Community-driven open-data on Pakistan’s air pollution problem

Abid Omar
Pakistan Air Quality Initiative (PAQI) provides community-driven air quality data and resources to increase social awareness.

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Visualization of air quality by Cameron Beccario, site:earth.nullschool.net
Pakistan has some of the worst air pollution in the world. This global air pollution hotspot has very limited research from the academic community.
It's not allowed to change the master safe space.

01 Nov 2019

AQI 402

“Hazardous”

19 April 2020

AQI 44

“Healthy”

Photo credits: Dawar Hameed Butt (@Lahorewala)
Pakistan has an air quality data problem with little to no monitoring across the country.

- Governments worldwide are mandated to monitor air quality, not for the sake of data, but for creating and evaluating policy to meet and enforce environmental standards.
- Monitoring air pollution is key to reducing its prevalence and health impact.
- Data in real-time puts a magnifying glass on air pollution, helping create a cleaner environment when citizens can react to their local air pollution, and also evaluate impact of emission-reduction policy.
PAQI started as a *curiosity* to understand more about the air in Pakistan, with the first monitor in 2016 tweeting hourly air quality data (inspired by @BeijingAir).

**Hourly tweets** of PM2.5 values were initially ignored by the media as ‘it’s not news until it’s breaking news.’

**First media coverage** by the *New York Times* when PM2.5 levels reached 1,077 μg/m³ in November 2017, calling smog the ‘Fifth Season’ in Lahore.
Low-cost monitors have created a grassroots movement in Lahore.

- **Availability** of real-time data through the IQAir/UNEP AirVisual website and app has helped create a grassroots citizen movement. Initial monitors were self-funded by the Pakistan Air Quality Initiative, and the rest are funded and hosted by concerned citizens and corporations.

- **More low-cost monitors** are required to achieve coverage density, enabling empowered public to fight air pollution, enabling researchers and policy-makers to further the fight on air pollution.

- **Reference-standard and multi-pollutant monitoring** is required to take this to the next steps.
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We want to utilize hospital networks as an ideal monitoring partner to correlate air quality data with hospital admissions data.

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- **Reference-standard** and multi-pollutant monitoring is required to take this to the next steps.
- **Potential project partners** in the healthcare sector to correlate air quality data with hospital admissions data:
  - SINA Health, Education and Welfare Trust, 30 potential locations
  - The Aga Khan University Hospitals, Medical Centers and Clinical Laboratories, 100 potential locations
Open-data on Lahore’s air pollution problem

105 μg/m³ annual average PM2.5 in 2021

Data: Hourly-average data aggregated by Pakistan Air Quality Initiative’s community monitors.
Open-data on Lahore’s air pollution problem
PAQI low-cost sensor data show excellent correlation

PAQI low-cost sensor data show excellent correlation with U.S. Consulate’s reference-standard PM2.5 monitors for the 24-hour city average from May-November 2019:

- R-Squared: 0.91
- Standard error: 0.029
- t-value: 42.44

Data source: Pakistan Air Quality Initiative (PAQI), the Environmental Protection Department, Government of Punjab (EPD), and U.S Environmental Protection Agency (EPA) AirNow, reported as concentration of particulate matter of 2.5 micrograms per cubic meter (μg/m³).
Open-data on Lahore’s air pollution problem
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Open-data on Lahore’s air pollution problem
EPD reports 70 μg/m3 of fine particulate matter
14 times above WHO safe limits!

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Lahore is more polluted than New Delhi!
Data from US Consulate’s BAM monitors
The dense alleys of the Walled City of Lahore has hazardous air throughout the year.
Pakistan’s community network has been instrumental in creating a movement.
'Scary Moms' Are Part Of The Citizen War Against Pollution In Pakistan

Volunteer 'Scary Moms' lead awareness sessions at 110 schools across Punjab.
How to engage and develop a community of citizen scientists to deploy, maintain and manage air quality sensors in a decentralized network.

**Social media**
- Post original content!
  Anyone can re-tweet, like or re-post.
- Primary research
  Citizen scientists add value by creating and spreading new information through open data.
- Network!
  Connect with fellow citizen scientists and “real” scientists to gain expertise in your area.

**Traditional media**
- Engage
  Plan regular outreach and interactions.
- Validate
  Traditional media is looking for validated and original new stories, it’s up to you to convince them that your air inequality story is worth sharing.

**Community**
- Meetups!
  Plan regular outreach and interactions, organize meetups, talks, events.
- Schools & Universities
  Workshops and dialogues at schools and universities help engage new citizen scientists.
- Government
  The government is your friend… try to find a meaningful engagement with policy-makers to champion your cause.
The elephant in the room for community networks.

Community-driven initiatives which are not organized under a formal institution have limited access to funds, and therefore have a limited scale and sustainability.

Urban waste disposal in Karachi, Pakistan. Photo credit: Pakistan Air Quality Initiative
We need you.

We are literally drowning in smog without your help.

Thick Air II, a sculpture by Ali Baba shown at the Smog Show, December 2021.
How can the ASIC community help?

- More **academic research** focused on Pakistan.
- Help us in statistical analysis to **publish our LCS data** in an academic journal to make it more reachable.
- **More low-cost monitors** are required to achieve coverage density, enabling empowered public to fight air pollution, enabling researchers and policy-makers to further the fight on air pollution. Help us expand the network across Pakistan.
- Collaborate with local institutions for **reference-standard** BAM monitors to help with co-location studies in the three major cities.
- Help us get a few **multi-pollutant monitors** to develop a more comprehensive understanding of air pollution (the SENSIT RAMP is a viable low-cost air quality monitoring platform).
- Collaborate with a local research institution in developing emissions inventory and source apportionment studies.
135,000 deaths per year are attributed to ambient air pollution in Pakistan.

Thank you.

Community-driven open-data on Pakistan’s air pollution problem. This presentation was shared at the Air Sensors International Conference 2022 Session 1D: Community Air Sensor Use on May 11-13, 2022. Please contact Abid Omar of the Pakistan Air Quality Initiative for any questions or comments at abidomar@pakairquality.com.
Pakistan Air Quality Initiative

About our founder

Abid Omar has a social mission: how can I help improve the environment of Pakistan? He sees the air pollution emergency in Pakistan as a silver lining — an opportunity to drive environmental awareness and change that will clean up Pakistan for good.

A key indicator of environmental issues is pollution that affects our daily lives, specifically air pollution. He found but there is no data for this, so he founded the Pakistan Air Quality Initiative to monitor air quality in across major urban areas of Pakistan and to provide awareness for air quality and air pollution issues, and therefore provide impetus for change.

His day job is in the technical textiles and filtration industries.

About the Pakistan Air Quality Initiative

The Pakistan Air Quality Initiative (PAQI) provides crowdsourced air quality data for Pakistan. PAQI is a community-driven initiative to set up low-cost, real-time monitors to capture air quality data and thereby increase social awareness. PAQI provides tools and information people need to thrive in polluted environments.

The Pakistan Air Quality Initiative was founded in 2016, and is a grassroots community organization.

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Media Coverage
International

The New York Times  THE WALL STREET JOURNAL  DW
REUTERS  theguardian  LACROIX

Newsweek  GREENPEACE  AFP

UNDARK  thethirdpole.net
Truth, Beauty, Science.  UNDERSTANDING ASIA'S WATER CRISIS

THE DIPLOMAT  THE WIRE  THOMSON REUTERS FOUNDATION NEWS

Global Voices

Selected media coverage for work done by or data provided by the Pakistan Air Quality Initiative.