

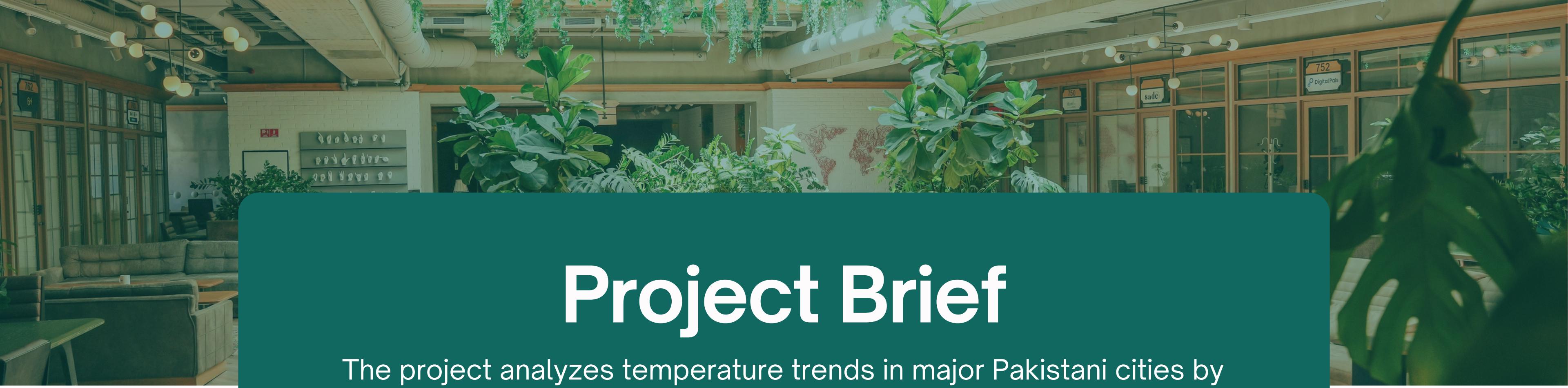
# 2025 Pakistan's Temperature Analysis

Amna Mahboob  
Laiba Hameed



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# Project Brief

The project analyzes temperature trends in major Pakistani cities by comparing 2025 predictions with 2024–2023 data. It examines seasonal trends and key factors like pressure and precipitation affecting variations and identifies proportional or inverse relationships. The project highlights max and min temperature patterns and identifies their differences. Through these findings we can determine if it truly supports the idea of global warming.



# Problem Outline

For our project, we mainly wanted to examine temperature trends from 2025-2023. So we went ahead and broke the project into questions whose findings we used to answer.

01



## Objective 01

What are the major factors that affected our temperature readings from? and what can we conclude from them? (explain if they have a proportional relationship or an inverse relationship)

02



## Objective 02

What is the average temperature (max and min) in each station in Pakistan in the previous years? (Give the station with the most, least temperature as well as the range and temperature of major cities). Also look at the trends season wise for each station.

03



## Objective 03

what is the mean, max, min temperature rise or decrease in general throughout the whole year for 2025 and compare to 2024-2023.  
Do past research papers support our findings and how do they link to global warming?

# Steps To Solve Problem

We resolved the problem utilizing the data science life cycle:



# Our Findings: Factors Influencing Temperature

In our dataset, there were mainly 2 factors that we considered which have been further categorized:



## Pressure

we took 3 types of pressures into consideration and found that:

- Vapour and station pressure are directly proportional to the mean temperature
- Sea pressure is inversely proportional to the mean temperature



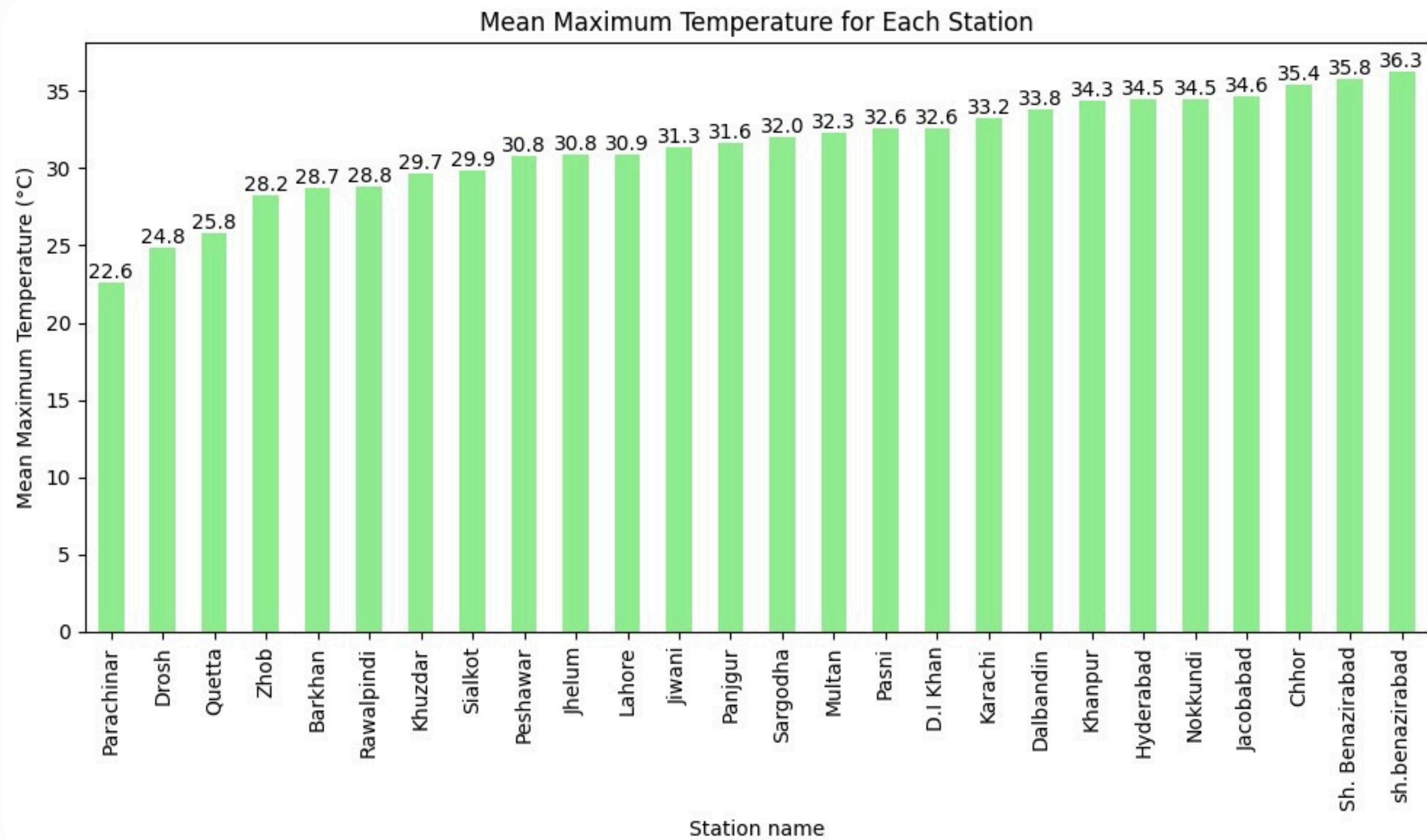
## Precipitation

We looked at 2 different versions of precipitation:

1. Total precipitation
2. Precipitation in a day

and we concluded that we cannot draw a direct conclusion on the effect precipitation has as it is neither direct nor inverse-proportional to the temperature.

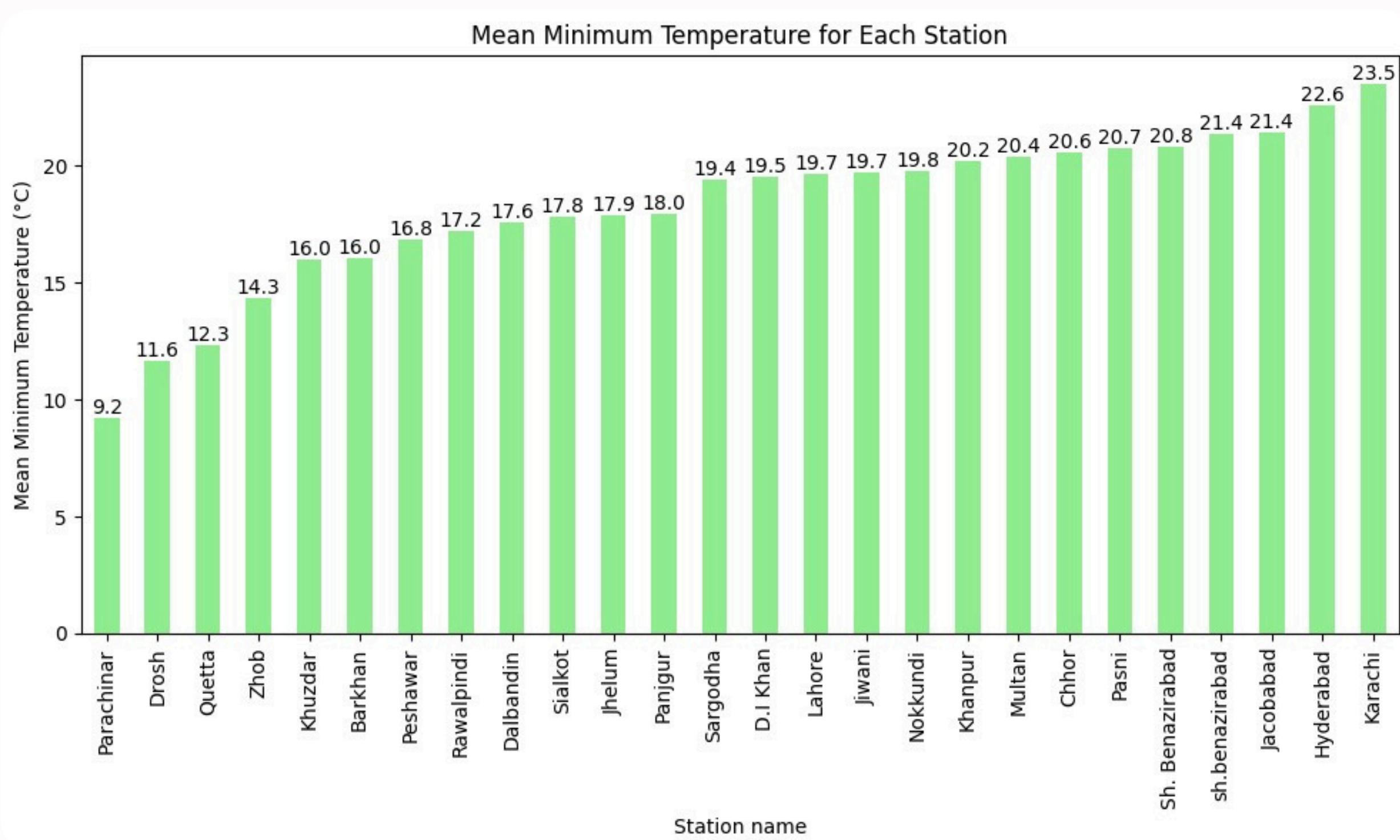
# Our Findings: 2024-23 year max temperature trends



We can summarize the maximum trends as the following:

- The maximum temperature Range is between 36 to 22
- The station with the lowest maximum temperature is Parachinar
- The station with the highest maximum temperature is sh. Benazirabad
- Major City's max temperature:
  - Karachi = 33.2
  - Rawalpindi= 28.8
  - Peshawar= 30.8
  - Quetta= 25.8
  - Lahore= 30.9

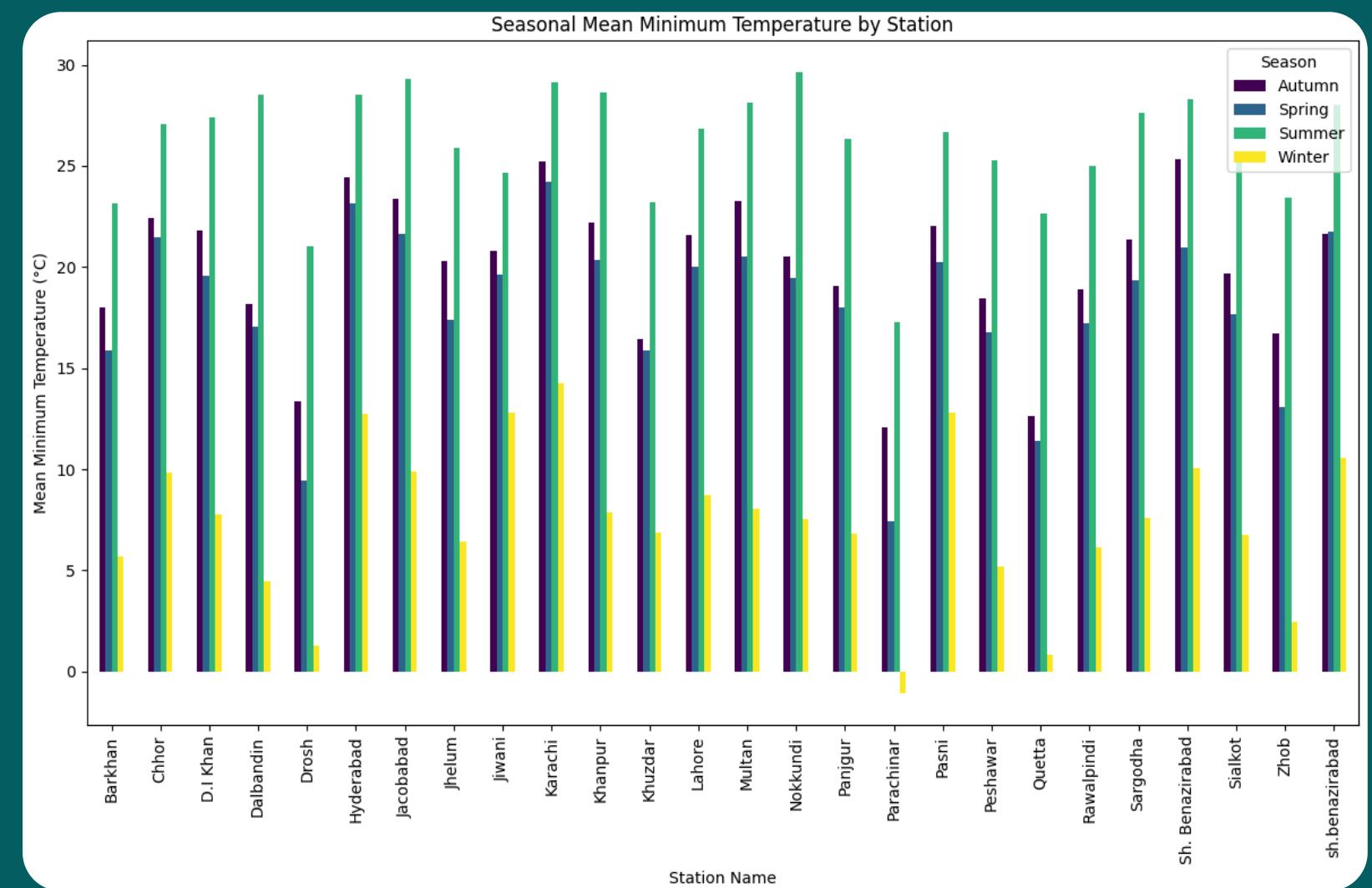
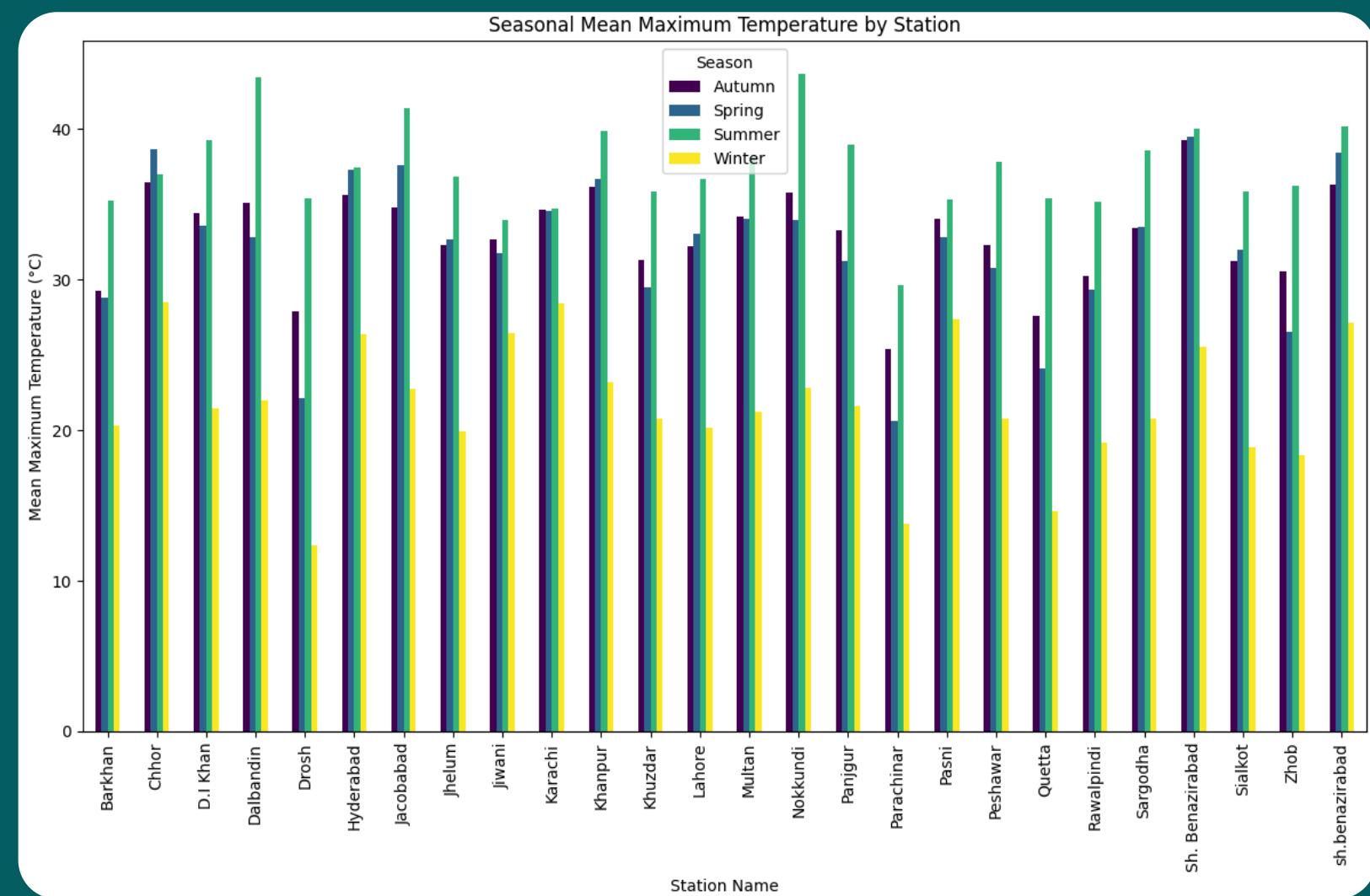
# Our Findings: 2024-23 year min temperature trends



We can summarize the minimum trends as the following:

1. The minimum temperature Range is between 8 to 25
2. The station with the lowest minimum temperature in Parachinar
3. The station with the highest minimum temperature in Karachi
4. Major City's min temperature:
  - Karachi = 23.5
  - Rawalpindi= 17.2
  - Peshawar= 16.8
  - Quetta=12.3
  - Lahore=19.7

# Our Findings: 2024-23 year seasonal temperature trends



# Our Findings: 2024-23 year seasonal temperature trends

Autumn	Spring	Summer	Winter
Range Max = 25 to 39 C Min = 12 to 25 C	Range Max = 20 to 39 C Min = 7 to 24 C	Range Max = 29 to 43 C Min = 17 to 29 C	Range Max = 12 to 28 C Min = -1 to 14 C
Highest Temperature of Station Max = 39.3 (Sh benazirabad) Min = 25.3 (Sh benazirabad)	Highest Temperature of Station Max = 39.4 (Sh benazirabad) Min = 24.2 (Karachi)	Highest Temperature of Station Max = 43.6 (Nokkundi) Min = 29.6 (Nokkundi)	Highest Temperature of Station Max = 28.5 (Chhor) Min = 14.2 (Karachi)
Lowest Temperature of Station Max = 25.4 (Parachinar) Min = 12.1 (Parachinar)	Lowest Temperature of Station Max = 20.6 (Parachinar) Min = 7.4 (Parachinar)	Lowest Temperature of Station Max = 29.6 (Parachinar) Min = 17.3 (Parachinar)	Lowest Temperature of Station Max = 12.3 (Drosh) Min = -1.1 (Parachinar)

# Our Findings: 2024-23 year temperature trends

## 2025 vs 2024-23 Mean Temperature

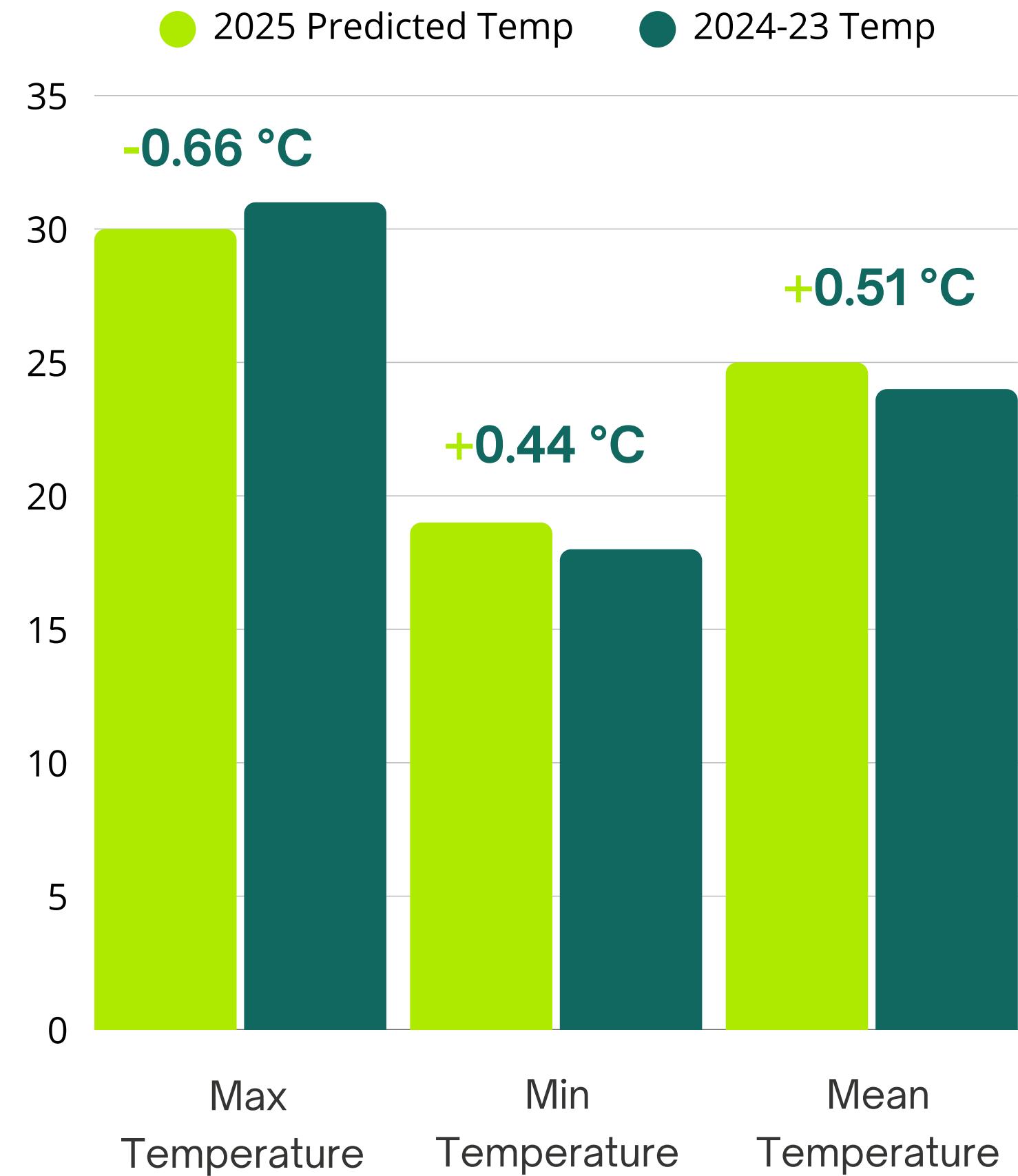
- 2025 mean temperature = 25.13
- 2024-23 mean temperature = 24.62
- Mean temperature decrease of 0.51°C in 2025 compared to 2024.

## 2025 vs 2024-23 Max Temperature

- 2025 mean temperature = 30.52
- 2024-23 mean temperature = 31.18
- Max temperature decrease of 0.66°C in 2025 compared to 2024.

## 2025 vs 2024-23 Min Temperature

- 2025 mean temperature = 18.57
- 2024-23 mean temperature = 18.13
- Min temperature decrease of 0.44°C in 2025 compared to 2024.



# Conclusion

Below we can find that our findings align with the indicators of global warming:

1

## GCM (Global Climate Model)

- .....• The GMC used in P.Lopez's article indicates that the key factors of global warming is temperature rise, altered precipitation and increased variability climate
- .....• Our study supports the statement by the steady mean temperature rise

2

## Sea Level Circulation Changes

- .....• According to the study done by M.Peters, global warming causes the sea-level to rise affecting the atmospheric circulation
- .....• Our study showed that sea level is inversely proportional to the temperature

3

## Climate change Impact

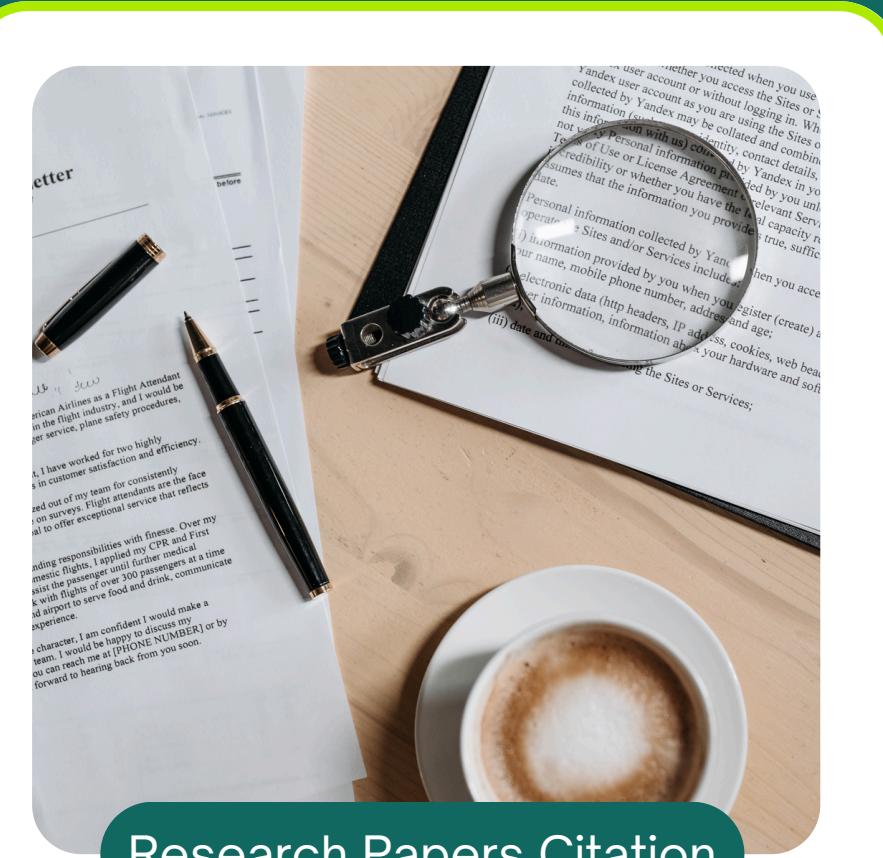
- .....• To summarize A.Shah's article, South Asia is highly affected by climate change because it depends heavily on monsoon rains and agriculture.
- .....• For instance, future temperature predictions in our study show warmer winters and unpredictable precipitation

# References



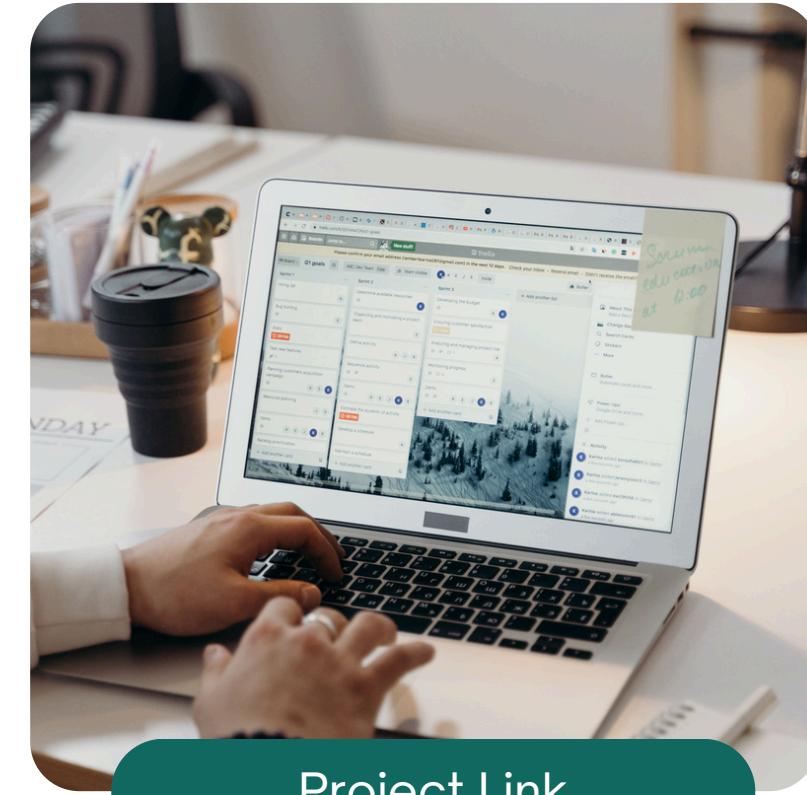
Dataset Resource

Pakistan Meteorological Department, Climate Data Processing Centre  
<https://cdpc.pmd.gov.pk/>



Research Papers Citation

- Peters, M., et al. (2021). Sea Pressure and Regional Climate Variability.
- Shah, A., et al. (2023). Climate Dynamics in South Asia.
- Lopez, P., et al. (2023). Regional Climate Modeling for the Global South



Project Link

<https://colab.research.google.com/drive/1TyZHaZaK5fZ3NNVTuQ3RbbGe4FVMhGMg?usp=sharing>