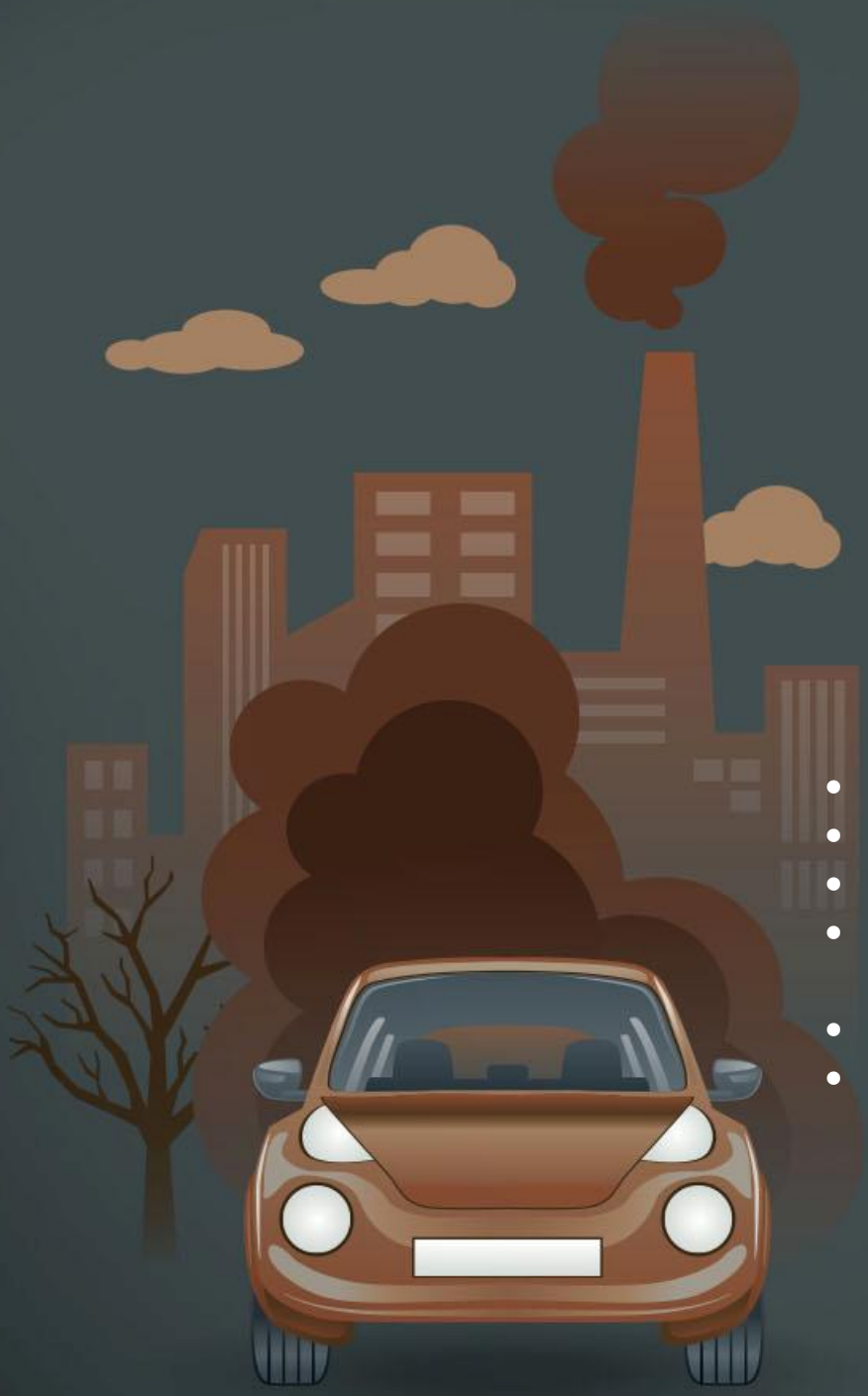
The Smog Crisis: Causes, Effects & Solutions

Examining Smog's Impact and the Path Forward for Cleaner Air



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Executive Summary :

This report is an exploratory exercise into the case of smog, elaborating its effects, its underlying causes and the policies of a government regarding the issue. To examine the opinion of the masses, we developed a Google Form questionnaire and included questions related to health effects caused by smog, as well as understanding, knowledge of and awareness about its causes and effects, satisfaction regarding what the government did about the issue – if at all, expectations in terms of how the issue of smog could be dealt with, etc. The results found out that people had significant levels of concern over the issue and supported measures towards smog reduction. The report further outlines a campaign design to be aimed at promoting activities and sensitization to address the problems associated with smog.

Introduction:

People who live or work in cities often suffer from a combination of smog and fog. Smoke is considered the most dangerous air in cities. Every November, Pakistan, especially Lahore, faces a thick smog, which makes this discussion all the more relevant. Smog is caused by a variety of factors, including industrial waste disposal, automotive pollution, and crop burning by farmers. When it occurs, it poses serious health risks, impairs vision, and contributes to environmental degradation. In addition, the storm restricts the activities of the general public and limits outdoor activities and daily activities. Addressing this issue requires interagency cooperation and a multilateral response. This report aims to analyze these issues, their causes and impacts, and recommend appropriate interventions to limit the adverse effects of smoke and raise public awareness about this critical issue.

What is Smog?

Smog, often known as smoke fog, is a type of severe air pollution. The term “smog,” a combination of the words “smoke” and “fog,” was first used to describe smoky fog in the early 20th century because of its opacity and odour.

What is Smog Composed of?

Smog is a form of air pollution that is a combination of numerous toxic effluents from industrial and residential activities. These activities occur both naturally and artificially as everything is just tossed into the atmosphere without being processed. It leads to air pollution and harm to the environment as well as every existing living being on the planet.

The main components of the smog are as follows:

- Tropospheric Ozone
- Sulphur Oxides
- Smoke
- Nitrogen Oxides
- Carbon Monoxide

- Volatile Organic Compounds (VOCs)
- Pollen
- Dust
- Ammonia Gas
- Other Chemicals

These elements, or pollutants, that make up smog are chemically highly reactive and extremely dangerous to both people and various animals.

Smog Formation

There are two types of smog:

1. Sulfurous Smog
2. Photochemical Smog

The smog we suffer from is photochemical smog. And it forms when sunlight combines with nitrogen oxides and at least one volatile organic compound (VOC) in the atmosphere.

Causes of Smog in Lahore, Pakistan

In Pakistan, Lahore is the city that has been affected the most by smog in the country over the last few years. The city is overpopulated and it is an industrialized region with a huge traffic problem.

So, the reasons for **smog in Lahore** are vehicle emissions, industrial pollution, fossil-fuel-fired power stations, waste-burning, and coal burned by thousands of brick kilns spread over the region. These are all contributors to the problem.

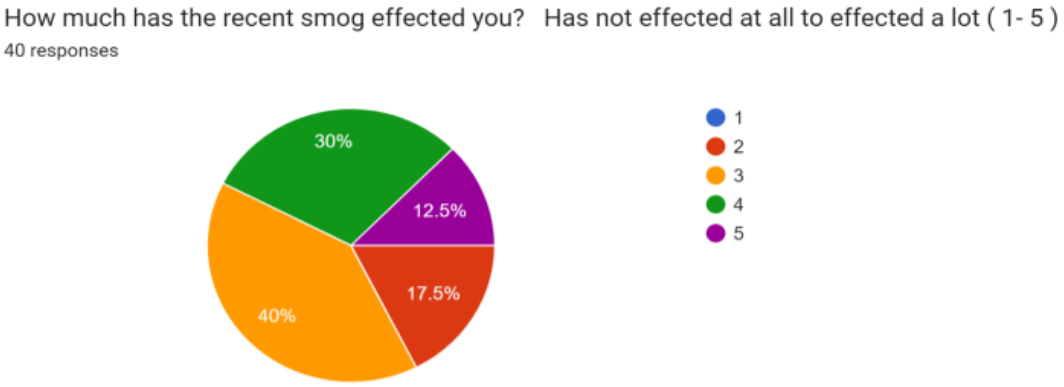
These emissions result in:

- Nitrogen oxides come from automobiles, coal power stations, and factories.
- VOCs are emitted by gasoline, paints, and a variety of cleaning solutions.
- Burning of crop residue, especially rice stubble in Punjab, contributes significantly to Lahore's smog, releasing harmful pollutants like PM2.5 and worsening air quality.

So, when sunlight strikes these compounds, they produce airborne particles and ground-level ozone, causing **smog in Punjab**. It leads to injurious health issues and causes detrimental effects on the environment.

Impacts of Smog:

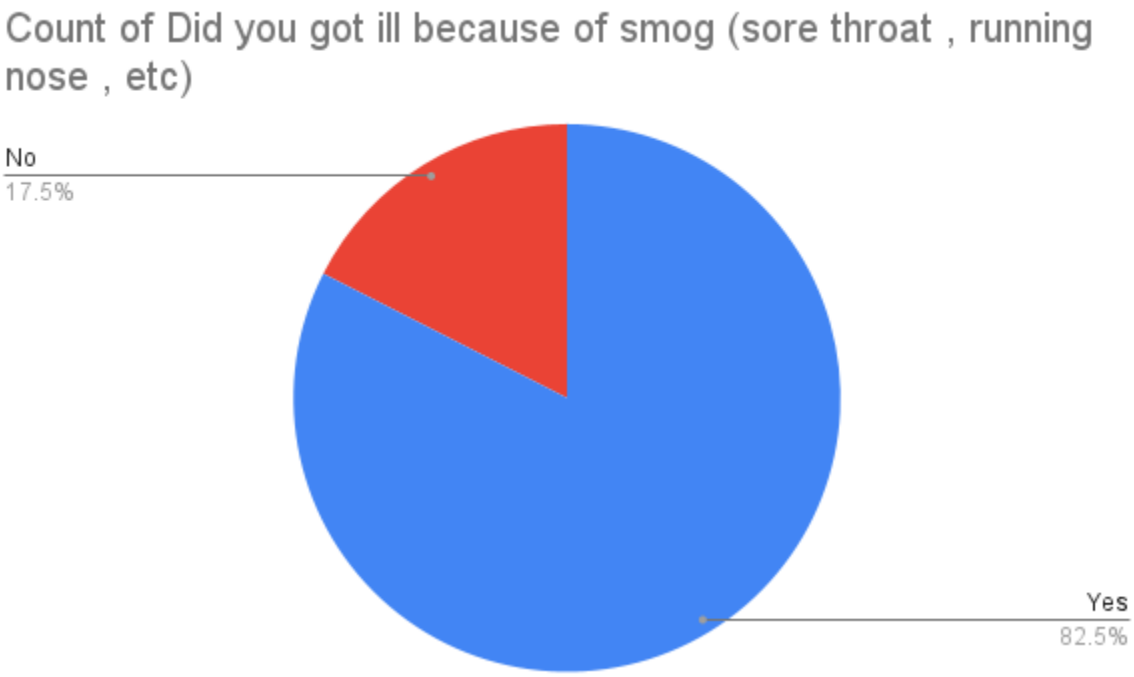
Smog, a combination of smoke and fog, is a type of air pollution that can seriously affect the environment, health, and society. We surveyed smog and its impact, according to which most people are affected by it.



Here's a breakdown of the impacts and effects of smog:

- ## Health Impacts:

Smog can seriously harm health by irritating the eyes and lungs, leading to breathing problems like asthma and bronchitis. Some chemicals in smog, such as benzene, can cause lung cancer. According to a study published in ***The Lancet*** **(2017),** air pollution decreases life expectancy by **1 to 2 years** globally. However, in highly polluted cities like Lahore and Delhi, the reduction could be as high as **6 to 7 years**. Vulnerable groups, such as children, the elderly, and those with pre-existing health problems, are especially at risk. According to the survey we conducted, most of the people fall ill due to smog.



- **Environmental Impacts:**

Smog also impacts trees, vegetation, and climate. It can hurt plants and trees by affecting their growth, affecting farming and nature. Tiny particles called **aerosols** in smog can affect rain patterns and cause disruptions in local weather patterns. Lahore is facing a delayed winter because of extreme smog. Smog can make the air look hazy, which makes it hard to see. This can block beautiful views and make places look less nice, especially in cities and popular tourist spots. Also, the reduction in visibility leads to accidents.

- **Economic Impacts:**

Smog can bring about higher healthcare costs because more individuals fall ill and have to be treated for their breathing problems and heart conditions. This adds pressure on doctors, hospitals, and health insurance. Other than that, it could also make people miss work to recover or to visit a doctor, meaning businesses lose workers and consequently dollars. In addition, with most people now working from home or online, smog can affect how well they do their jobs especially if they feel sick or cannot focus. It also tends to hurt crops, which makes it a bit harder to grow food and thereby can affect the prices of foodstuffs.

- **Impact on Wildlife:**

The animals, especially those in an urban or industrial setting, are also affected by the smog. The pollutants may cause some respiratory ailments to certain animals, especially those that are sensitive to air pollution. For example, rats and squirrels can suffer from respiratory diseases similar to those of humans and lose their life expectancy. It may also damage the plants and water resources, therefore affecting the food and shelter for animals. Air and industrial pollution can cause acid rain which kills trout, salmon, and all other species responsive to changes in the water quality of water bodies, thereby reducing the population of those fish because of pollution from the smog.

- **Social and Psychological Effects:**

Chronic exposure to smog as well as the health risks it poses may cause anxiety and stress among affected populations. Those people living under situations of frequent smog conditions will be worse off psychologically because their health and well-being are constantly threatened. Studies in **2020** indicated in the **Journal of Environmental Health Science and Engineering** that long exposure to a high level of particulate matter, otherwise known as **PM2.5**, being the major constituent of smog, is linked with a higher psychological distress rate among **Lahore**'s residents. Also, the investigation by the **Lahore University of Management Sciences (LUMS)** in **2020** which conducted medical examinations on children exposed to the severe levels of air pollution prevalent in Pakistan, proved that these children had more severe respiratory problems and some emotional symptoms.

Government Policy:

Currently, in 2024, Pakistan is still fighting for fresh air: not only in Lahore but also in Multan, Faisalabad and Islamabad. More policies are being implemented with improvements over the earlier ones to tackle pollution and smog.

- **Punjab's Smog Action Plan (2024 Update):**
    1. **Air Quality Monitoring:** More monitoring stations established in Punjab, especially Lahore, to monitor the level of pollution in real-time.
    2. **Crop Burn Ban:** Enforcement through drones and satellite imagery, and hefty fines for those violators.
    3. **Solar Energy Promotion:** Increased subsidies for small businesses and rural families to install solar panels, cutting pollution.

- **National Air Quality Standards:**
    1. Stricter Emission Regulations for Vehicles and Industries.
    2. Development of a National Air Quality Index (AQI) to give in real-time data on pollution levels.

- **Electric Vehicle (EV) Policy:**
    1. Continued tax incentives for EVs and manufacturing of electric buses for public transport.
    2. Expansion of EV charging infrastructure in urban centers.

- **Climate Change Integration:**
    1. The **Climate Change Act 2023** focuses on lowering emissions associated with air pollution.
    2. Pakistan keeps accepting international agreements on the climate issue, including the Paris Agreement.

- **Public Health Response:**
    1. Organize health campaigns to highlight the health risks associated with smog.
    2. Free health camps for people affected by respiratory diseases in pollution affected areas.

- **International Collaboration:**

    1. Continued World Bank, ADB and UNDP assistance for the projects aimed at improving air quality.

- **Agricultural Policy:**

    1. Schemes to educate farmers to reduce crop burning, includes training and financial assistance towards sustainable farming practices.

Smog Awareness Campaign Report:

Conducted at FAST University & Online Campaign

Survey Insights

To better understand the community's perspective on smog, we conducted a detailed survey. Key areas assessed included:

1. **Impact of Smog on Health**
    - 84% of participants reported falling ill due to smog (sore throat, running nose, etc.).
2. **Smog's Effect on Daily Life**

    - On a scale from 1 (not affected at all) to 5 (affected a lot), the average response was **3.5**, indicating moderate to severe impact.
3. **Awareness of Smog Causes and Effects**
    - Majority of participants claimed to have a general idea, but only a few were completely up-to-date on smog's causes and effects.
4. **Satisfaction with Government's Response**
    - 72% strongly disagreed with the government's efforts to combat poor air quality.
5. **Should FAST Switch to Online Classes?**
    - Overwhelmingly, participants suggested shifting to online classes during peak smog season.
6. **Preferred Solutions to Combat Smog**
    - Urgently Implemented Solution: **Providing Air Purifiers at Subsidized Rates** and **Increasing Use of Public Transport.**
    - Long-term Solution: **Use of Renewable Sources** and **IT-based Digital Air Quality Monitoring Systems.**
7. **Major Causes of Smog (Per Participants):**
    - Vehicular and industrial emissions.
    - Deforestation and lack of public transport.
    - Crop burning and unregulated factory operations.

On-Campus Activities

1. **Mask Distribution**
    - Over **200 masks** were distributed among students and faculty members to minimize exposure to harmful air.
2. **Interactive Sessions**
    - Informational sessions were held highlighting the causes, effects, and solutions to smog.
    - Students shared personal experiences with air pollution and received free eco-friendly pamphlets.
3. **#SmogFreeFAST Trend**
    - The campaign's hashtag gained traction online, fostering greater engagement and sparking discussions on air quality among the university and general public.

Online Campaign Highlights

1. **Hashtag Performance (#SmogFreeFAST)**
    - The hashtag reached over **1,000 interactions** on social media, emphasizing collective action against smog.
2. **Educational Content**
    - Infographics, videos, and articles on smog's health impacts and sustainable practices were widely shared.
3. **Polls and Discussions**

- Online polls engaged the audience, gathering opinions on solutions like public transport improvements and renewable energy adoption.

Solutions to Smog: Addressing Community Needs

Based on insights from our community survey, there are actionable solutions to mitigate smog effectively:

1. **Implementation of Renewable Energy Sources**

   Transitioning to renewable energy sources such as solar, wind, and hydropower is crucial. Respondents identified the urgent need for adopting renewable sources to reduce dependency on fossil fuels, which are primary contributors to smog. Encouraging industrial zones to integrate green energy solutions through tax incentives or subsidies can catalyze this shift.

2. **Expansion of Public Transport**

   A significant portion of the community advocated for increased use of public transport. This includes expanding affordable, efficient, and eco-friendly public transit systems, which would minimize the reliance on personal vehicles, a major source of vehicular emissions. Incentivizing electric and hybrid buses can further decrease air pollution levels.

3. **Digital Air Quality Monitoring Systems**

   As suggested by survey participants, implementing IT-based digital air quality monitoring systems in urban centers is imperative. These systems can provide real-time data on pollution levels, alerting citizens and authorities about critical areas and times. Transparent reporting from these systems would also foster community trust and encourage behavioral changes.

4. **Affordable Air Purifiers and Masks**

   Providing air purifiers at subsidized rates, as recommended in the survey, can alleviate indoor pollution effects. Distributing free masks in smog-affected zones will protect individuals while long-term measures take effect.

5. **Stronger Regulation of Industrial Emissions**

   The survey highlighted factories and industrial emissions as key contributors. Strict

enforcement of emission limits, along with penalties for non-compliance, can compel industries to adopt cleaner technologies.

6. **Awareness Campaigns**

   Community education on the health effects of smog and preventive measures, such as tree planting and reduced reliance on burning waste, is critical. Our campaign can mobilize citizens to adopt these sustainable practices.

Implementing these solutions requires collaborative efforts between the government, industries, and citizens, ensuring a healthier, cleaner environment.