Global Air Quality

Trends, Indicators and Insights

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INTRO

A Global Crisis

Goal

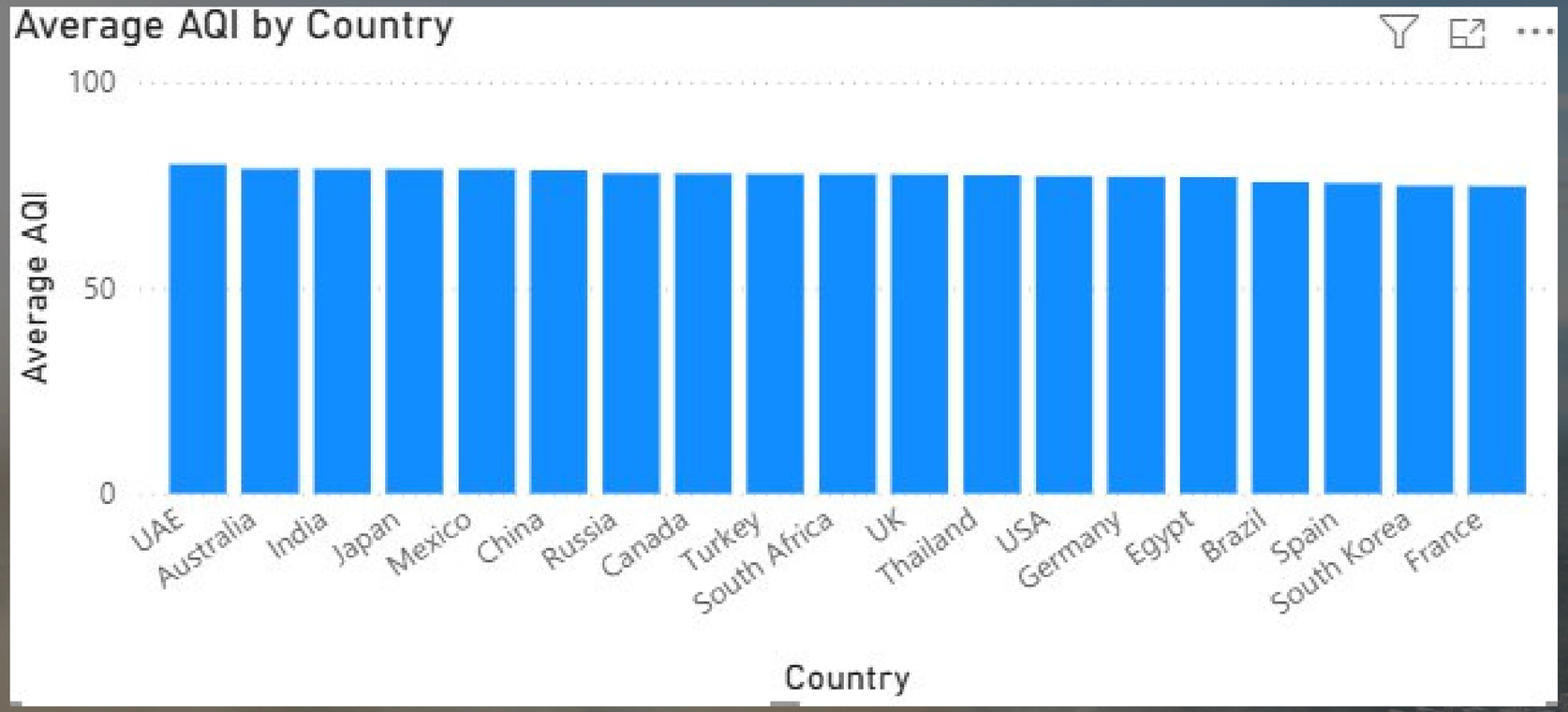
to analyze global air quality data to identify major pollution patterns, determine the most influential pollutants affecting AQI, and compare air quality across different countries and time periods.

Relevance

Air pollution is a major global issue that affects public health, climate, and overall quality of life.
Understanding air quality trends through data analysis is essential for governments, researchers, and communities

Data

- indicators such as particulate matter (PM2.5 and PM10), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and ozone (O_3)
- temperature, humidity, and wind speed
- Location (countries)



Country	Average AQI
Australia	78.93
Brazil	75.67
Canada	77.83
China	78.63
Egypt	76.89
France	74.69
Germany	76.97
India	78.90
Japan	78.87
Mexico	78.86
Russia	77.88
South Africa	77.67
South Korea	74.80
Spain	75.43
Thailand	77.46
Turkey	77.71
UAE	80.01
UK	77.61
USA	77.11
Total	**77.45**

Average AQI by Country

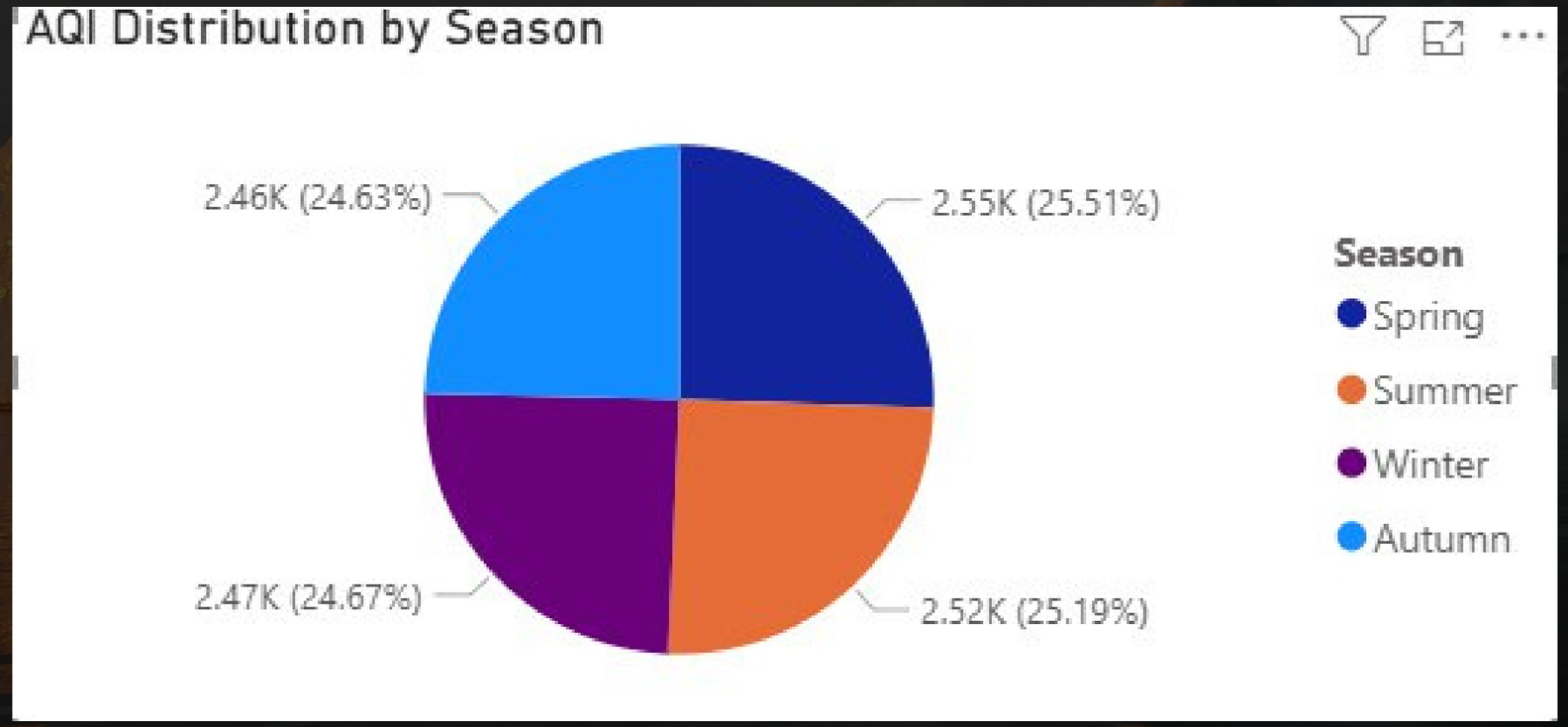
This graph shows the air quality levels across different countries.

- UAE has the highest AQI (80.01).
- USA and France have the lowest AQI values (around 77).

AQI Distribution by Season

This graph shows how AQI is distributed across different seasons.

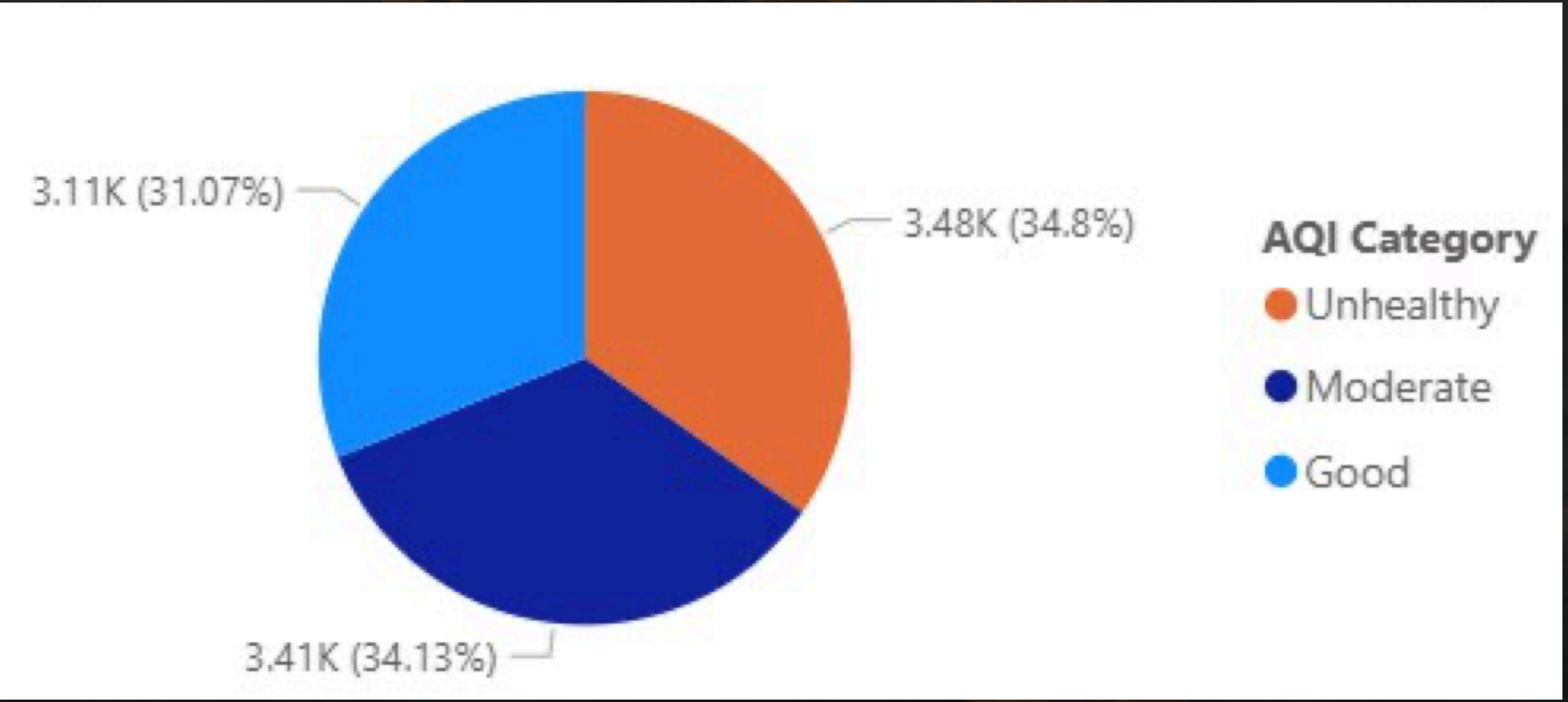
- Spring has the highest number of entries (25.51%).
- Summer and Autumn have similar values, with Winter slightly lower.



Country distribution

by AQI category

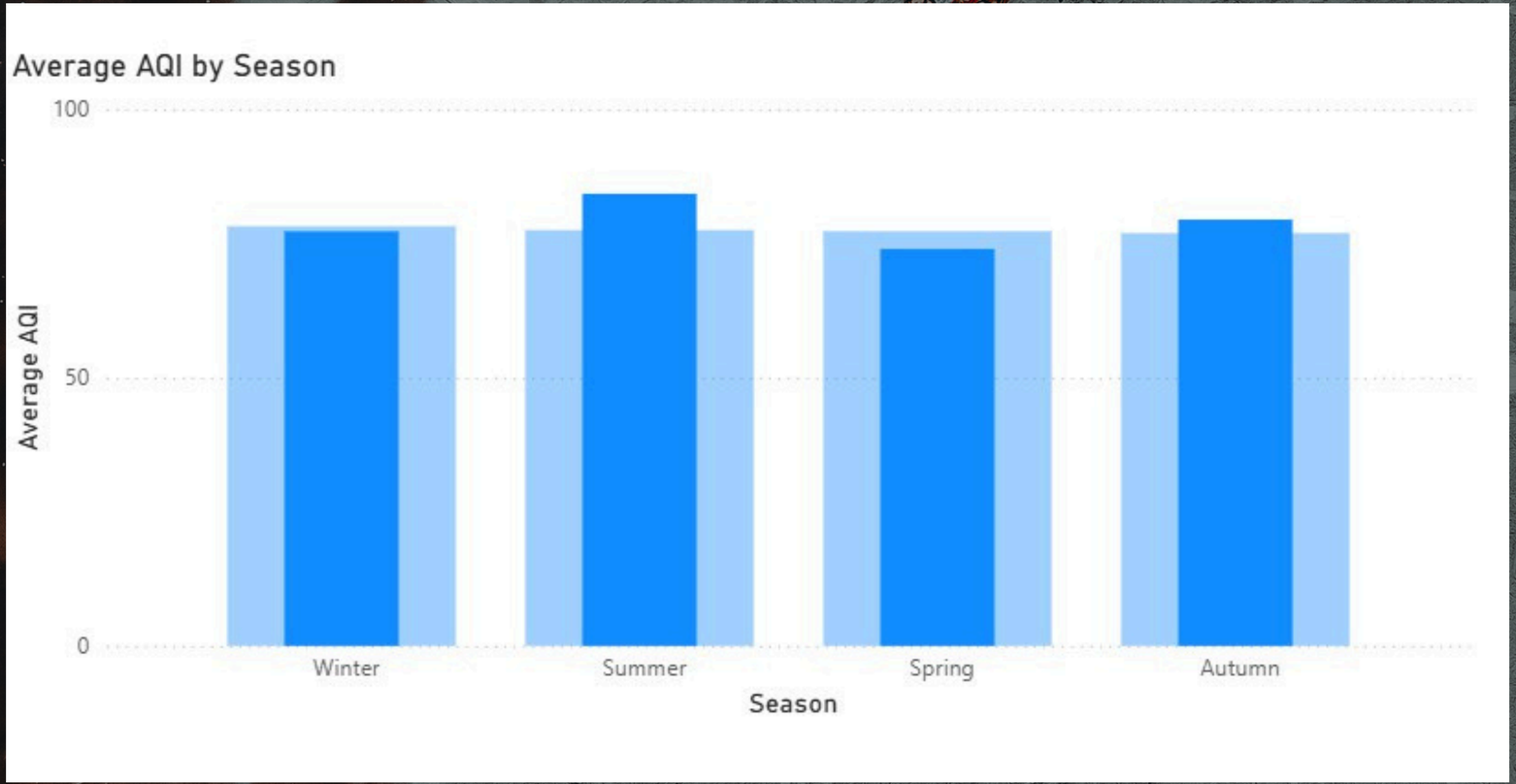
In most countries, the air is more often moderate or polluted, and cases of truly good air quality are less common.

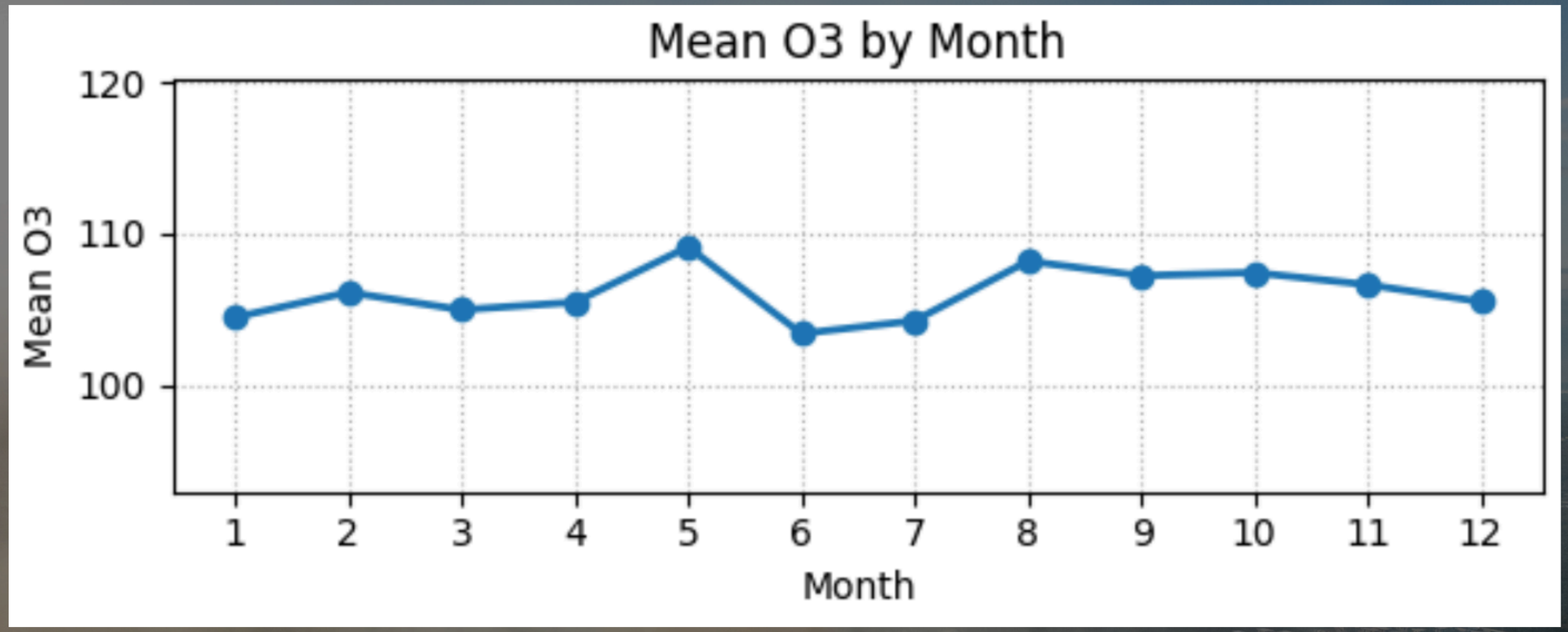


Average AQI by Season

This graph provides an overview of how air quality varies throughout the year.

- Summer has the highest average AQI.
- Winter, Spring, and Autumn have similar AQI values, with Summer slightly higher.





Mean O3 by Month

This graph shows how the ozone concentration varies throughout the year.

- The highest O3 levels occur around May and August.
- O3 levels remain relatively stable, with a slight decrease in the later months of the year.

Average CO level by month

increase in April: this peak may be linked to several factors:

- increased traffic after winter,
- the start of seasonal agricultural work, including the burning of plant residues in some regions.

PM2.5 prediction model

City	PM2.5_Status
Bangkok	Bad
Istanbul	Good
Rio de Janeiro	Bad
Mumbai	Bad
Paris	Good
Los Angeles	Bad

Model Description:

Prediction of air pollution levels (PM2.5) based on data (temperature, humidity, wind speed, etc.)

Key results:

- Mean Absolute Error: 36.36
- Mean Squared Error: 1807.83
- R-squared: 0.85

Conclusions from the model

- The model predicts PM2.5 levels fairly well.
- Temperature and wind speed have the most influence on the predictions.

Conclusion

Seasonal Air Pollution Patterns

Seasons

Summer: Highest pollution → increased O_3, heat, possible wildfires.
Spring: Cleanest season

Pollutant behavior

CO peaks in April → traffic, agriculture, local inversions.
O_3 fairly stable, slight rise in May

AQI average

~75–80 → similar air quality across countries

Key factors

Seasonal climate, human activity, local emissions

References

to search and to prove

Increased air pollution: Is it worse during the summer or winter

Air quality. NASA Earthdata

World Air Quality Index. (n.d.). WAQI.

Particulate matter (PM) pollution

World Health Organization. Air quality and health

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Thank You

for your attention