SPHERE
Driving development through data

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The same crisis, every winter

Effective Measures and Recommendations for Punjab

Part III/III

Acronyms

Abbreviation	Full Form
API	Application Programming Interface
AQI	Air Quality Index
COPD	Chronic Obstructive Pulmonary Disease
EPA	Environmental Protection Agency
FIR(s)	First Information Report(s)
PAQI	Pakistan Air Quality Initiative
PM2.5 / PM10	Particulate Matter 2.5 / 10
PVICS	Private Vehicle Inspection and Certification System
Rs	Rupees
VICS	Vehicle Inspection and Certification System





Part III/III at a glance

The first installment in this series established what smog is and traced its principal causes within Punjab, Pakistan. It went on to examine the toll smog takes on public health, community well-being, and the surrounding environment. The second installment turned to the response; it mapped the institutions involved, reviewed Punjab's core measures and enforcement record, and compared them with global best practices.

Building on that foundation, this final installment looks ahead. It assesses which of Punjab's core measures have worked, which have fallen short, and which still hold promise, and it asks where public spending delivers the most value. It closes with practical, evidence-based recommendations, from redirecting funds away from short-term fixes and scaling proven source-control measures to closing evidence and accountability gaps and acting before smog episodes begin

The brief covers the following information:

1. **Effective Measures of Punjab**
2. **Recommendations for Punjab**

Effectiveness of Punjab's Anti-Smog Measures

Which of Punjab's core measures have worked well? or Which haven't worked at all or have little to no potential of tackling the smog crisis?

1. **The zigzag brick kiln conversion has worked well**



2. **Vehicle emission control has the potential to work well**



3. **Demolition of pyrolysis plants has worked well**



4. **Crop burning bans has worked well with regular monitoring, reported violations, and enforced FIRs**



5. **Mandate to install industrial dry scrubbers has worked just fine but has only targeted a fraction of industrial sites.**



6. **Regular monitoring has made data more accessible by the general public and helped establish high AQI zones.**



Questionable Use of Resources

Anti-smog gun is a questionable use of resources. It is more of a reactive measure rather than a preventive measure. The mechanism only brings down the PM10 concentrations while PM2.5 remains suspended in the air. Moreover, it places an added burden on water table because of its reliance on water.

One of the discussions in the Lahore High Court claimed that "one such measure should not be counterproductive in respect of another precious resource."



Recommendations for Punjab, Pakistan

Based on the evidence evaluated on Punjab's anti-smog measures and the three international case studies (Beijing, New Delhi, and Mexico City), the following recommendations are proposed to guide long term, practical, cost-effective, and evidence-based smog management in Punjab.

RECOMMENDATION 01



Scale up brick kiln zig-zag conversion - Punjab's only intervention with a quantified, verified result.

This is the single most cost-effective lever available. It already has a documented 29.32% particulate reduction, it's a one-time capital conversion rather than a recurring seasonal cost, and it directly targets a real, sizeable pollution source.

Practical step: Prioritize remaining unconverted kilns with subsidized financing (similar to the 80% government subsidy model) and make zig-zag conversion mandatory with real penalties for non-compliance, not just fines that get absorbed as a cost of doing business.

RECOMMENDATION 02



Stop or scale back anti-smog gun deployment; redirect the budget

This is the clearest, cheapest win available before the smog season starts every year. Peer-reviewed evidence (Xu et al., 2023) shows mist cannons may actually increase PM2.5 by up to 13% by raising humidity and promoting secondary aerosol formation. Beijing achieved a sustained 35% PM2.5 reduction without ever using this technology. The technology effectively reduces PM10 concentrations but doesn't do much in bringing down PM2.5 which remain suspended in the air.

Practical step: Reallocate a proportion of the anti-smog gun budget to other interventions that are preventive and reserve the anti-smog guns for times with extremely high AQI since the measure is more reactive than preventive. This is resource reallocation, not new spending.

RECOMMENDATION 03



Fund crop-residue machinery subsidies directly, rather than "response teams."

Response teams and enforcement squads are recurring seasonal costs with no evidence attached. Subsidized Happy Seeders/Super Seeders machinery is a one-time capital cost with a plausible mechanism, it makes burning economically unnecessary rather than just illegal and has precedent from both Indian Punjab and Delhi-side subsidy programs.

What is Happy Seeders and Super Seeders?
The Happy Seeder is a tractor-mounted machine that cuts and lifts the leftover rice straw, sows wheat directly into the bare soil, and spreads the straw back over the field as mulch. That lets farmers clear their fields and plant wheat on time without burning anything. Punjab, Pakistan tried the Happy Seeder about a decade ago and it never took off. The current program centers on its second-generation successor, the Super Seeder. Per Health Policy Watch, it plants seed deeper, mixes the stubble into the soil, and does land preparation, fertilizer placement, and sowing in one pass. Punjab pairs it with a burning ban and fines (50,000 Rs per violation) and a 65% subsidy on the machine.
Why it helps with smog?
Farmers burn stubble because it is the quickest, cheapest way to clear fields before the wheat sowing window. The seeder removes the reason to burn rather than only punishing farmers who do, which is why the Lahore High Court called mechanization the sustainable solution rather than enforcement alone.

Practical step: Expand machinery subsidies before the season starts (farmers need lead time to plan around harvest), rather than deploying awareness squads once burning has already begun.

RECOMMENDATION 04



Build independent, third-party verification into industrial enforcement.

Right now, "80% industry compliance" is a government claim that PAQI's independent report disputed outright. Sealing and demolishing units is cheap to do but expensive to verify honestly and if compliance claims are unverified, you can't tell if the fines and closures are actually reducing emissions or just moving them elsewhere.

Practical step: Fund a small independent monitoring/audit function (even a partnership with an existing university environmental science department) rather than relying solely on EPA self-reported enforcement numbers.

RECOMMENDATION 05



Expand Punjab PVICS beyond its current urban footprint.

What is PVICS?

The Private Vehicle Inspection and Certification System (PVICS) licenses private operators to test vehicles against mechanical safety and environmental emission standards.

Vehicular emissions are a major contributor to Punjab's smog, yet PVICS testing remains concentrated in Lahore and a few other cities. Punjab should expand coverage in phases, prioritizing cities with high vehicle density and poor air quality.

Expansion can leverage the existing VICS network, which operates in around 27 cities for public service vehicles. The Transport Department can add private-vehicle testing lanes at these stations and deploy mobile testing units in smaller districts. Additional capacity is essential, given the estimated 2.3 million private vehicles entering the testing cycle and repeated deadline extensions due to overcrowding.

PVICS should also coordinate with the Environment Protection Agency's emission testing programme to establish one test and one certificate, avoiding duplication. City-level compliance data should be published to track coverage and results.

Practical step: The Transport Department should pilot integrated testing at existing VICS stations in 3-5 high-priority cities, assess demand and compliance within six months, and use the findings to guide province-wide expansion.

RECOMMENDATION 06



Fix the health-outcome measurement gap: low incremental cost

Punjab reports enforcement activity, including fines, sealed units, and FIRs, but does not systematically show whether these measures improve public health. The gap can be addressed by linking EPA Punjab's real-time AQI data with hospital admission records. A shared dashboard could track respiratory admissions alongside air quality, at relatively low cost using existing data systems.
To ensure the evidence is credible and actionable.

Punjab should:

- Publish aggregate health data: Report daily or weekly district-level admissions for asthma, COPD, and acute respiratory infections, without patient-identifiable information.
- Compare seasonal trends: Measure outcomes against the same periods in previous years using a transparent methodology.
- Track interventions: Mark the implementation dates of measures such as kiln conversion and vehicle emission testing to assess their association with health trends.
- Report all findings: Publish results even when health outcomes do not improve, allowing ineffective measures to be reconsidered.
- Link data with public guidance: Display health advice alongside AQI readings and summarize which interventions show evidence of effectiveness.

Practical step: The EPA Punjab and Health & Population Department should establish a joint data-sharing agreement and pilot a district-level AQI-respiratory admissions dashboard during the next smog season. A six-month review should identify which measures merit continued funding, modification, or discontinuation.

RECOMMENDATION 07



Move from reactive emergency measures to forecast-based action and outcome-linked targets; the Beijing and Mexico City lesson.

School closures, smart lockdowns, and anti-smog guns are expensive, disruptive, and address symptoms during a crisis rather than preventing it. Beijing's structural advantage was tying department performance to actual measured outcomes rather than activity metrics (inspection counts, FIRs issued). Both Beijing and Mexico City also activate controls 24-48 hours before a pollution episode based on meteorological forecasts, whereas Punjab currently reacts only after AQI spikes (school closures, vehicle bans). Combining forecast-based activation with outcome-linked targets would allow preventive action before pollution accumulates and hold departments accountable for results.

Practical steps: Shift from "number of inspections conducted" as the success metric to "measured PM2.5 change" as the success metric for provincial departments; inspections are effort, not outcome. Use the existing AQI dashboard and Pakistan Meteorological Department data to issue 2-3 day lead-time warnings and pre-position controls (e.g., advance notice to farmers to avoid burning, temporary industrial reductions before a stagnation period).

RECOMMENDATION 08



Publish all data publicly and make it usable.

The AQI dashboard exists but is underutilized. If citizens can see pollution, they can pressure officials. This is how Beijing built accountability.

Practical step: Provide API access for developers to build apps showing real-time air quality and health alerts; make data visualizations accessible to the public through social media and local news

Conclusion

Smog in Punjab is not a multi-faceted issue, and it is not a new problem. The three parts of this series show that its sources are well understood, its toll on health and well-being is severe, and the province has already acted against several of its main causes. Measures that remove pollution at the source, such as converting brick kilns to zig-zag technology and demolishing illegal pyrolysis plants, have delivered results. Visible, reactive measures such as anti-smog guns have not, and they strain scarce water in return. The comparison with Beijing, New Delhi, and Mexico City points in the same direction that lasting improvement comes from sustained, preventive, source-focused action that is measured by outcomes rather than activity.

The path forward does not depend on doing more, but on doing what works. Punjab should redirect funds toward proven measures, verify compliance independently, link air quality to health outcomes, and act on forecasts before smog arrives, keeping the evidence visible to the public throughout. Done consistently, this can turn the same crisis, every winter, into a problem the province is steadily solving.





What more do you think Punjab could do to tackle smog? Send us your thoughts at info@sphereconsulting.services.

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