# UAE Air Pollution: Particulate Matter

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# Air pollution in the UAE

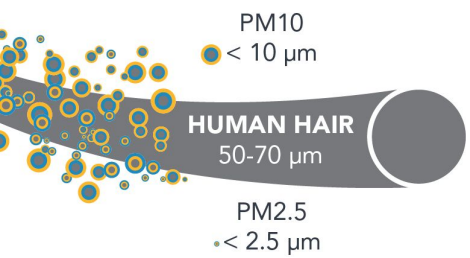
## The Problem

- As per the World Air Quality Index rankings (2024), the UAE ranked the 7th most air-polluted country out of 137.

- Natural and human activities raise the levels of particulate matter (PM) in the air.

- Particulate matter (PM): is a mixture of solid and liquid particles suspended in the air.

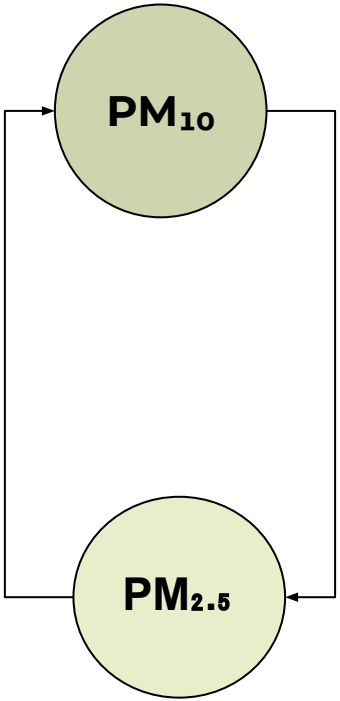
- The main source of PM is anthropogenic emissions (greenhouse gasses from human activities):
  - industrial activities
  - generation of fossil-based power
  - Increased transportation
  - large-scale construction




# Particulate Matter

## $PM_{10}$: Coarse PM

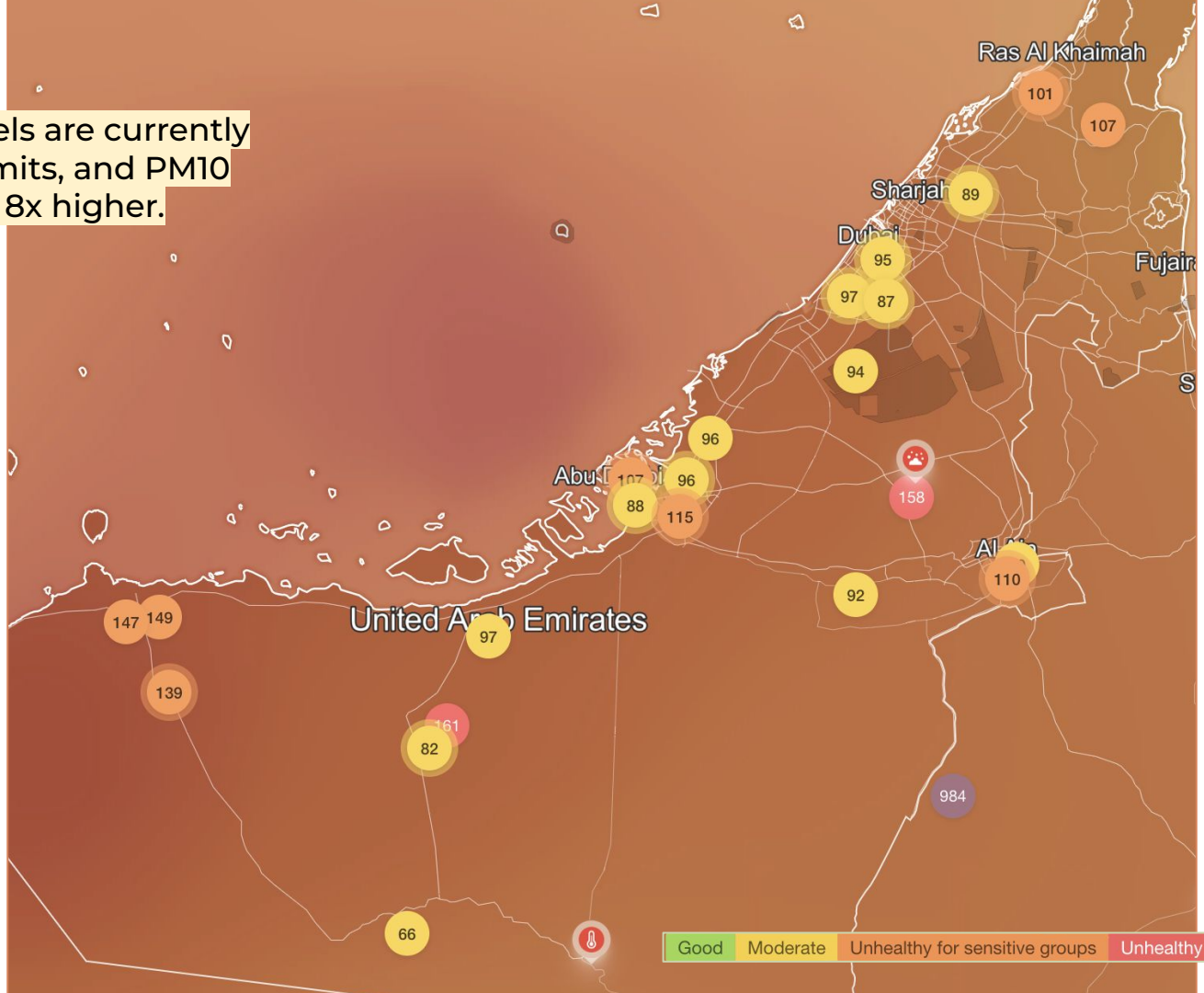
- inhalable particles ≤ 10 µm in diameter.
- From dust, pollen, and waste-burning.
- Short-term exposure: worsening of respiratory diseases.
- Positive correlation with GDP growth, population growth, and energy consumption.




## $PM_{2.5}$: Fine PM

- fine inhalable particles ≤ 2.5 µm in diameter.
- From urban and industrial emissions.
- More likely to travel into deeper parts of the lung and the bloodstream.
- Positively correlated with population growth, vehicle-use, and industrial activity.

UAE PM2.5 levels are currently ~6.7x WHO limits, and PM10 levels are 8x higher.



# Fine Particulate Matter ($PM_{2.5}$)

- Its main source is anthropogenic emissions like rapid urbanization, traffic growth, generation of power (primarily fossil-based), and industrial generation,  increases $PM_{2.5}$ in the UAE cities.
- It is associated with the greatest proportion of adverse health effects related to air pollution
- Short-term exposure is associated with acute and chronic bronchitis, asthma attacks, increase risk of asthma, and respiratory infection.
- Long-term exposure is associated with lung cancer, higher risk of cardiovascular diseases, COPD, and premature death, reduced lung function growth in children, and even neurological diseases.
- It can affect the nervous system by causing inflammation, oxidative stress, cancer, DNA damage, and genetic mutations.

# Exposed Populations: Migrant Workers & Vulnerable Communities in the UAE

Based on WHO estimates, approximately 1,872 people die every year from outdoor air pollution in the UAE.

More than 120,000 people die prematurely each year in the MENA region because of air pollution.

They are 88% of the UAE population and many face continuous exposure working outdoors (construction, transport, and oil/gas fields).

High exposure to harmful to both carcinogens and particulate matter.

Migrant workers often live in crowded or poorly ventilated accommodations, making them more vulnerable to air pollution indoors.

# Indoor Air Pollution

- Modern constructions have airtight, air-conditioned buildings which locks pollutants in, including:
  - Outdoor PM10 and PM2.5 that seeps in but does not ventilate out.
  - Dust, mold, and allergens.
  - Heating byproducts.
  - VOCs from glues, paints, carpets, and building materials.
- The result is “Sick Building Syndrome”
  - Headaches, dizziness, fatigue
  - Irritated eyes, nose, throat, skin
  - Breathing difficulties, asthma aggravation
  - Poor concentration, reduced productivity

# Environmental Impacts

## Visibility Impairment

Fine particles (PM2.5) are the main cause of reduced visibility (haze).

## Settling on Soil & Water

Depletes the nutrients in soil & damages crops.

Affects humans through the food chain.

“Legacy effects”

# Economic Consequences

## Healthcare costs

Increased respiratory, cardiovascular, and chronic disease cause higher healthcare costs for both the government and residents.

## Reduced Productivity

Poor air quality causes sick days, fatigue, and absenteeism, lowering overall workforce efficiency.

## Environmental/Agricultural damage

Pollution harms soil, water, and agriculture, leading to costly ecosystem restoration.

## Infrastructure Maintenance

Pollution accelerates the wear & tear of buildings, increasing cleaning and repair costs.

Air pollution costs Middle Eastern economies billions of dollars every year through lost labor income, higher healthcare spending, and reduced productivity.

# How the UAE is Addressing Air Pollution

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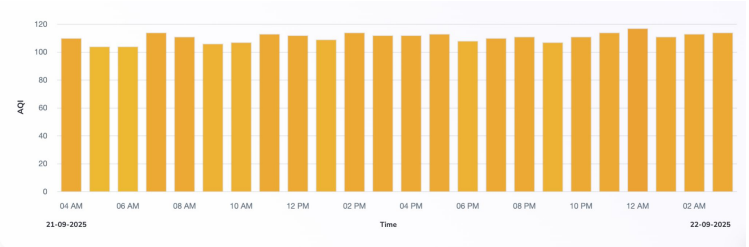
## Air Quality Monitoring (MOCCAE)

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## The UAE National Air Quality Agenda 2031

Abu Dhabi's Air Quality Improvement Plan

3

## UAE 2030 Vision

UAE Green Agenda 2030

Pledged to reduce its emissions by 47% from 2019 levels by 2035.

(Its current policies are measured to get it to only about 7% below 2019 by 2030).

# Conclusion

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