groups
	Adults (> 18 years)	Adult mortality ~13% increase	Lower relative risk
Delhi, Mumbai, Hyderabad, Chennai (megacity studies)	All ages (especially > 40)	Long-term $PM_{2.5}$ linked to cardiovascular diseases (≈40% IHD, ≈30% stroke contribution), COPD, lung cancer, pneumonia, diabetes	Adults/adults >40 most burdened
Delhi (specific)	Children ≤ 5	Respiratory infections, asthma, reduced lung function, stunting, low birthweight, anaemia; ~2.2 million children with lung abnormalities	Children heavily impacted
	School-age (6–17 years)	High prevalence of asthma, reduced lung capacity	Especially among ~12–14 year-olds in Delhi
Hyderabad	Children (esp. young)	Chronic cough, asthma, respiratory infections; rising pediatric admissions	Children particularly affected
Older adults (≥ 60 yrs)	Elderly (≥60 years)	Frailty, increased vulnerability associated with long-term exposure (esp. indoor pollution)	Seniors show elevated frailty risk

Young children (infants and under-5s) bear the highest relative increase in mortality from ambient $PM_{2.5}$ exposure—often doubling the risk compared to adults. This is consistent across India, including major cities.
In urban centers like Delhi, Mumbai, Hyderabad, Chennai, long-term exposure predominantly causes cardiovascular disease, COPD, lung cancer, pneumonia, asthma, anemia, stunting, and even type 2 diabetes, particularly among adults and children.
Children in Delhi show especially high burdens: reduced lung function in millions, frequent respiratory illnesses, and developmental impacts like stunting and low birthweight.
Older adults, especially those over 60, are also vulnerable—showing increased frailty correlated with pollution exposure, especially indoor air pollution in rural and lower-income areas.

Sources

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https://www.theguardian.com/global-development/2023/nov/01/air-pollution-raises-risk-of-type-2-diabetes-says-landmark-indian-study-acc

Secondary Analysis

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

Brand	Filtration Stages	Smart Features	Price Range	Notable Strength	Source Link
Dyson	HEPA + Carbon	App, AQI Display	₹30K–₹60K+	Tech & design innovation	https://www.dyson.in/air-treatment https://www.dyson.in/dyson-purifier-cool-white-silver
Philips	HEPA + Carbon	AQI Sensor, App (some)	₹10K–₹30K	Reliability & health focus	https://www.philips.co.in/c-m-ho/air-purifiers https://www.philips.co.in/c-p/AC2887_20/air-purifier
Honeywell	HEPA + Carbon + Pre	Basic Smart (some)	₹9K–₹25K	Energy efficiency	https://honeywellsmarthomes.com/air-purifier https://honeywellsmarthomes.com/air-purifier/air-touch-i8
Xiaomi (Mi)	HEPA	OLED, App, Alexa	₹8K–₹15K	Smart + budget-friendly	https://www.mi.com/in/product/mi-air-purifier-3
Blue Star	HEPA + UV (some)	Filter Alert, Touch	₹8K–₹25K	Indian service & features	https://www.bluestarindia.com/air-purifiers https://www.bluestarindia.com/air-purifiers/model/bs-ap490lan
Sharp	HEPA + Plasmacluster Ion	Auto Mode, Sensors	₹10K–₹25K	Surface + air purification	https://in.sharp/products/air-purifier-fp-f40e-w
Coway	True HEPA + Carbon	Minimal Smart	₹7K–₹22K	Performance & filter life	https://www.coway.in/products/airmega-150
Eureka Forbes	HEPA + UV + Ionizer	Basic display	₹8K–₹20K	Local brand & support	https://www.eurekaforbes.com/air-purifiers https://www.eurekaforbes.com/dr-aeroguard-supreme-air-purifier

Secondary Analysis

What is the relationship between a city's population size and its average AQI — do larger cities always suffer from worse air quality?

- Larger cities often suffer from worse air quality, particularly Northern megacities—Delhi (~169 AQI), Kolkata (~100 AQI), Ahmedabad (~110 AQI).
- Exceptions exist: Bengaluru and Chennai, despite having 12–14 million residents, typically maintain moderate AQI (≈65–75), significantly better than Delhi or Ahmedabad.
- Smaller/smoke-free cities, like Aizawl and Gangtok (~0.14 million), have much cleaner air (≈35 AQI).

Conclusion:
There is a general trend that larger Indian cities face worse air quality—but size is not destiny. Factors like geography, industry, vehicular emissions, burning practices, climate, and regional policies strongly impact AQI. Some mid-sized and large cities manage comparatively better air, indicating that city planning and source control matter as much as population size.

City	Metro Population ('24)	Annual Avg PM2.5 (µg/m³)	AQI Equivalent†	Notes on Air Quality
Delhi	33.8 M	95 µg/m³	AQI ≈ 169	Most polluted globally in 2024
Mumbai	21.7 M	~50 µg/m³*	AQI ≈ 85	Seasonal moderate pollution
Kolkata	15.6 M	~60 µg/m³*	AQI ≈ 100	Significant winter spikes
Bengaluru	14.0 M	~25 µg/m³*	AQI ≈ 65	One of less polluted megacities
Chennai	12.1 M	~30 µg/m³*	AQI ≈ 75	Relatively stable throughout year
Hyderabad	11.1 M	~40 µg/m³*	AQI ≈ 95	Moderate seasonal pollution
Ahmedabad	8.85 M	~55 µg/m³*	AQI ≈ 110	Significant variations
Pune	7.35 M	~40 µg/m³*	AQI ≈ 95	Moderate conditions
Aizawl	0.13 M	13.8 µg/m³	AQI ≈ 35	Among cleanest in India
Gangtok	~0.15 M	13.8 µg/m³	AQI ≈ 35	Clean air leader

Source:
- https://timesofindia.indiatimes.com/etimes/trending/top-10-largest-cities-in-india-by-population/articleshow/113791114.cms
- https://worldpopulationreview.com/countries/cities/india
- https://www.iqair.com/world-most-polluted-cities
- https://www.aqi.in/blog/us/94-100-most-polluted-cities-are-in-india-2024-aqi-report

Secondary Analysis

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

Category	Subgroup	Heard of AQI	Knows PM2.5 / PM10	Knows AQI Color Scale	Believes AQI Affects Health	Takes Protective Action
Urban (Metro Cities)	Delhi, Mumbai, Bengaluru, Chennai, Kolkata	85%–90%	~30%	~18%	90%–95%	Moderate (masks, filters)
Tier-2/3 Cities	Raipur, Singrauli, Dhanbad, Varanasi, etc.	75%–85%	10–20%	<10%	85%+	Low
Rural Regions	Eastern UP, Bihar, Jharkhand, Odisha	~50%	<5%	Very low	80%+	Very low
Youth (18–25 yrs)	Across India	~70%	25–30%	~20%	90%+	High (online engagement)
Middle-Aged (26–50 yrs)	Urban + Semi-Urban	~85%	~35%	~20%	~95%	Moderate
Senior Citizens (50+ yrs)	Urban	~50%	<20%	Low	~80%	Low
Middle-Class (Delhi NCR)	Households with air purifiers	~90%	~40%	~25%	95%+	High
Urban Poor (Delhi NCR)	Informal settlements	~45%	<10%	<5%	80–90%	Moderate (mask usage only)
Educated (college+ level)	Across India	85–95%	~40%	~30%	~95%	High
Low-literacy population	Rural/Slum	<50%	<5%	Very low	~80%	Very low
Regular AQI app users	Mostly urban youth	100%	~80%	~80%	100%	Very High

Secondary Analysis

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

- High general awareness of air pollution, but limited understanding of AQI specifics.
- Over 85% of urban citizens have heard of AQI, but only about half understand what it actually means.
- Technical terms like PM2.5, PM10, and the AQI color scale are poorly understood—especially outside metro areas.
- Awareness and comprehension vary widely by region and demographics:
- Metro cities and educated populations show the highest awareness and interpretation ability.
- Tier-2/3 cities, rural areas, and the urban poor have significantly lower understanding (<30%).
- Across all groups, 80–95% agree that air pollution affects health.
- However, only a small percentage can correlate specific AQI levels to health actions (e.g., staying indoors, wearing masks).
- Middle-class and youth groups are more proactive (e.g., using air purifiers, checking AQI apps).
- Low-income or rural groups may acknowledge the risk but lack resources or knowledge to act on it.
- Information gap is biggest in rural and underserved urban communities:
- <10% of rural or slum populations understand AQI or pollutants.

Bottom Line

While India's citizens are broadly aware of the health impacts of air pollution, understanding and acting on AQI data is still limited and unequal. Bridging this gap will require targeted education, vernacular communication, and user-friendly tools—especially in non-metro regions.

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Secondary Analysis

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?

Policy / Program	Timeframe	Nationwide measurable impact	Regional / city-level variation
NCAP -National Clean Air Programme	2019–2025	19% reduction in $PM_{2.5}$ in non-attainment areas; life expectancy gains (India Today)	Big gains in Varanasi (~72% drop) and Prayagraj; others mixed
BS-VI vehicle norms	April 2020 onward	Partial reduction in transport emissions; broader declining $PM_{2.5}$ trend	Benefits most visible in highly motorized cities (Delhi, Mumbai)
GRAP revisions	2022 onwards	Variable—provides temporary AQI relief in high-alert periods	Effective in Delhi-NCR winters; limited elsewhere
Clean-fuel & crop-residue subsidies	2020–present	Moderate residential and seasonal improvements	Seasonal benefit around Delhi from reduced stubble burning
Power plant emissions norms	2020–2025	Regulatory progress ongoing; limited widespread compliance	Impact dependent on local plant enforcement
City-led greening / real-time measures	2023–25	Strong AQI and PM_{10} reductions in focused cities	Exemplary in Prayagraj, Varanasi; less data elsewhere

Secondary Analysis

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?

- The NCAP has provided structure, targets, and funding, and some measurable progress, especially in selective cities—but its attribution to $PM_{2.5}$ reductions is debated, and effectiveness varies widely.
- BS-VI emission standards contributed to transport-sector improvements, especially in large urban centers.
- GRAP(Graded Response Action Plan) delivers critical but short-lived relief in the Delhi-NCR region.
- Clean-fuel schemes and crop residue interventions are helping modestly, mostly seasonally.
- City-level strategies, particularly those in Varanasi and Prayagraj, show that locally tailored, high-engagement actions can produce dramatic results.
- Northern India, particularly the Indo-Gangetic plain, continues to suffer very poor air quality. Challenges include meteorological factors, cross-boundary pollution, and gaps in enforcement.

Bottom line

Among policies in the past five years, NCAP, BS-VI vehicle standards, GRAP, and clean-energy / fuel schemes have had the most measurable impacts—but outcomes vary sharply. Cities like Varanasi and Prayagraj have seen major air-quality gains through combined citizen-driven, green, and regulatory measures, while many northern cities still struggle. For real progress, integrated policy across regions and stronger local implementation are essential.

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Secondary Analysis

What do existing products lack ?

Missing Feature	Why It Matters
Real-time AQI Sync + Alerts	Users need proactive purification before AQI peaks; current models lack this.
Compact/Battery-Powered Design	Bulky form factors limit portability to cars, travel, or small rooms.
Pediatric/Sleep Modes	Few include child-safe noise, low allergen focus, or sleep-friendly settings.
Advanced Sensors + Auto Filter Alerts	Most have simple PM sensors; absence of VOC detection and filter maintenance prompts.
Energy Efficiency & Eco Filters	Few have energy-star ratings or reusable/eco-friendly filters to reduce impact.

Which Tier 1/2 cities show irreversible AQI degradation?

Delhi (Tier 1)
•Among the most polluted major cities globally.
•Over **2.2 million** children in Delhi have sustained **irreversible lung damage** from chronic $PM_{2.5}$ exposure. Daily emergency visits for respiratory symptoms increase by ~30% on high pollution days.

Tier 2 cities: Patna, Gwalior, Raipur, Lucknow, Ahmedabad, Firozabad, Kanpur, Amritsar, Ludhiana, Prayagraj, Agra—all record **annual $PM_{2.5}$ averages between 88–153 µg/m³**, drastically above the WHO guideline of 5 µg/m³.

Summary: Delhi and several Tier 2 cities in northern India are experiencing chronic AQI deterioration with **irreversible health impacts**, particularly in children.

Do pollution emergencies increase purifier searches/purchases?

•School-use studies show portable air purifiers **reduce indoor $PM_{2.5}$ by up to 49%**, proving high usefulness during pollution peaks.
•While India-specific e-commerce data is scarce, **global trends** and **government advisories** (like recommending HEPA purifiers during AQI emergencies) strongly suggest **spikes in searches and purchases** of purifiers during high-pollution episodes. Examples include increased purifier ads around Diwali smog season in Delhi NCR.

Summary: Though direct sales data from India is limited, the proven effectiveness of purifiers and aligned advisories indicate that pollution emergencies **trigger increased public interest**.

India's Current AQI Status – A Turning Point?

Delhi Records Cleanest July In A Decade, Air Quality At 67
https://www.ndtv.com/india-news/delhi-records-cleanest-july-in-a-decade-air-quality-at-67-8935291
https://timesofindia.indiatimes.com/city/delhi/no-respite-from-humidity-aqi-improves/articleshow/122927289.cms

Decline in stubble burning incidents in Punjab and Haryana in recent years has contributed to partial improvement in India's seasonal AQI levels
https://timesofindia.indiatimes.com/city/chandigarh/categorised-villages-satellite-alerts-penalties-in-punjabs-new-plan-against-farm-fires/articleshow/122927787.cms
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Ahmedabad: Air pollution down 40%
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Air Pollution in India: Real-time Air Quality Index Visual Map - https://aqicn.org/map/india/

Conclusion & Strategic Roadmap

Market Opportunity Confirmed

- Widespread air quality challenges across Tier 1 and Tier 2 cities.
- Rising health awareness and pollution emergencies are driving demand for air purifiers.

Targeted Product Development

- Prioritize filtration for PM2.5, VOCs, and SO_2 based on region-specific pollutant profiles.
- Incorporate child-safe features and smart monitoring for health-conscious urban families.

Data-Driven Market Focus

- Focus launch in Northern Indian cities with high AQI & population (e.g., Delhi, Patna, Kanpur).
- Customize marketing for metro vs. rural regions based on AQI awareness levels.

Strategic Next Steps

1. **Prototype Development** aligned with region-specific pollution patterns.
2. **Awareness Campaigns** to bridge AQI knowledge gap.
3. **Policy Alignment** to leverage government clean air initiatives.
4. **Distribution Planning** based on high AQI + high population clusters.

“Cleaner air is not just a product promise — it’s a public health mission.”

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