**Air Quality Index (AQI) Report**

Data Source: West Bengal Pollution Control Board
Station- Bhasa 2nd Campus of Asutosh College
(JUNE 2024)

## Introduction

The Air Quality Index (AQI) is a vital tool used to communicate the quality of the air in a particular region and its potential impact on human health. Developed by the United States Environmental Protection Agency (EPA), the AQI simplifies complex air quality data into a single number and color-coded categories that represent varying levels of health concern. This index is crucial for raising public awareness about air pollution and guiding health-related decisions.

## Purpose and Importance

The AQI's primary purpose is to provide the public clear and concise information about daily air quality levels. By understanding the AQI, individuals can take necessary precautions to protect their health, particularly on days when air pollution levels are high. The AQI is especially important for vulnerable populations, including children, the elderly, and those with pre-existing respiratory or cardiovascular conditions, as these groups are more susceptible to the adverse effects of air pollution.

## AQI Scale

The AQI scale ranges from 0 to 500 and is divided into six categories, each representing a different level of health concern:

- **0-50 (Good)**: Air quality is considered satisfactory, and air pollution poses little or no risk.
- **51-100 (Moderate)**: Air quality is acceptable; however, for some pollutants, there may be a moderate health concern for a very minimal number of people who are unusually sensitive to air pollution.
- **101-150 (Unhealthy for Sensitive Groups)**: Members of sensitive groups may experience health effects. The public is not likely to be affected.
- **151-200 (Unhealthy)**: Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.

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- **201-300 (Very Unhealthy)**: Health alert: everyone may experience more serious health effects.
- **301-500 (Hazardous)**: Health warnings of emergency conditions. The entire population is more likely to be affected.

**Description of the table**

| | AQI | PM 2.5 AVG (µg/m³) | PM 10 AVG (µg/m³) | REL HUMI (%) | TEMPERATURE (°C) |
|---|---|---|---|---|---|
| Min. | 44.79 | 26.28 | 44.79 | 74.08 | 29.74 |
| 1st Qu. | 56.06 | 32.54 | 56.07 | 76.05 | 31.09 |
| Median | 61.67 | 35.91 | 61.66 | 77.22 | 31.79 |
| 3rd Qu. | 68.65 | 39.91 | 67.83 | 80.31 | 32.22 |
| Max. | 84.83 | 49.37 | 85.12 | 86.92 | 33.11 |
| Mean | 62.25 | 36.19 | 62 | 78.56 | 31.6 |
| St. d. | 9.09 | 5.21 | 9 | 3.3 | 0.87 |

## Air Quality Index (AQI)

AQI values range from 44.79 to 84.83, averaging 62.25. The 1st quartile is 56.06, and the median is 61.67, indicating that half of the AQI readings fall within moderate pollution levels. The 3rd quartile value of 68.65 shows that 75% of the time, AQI is below this level. A standard deviation of 9.09 reflects occasional fluctuations in air quality.

## Particulate Matter $_{2.5}$ (PM $_{2.5}$ AVG in µg/m³)

PM $_{2.5}$ concentrations range from 26.28 µg/m³ to 49.37 µg/m³, with an average of 36.19 µg/m³. The 1st quartile is 32.54 µg/m³, and the median is 35.91 µg/m³, indicating frequent levels that can pose health risks. The 3rd quartile value of 39.91 µg/m³ shows that most PM $_{2.5}$ levels are below 40 µg/m³, while the standard deviation of 5.21 indicates moderate variability.

## Particulate Matter $_{10}$ (PM $_{10}$ AVG in µg/m³)

PM $_{10}$ levels range from 44.79 µg/m³ to 85.12 µg/m³, averaging 62 µg/m³. The 1st quartile is 56.07 µg/m³, and the median is 61.66 µg/m³, indicating typical levels that could impact health. The 3rd quartile value of 67.83 µg/m³ shows that most PM $_{10}$ levels are under control, while the standard deviation of 9 µg/m³ reflects considerable variation.

## Relative Humidity (%)

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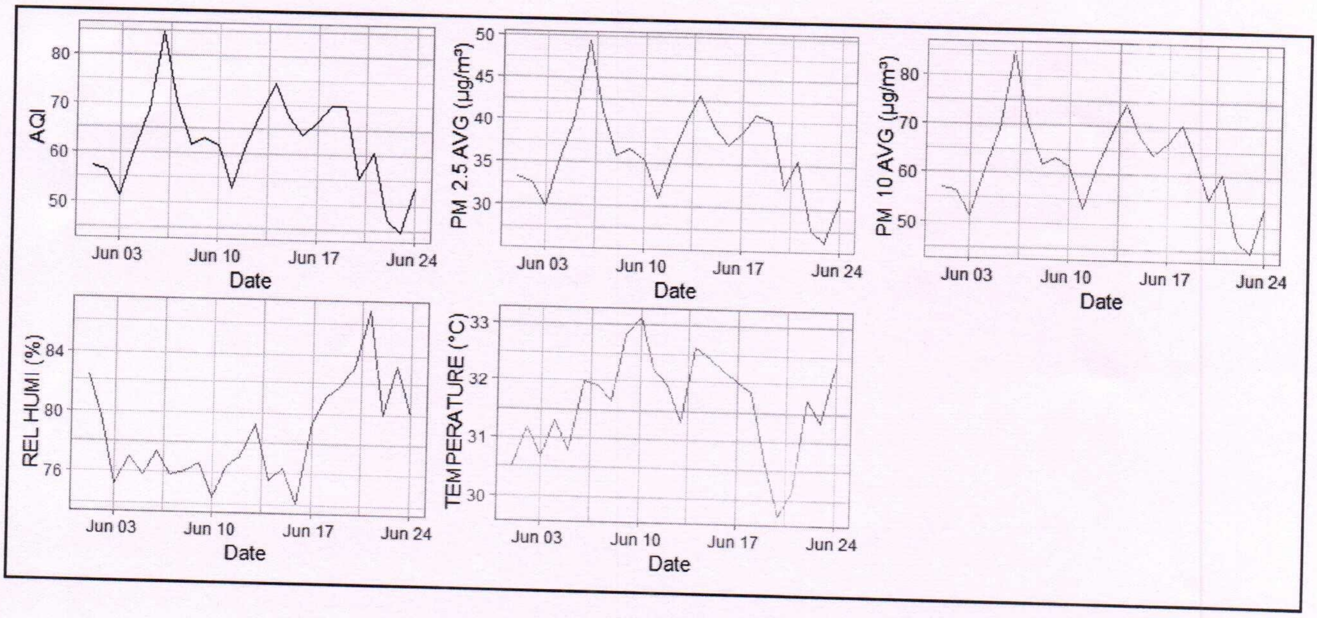
Relative humidity ranges from 74.08% to 86.92%, averaging 78.56%. The 1st quartile is 76.05%, and the median is 77.22%, indicating consistently high humidity. The 3rd quartile value of 80.31% shows that humidity remains high most of the time, with a standard deviation of 3.3%, indicating low variability.

**Temperature (°C)**

Temperature ranges from 29.74°C to 33.11°C, averaging 31.6°C. The 1st quartile is 31.09°C, and the median is 31.79°C, indicating stable thermal conditions. The 3rd quartile value of 32.22°C and the standard deviation of 0.87°C confirm minimal variability.

**Scientific Insights**

The analysis indicates moderate air pollution with occasional higher values that may impact health, particularly in sensitive groups. Stable temperature and humidity conditions influence air quality dynamics, highlighting the need for effective environmental management and public health strategies to mitigate air pollution effects.




**Air Quality Index (AQI)**

The AQI graph shows fluctuating values between early and late June. Peaks are observed around June 3rd, 10th, and 17th, reaching up to 80, indicating episodes of higher pollution. The lowest AQI values drop to around 50, suggesting periods of relatively better air quality. This variability underscores the inconsistency in air quality, likely due to changes in environmental conditions or pollution sources.

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## Particulate Matter $_{2.5}$ (PM $_{2.5}$ AVG in μg/m$^3$)

The PM $_{2.5}$ levels also show significant fluctuations, with notable peaks around June 3rd and June 10th, reaching close to 50 μg/m$^3$. The levels decrease slightly but still show variations throughout the month, indicating persistent particulate pollution. These peaks correspond with the AQI peaks, reflecting the impact of fine particulate matter on overall air quality.

## Particulate Matter $_{10}$ (PM $_{10}$ AVG in μg/m$^3$)

Similar to PM $_{2.5}$, the PM 10 levels exhibit variability, with the highest peaks occurring around June 3rd and June 10th, reaching up to 80 μg/m$^3$. This pattern suggests that larger particulate matter also significantly contributes to air pollution during these periods. The variations align with the fluctuations seen in AQI and PM $_{2.5}$ levels.

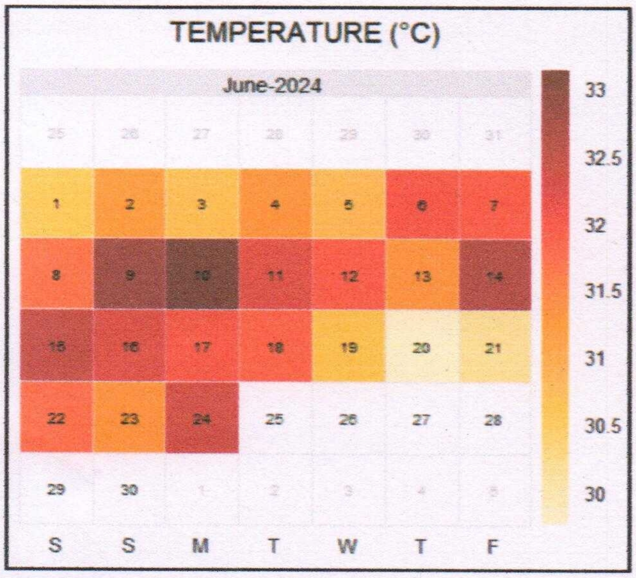
## Relative Humidity (%)

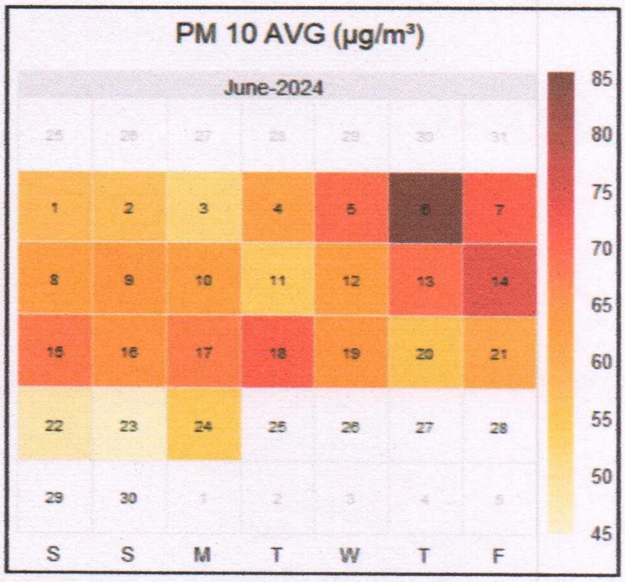
The relative humidity graph shows a general upward trend, with values fluctuating between 74% and 86%. There is a notable increase towards the end of June, indicating more humid conditions. High humidity can affect pollutant dispersion and might correspond with some of the fluctuations observed in particulate matter levels.

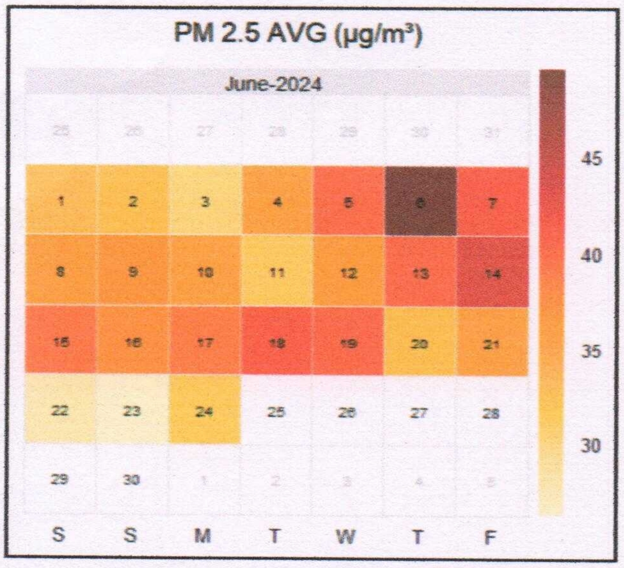
## Temperature (°C)

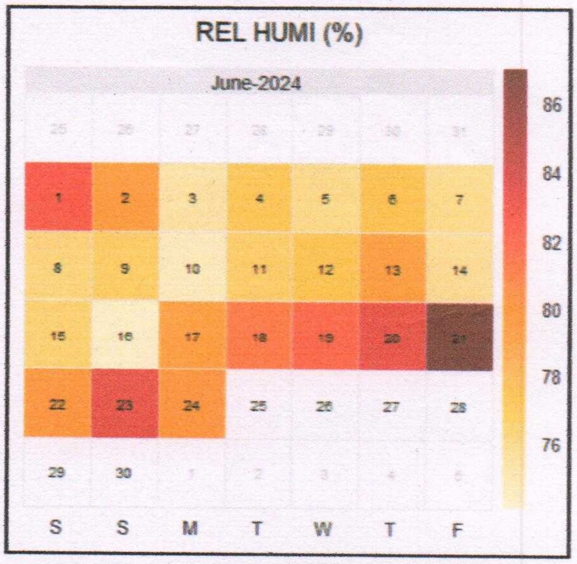
Temperature values range between 30°C and 33°C, with noticeable fluctuations. Peaks in temperature often correspond with dips in relative humidity, indicating an inverse relationship. The relatively stable but slightly variable temperatures suggest consistent thermal conditions that could influence air quality dynamics, particularly the dispersion of pollutants.

The data reveal significant fluctuations in AQI, $PM_{2.5}$, and $PM_{10}$ levels, indicating varying air quality throughout June. The relationship between particulate matter levels and AQI highlights the impact of both fine and coarse particles on air pollution. Relative humidity and temperature also show variability, which can influence pollutant behaviour and air quality. This comprehensive understanding of the interplay between these factors is crucial for developing strategies to manage and mitigate air pollution effectively.




A detailed overview of temperature, $PM_{10}$ and $PM_{2.5}$ concentrations, and relative humidity throughout the month. The temperature data (°C) reveals that the highest temperatures, ranging from 32.5°C to 33°C, were recorded on several days, including the 6th, 7th, 9th, 10th, 11th, 13th, 14th, 15th, 21st, and 22nd, with the 9th to the 14th showing a particularly intense heatwave. The lowest temperatures were observed around 30.5°C on the 20th, 25th, and at the month's end, indicating a slight cooling period. This temperature variation may have significant implications for local climate conditions and energy consumption patterns.

The $PM_{10}$ concentrations ($\mu g/m^3$) map indicates a peak of 85 $\mu g/m^3$ on the 6th and 7th, with elevated levels continuing throughout the month, particularly during the heatwave period. The lowest concentrations were noted at the start and end of June, suggesting a potential correlation between temperature spikes and increased particulate matter. This pattern could indicate that higher temperatures contribute to the resuspension of particles or reduced dispersion, adversely affecting air quality.

Similarly, $PM_{2.5}$ concentrations ($\mu g/m^3$) followed a comparable pattern to $PM_{10}$, with the highest values of 45 $\mu g/m^3$ on the 6th and 7th. Elevated $PM_{2.5}$ levels persisted through much of the month, particularly during the mid-June heatwave. The lowest concentrations were again observed at the beginning and end of June, highlighting the impact of temperature variations on fine particulate matter levels. This relationship is critical for public health, as $PM_{2.5}$ particles pose significant respiratory and cardiovascular risks.

The relative humidity (%) data shows an inverse relationship with temperature. The highest relative humidity, exceeding 86%, was recorded on the 1st and 2nd, coinciding with lower temperatures. As temperatures rose, relative humidity decreased, reaching the lowest values around 76% during the peak heatwave days in mid-June. This inverse trend indicates that higher temperatures likely contribute to lower humidity levels, which can exacerbate heat stress and affect comfort levels.

Thus, a significant interplay between temperature, particulate matter concentrations, and relative humidity during June 2024 can be observed. The data highlights the importance of considering multiple meteorological and environmental factors together to understand their combined impact on air quality and public health.

Note: Report produced by Air Quality Monitoring System Committee

Committee Members

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Signature of Principal with date and seal

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