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Nigerian Meteorological Agency

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2024
STATE OF THE CLIMATE IN NIGERIA

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2024
State of the Climate in Nigeria

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Foreword

It is more certain now than ever, based on many obvious lines of evidence, that humans are changing Earth's climate, thereby making Climate Change one of the defining issues of our time. The atmosphere and oceans have warmed, which has been accompanied by sea level rise, a strong decline in Arctic Sea ice, and other climate-related changes as its impacts on people and nature are increasingly apparent. Unprecedented flooding, heat waves, and wildfires have cost billions in damages worldwide, Nigeria inclusive. Habitats are undergoing rapid shifts in response to changing temperatures and precipitation patterns. Also, recent climate data and scientific analyses, all of which reinforce our understanding of human-induced climate change.

The scientific evidence is clearer and new insights continues to emerge. For example, the period of slower warming during the 2000s and early 2010s transited with a jump to warmer temperatures between 2014 and 2015. This trend has continued with emerging reports by the World Meteorological Organisation (WMO) that the year 2024 is the warmest year on record with the global average near surface temperature surpassing the recorded value in 2023. These and other recent observations by NiMet over some parts of the Northern Nigeria where 70 - 90 days of above 40 °C temperatures were recorded, further emphasised the reality of changing climate.

Calls for climate action are getting louder globally. The 2020 Global Risks Perception Survey from the World Economic Forum ranked climate change and related environmental issues as one of the top five global risks likely to occur within the next ten years. Therefore, more concerted effort is required within the international community for effective and sustainable mitigation and adaptation strategies.

Scientific information is a vital tool for society to make informed decisions, and ***NiMet's 2024 State of the Climate*** publication serves as a key reference document for decision makers, policy makers, educators, and others seeking authoritative answers about the current state of climate in Nigeria.

Professor Charles Anosike
Director General/CEO NiMet & Permanent Representative of Nigeria with WMO

February 2025

Preface

The Nigerian Meteorological Agency (NiMet) as part of its statutory responsibilities has been documenting the state of the climate in Nigeria for more than a decade. This is critical for tracking and providing local evidence of changing climate in Nigeria and their impacts on the socio-economic sectors of the Nigerian economy which are increasingly vulnerable to the impacts of climate change which poses a significant threat to their sustainability. Rising temperatures, changing precipitation patterns, and increased frequency of extreme weather events can disrupt operations, compromise safety, and impact the overall economy such as national food security, aviation safety, among others.

This year is no exception as the Agency has carefully observed, analysed and documented the state of the climate in Nigeria for the year 2024.

This year's edition of State of the Climate has Five Chapters. Chapter One captures the observed behaviours of some key climatic parameters such as temperature and rainfall. Chapter Two described the observed evidence of climate change over Nigeria using long-term temperature and rainfall data. Synoptic features and their observed signatures are discussed in Chapter Three while the impacts of extreme weather events on Aviation, Health, Agriculture, Water Resources, Overview of Air Pollution in Nigeria, Early warning and Disaster-Risk Reduction in 2024 as well as Food Security are discussed in Chapter Five.

Ultimately, this Publication aims to contribute to the development of a climate-resilient society which can thrive in the face of changing climate by supporting national sustainable Socio-Economic development.

CHAPTER ONE

Observed Characteristics of Some Key Climatic Parameters In 2024

1.1 Solar Radiation

The annual average incident solar radiation across Nigeria in 2024 (Figure 1.1). Jigawa and Yobe states recorded the highest annual mean incident solar radiation of above 281.0 Wm-2/day. Borno, Bauchi, Kaduna, Katsina, Kano, Kebbi, Sokoto, Zamfara Plateau, Nasarawa and parts of Jigawa, Yobe, Taraba, Niger, Benue and Cross River states and the FCT recorded 239.0 Wm-2/day to 278.0 Wm-2/day while most states in the country recorded between 197.0 Wm-2/day to 234.0 Wm-2/day except the coastal parts of Lagos, Ondo, Delta, Rivers and Akwa Ibom states that recorded below 195.0 Wm-2/day

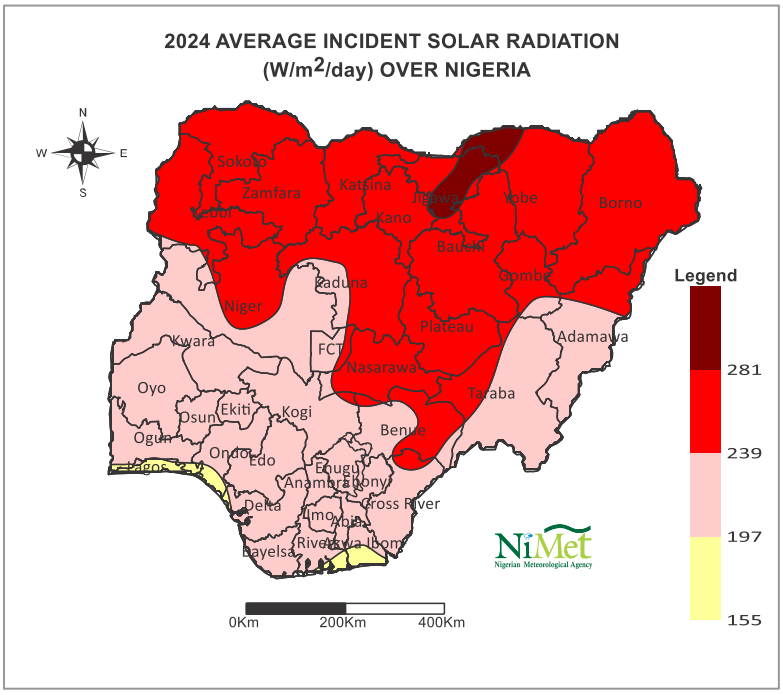


Figure 1.1: Annual Average incident Solar Radiation over Nigeria in 2024

1.1.1 Daily Average Incidence of Solar Radiation

The highest single day incident solar radiation in 2024 was recorded between 16th January and 30th March in most states. Jigawa State recorded the highest value of 395.8 Wm-2 /day in March 2024, followed by Katsina, Bauchi, Yobe, Kebbi and Benue states with 381.9 Wm-2 /day, 368.1 Wm-2 /day, 368.1 Wm-2 /day, 362.3 Wm-2 /day and 361.1 Wm-2 /day respectively as shown in Table 1.0

Table 1.0: Average and Highest Single Day Incident Solar Radiation in 2024

S/N	State	Average (Wm^{-2} day^{-1})	Highest (Wm^{-2} day^{1})	S/N	State	Average (Wm^{-2} day^{1})	Highest (Wm^{-2} day^{1})
1	Abia	233.8	312.5	19	Kano	257.6	350.7
2	Adamawa	233.2	328.7	20	Katsina	243.0	381.9
3	Akwa Ibom	202.4	299.8	21	Kebbi	239.0	362.3
4	Anambra	229.6	329.9	22	Kogi	237.6	338.0
5	Bauchi	257.5	368.1	23	Kwara	237.6	338.0
6	Bayelsa	221.6	307.9	24	Lagos	200.8	291.7
7	Benue	229.3	361.1	25	Nasarawa	277.7	354.2
8	Borno	269.3	354.2	26	Niger	236.7	329.3
9	Cross River	237.5	321.8	27	Ogun	229.9	326.4
10	Delta	217.9	325.2	28	Ondo	250.8	346.6
11	Edo	206.4	288.2	29	Osun	239.2	342.6
12	Ekiti	225.7	346.1	30	Oyo	212.5	303.2
13	Enugu	217.7	325.2	31	Plateau	238.9	346.1
14	FCT	232.6	333.3	32	Rivers	208.3	316.0
15	Gombe	241.4	356.5	33	Sokoto	254.9	357.6
16	Imo	218.9	334.5	34	Taraba	231.0	343.8
17	Jigawa	287.5	395.8	35	Yobe	272.2	358.2
18	Kaduna	245.0	347.2	36	Zamfara	240.8	336.8

1.2 Temperature

1.2.1 Annual Mean Maximum Temperature

In 2024, the annual mean maximum temperatures across Nigeria ranged from 29 °C to 37 °C. Notably, the Northeastern states of Borno and Yobe experienced the highest annual mean maximum temperatures, exceeding 36 °C. In the central and other northern states annual mean maximum temperatures ranged between 34 °C and 36 °C. In contrast, the southern states, the FCT, and most parts of Nasarawa, Bauchi, Kaduna, and Plateau states recorded annual mean maximum temperatures between 30 °C and 34 °C, with a small portion of Plateau State experiencing values below 30 °C.

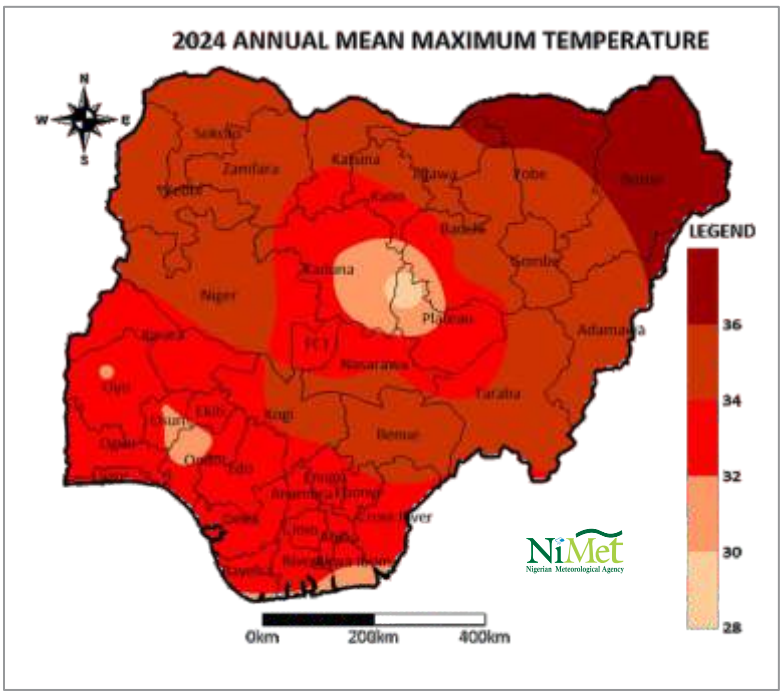


Figure 1.2: Observed Annual Mean Maximum Temperature across Nigeria in 2024

1.2.1.1: Annual Mean Maximum Temperature Departure (Deviation from Long-term Average)

According to the World Meteorological Organization (WMO), the global average near-surface temperature from January to September 2024 was 1.54 °C above the pre-industrial average. Real-time data indicate that the atmospheric concentration of Greenhouse Gases reached record observed levels in 2023 and continued to rise in 2024. These Greenhouse Gases trap heat and cause temperatures to rise.[1] Across Nigeria in 2024, just a few isolated locations in FCT and Kaduna State recorded normal annual mean maximum temperature compared to the 1991 – 2020 average. Most of the country observed above-normal values in 2024 (Figure 1.3)

[1] WMO State of the Climate 2024 Update

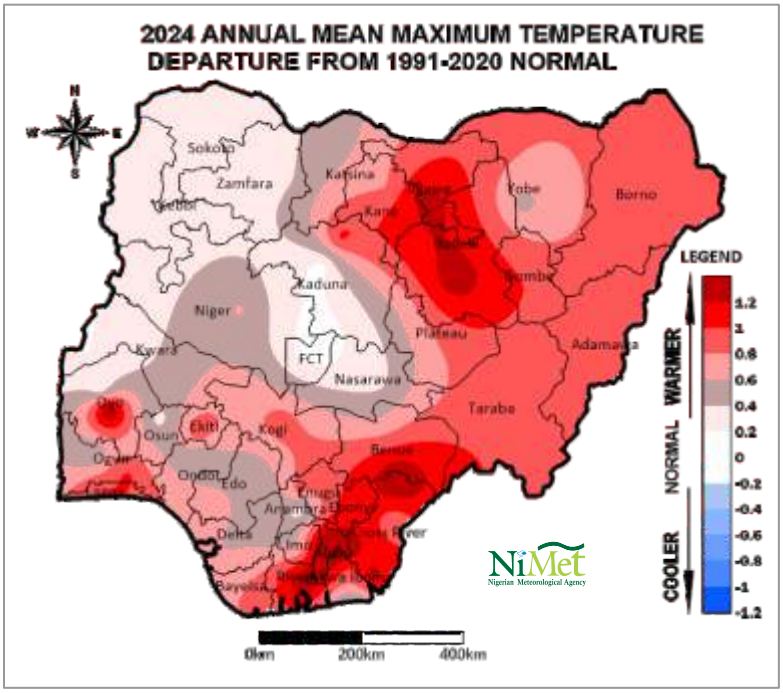


Figure 1.3: Observed annual mean maximum temperature departure from 1991-2020 average (normal) across Nigeria in 2024

1.2.1.2 Maximum Temperatures and Hot season

The hot season in Nigeria is characterized by daily sunshine hours, increased solar radiation intensity, and heat waves resulting in heat stress on humans and livestock. The hot season commences in February, lasting till March across the South while the North experiences the same occurrence during March, April, and May. In 2024, the North recorded its highest single day maximum temperature of 45.9 °C in Maiduguri in May while the South observed its highest single day maximum temperature of 40.9 °C in Ogoja (Cross River) in February.

1.2.1.3 Hot Season in the South in 2024

The mean monthly maximum temperature across the Southern States ranged from 31.4 °C recorded in Eket (Akwa-Ibom State) to 37.7 °C in Ogoja (Cross-River State) in February. The southern cities attained their highest mean maximum temperature in February similar to what was observed in 2023. All southern cities except Eket recorded mean hot season temperatures higher than their long-term average.

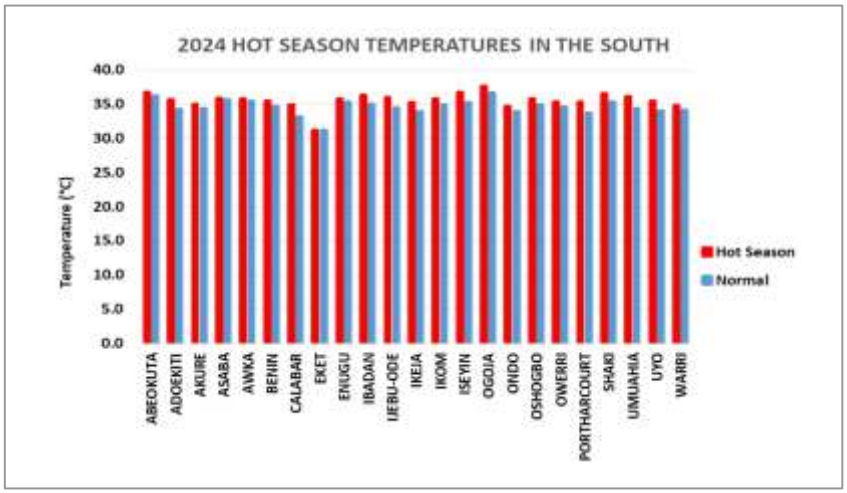


Figure 1.4: Comparison of 2024 Hot season Mean Maximum Temperatures of Cities in Southern Nigeria with the Normal (1991 – 2020 Average)

1.2.1.4: Hot Season in the North in 2024

Hot season mean maximum temperatures observed in 2024 across the Northern States ranged from 34.2 °C over Jos (Plateau state) to 41.7 °C over Yola (Adamawa state) in March; from 32.5 °C over Jos (Plateau state) to 43.8 °C over Maiduguri (Borno state) in April, and 29.4 °C over Jos (Plateau) to 43 °C over Nguru (Yobe state) in May. Every State in the North recorded mean values above their 1991 – 2020 averages as shown in Figure 1.5 below.

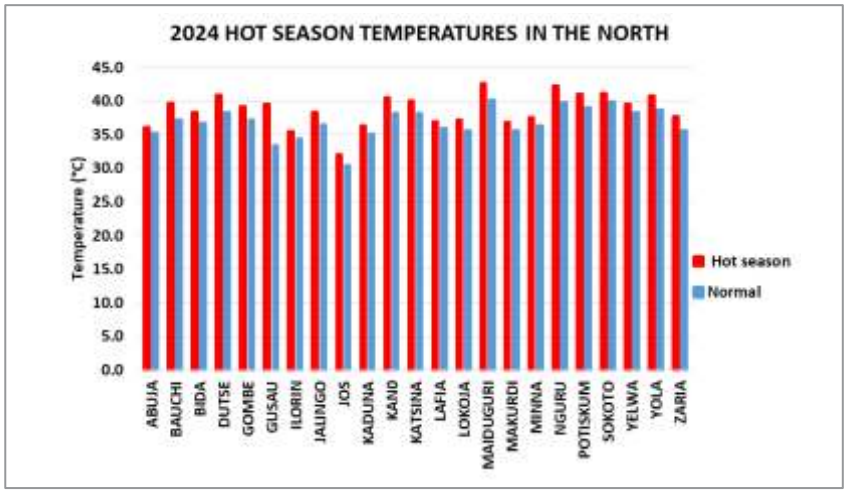


Figure 1.5: Comparison of 2024 Hot season Mean Maximum Temperatures of Cities in Northern Nigeria with the Normal (19912020 Average)

1.2.1.5: Hot Season Departure from Normal in 2024

In 2024, the hot season in Nigeria was generally warmer-than-normal across the country, with the eastern half and parts of Lagos, Oyo, Ekiti, Niger, and Kwara States recording 1.2 °C above the long-term hot season average temperature. The temperatures recorded in the western half of the country and parts of Nasarawa, FCT, Ogun, Osun, Enugu, Imo, Rivers, and Akwa-Ibom States were 0.8 to 1.2 °C, higher than normal. Parts of Delta, Edo, Anambra, Imo, Akwa-Ibom states recorded less than 0.8 °C above normal. (see Figure 1.6).

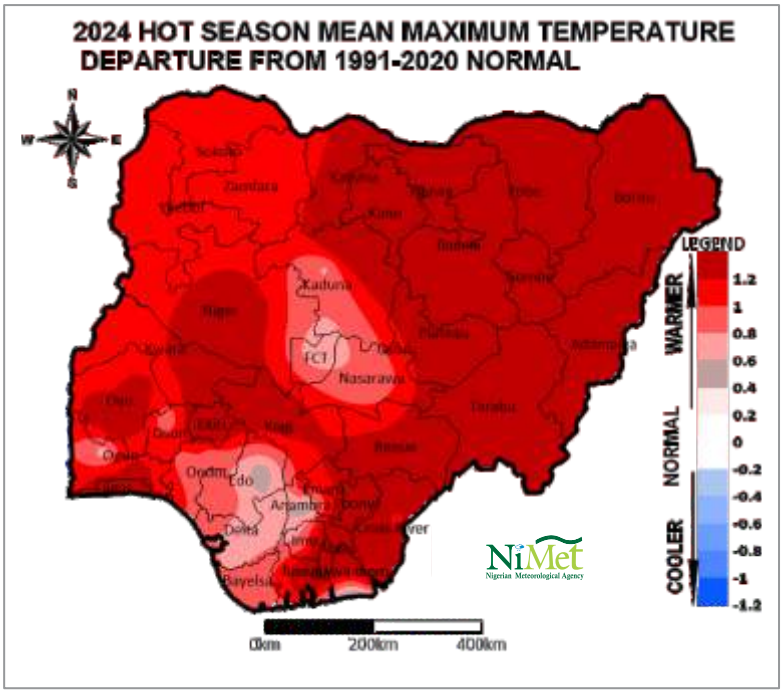


Figure 1.6: Observed Hot season mean maximum temperature Departure from Normal (1991 - 2020 Average)

1.2.2: Annual Mean Minimum Temperature in 2024

The annual mean minimum temperature across Nigeria in 2024 was between 16 °C and 27 °C. The lowest minimum temperatures were recorded over parts of Jigawa, Plateau, Ogun, Kaduna, Kano, Bauchi, and Nasarawa States. Minimum temperatures over most of the country were between 22 °C and 27 °C. (See Figure 1.7).

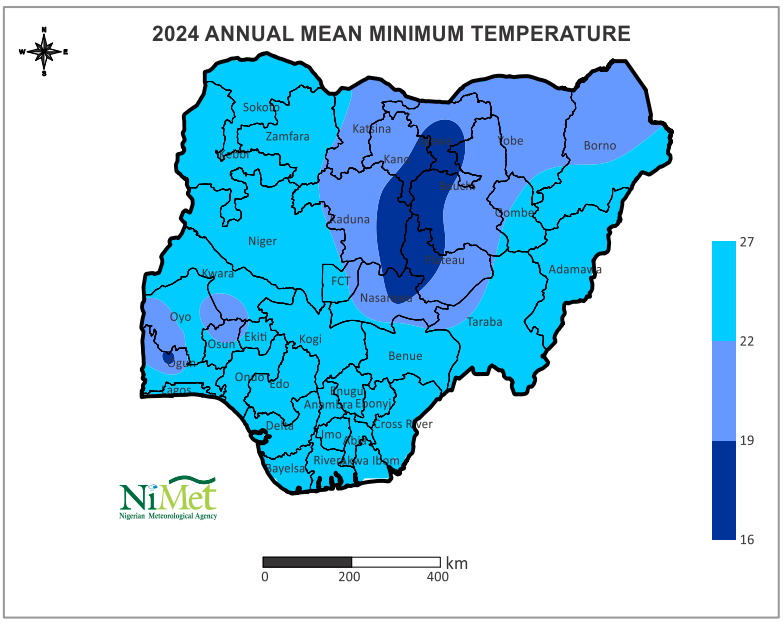


Figure 1.7: 2024 Annual Mean Minimum Temperature Across Nigeria

1.2.2.1: 2024 Annual Minimum Temperature Departure from Normal

Analysis of minimum temperatures and their departures from the long-term average shows that cooler-than-normal temperatures were recorded over parts of Jigawa, Nasarawa, Sokoto, Plateau, Kano, Oyo, Osun, Ogun, Cross River, Abia, and Anambra States. Warmer than normal minimum temperatures were recorded over much of the northern and southern states, as well as the Federal Capital Territory (See Figure 1.8).

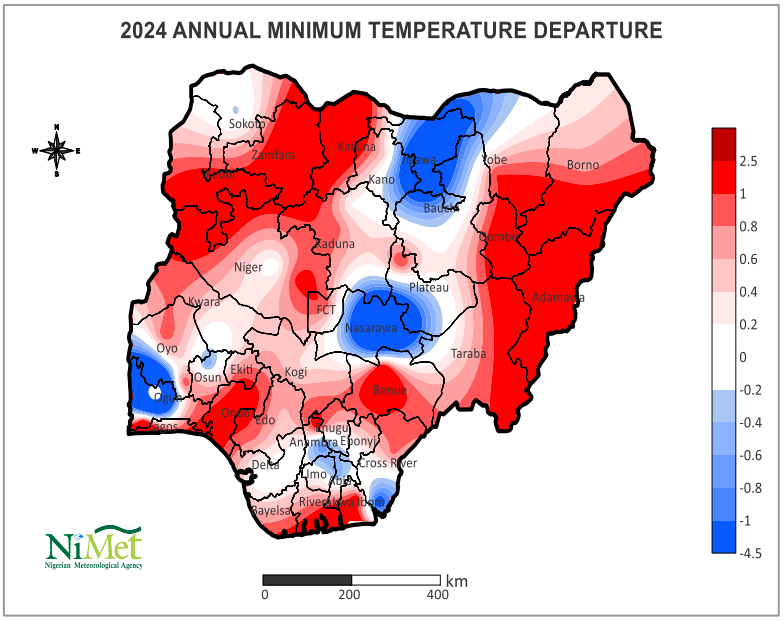


Figure 1.8: 2024 Annual Minimum Temperature Departure from Normal (1991 - 2020 Average)

.2.2.2: Minimum Temperature and Cold Season

The cold season occurs in the months of December and January. It is the period when the Country is predominantly under the influence of the cold dry northeasterly winds blowing from across the Sahara Desert. Minimum temperatures are lowest within these two months and nights can be slightly chilly.

1.2.2.3: Cold season temperatures over the Northern cities

Minimum temperatures for 2024 cold season were significantly cooler than normal over Jalingo, Minna, Lokoja and Kaduna. They were on the other hand significantly warmer over Bauchi, Gusau, Dutse, Lafia, Maiduguri, Nguru, and Potiskum. The rest of the cities in Northern Nigeria recorded near normal temperatures during the season. On the whole, a greater proportion of the Northern cities recorded a warmer-than-normal cold season. This agrees with the generally warmer-than-normal temperatures during the year.

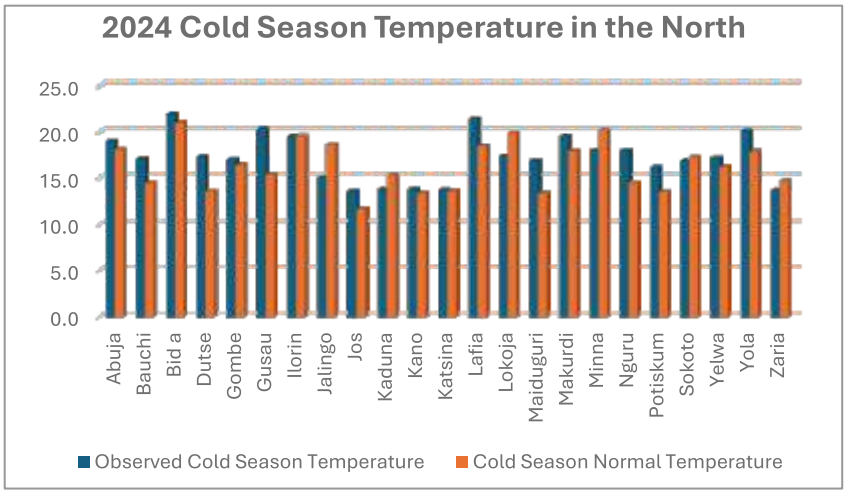


Figure 1.9: Cold season temperatures over the Northern cities in 2024

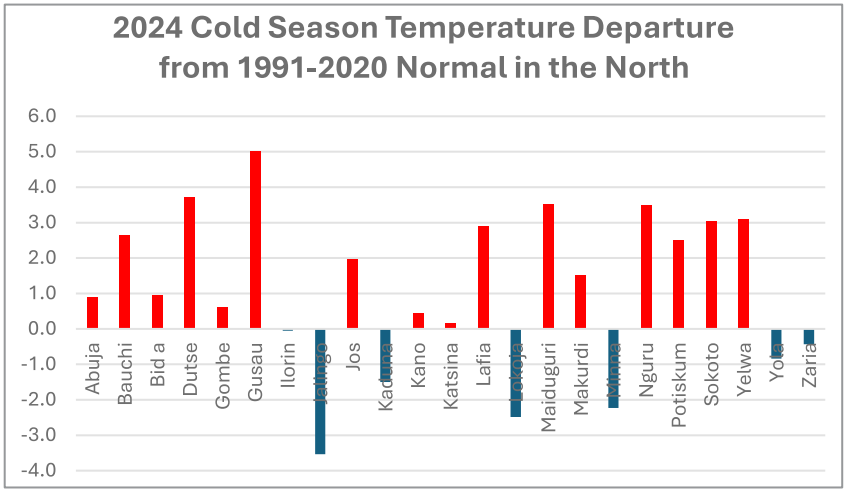


Figure 1.10: 2024 Cold Season Temperatures Departure over the Northern cities

1.2.2.4: Cold season temperatures over the Southern cities

Figures 1.12 and 1.13 show that the temperatures during the cold season of 2024 in Southern Nigerian cities were generally close to the long-term normal values, indicating a typical cold season overall. However, in some cities, temperatures deviated significantly from their historical averages. Abeokuta, Akwa, Calabar, and Warri were notably cooler than their long-term mean, while Lagos Island and Akure were significantly warmer than their average cold season temperature.

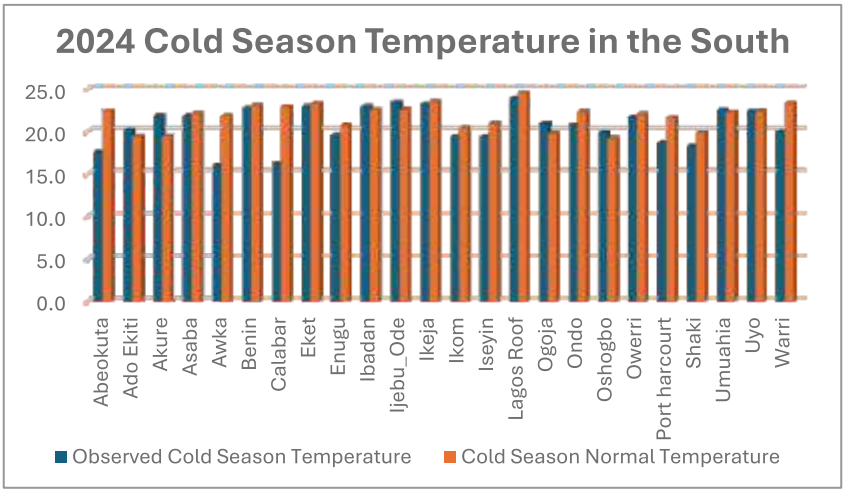


Figure 1.11: 2024 Cold season temperatures over the Southern cities

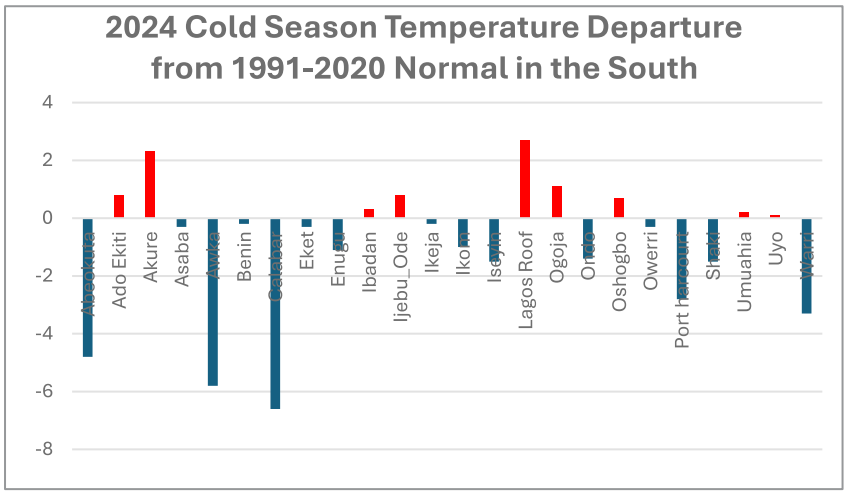


Figure 1.12: 2024 Cold season temperatures departure from long term average over the Southern cities

1.2.3: 2024 Annual Mean Temperature Departure from Normal

In 2024 both the maximum and minimum temperatures were generally normal all over the country except for parts of Ogun, Lagos, Akwa-Ibom, and River States which were cooler than their long-term averages. (See Figure 1.13).

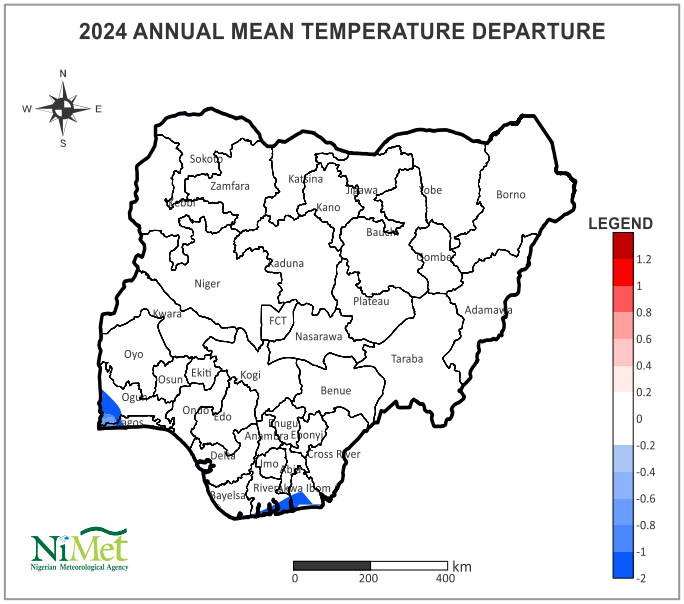


Figure 1.13: 2024 Annual Mean Temperature Departure

1.3 Rainfall

1.3.1 Cumulative annual rainfall

The annual total rainfall over Nigeria in 2024 varied between (669.5 – 4976.8 mm) and increased gradually from the north to the south as shown in Figure 1.14. The lowest and highest values of 669.5 and 4976.8 mm were recorded over Katsina and Bayelsa states respectively. Most northern states recorded rainfall amounts above 1000 mm, except Gombe, Katsina, Kano, Yobe (Nguru), Niger (Bida) and Adamawa states, where the annual total rainfall amounts were less than 1000 mm. The central states recorded rainfall between 1000 and 2200 mm, while the rainfall amounts between 1600 mm to 5000 mm were observed over the southern parts of the country.

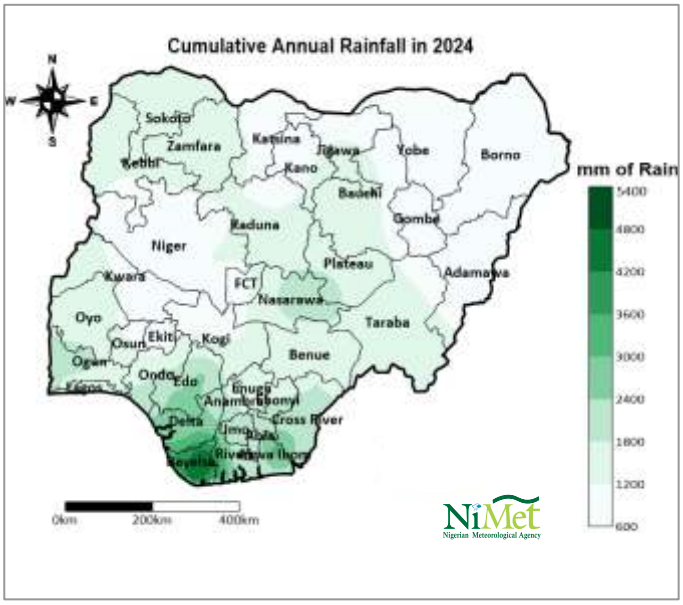


Figure 1.14: Cumulative annual rainfall Across Nigeria in 2024

1.3.2 2024 Cumulative Annual Rainfall Departure from Normal

The 2024 cumulative annual rainfall departure from the long-term average (1991–2020) reveals that most parts of the country experienced normal to above-normal rainfall (positive departures). Sokoto, Nasarawa, Ogun and Bayelsa states observed significant positive departures (above normal) of above 1000 mm. However, Kano, Niger, Gombe, Adamawa, Kogi, Ekiti, Lagos, Ebonyi, Enugu, Anambra, Imo and Cross River states, and the FCT recorded below normal rainfall (negative departures of 100 – 500 mm). Figure 1.15(a).

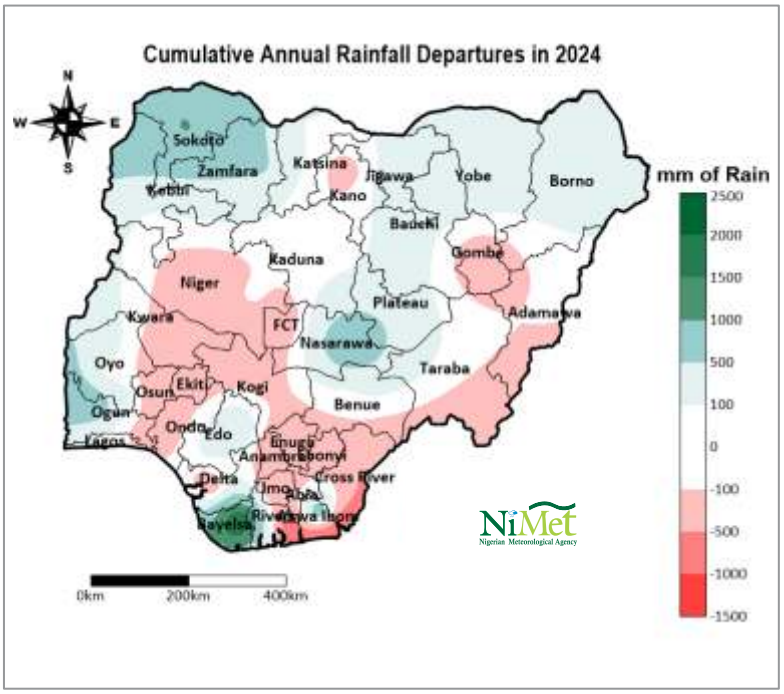


Figure 1.15(a): Cumulative Annual Rainfall Departures in 2024

The comparison of the 2024 cumulative rainfall with the long-term (1991 – 2020) average shows that the cumulative rainfall was 148% above normal in Sokoto, and this was the highest in the country for the year. Other notable above-normal cumulative rainfall values were recorded over Yenagoa (76%), Lafia (72%), Abeokuta (69%), Nguru (69%), Gusau (58%), Potiskum (47%), Maiduguri (46%), Uyo (37%) and Shaki (33%). However, below-normal rainfall (or rainfall deficit) were recorded over the cities of Kano (-18%), Abuja (-24%), Ado Ekiti (-30%), Awka (-20%), Bida (-27%), Calabar (-24%), Eket (-41%), Enugu (-20%), Gombe (-33%), Ikom (-20%), Ilorin (-16%), Ondo (-23%), Port Harcourt (-23%), Owerri (-22%), and Umuahia (-20%). (See Figure 1.15(b)).

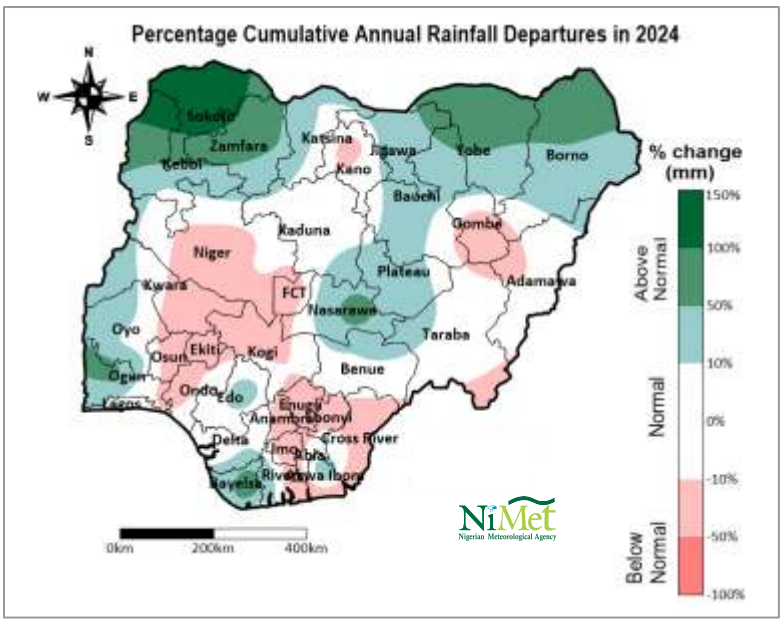


Figure 1.15(b): Percentage Cumulative Annual Rainfall Departures from Long term Average in 2024

1.3.3 Number of Rain-days in 2024

The term "rain day" is used to denote a day on which a station records measurable precipitation, in the form of rain amounting to 0.3 mm or more. In 2024, Eket in Akwa Ibom State, Southern Nigeria recorded the highest number of rain days (214) while Nguru in Yobe State, Northern Nigeria recorded the least number of rain days (47). Number of rain-days between 40-90 days were observed over the extreme northern states, while rain-days of between 90-140 days were observed over the central states. The southern parts of the country recorded rain-days of between 140 and 215 days as shown in Figure 1.16.

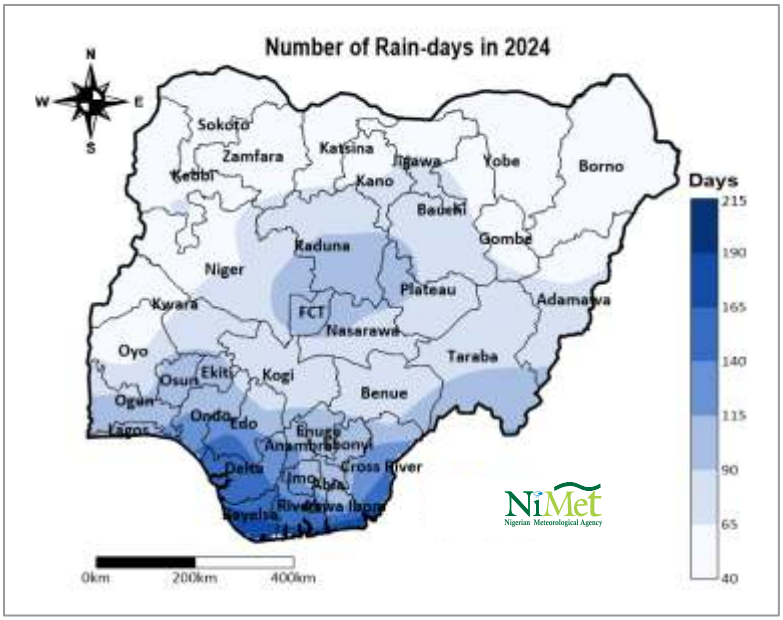


Figure 1.16: Number of rain days across Nigeria in 2024

1.3.4 2024 Number of Rain-Days Departures from Normal

The 2024 number of rain-days departure from normal (1991-2020) across Nigeria is shown in Figure 1.17. Most parts of the country recorded decreases in the number of rain-days when compared to the climatological normal, with Oyo, Kwara, Ogun, Edo, Akwa Ibom, Cross River, Enugu, Ebonyi, Abia, Imo and Anambra states being the most affected. However, Sokoto, Borno, Yobe, Jigawa, Bauchi and Katsina states recorded above normal number of rain days. The highest positive departure of 19 days was recorded over Dutse in Jigawa State, while the lowest negative departure of -50 days recorded over Uyo (Akwa Ibom State).

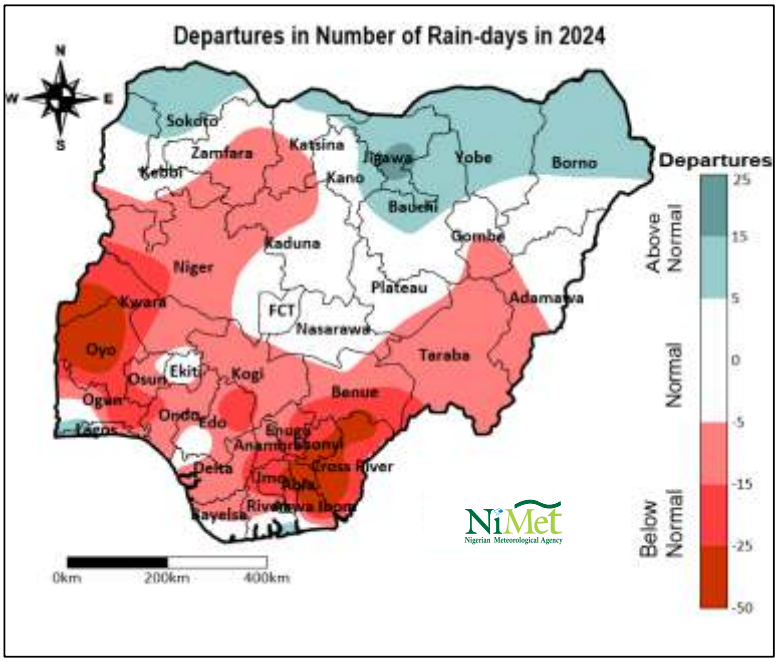


Figure 1.17: Number of Rain-Days Departures in 2024

1.3.5 2024 August Cumulative August Rainfall

Figure 1.18 depicts rainfall totals over the country in August 2024. It ranged from 40.6 to 575.2 mm. The lowest cumulative rainfall amounts between 40 and 200 mm were recorded over the southwest and southeast, as well as parts of Benue, Kogi, Kwara, and Niger states. This could be attributed to the effect of the Little Dry season that occurred during this period. Most parts of the country recorded cumulative rainfall amounts in the range of 200 mm to 500 mm and above in the month. The lowest and highest rainfall values of 40.6 mm and 575.2 mm were recorded over Ikeja in Lagos State and Sokoto in Sokoto State, respectively.

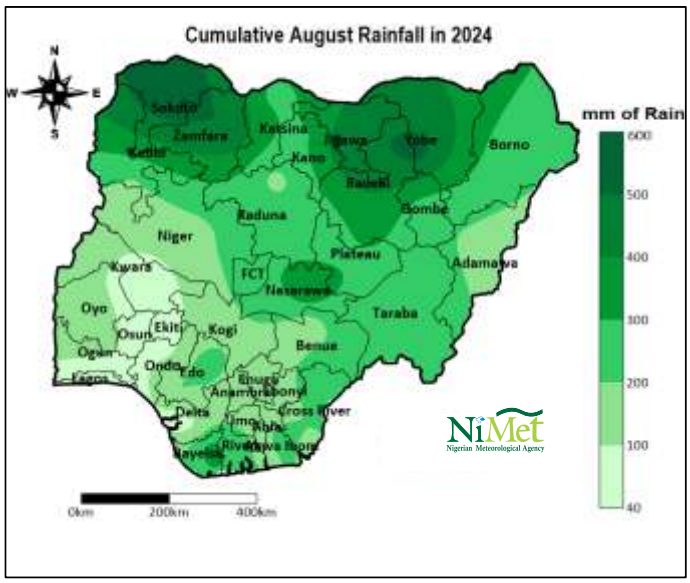


Figure 1.18: Cumulative August rainfall in 2024

1.3.6 2024 August Cumulative Rainfall Departure from Normal

As shown in Figure 1.19(a), most parts of the country recorded below normal rainfall (i.e. negative departure from the climatological normal (1991 – 2020)), except for parts of the extreme northern states of Sokoto, Zamfara, Jigawa, Yobe and Bauchi. In terms of the percentage in departure, Figure 1.21 shows positive departure (above normal) rainfall over parts of Sokoto, Zamfara, Kebbi, Jigawa, Yobe, Bauchi, Borno, Oyo, Ogun, Nasarawa and Taraba states. The inland states of the southeast and coastal parts of the country experienced negative departures (below normal) rainfall. This may not be unconnected with the extended "Little Dry Season" that occurred over these parts of the country in August 2024. The cumulative rainfall recorded in Sokoto and Yobe states during the month was more than 100% higher than the long-term averages for these states. (See Figure 1.19(b)).

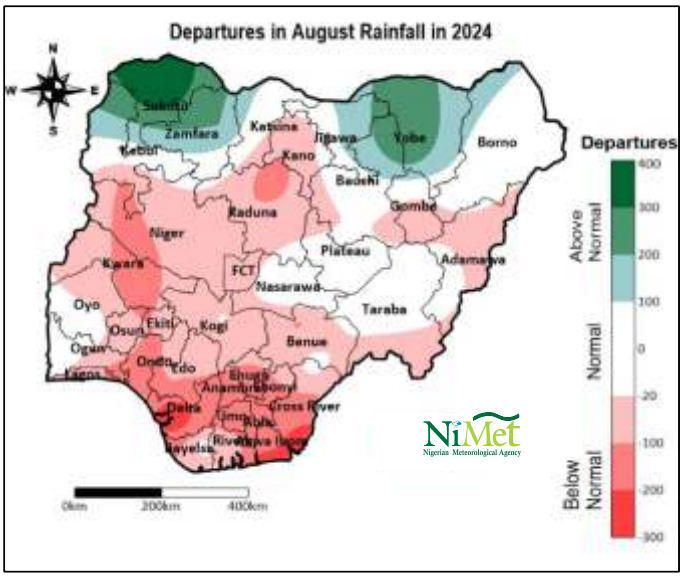


Figure 1.19(a): 2024 August Rainfall Departure from Normal (1991–2020 Long term Average)

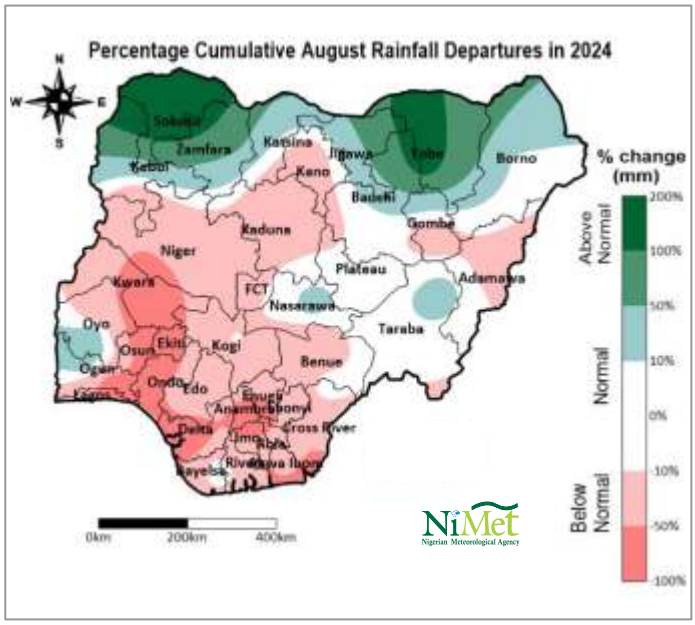


Figure 1.19(b): Percentage Cumulative August Rainfall Departure in 2024

1.3.7 Standardized Rainfall Anomaly

The Standardized Precipitation Index (SPI) over Nigeria in 2024 shows normal-to-below normal rainfall amounts in most parts of the country, mostly around the central and southern states. However, above normal rainfall amounts were recorded in parts of Zamfara, Sokoto, Kebbi, Jigawa, Yobe, Borno, Ogun, Oyo, Nasarawa and Plateau states as shown in Figure 1.20.

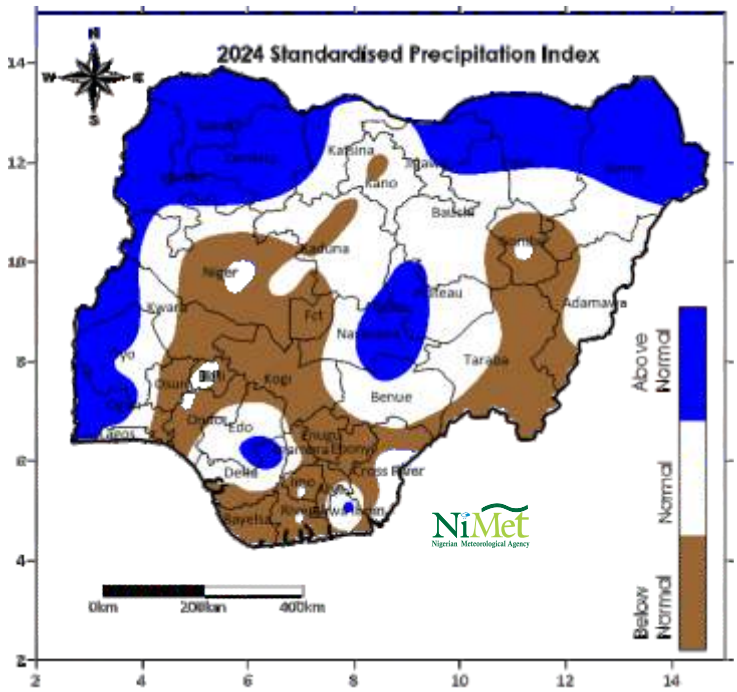


Figure 1.20: Standardized Rainfall Anomaly in 2024

1.3.8 Standardized Rainfall Anomaly for August 2024

Rainfall amounts across most parts of Nigeria in August 2024 were normal to below normal when compared to climatological averages. However, parts of Sokoto, Zamfara, Jigawa, Yobe, Borno, Ogun, Nasarawa and Taraba states recorded above normal rainfall amounts as shown in Figure 1.21.

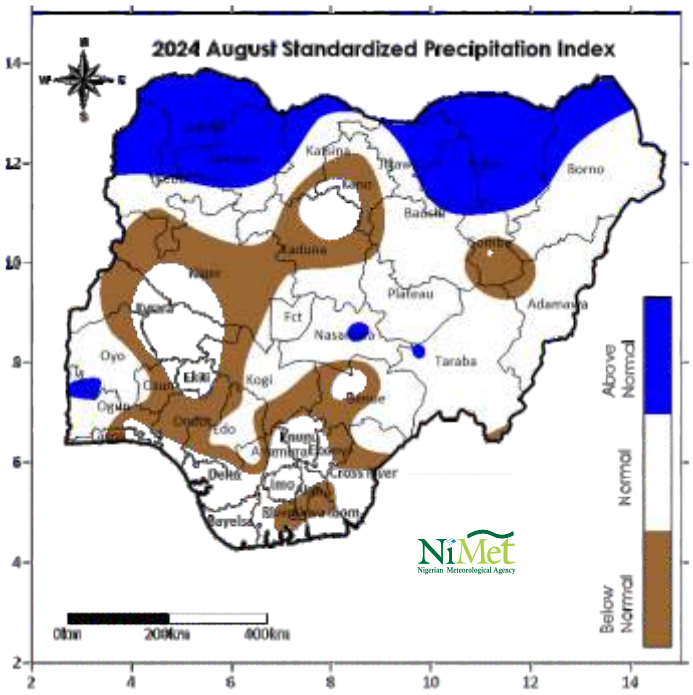


Figure 1.21: Standardized August Rainfall Anomaly in 2024

1.4 2024 Little Dry Season

The Little Dry Season (LDS) otherwise known as August Break is a period of little or no rainfall which usually coincides with the end of the first rainfall season in the Southwestern part of Nigeria.

The intensity and duration of the LDS is dynamic with inter-seasonal and intra-seasonal variabilities often occurring from year to year. The effect of the little dry season was mild in 2023, while it was quite pronounced in 2024. Apart from a section of Ondo state which had a low impact, other states in the region had moderate or severe effects lasting beyond 9 to 30 days.

When the effect of little dry season in 2024 is compared with that of 2022, It becomes clear that the severity had spread to more states in the southwest. States like Lagos, Oyo, Osun, Kwara and Ekiti had graduated from low effects to moderate and severe conditions.

Figure 1.22(c) shows the highlight of the activities of LDS in 2024. The earliest onset date of LDS in 2024 was 6th of July in Oyo state while its latest onset date was August 3rd in Akure. The event lasted 39 days in Oyo state followed by Lagos which had 36 days of little or no rainfall activities. These periods are often cloudy with cool temperatures below 30 degrees Celsius.

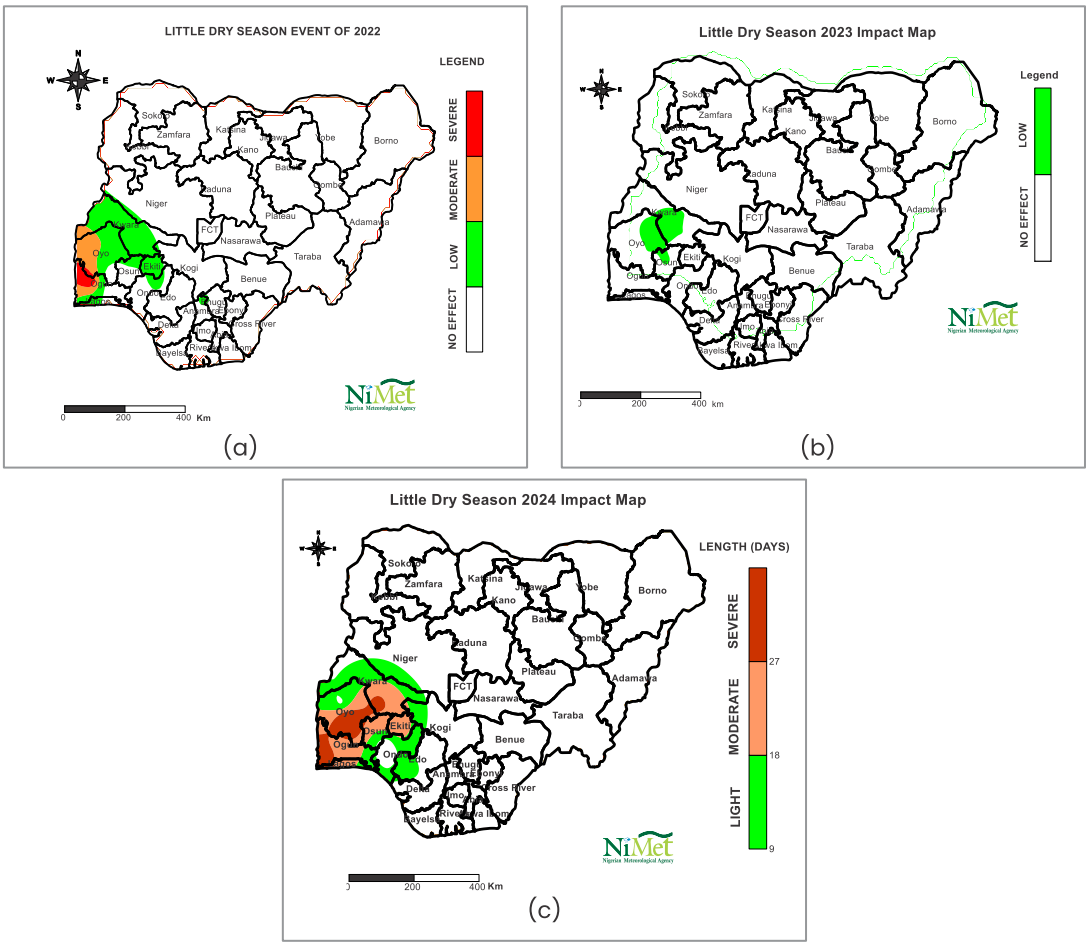


Figure 1.22: Little Dry season impact in 2024, compared to 2023 and 2022

Table 1.2: Comparison of the 2024 LDS with the Two Preceding Years (2023 and 2022)

S/N	City	Dates of Consecutive Dry Days in 2024	Number of dry days in 2024	Number of dry days in 2023	Number of dry days in 2022
1	Abeokuta	22nd July - 14th August	24	7	8, 24
2	Akure	21st - 27th July, 4th - 18th August	7, 15	0	9
3	Ikeja	21st July - 18th August	29	13	10, 7, 12
4	Ijebu Ode	29th July - 18th August	21	8	12
5	Iseyin	6th - 13th August	39	7	13, 9
6	Ondo	26th July – 1st August, 3rd – 12th August	7, 10	8	10
7	Oshogbo	21st July – 12th August	23	7	9
8	Shaki	21st – 27th July, 29th July – 5th August. 8th – 15th August.	7, 8, 8	7	13, 10
9	Ibadan	21st July – 18th August	28	7, 7	13, 12
10	Usi Ekiti	11th – 17th July, 22nd July - 19th August	7, 29	0	7

1.5 2024 Dry Spell Episode

A dry spell is defined as a period characterized by an extended lack of rain, a drawn-out period where the weather has been dry, for an abnormally long time. Dry spells are usually shorter than, and not as severe as a drought. As shown in Figure 1.24, severe dry spell episodes that lasted for more than 21 days were experienced in Kwara, Oyo, parts of Taraba, Niger, Bauchi, Adamawa, Benue, and Kogi states. Moderate dry spells that lasted up to 15 days were also reported in Kano, Bauchi, Gombe, Ogun, Osun, Ekiti, Lagos, Ondo, Edo, Enugu and Ebonyi states as shown in Figure 1.24.

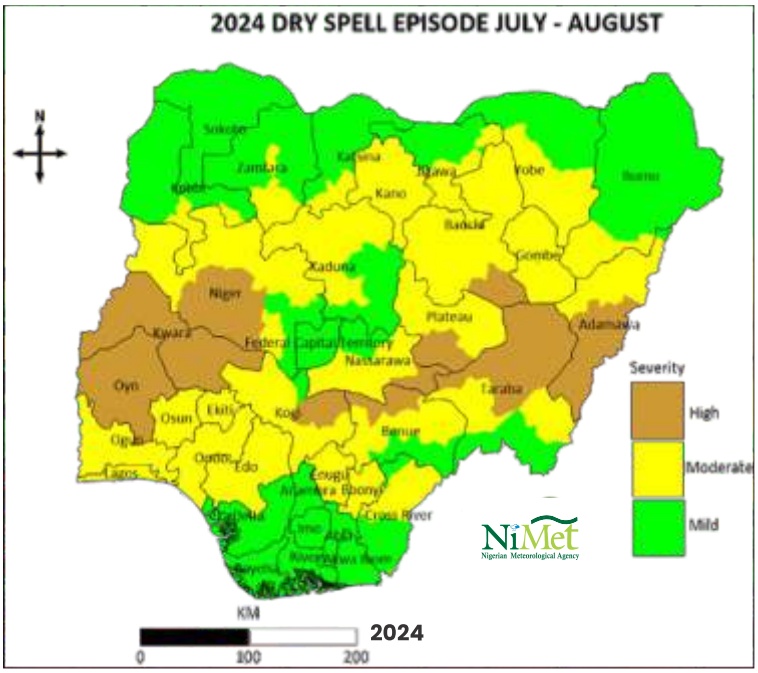


Figure 1.23: Spatial Distribution of Mild, Moderate, and Severe Dry Spells Over Nigeria in

CHAPTER TWO

Systematic Changes 0f Climate Parameters over Nigeria

In this section, we examine key climate parameters essential for monitoring climate change and variability across Nigeria. A broad range of meteorological parameters can be used for this purpose; however, temperature and precipitation are considered highly significant worldwide. The World Meteorological Organization (WMO) classifies these parameters (temperature and precipitation) as the principal surface climatological variables. For this analysis, we utilized 45 years of in-situ rainfall and temperature data from the Nigerian Meteorological Agency (NiMet) database. These data are sourced from 47 meteorological stations across Nigeria, providing high-quality, consistent, and long-term records. Of these stations, 23 are located in the northern part of the country, while 24 are in the south, ensuring sufficient data for a regional analysis. To facilitate comparison with both recent and historical observations, the climatological standard normal for the period 1991-2020 was applied. This new reference period, adopted in 2021 in line with WMO recommendations, reflects recent climate changes.

2.1 Rainfall

The rainy season in Nigeria in 2024 was marked by rainfall-induced hazards even though relatively lower than hazards recorded in previous years. High-intensity and high-frequency rainfall have resulted in river overflows and flash floods in many parts of the country. Moreover, the Reliefweb and the National Emergency Management Agency (NEMA) reported that as of 17 September 2024, 31 states and 180 local government areas (LGAs) severely affected. Over 1,083,141 individuals have been impacted by the relentless rains, leading to widespread displacement, loss of lives, and destruction of homes and livelihoods. The floods have left 641,598 persons displaced, 285 people dead, and 2,504 injured. Houses, farmlands, and critical infrastructure have been devastated, with 98,242 homes affected[2]

2.1.1 The 2024 Standardized Rainfall Anomaly Analysis Over Nigeria

The standardized rainfall anomaly analysis for Nigeria in 2024 shows a continuing upward trend. With a standardized rainfall anomaly of 0.2, 2024 ranks as the eleventh wettest year since 1981. The wettest years on record are 2019 and 2012, which are ranked first and second, respectively (see Figure 2.1, Table 2.1). Additionally, since 2006, Nigeria has experienced consistent wet years, with the exceptions of 2021, 2015, and 2013 (Table 2.1).

[2] *Source*: https://reliefweb.int/report/nigeria/nigeria-flood-overview-17-september-2024

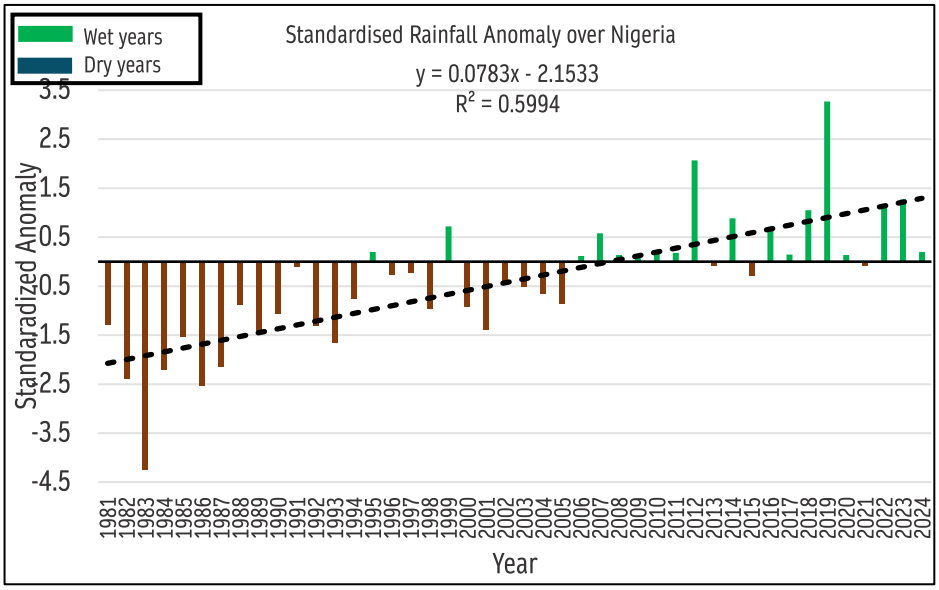


Figure 2.1: Standardised rainfall anomaly and trend over Nigeria for the period 1981-2024 based on data from 47 Meteorological stations and 1991-2020 Climatological Standard Normal

A regional analysis of rainfall for 2024 shows a contrasting pattern between northern and southern Nigeria. In the northern region, 2024 is classified as a wet year, with a standardized rainfall anomaly of 0.8, making it one of the wettest years since 1981 for this part of the country.

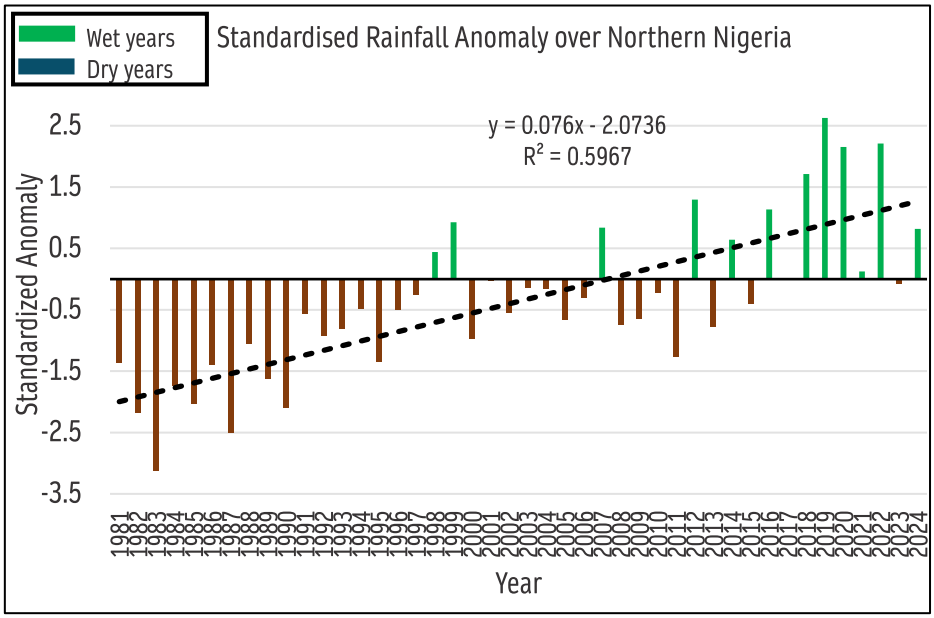
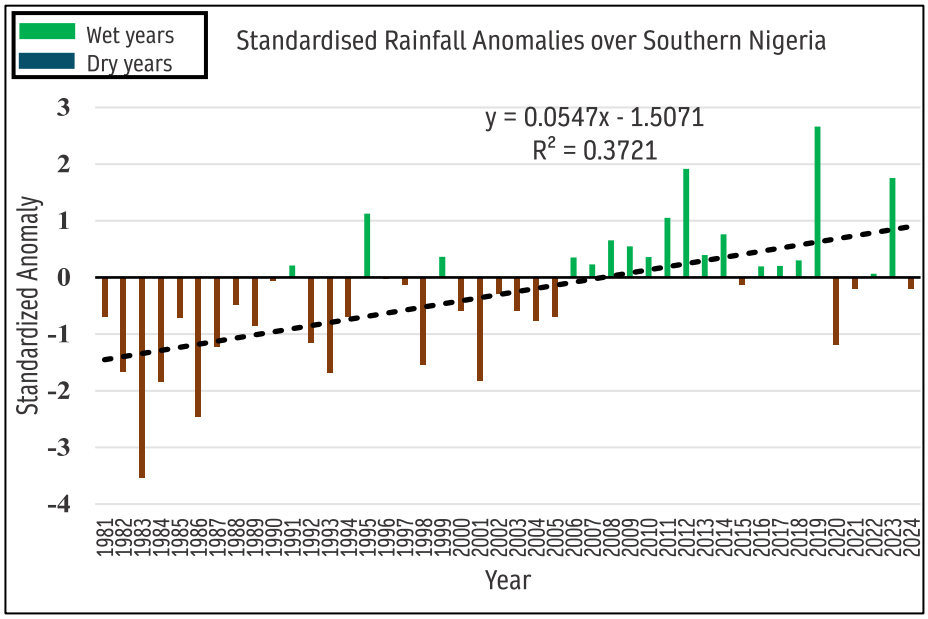


Figure 2.2: Standardised rainfall anomaly and trend over northern Nigeria for the period 1981–2024 based on data from 23 Meteorological stations and 1991–2020 Climatological Standard Normal

In contrast, the southern region experienced a more normal rainfall pattern in 2024, as reflected by a standardized rainfall anomaly close to zero (see Figure 2.2).

The wettest years in the south remain 2019 and 2012 and maintained the top positions for rainfall amount since 1981 (Table 2.1). Notably, the southern region has seen a consistent trend of wet years since 2006, with only a few exceptions, including 2015, 2020, 2021, and 2024. These years stand out as anomalies in an otherwise steady pattern of rainfall, indicating variability in the region's climate despite the general wet trend.



28Figure 2.3: Standardised rainfall anomaly and trend over southern Nigeria for the period 1981-2024 based on data from 24 Meteorological stations and 1991-2020 Climatological Standard Normal

Table 2.1 Summary of the wet years and standardised rainfall anomalies from 1981-2024 ranked in descending order of wetness

NIGERIA		Northern Nigeria		Southern Nigeria	
Wet Years	Standardised Anomalies	Wet Years	Standardised Anomalies	Wet Years	Standardised Anomalies
2019	3.3	2019	2.6	2019	2.7
2012	2.1	2022	2.2	2012	1.9
2023	1.3	2020	2.2	2023	1.8
2022	1.1	2018	1.7	1995	1.1
2018	1.1	2012	1.3	2011	1.1
2014	0.9	2016	1.1	2014	0.8
1999	0.7	1999	0.9	2008	0.7
2016	0.7	2007	0.8	2009	0.5
2007	0.6	2024	0.8	2013	0.4
1995	0.2	2014	0.6	1999	0.4
2024	0.2	1998	0.4	2010	0.4
2011	0.2	2021	0.1	2006	0.4
2010	0.2			2018	0.3
2017	0.1			2007	0.2
2020	0.1			1991	0.2
2008	0.1			2017	0.2
2006	0.1			2016	0.2
2009	0.1			2022	0.1
				1996	0.0

Table 2.2 Summary of the dry years and standardised rainfall anomalies from 1981-2024 ranked in descending order of dryness

NIGERIA		Northern Nigeria		Southern Nigeria	
Wet Years	Standardised Anomalies	Dry Years	Standardised Anomalies	Dry Years	Standardised Anomalies
1983	-4.2	1983	-3.1	1983	-3.5
1986	-2.5	1987	-2.5	1986	-2.5
1982	-2.4	1982	-2.2	1984	-1.8
1984	-2.2	1990	-2.1	2001	-1.8
1987	-2.1	1985	-2.0	1993	-1.7
1993	-1.7	1984	-1.7	1982	-1.7
1985	-1.5	1989	-1.6	1998	-1.5
1989	-1.4	1986	-1.4	1987	-1.2
2001	-1.4	1981	-1.4	2020	-1.2
1992	-1.3	1995	-1.3	1992	-1.2
1981	-1.3	2011	-1.3	1989	-0.9
1990	-1.1	1988	-1.1	2004	-0.8
1998	-1.0	2000	-1.0	1985	-0.7
2000	-0.9	1992	-0.9	2005	-0.7
1988	-0.9	1993	-0.8	1981	-0.7
2005	-0.8	2013	-0.8	1994	-0.7
1994	-0.8	2008	-0.7	2000	-0.6
2004	-0.7	2005	-0.7	2003	-0.6
2003	-0.5	2009	-0.6	1988	-0.5
2002	-0.5	1991	-0.6	2002	-0.3
2015	-0.3	2002	-0.5	2024	-0.2
1996	-0.3	1996	-0.5	2021	-0.2
1997	-0.2	1994	-0.5	2015	-0.1
1991	-0.1	2015	-0.4	1997	-0.1
2021	-0.1	2006	-0.3	1990	-0.1
2013	-0.1	1997	-0.3		
		2010	-0.2		
		2004	-0.2		
		2003	-0.1		
		2023	-0.1		
		2001	0.0		
		2017	0.0		

2.2 Temperature

2.2.1 Maximum Temperature

The maximum temperature for any given day is defined as the highest air temperature recorded for that day. This usually occurs during the daytime. In this section, we analyse maximum temperature trends from 1981 to 2024. The analysis reveals a clear warming trend, with consistent high-temperature years since 2015. Notably, 2024 stands out as the warmest year on record for Nigeria since 1981, with a standardized maximum temperature anomaly of 4.0 (see Figure 2.5).

It is important to highlight that the last decade (2015–2024) has been marked by a series of exceptionally warm years, with nine out of the ten years falling among the 11 warmest on record. This trend underscores the increasing intensity of warming in recent years, aligning with global temperature patterns.

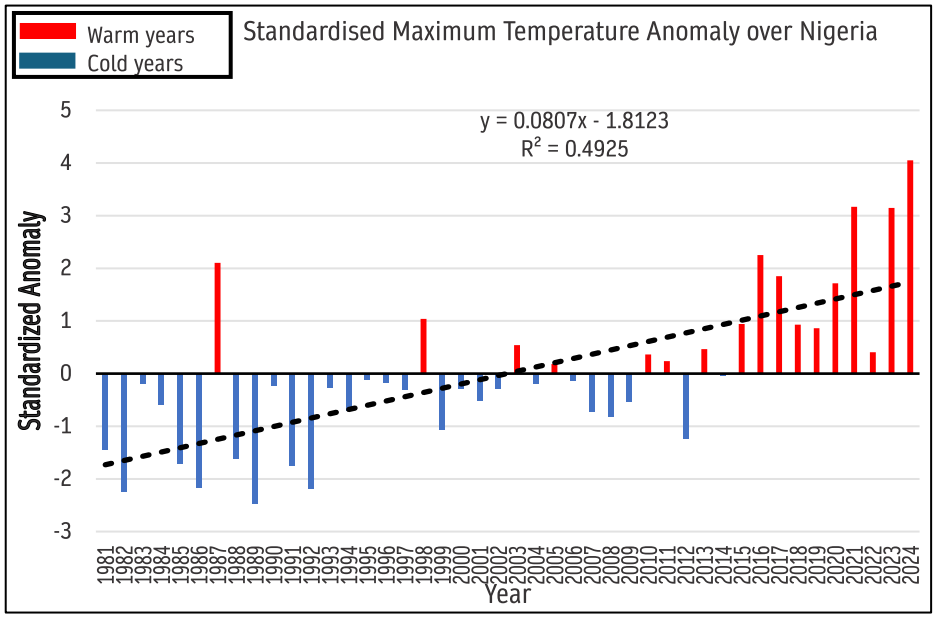


Figure 2.4: Standardised maximum temperature anomaly and trend over Nigeria for the period 1981-2024 based on data from 47 Meteorological stations and 1991-2020 Climatological Standard Normal

Looking at regional temperature patterns, the standardized maximum temperature anomaly in 2024 was 3.0 for northern Nigeria (see Table 2.4), indicating a significantly warmer year compared to previous records in the region

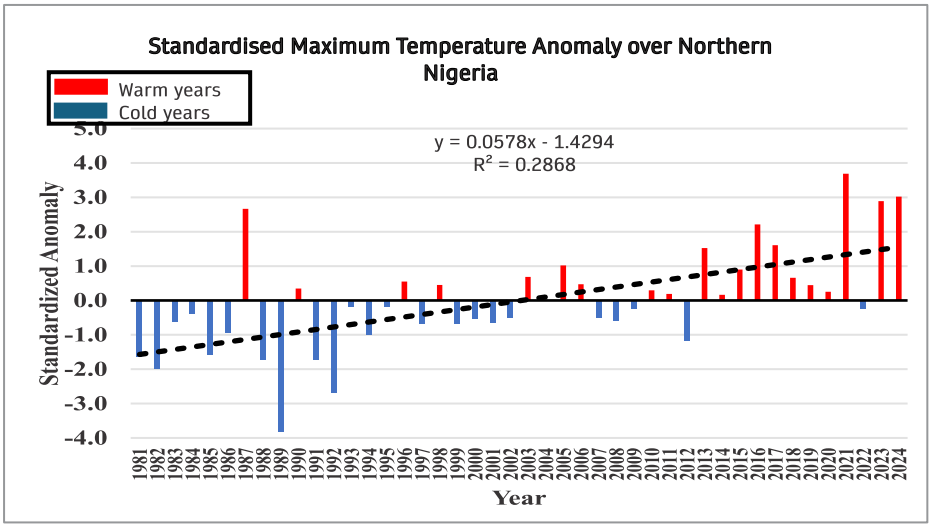


Figure 2.5: Standardised maximum temperature anomaly and trend over northern Nigeria for the period 1981–2024 based on data from 23 Meteorological stations and 1991–2020 Climatological Standard Normal

In contrast, the southern part of Nigeria recorded an even higher standardized maximum temperature anomaly of 4.4, making 2024 the hottest year for the south as well. These regional warming patterns further reveal the widespread nature of the warming trend across the country, with both northern and southern Nigeria experiencing record-high temperatures in 2024.

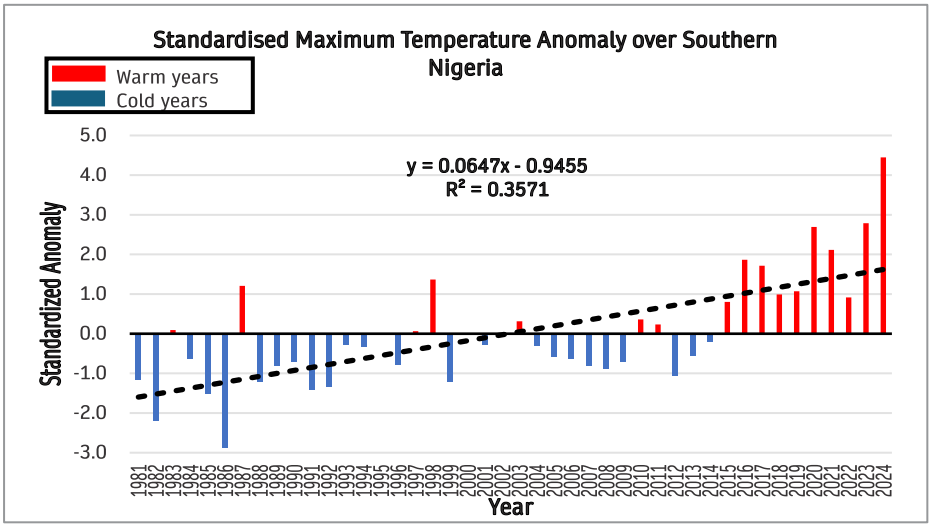


Figure 2.6: Standardised maximum temperature anomaly and trend over southern Nigeria for the period 1981–2024 based on data from 24 Meteorological stations and 1991–2020 Climatological Standard Normal

Table 2.3 Summary of the warm years and standardised maximum temperature anomalies from 1981-2024 ranked in descending order of warming

NIGERIA		Northern Nigeria		Southern Nigeria	
Warm Years	Standardised Anomalies	Warm Years	Standardised Anomalies	Warm Years	Standardised Anomalies
2024	4.0	2021	3.7	2024	4.4
2021	3.2	2024	3.0	2023	2.8
2023	3.1	2023	2.9	2020	2.7
2016	2.3	1987	2.7	2021	2.1
1987	2.1	2016	2.2	2016	1.9
2017	1.8	2017	1.6	2017	1.7
2020	1.7	2013	1.5	1998	1.4
1998	1.0	2005	1.0	1987	1.2
2015	0.9	2015	0.9	2019	1.1
2018	0.9	2003	0.7	2018	1.0
2019	0.9	2018	0.7	2022	0.9
2003	0.5	1996	0.6	2015	0.8
2013	0.5	2006	0.5	2010	0.4
2022	0.4	1998	0.5	2003	0.3
2010	0.4	2019	0.4	2011	0.2
2011	0.2	1990	0.3	1983	0.1
2005	0.2	2010	0.3	1997	0.1
		2020	0.3		
		2011	0.2		
		2014	0.2		
		2004	0.0		

Table 2.4 Summary of the cold years and standardised maximum temperature anomalies from 1981-2024 ranked in descending order of cooling

NIGERIA		Northern Nigeria		Southern Nigeria	
Cold Years	Standardised Anomalies	Cold Years	Standardised Anomalies	Cold Years	Standardised Anomalies
1989	-2.5	1989	-3.8	1986	-2.9
1982	-2.2	1992	-2.7	1982	-2.2
1992	-2.2	1982	-2.0	1985	-1.5
1986	-2.2	1991	-1.7	1991	-1.4
1991	-1.7	1988	-1.7	1992	-1.3
1985	-1.7	1981	-1.6	1988	-1.2
1988	-1.6	1985	-1.6	1999	-1.2
1981	-1.5	2012	-1.2	1981	-1.2
2012	-1.2	1994	-1.0	2012	-1.1
1999	-1.1	1986	-0.9	2008	-0.9
2008	-0.8	1999	-0.7	2007	-0.8
2007	-0.7	1997	-0.7	1989	-0.8
1994	-0.7	2001	-0.7	1996	-0.8
1984	-0.6	1983	-0.6	1990	-0.7
2009	-0.5	2008	-0.6	2009	-0.7
2001	-0.5	2000	-0.5	2006	-0.6
1997	-0.3	2002	-0.5	1984	-0.6
2002	-0.3	2007	-0.5	2005	-0.6
2000	-0.3	1984	-0.4	2013	-0.6
1993	-0.3	2022	-0.3	1994	-0.3
1990	-0.2	2009	-0.2	2004	-0.3
1983	-0.2	1995	-0.2	2001	-0.3
2004	-0.2	1993	-0.2	1993	-0.3
1996	-0.2			2014	-0.2
2006	-0.1			2002	-0.1
1995	-0.1				
2014	0.0				

2.2.2 Minimum temperature

Similar to the trend observed in maximum temperatures, minimum temperatures in Nigeria also exhibit a consistent positive trend. In particular, the minimum temperature recorded in 2024 is significantly higher than the 1991-2020 climatological standard normal, indicating an ongoing increase in nighttime temperatures. This upward trend in minimum temperatures has been evident since 2009, with temperatures consistently surpassing the climatological normal in subsequent years.

In northern Nigeria, the minimum temperature in 2024 was significantly higher than the

climatological normal, with a standardized minimum temperature anomaly of 1.6. This reflects a continued warming in the region, which has seen a steady increase in minimum temperatures since 2001. Similarly, the southern part of Nigeria also experienced a warming trend in minimum temperatures, with consistent increases observed since 2001. This trend highlights a broader regional pattern of warming, with both northern and southern Nigeria experiencing sustained increases in minimum temperatures over the past two decades.

The ongoing rise in minimum temperatures across the country is indicative of a changing climate, characterized by warmer nights and a shift in the overall temperature profile of Nigeria. This trend may have implications for agriculture, energy consumption, and human health.

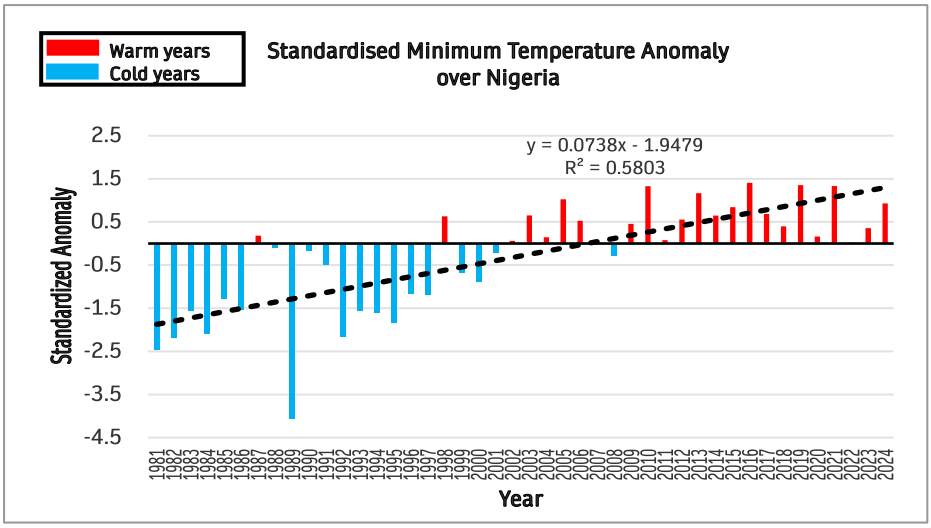


Figure 2.7: Standardised minimum temperature anomaly and trend over Nigeria for the period 1981-2024 based on data from 47 Meteorological stations and 1991-2020 Climatological Standard Normal

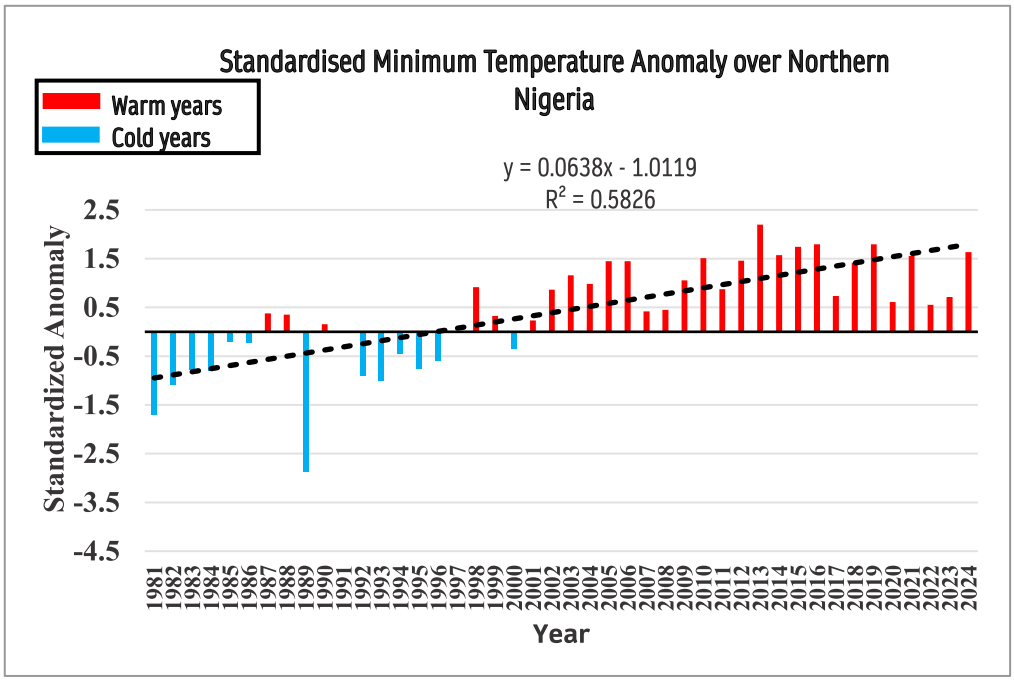


Figure 2.8: Standardised minimum temperature anomaly and trend over northern Nigeria for the period 1981–2024 based on data from 23 Meteorological stations and 1991–2020 Climatological Standard Normal

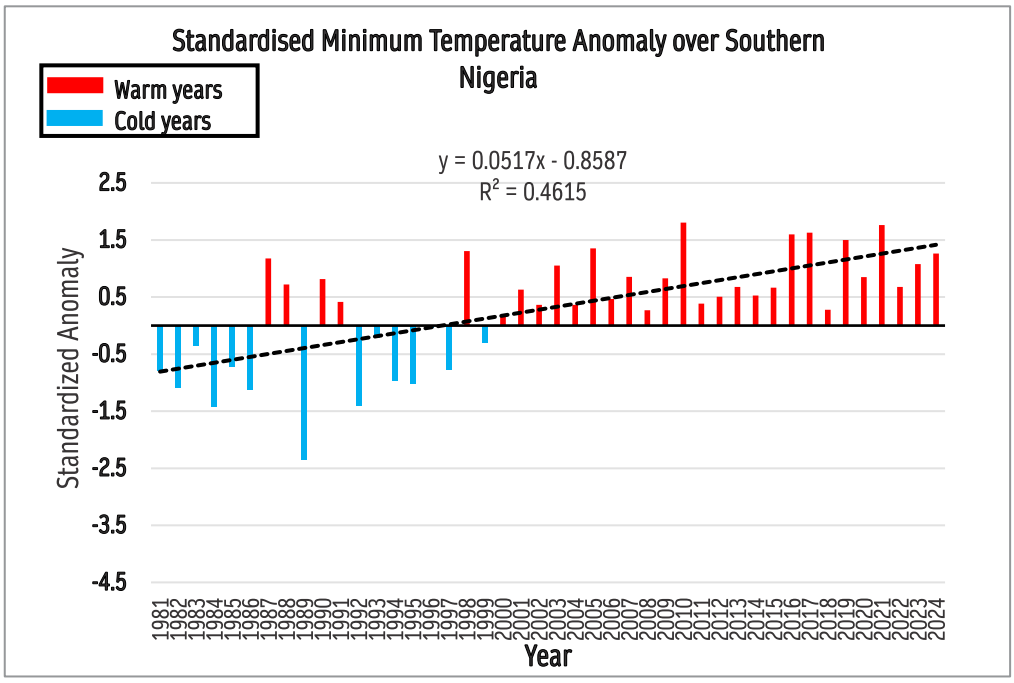


Figure 2.9: Standardised minimum temperature anomaly and trend over southern Nigeria for the period 1981–2024 based on data from 24 Meteorological stations and 1991–2020 Climatological Standard Normal

Table 2.5 Summary of the warm years and standardised minimum temperature anomalies from 1981-2024 ranked in descending order of warming

NIGERIA		Northern Nigeria		Southern Nigeria	
Warm Years	Standardised Anomalies	Warm Years	Standardised Anomalies	Warm Years	Standardised Anomalies
2016	1.4	2013	2.2	2010	1.8
2019	1.4	2019	1.8	2021	1.8
2021	1.3	2016	1.8	2017	1.6
2010	1.3	2015	1.7	2016	1.6
2013	1.2	2024	1.6	2019	1.5
2005	1.0	2014	1.6	2005	1.4
2024	0.9	2021	1.6	1998	1.3
2015	0.8	2010	1.5	2024	1.3
2017	0.7	2012	1.5	1987	1.2
2003	0.7	2006	1.4	2023	1.1
2014	0.6	2005	1.4	2003	1.1
1998	0.6	2018	1.4	2007	0.9
2012	0.6	2003	1.2	2020	0.8
2006	0.5	2009	1.1	2009	0.8
2009	0.5	2004	1.0	1990	0.8
2018	0.4	1998	0.9	1988	0.7
2023	0.4	2011	0.9	2022	0.7
1987	0.2	2002	0.9	2013	0.7
2020	0.2	2017	0.7	2015	0.7
2004	0.1	2023	0.7	2001	0.6
2011	0.1	2020	0.6	2014	0.5
2002	0.1	2022	0.6	2012	0.5
2007	0.0	2008	0.5	2006	0.5
2022	0.0	2007	0.4	1991	0.4
		1987	0.4	2011	0.4
		1988	0.4	2002	0.4
		1999	0.3	2004	0.4
		2001	0.2	2018	0.3
		1990	0.2	2008	0.3
		1991	0.0	2000	0.2
				1996	0.0

Table 2.6 Summary of the cold years and standardised minimum temperature anomalies from 1981-2024 ranked in descending order of cooling

NIGERIA		Northern Nigeria		Southern Nigeria	
Cold Years	Standardised Anomalies	Cold Years	Standardised Anomalies	Cold Years	Standardised Anomalies
1989	-4.1	1989	-2.9	1989	-2.4
1981	-2.5	1981	-1.7	1984	-1.4
1982	-2.2	1982	-1.1	1992	-1.4
1992	-2.2	1993	-1.0	1986	-1.1
1984	-2.1	1992	-0.9	1982	-1.1
1995	-1.8	1984	-0.8	1995	-1.0
1994	-1.6	1983	-0.8	1994	-1.0
1993	-1.6	1995	-0.8	1981	-0.8
1983	-1.6	1996	-0.6	1997	-0.8
1986	-1.5	1994	-0.4	1985	-0.7
1985	-1.3	2000	-0.4	1983	-0.4
1997	-1.2	1986	-0.2	1999	-0.3
1996	-1.2	1985	-0.2	1993	-0.2
2000	-0.9	1997	0.0		
1999	-0.7				
1991	-0.5				
2008	-0.3				
2001	-0.2				
1990	-0.2				
1988	-0.1				

2.2.3 Diurnal Temperature Range

The Diurnal Temperature Range (DTR), which is the difference between the daily maximum and minimum temperatures, is widely regarded as a valuable indicator for assessing climate change and variability. Over the past 45 years, a noticeable decreasing trend in DTR has been observed across the country, indicating changes in the daily temperature cycle.

The highest variability in DTR occurred from the 1980s to the mid-1990s, reflecting significant fluctuations in temperature patterns during that period. However, a sharp downward trend in DTR became apparent from 1995 to 2012, indicating a period of reduced temperature differences between day and night. Following this decline, a gradual increase in DTR is observed from 2013 to 2024, although with a notable dip in 2019 (see Figure 2.10).

In 2024, the DTR reached 11.2 °C, marking the highest value recorded since 1995. This increase in 2024 represents a slight rise of 0.6 °C above the thirty-year climatological average (1991-2020), suggesting a partial recovery or shift in the daily temperature fluctuations. This change could be reflective of broader climatic shifts, potentially linked to regional and global climate patterns.

The DTR trend provides valuable insights into the changing dynamics of temperature extremes in Nigeria, where warming of both daytime and nighttime temperatures has been observed, although the difference between them (the DTR)

has been narrowing for much of the past few decades. This could have implications for various sectors, including agriculture, energy demand, and public health, as changes in the diurnal temperature range can affect crop growth cycles, energy consumption patterns, and human comfort.

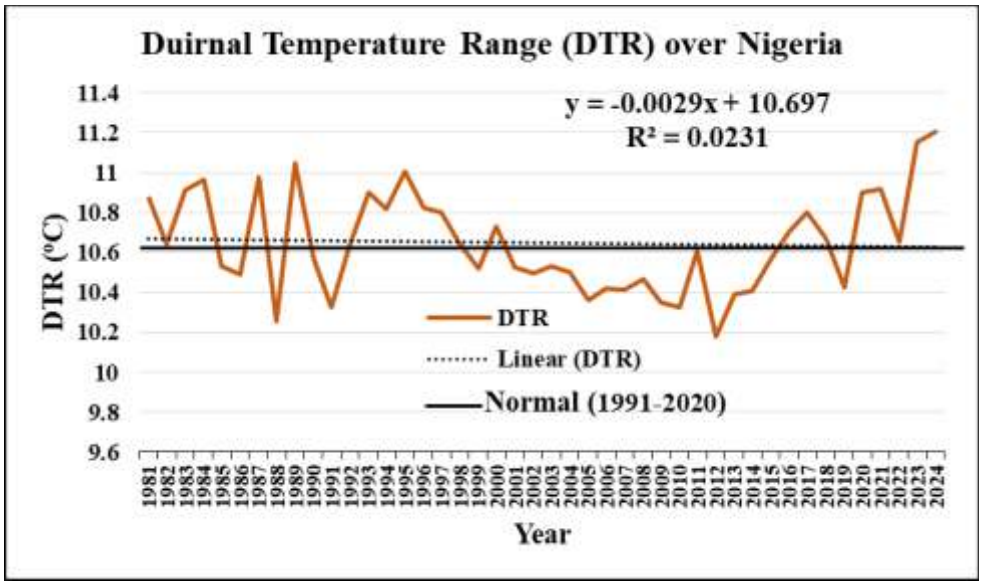


Figure 2.10: Diurnal temperature range (DTR) 1991-2020 climatological average and linear trend over Nigeria during the period 1981-2024 based on data from 47 Meteorological stations

A more pronounced and steeper decreasing trend in the Diurnal Temperature Range (DTR) is observed in northern Nigeria compared to the country as a whole (see Figures 2.10 and 2.11). This suggests that the northern region has experienced a more significant reduction in the daily temperature variation over the past decades. Despite this long-term trend of decreasing DTR, 2024 stands out as a year with an increase in the range. The DTR for northern Nigeria in 2024 was recorded at 12.6 °C, which represents a slight rise of 0.2 °C above the climatological normal for the region.

In contrast, the southern part of Nigeria exhibited a DTR of 8.9 °C in 2024, which is almost exactly in line with the climatological average for the region. This indicates that, while the overall daily temperature variability in the south remains stable, there has been no significant deviation from the long-term average of DTR in 2024.

The observed regional differences in DTR trends highlight the variability in temperature patterns across Nigeria. While both the north and south have experienced a general decline in DTR over the years, the degree of change and the current state of temperature fluctuations differ between the two regions.

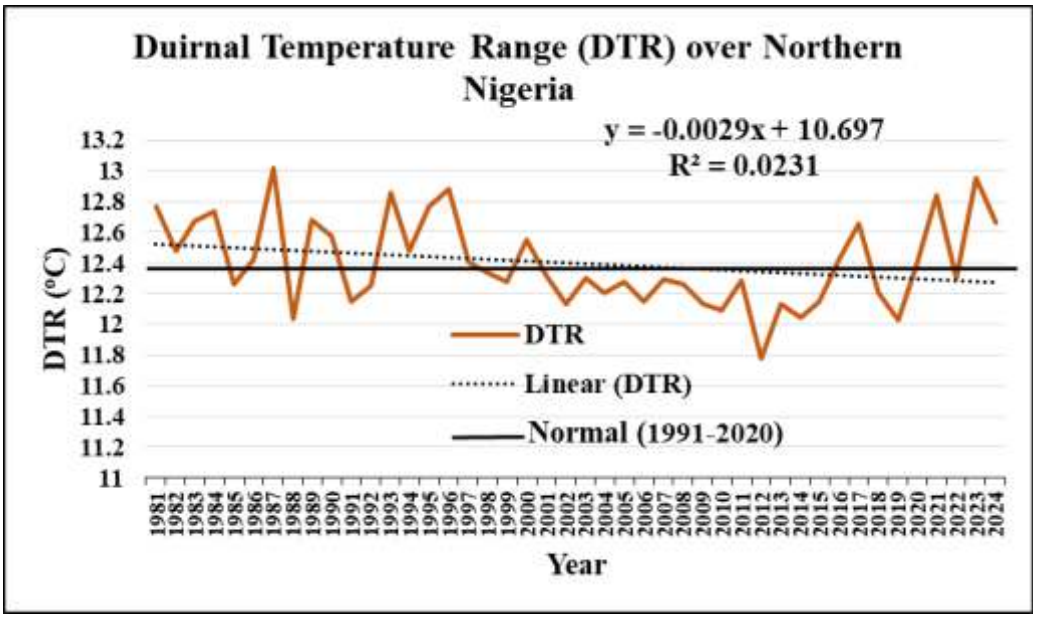


Figure 2.11: Diurnal temperature range (DTR), 1991-2020 climatological average and linear trend over northern Nigeria during the period 1981-2024 based on data from 23 Meteorological stations

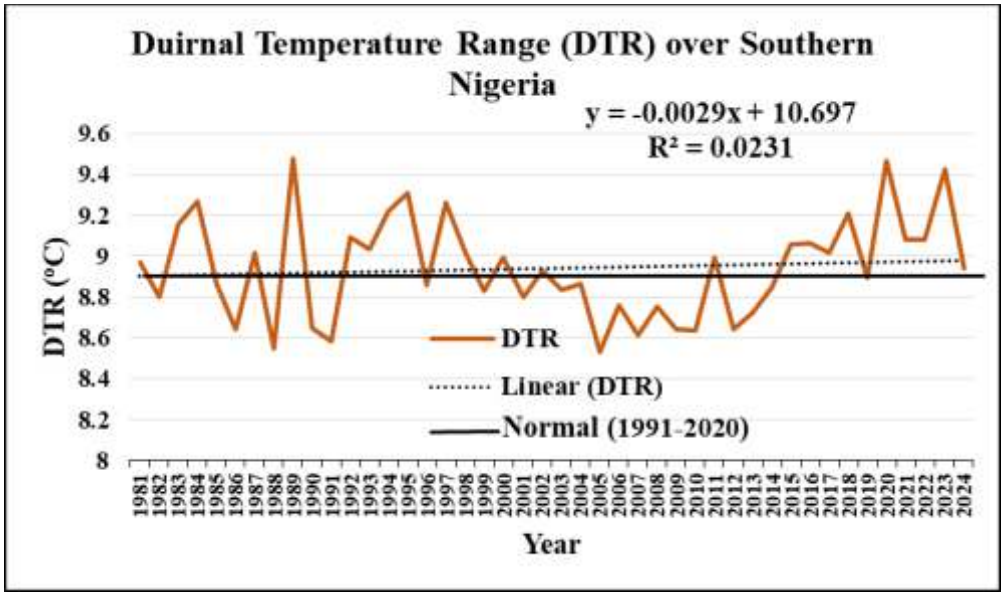


Figure 2.12: Diurnal temperature range (DTR), 1991-2020 climatological average and linear trend over southern Nigeria during the period 1981-2023 based on data from 24 Meteorological stations

CHAPTER THREE
Observed Climate Drivers

3.1 Inter-Tropical Discontinuity (ITD)

The Inter-Tropical Discontinuity (ITD); a boundary where the dry, dusty Harmattan winds from the Sahara Desert meet the moist, warm south-westerly winds from the Atlantic Ocean, plays a crucial role in shaping the prevailing weather across Nigeria. Its position fluctuates seasonally and daily, strongly influencing the weather patterns over Nigeria. The latitudinal position of ITD over the country determines the type of weather that would be expected over any particular region within the country.

Figure 3.1 shows the decadal latitudinal position of the ITD in 2024 compared with the long-term average position over Nigeria. The year started with the ITD position slightly above its normal position and continued on that trend till the second dekad of April when it briefly dipped below its normal position of 12.3 °N to 11.42 °N. This northward surge resulted in enhanced moisture influx into the country that may have contributed to rainfall in the south and false onset of rain over many parts of the country during the period.

The ITD gradually moved northwards from the third dekad of April, through the first dekad of July, leading to the onset of rainy season in most parts of the country. However, a southward retreat below its long-term average was observed in the second dekad of July. The Northernmost dekadal position of the ITD in 2024 was 21.45 °N. This occurred in the second dekad of August. This position was over 2 °N above normal ITD position. A gradual southward retreat was observed from the second dekad of September, however, the ITD stayed above its normal till the third dekad of October and remained below the long-term average through November and December.

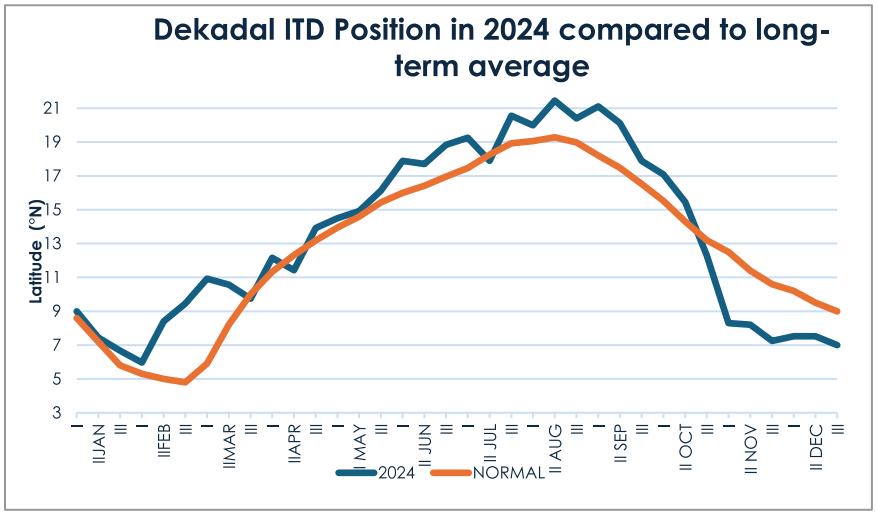


Figure 3.1: Dekadal latitudinal positions of the ITD in 2024 compared with climatological mean over Nigeria

The ITD latituidnal positon began its northward movement from 10.4 °N in March to attain its northernmost position in August and retreated southward from September as shown in Figure 3.2. The ITD attained its northernmost dekadal latitudinal peak in August at 21.45 °N while the southernmost position of 7.7 °N was reached in January as shown in Figure 3.2.

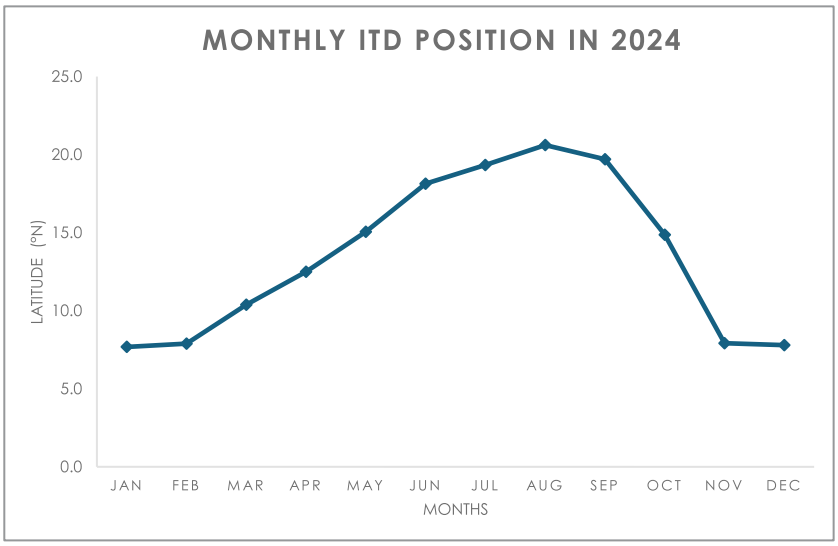


Figure 3.2: Monthly position of the ITD over Nigeria in 2024

Figure 3.3 shows the monthly departure in position of the ITD over Nigeria in 2024 is shown in Figure 3. Above normal monthly position of the ITD was observed in January, February, March, April, May, June, July, August, September, and October. However, below normal monthly position was recorded in November and December 2024. This implies that the months with above normal position of the ITD experienced more influx of the moist south-westerly winds.

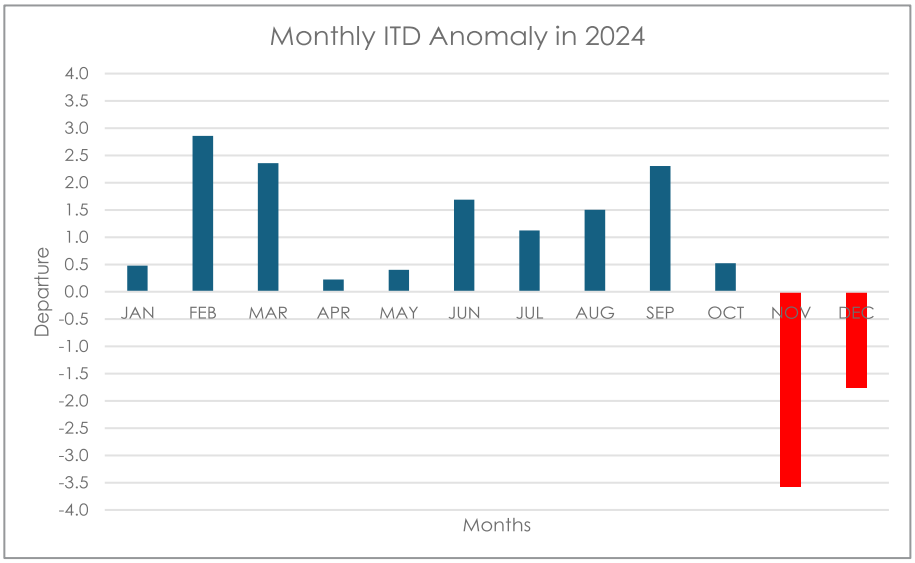


Figure 3.3: Monthly ITD Position Anomaly over Nigeria in 2024

3.2 Surface Pressures

The circulation and flow of the two dominant winds systems (moisture-laden southerly winds from the Atlantic Ocean and dry, dusty cold north-easterly winds from the Sahara Desert) that influences the prevailing weather seasons over the country is determined by two subtropical high-pressure systems. These are the Southern Sub-Tropical High-Pressure Cell (St. Helena) and Northern Sub-Tropical High-Pressure Cell (Azores) high pressure cells respectively. They significantly influence weather patterns over Nigeria by modulating moisture transport, air circulation, and rainfall distribution. Their interactions with the Inter-Tropical Discontinuity (ITD) and monsoonal flow play pivotal roles in shaping Nigeria's seasonal weather.

The average monthly values for both the Azores and St. Helena high pressure systems are depicted in Figure 3.4. In the first quarter of 2024, the Azores High Pressure cell was stronger than the St. Helena high pressure cell and attained peaked value of 1028 hPa in January. The intensification of the Azores is usually associated with the extension of large-scale deep ridges over West African sub-region. The subsidence caused by the ridges is often accompanied by the raising of dust over the source regions in Niger and Chad Republic. Such dust episodes affected the country during the period under review in 2024.

The second quarter was marked by the intensification of the St. Helena high and reached a peak value of 2032 hPa in September (Figure 3.4). The intensification of this pressure cell indicates the establishment of the monsoon season and led to increased influx of moisture into the country through south westerly wind trajectory, as well as increase in the frequency of convective activities.

The peak of rainy season occurred over the northern parts of the country in the third quarter of the year; as the moisture laden south westerly winds traversed the entire country. A reversal in the average monthly values of the St. Helena and Azores highs started in the fourth quarter of the year with the Azores strengthening while the St. Helena was weakening, marking the approach of rainfall cessation and the beginning of the dry season.

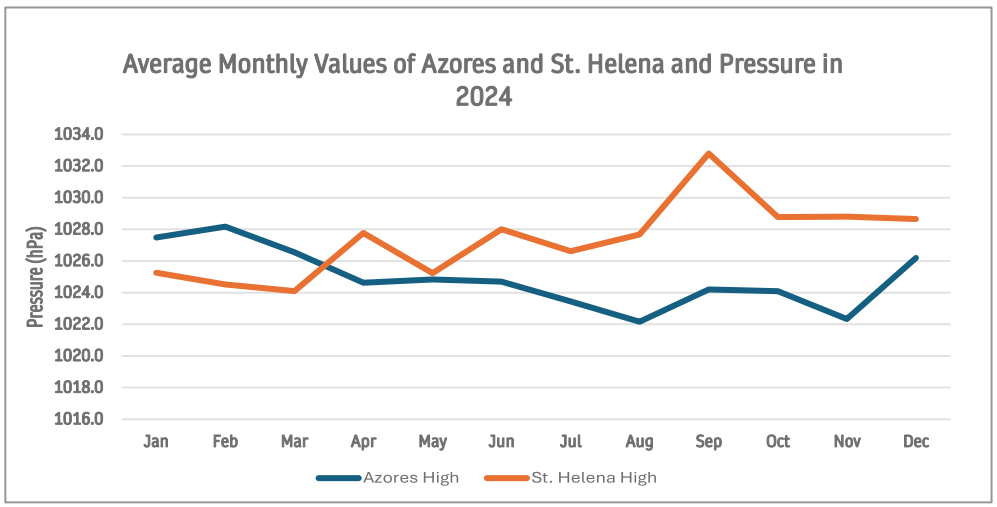


Figure 3.4: Average monthly values of Azores and St. Helena high pressure systems in 2024

3.3 Winds

The northeasterly wind, also known as continental wind, which prevails to the north of the ITD position usually dominates the entire country in January and February. The observed mean wind speed at 10 meters above Mean Sea Level (MSL) ranged from 5 to 15 knots. At 925 hPa (900 m), the maritime and continental wind speeds varied from 5 to 10 knots and 10 to 30 knots, respectively. The prevalent winds at the surface and at 925 hPa led to the dust haze conditions observed in the northern parts and later the south, in January and February. This resulted in considerable reduction in the horizontal visibility during the period.

The speeds of the continental winds ranged from 10 to 15 knots at 925 hPa, and maritime winds ranged from 10 to 35 knots were frequently observed in March, whereas the predominant winds at 850 hPa were continental winds, with speeds ranging from 10 to 35 knots.

From April to October, the maritime winds became dominant at the surface and occurred more frequently than the continental winds, with an average speed of 5 to 15 knots. At 925 hPa, the winds were mostly maritime, with speeds ranging from 5 to 25 knots. Continental and maritime winds occurred simultaneously at 850 hPa throughout the country during this period. The monsoon trough was observed to be oscillating between 15.0 °N and 23.0 °N at both 925 hPa and 850 hPa. November marked the beginning of the incursion of the dusty northeasterlies into the country by more frequent continental winds. However, maritime winds were more common over the coastal cities.

3.4 GLOBAL & REGIONAL TELECONNECTIONS

3.4.1 OCEANIC NINO INDEX (ONI)

Oceanic Nino Index is a key parameter for monitoring El Niño and La Niña which are opposite phases of the El Nino Southern Oscillation (ENSO). Oceanic Nino Index is the difference between a three-month running average of the sea surface temperature average over an area of the ocean from 120 to 170 west longitude along the equator and the long-term average for the same three months. El Nino condition is considered to be present when the Oceanic Nino Index is above +0.5, indicating the eastern-central pacific is significantly warmer than normal. La Niña conditions exist when the Oceanic Nino Index is lower -0.5 or indicating the region is cooler than normal.

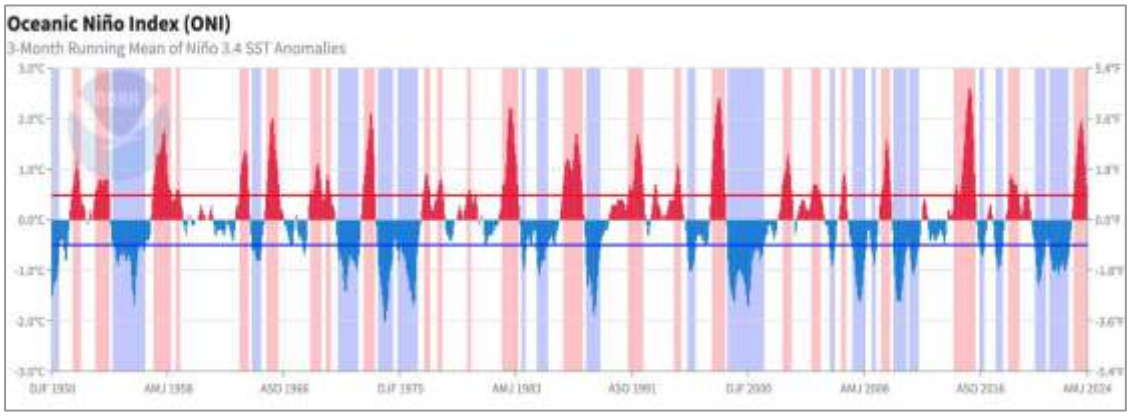


Figure 3.5: Oceanic Nino Index (Sea Surface Temperature Anomaly)[3]

[3] https://www.ncei.noaa.gov/access/monitoring/enso/sst

3.4.2: ENSO PROJECTION IN 2024

El Nino Southern oscillation (ENSO) is a periodic fluctuation in sea surface temperature and the air pressure of the overlying atmosphere across the equatorial Pacific Ocean. 2024 started as El Nino year in January-March season (JFM) up to March-May (MAM) season, thereafter, transitioned to neutral from April-June (AMJ) to September-November (SON) seasons. As of mid-November 2024, ENSO neutral conditions persisted in the equatorial pacific, and both oceanic and atmospheric indicators remained in neutral state. In September, October, and early November, 2024 there was a sustained weakening of the trade winds tending to hamper the ongoing development of La Nina conditions. The IRI ENSO predictions plume forecasts slightly higher chances (52%) for ENSO-neutral conditions for November-December 2024.

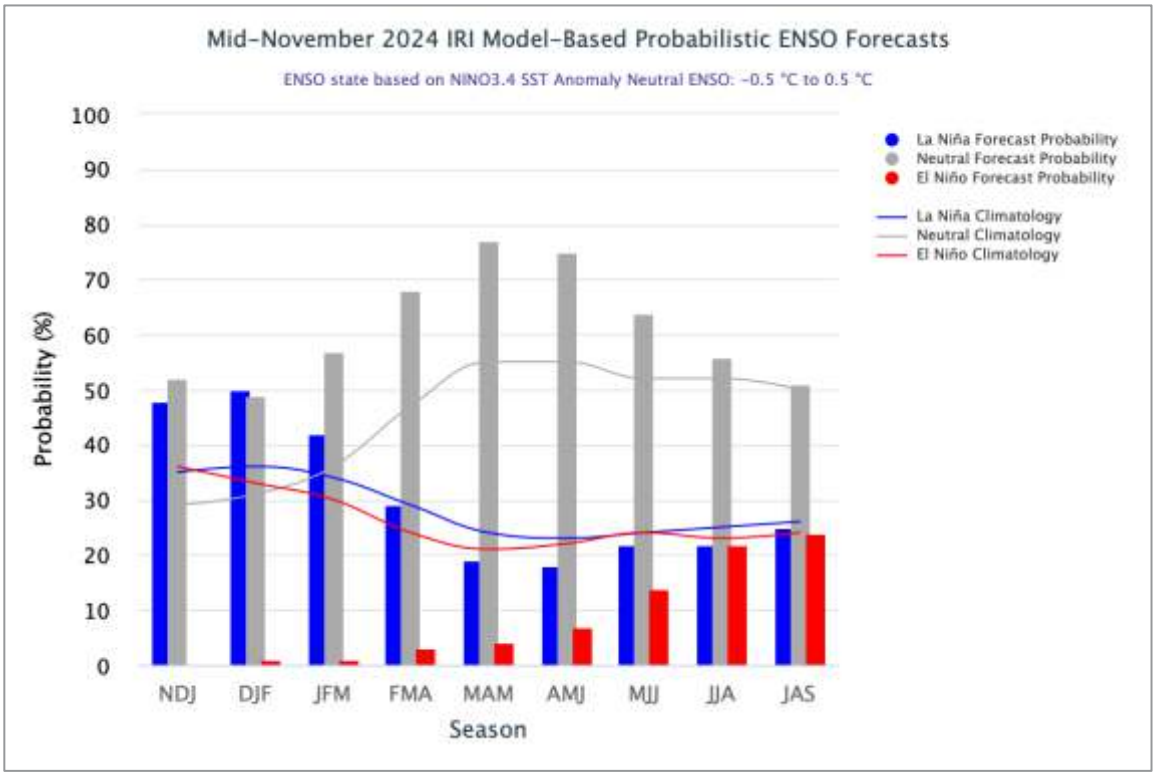


Figure 3.6: Official CPC ENSO Probabilistic ENSO Forecast

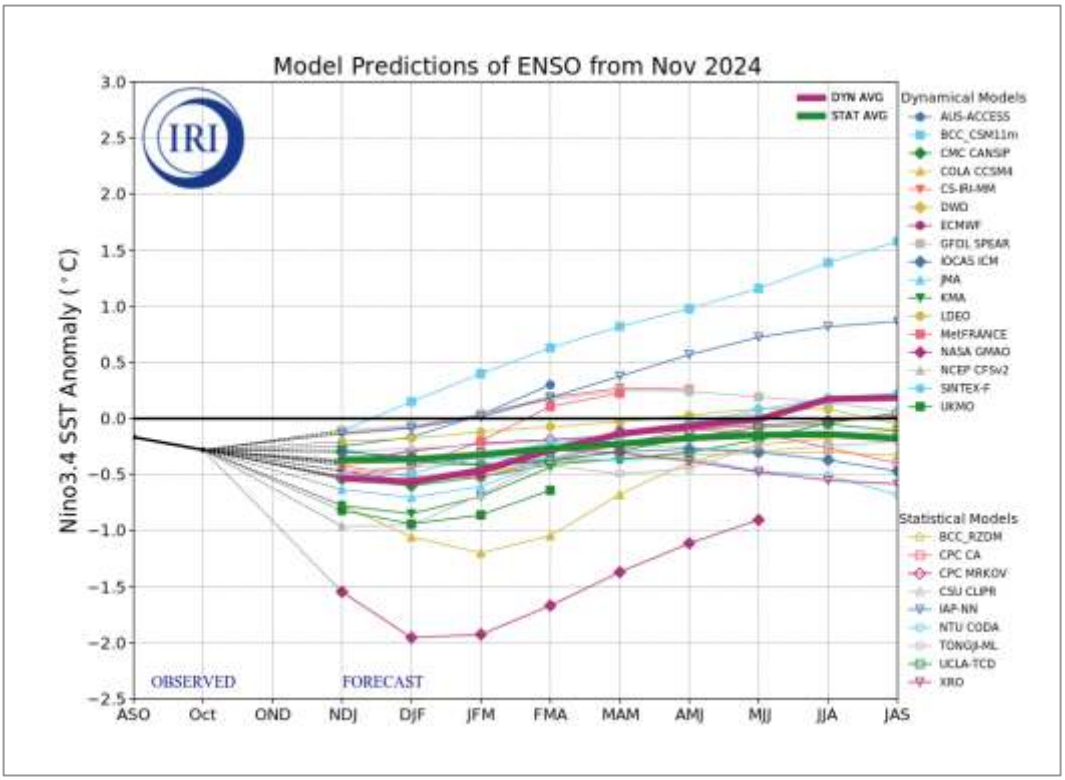


Figure 3.7: Model Predictions of ENSO[4] from December 2023

SOURCE: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/figure06.gif

3.4.3 GLOBAL EXTREME TEMPERATURE RECORD IN 2024

The World Meteorological Organization (WMO) has confirmed that 2024 with a global average surface temperature of 1.55 ℃(±0.13 ℃) above the pre-industrial (1850-1900) average temperature, is the hottest year on record[5] . Similarly, the last ten decade (2015-2024) has also been declared as the warmest on record highlighting the call for action by the United Nations Secretary General.

A similar analysis by the United States' National Aeronautics and Space Administration (NASA) confirms Earth's average surface temperature in 2024 as the warmest following a consecutive 15 months (June 2023-August 2024) of highest temperature record base on their dataset[6].

[4] https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/figure06.gif
[5] 2024 is on track to be hottest year on record as warming temporarily hits 1.5°C
[6] https://www.nasa.gov/news-release/temperatures-rising-nasa-confirms-2024-warmest-year-on-record/#:~:text=Global%20temperatures%20in%202024%20were,records%20%E2%80%94%20an%20unprecedented%20heat%20streak
[7] 2024 is on track to be hottest year on record as warming temporarily hits 1.5°C

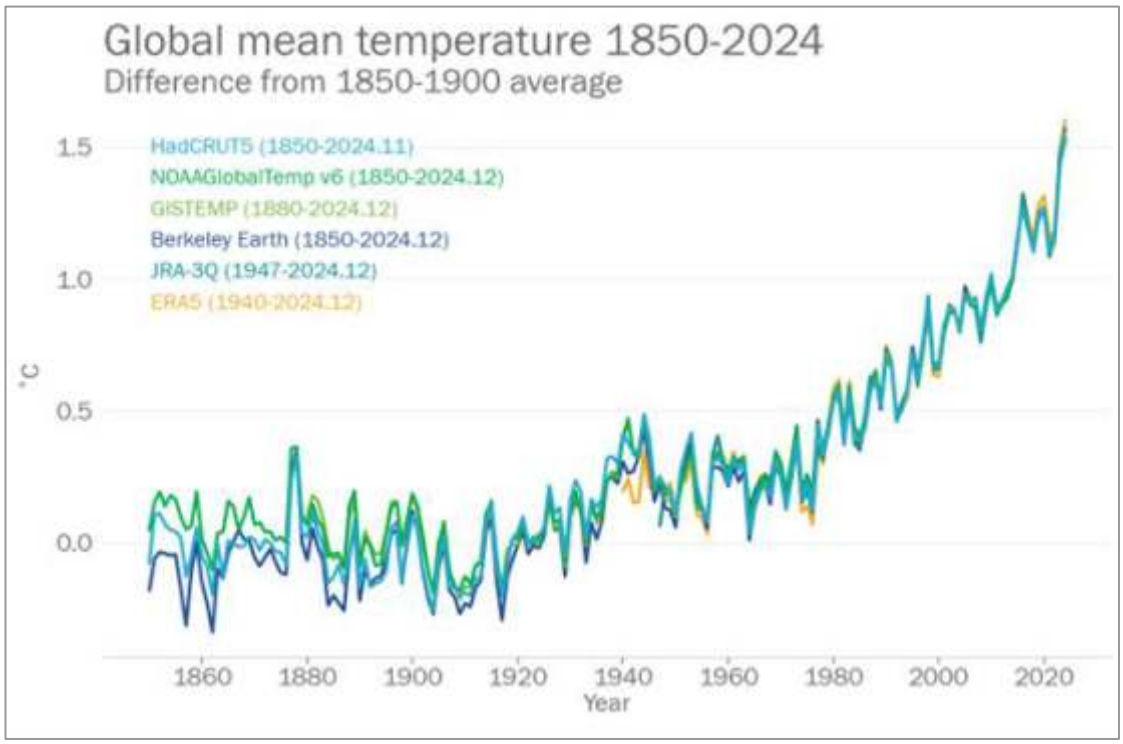


Figure 3.8: Daily Global Temperature[7] in 2024

Source: https://wmo.int/news/media-centre/2024-track-be-hottest-year-record-warming-temporarily-hits-15degc

CHAPTER FOUR
Extreme Weather Events In Nigeria In 2024

In recent years, the world has witnessed an alarming increase in the frequency and intensity of extreme weather events, reshaping the landscape of our climate and posing significant challenges to communities, economies, and ecosystems. From devastating hurricanes and unprecedented flooding to prolonged droughts and soaring temperatures, these phenomena are not merely isolated incidents, but harbingers of a changing climate driven by human activities. Nigeria has been increasingly affected by climate change, leading to more frequent and intense weather events such as heavy rainfall, flooding, droughts, and heatwaves.

4.1: EXTREME DAY-TIME TEMPERATURES IN 2024

Table 4.1: Cities and Number of Days with Day-Time Temperatures >40°C in 2024

S/N	City	Observed Maximum Temperature (°C)	Number Of Days with temperature > 40°C
1	Abuja	40.8	4
2	Bauchi	43.0	52
3	Bida	42.6	34
4	Dutse	43.6	75
5	Enugu	40.5	1
6	Gombe	43.0	36
7	Gusau	43.4	45
8	Iseyin	40.2	2
9	Jalingo	44.0	42
10	Kano	44.0	72
11	Katsina	43.6	61
12	Lafia	42.5	21
13	Lokoja	41.0	15
14	Maiduguri	45.9	91
15	Makurdi	42.0	15
16	Minna	42.1	17
17	Nguru	45.0	86
18	Ogoja	41.2	7
19	Potiskum	44.5	72
20	Sokoto	44.8	75
21	Yelwa	43.8	57
22	Yola	44.5	82
23	Zaria	42.5	27

In 2024, extreme temperatures were recorded in states across Nigeria with some states recording day-time temperatures of 40°C and above. These temperatures were mostly experienced in the northern and central states. Similarly, high temperatures were recorded in Enugu in the southeast, Iseyin (Oyo State) in the southwest, and Ogoja (Cross River State) south-south. Maiduguri (Borno State) recorded the highest daytime temperature of 45.9°C and the highest occurrence, recording a total of ninety-one days of temperature above 40°C. Nguru and Yola recorded 86 & 82 days of temperature above 40°C respectively. These high temperatures persisted until June. In 2024, the number of days with temperatures above 40°C increased across the states in the north when compared to 2023.

4.2: EXTREME NIGHT-TIME TEMPERATURES IN 2024

In 2024, low night-time temperatures below 12 °C were recorded in some cities across Nigeria. Among these cities, Dutse experienced the highest number of days with night-time temperatures of 12°C or lower with a total of seventy-nine (79) days. Kano, Jos and Bauchi recorded such temperatures in sixty-nine (69) and sixty-four (64) and sixty-one (61) days, respectively. Most of these extreme low temperatures were recorded in January.

Extremely low night-time temperatures below 7°C were recorded in Nguru, Kano, Bauchi and Dutse. The temperatures recorded in these cities were 6.0°C, 6.3°C, 6.4°C and 6.6°C, respectively.

Table 4.2: Cities and Number of Days with Night-Time Temperatures <12°C in 2024

S/N	City	Observed Minimum Temperature ≤ 12 °C	Number of Days with temperature ≤ 12 °C
1	Bauchi	6.4	61
2	Dutse	6.6	79
3	Jos	7.5	64
4	Kaduna	11.6	2
5	Kano	6.3	69
6	Katsina	9.7	9
7	Maiduguri	10.9	4
8	Nguru	6.0	29
9	Potiskum	8.0	22
10	Zaria	10.5	8
11	Usi Ekiti	10.8	7
12	Lafia	10.9	3
13	Yelwa	11.0	2

4.3: EXTREME RAINFALL EVENTS IN 2024

Rainfall totals of 100 mm and above were recorded in various parts of the country throughout the year. Warri, Yenagoa and Benin recorded the highest single day rainfall of 208.0, 195.0, and 183.8 mm, respectively. These were closely followed by Uyo and Shaki with 171.4, and 164.3 mm of rainfall in one day. These are summarized in Table 4.3

Table 4.3: One day Rainfall of 100mm and above in 2024

S/N	City	Highest 1-day Rainfall amount ≥ 100 mm	Number of days with One day rainfall ≥ 100 mm	Annual total
1	Asaba	131.2	2	2490.1
2	Awka	100.7	1	1724.4
3	Bauchi	106.3	1	1502.4
4	Benin	183.8	1	2486.1
5	Calabar	135.0	1	2144.0
6	Enugu	101.6	1	1507.4
7	Ibadan	130.7	1	1669.7
8	Ijebu-Ode	147.2	2	1633.3
9	Ikeja	113.7	1	1513.5
10	Ikom	122.7	1	1865.1
11	Kano	116.0	1	940.9
12	Lagos Island	142.4	1	1799.7
13	Maiduguri	105.0	1	1023.6
14	Makurdi	106.4	1	1373.9
15	Nguru	101.8	1	880.5
16	Ogoja	100.8	1	1797.2
17	Owerri	131.9	1	1824.2
18	Shaki	164.3	2	1540.0
19	Sokoto	122.1	1	1701.7
20	Umuahia	105.9	1	1865.9
21	Uyo	171.4	7	3233.6
22	Warri	208.0	3	2503.5
23	Yenagoa	195.0	11	4853.6

4.4: REPORTED FLOODING ACROSS NIGERIA IN 2024

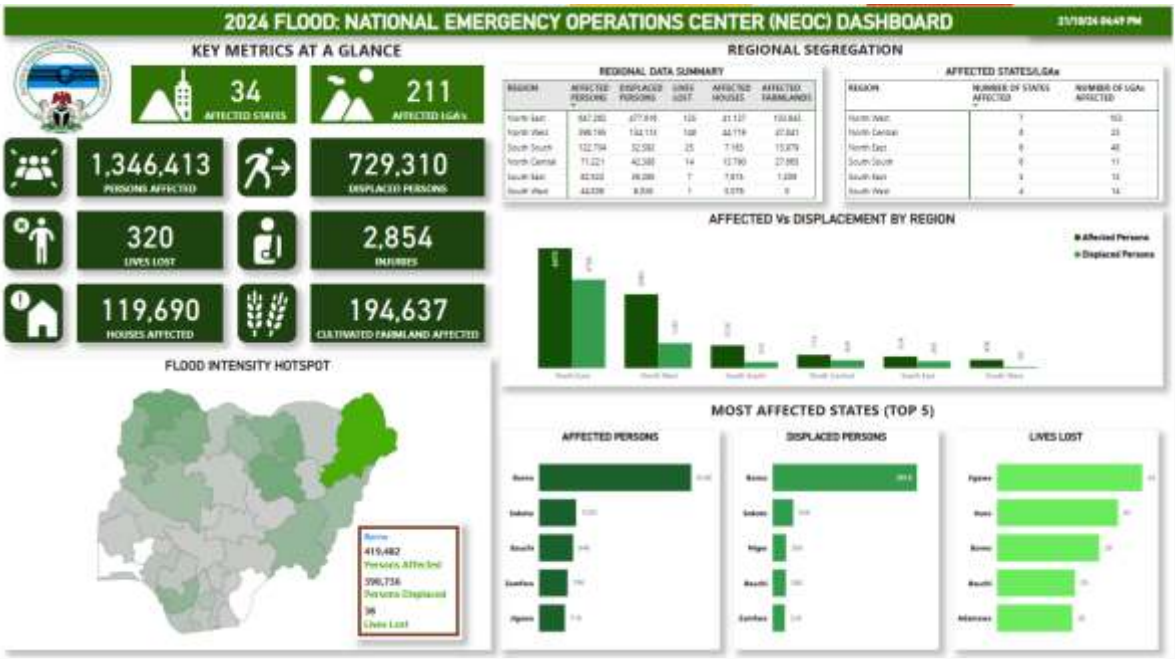


Figure 4.1: 2024 National Emergency Operations Centre (NEOC) Dashboard
Source: https://nema.gov.ng/flood-alert-2024/

In 2024, high-intensity rainfall was recorded in most parts of the country resulting in flooding in no fewer than 34 states across the six geopolitical zones of Nigeria. The northeast was the region most affected by floods in 2024. Over 1,346,413 persons were affected by 2024 floods, out of which 729,310 persons were displaced, and 320 were lost[8].

The Kiri Dam in Adamawa State and the Alau Dam in Borno State were some of the dam facilities that were impacted by the prolonged rainfall in Adamawa and Borno states of Nigeria. Additionally, the water discharged from the Lagdo Dam in Cameroon also exacerbated the river flooding that was experienced in Nigeria, particularly in those states bordering the Niger and Benue Rivers.

4.5 DUST HAZE EPISODES ACROSS NIGERIA IN 2024

Dust haze is a common weather phenomenon during the dry season in Nigeria. Its occurrence, when severe, can lead to drastic reduction in both horizontal and vertical visibility. Dust haze is brought about by predominant dry north easterly winds blowing from the heart of the Sahara Desert into the vast land of the country bringing with it fine dust particles that are raised by strong surface pressure gradient force developing over the Azores and Saharan high at about Latitudes 15-30 °N.

Bodélé Depression located at approximately Latitude 17 °N and Longitude 18 °E in the Republic of Chad has been found to be the world's largest source of mineral dust (Hermann et al. (1999), and Legrand (2000); Goudie and Middleton,

[8] https://nema.gov.ng/flood-alert-2024/

(2001)). The seasonal transport of dust from this source region and others to Nigeria by strong winds at 925 hPa level or below is deposited to the lower layers of the atmosphere thereby reducing visibility. The increased atmospheric aerosol concentrations that usually accompanies the influx of Saharan dust could also cause irritation of respiratory tracts of both human and animals.

Visibility reductions during the Harmattan constitutes a challenge to the various modes of transportation (air, road and water). The resultant disruption such as flight cancellations and delays in aviation has negative economic consequences.

In 2024, there were significant dust haze events across Nigeria in January, February, March, as well as October, November and December. The lowest horizontal visibility value reported was 200 m in Sokoto and Bauchi in December.

Table 4.4: Dust Spells During 2024 Harmattan Season

No. of Spells	Spell period	Number of days	Places Affected	Visibility Range (m)
2	11th–15th Jan. 26th – 31st Jan.	5 6	Whole country	300-5000
3	1st –3rd Feb. 5th –8th Feb. 16th –19th Feb.	3 4 4	Whole country Whole country Whole country	300-5000 300-5000 400-5000
2	3rd –4th March 18th –21st March	2 4	Whole country Whole country	1000-5000 300-5000
2	Oct 4th –6th Oct 8th –14th	3 7	North North	400-5000 500-5000
3	Nov 2nd 4th Nov 14th –17th Nov 20th –23rd	3 4 4	North North and Central Central	700-5000 400-4000 700-4000
3	11th – 14th Dec 16th –22nd Dec 25th –30th Dec	4 7 6	Whole country Whole country Whole country	200-5000 400-5000 200-5000

4.6 STATE OF AIR QUALITY OVER NIGERIA IN 2024

The air quality over the country is described with emphasis on major air pollutants such as particulate matter (PM2.5), Carbon monoxide (CO) and Nitrogen dioxide (NO2) for which data was available. The following analysis was based on Copernicus Atmospheric Monitoring Service (CAMS) Satellite data.

Amongst these three pollutants, PM2.5 has the highest levels in the atmosphere (Figure 1) and poses the highest risk to Nigerians. Air Quality Index (AQI) describes the quality of air with associated likely health risks or impact. The AQI observed in 2024 revealed that the quality of air over Nigeria was generally good to moderate (AQI 1-100) during the wet season but unhealthy (AQI 101-200) for both sensitive and other persons and occasionally hazardous (AQI > 250) during the dry season because of the high

level of PM2.5 concentration from dust sources present in the atmosphere during this period. The observed levels were far above the World Health Organization (WHO) revised 2021 Air Quality guideline limits (WHO 2024)[9]. However, concentration of NO2 and CO in the atmosphere in the year was lower than that of PM2.5 (Figure 1) and also lower than World Health Organization Air Quality guideline limits. Thus, CO and NO2 posed no serious threat to Nigerians compared to PM2.5.

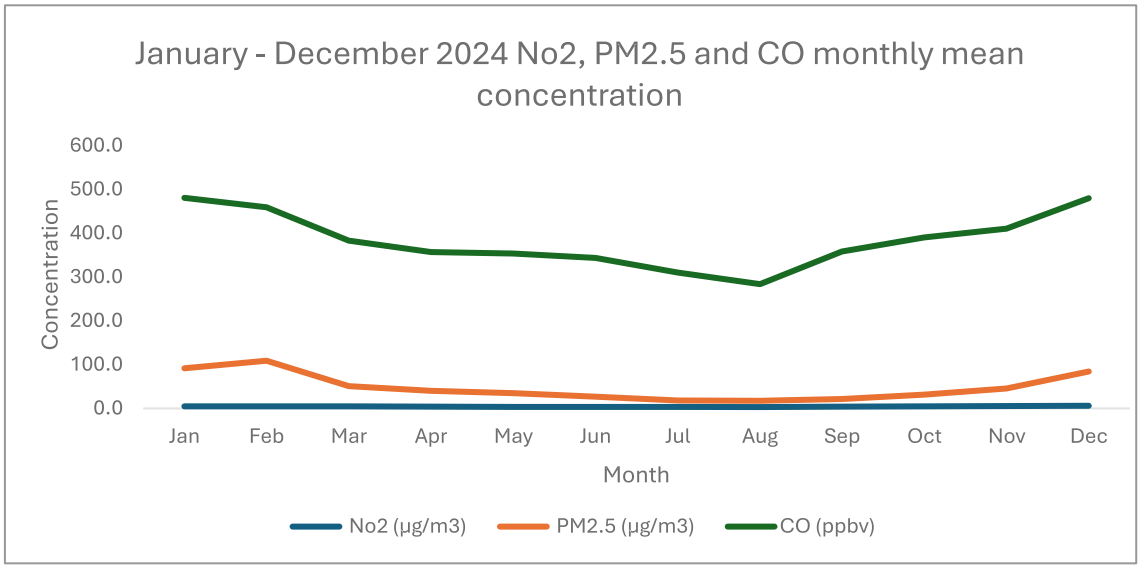


Figure 4.2: January to December 2024 Mean monthly concentration of NO2, PM2.5 and CO Over Nigeria.

4.6.1 SPATIAL DISTRIBUTION OF PM2.5 OVER NIGERIA

The distribution of PM2.5 which posed great health risk to Nigerians in the year is shown in figure 2. The map shows that annual mean levels of 15 to 75 µg/m3 were recorded across most places of the country (about 99%).

Northern States of Yobe, Gombe, Bauchi, Jigawa, Kano, Katsina, Kaduna, Zamfara and part of Plateau, Sokoto, Kebbi and Adamawa recorded the highest mean amount of 50 to 75 µg/m3 in 2024. Other parts of the North and Central States recorded 35 to 50 µg/m3 while the southern states of Cross River, Akwa-Ibom, Rivers, Bayelsa and part of Delta, Edo, and Ondo recorded the lowest PM2.5 concentration of 15 to 25 µg/m3.

The 24-hour concentration of PM2.5 recorded on most days during the dry season and the annual mean levels were observed to be all above the World Health Organization acceptable threshold of 15 µg/m3 per day and 5 µg/m3 per annum. There is no doubt that these levels posed great health risks to Nigerians during the year.

[9] https://www.who.int/news -room/questions-and-answers/item/who-global-air-quality-guidelines

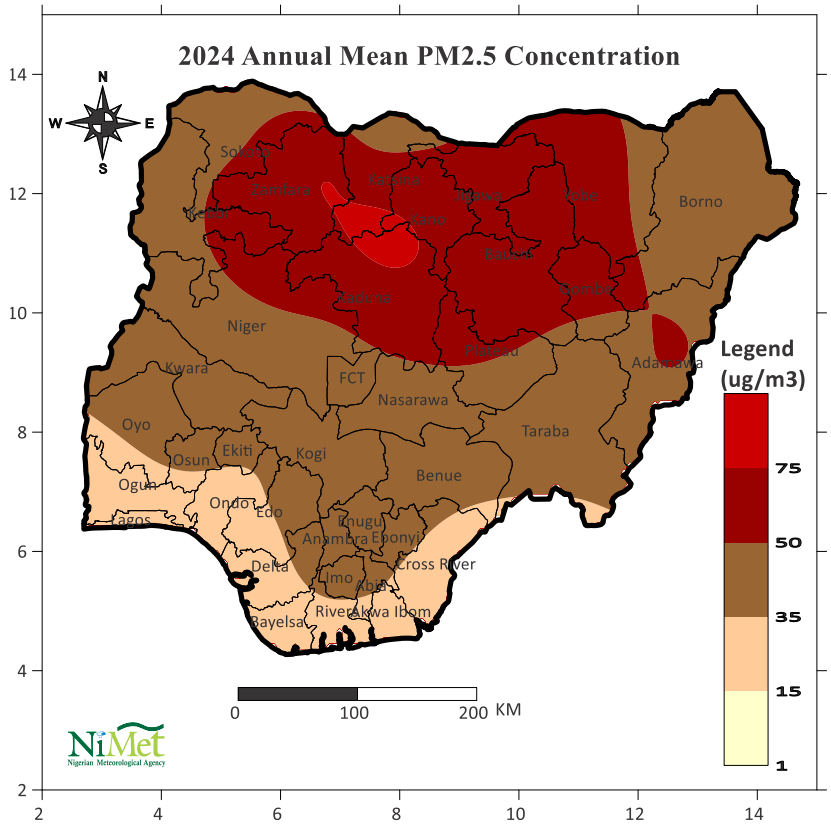


Figure 4.3: 2024 Annual Mean PM2.5 Concentration over Nigeria

CHAPTER FIVE

Socio-Economic Impacts of Extreme Weather Events In 2024

5.0 Socio-economic Impacts Of Extreme Weather Events In 2024

5.1. Severe Weather Report For 2024

Climate change has resulted in extreme weather event, with more intensity and frequency recorded globally, these extreme weather events such as heavy rainfall, very high temperatures, and in some cases extremely low temperatures impact negatively on the climate sensitive sectors of the economy. Extreme event of temperatures has been implicated in the outbreak of some climate sensitive diseases such as measles and meningitis. Some socio-economic impacts of extreme weather events as they occurred and impacted on different sectors in 2024 are outlined below.

Table 5.1: Severe weather report for 2024

S/N	INCIDENT	STATE	DATE OF OCCURRENCE	PUBLICATION	DETAILS
1	Flood	Lagos	Tuesday, February 20, 2024	Daily Trust, Wednesday, February 21, 2024	An early morning downpour caused heavy flood which overran the command bridge in Ipaja, Alimosho Local Government Area.
2	Meningitis	Yobe		Daily Trust, Thursday, February 29, 2024/ The Punch, Friday, March 1, 2024	No fewer than 214 cases of Cerebrospinal Meningitis were recorded in the state.
3	Heatwave	Taraba	Thursday, February 15, 2024	Daily Trust, Saturday, March 16, 2024	The Nigerian Meteorological Agency (NiMet) had predicted prolong heatwave in the north and warned that it can cause high level of heat related illnesses, respiratory issues among other chronic conditions. Residents in Borno, Yobe, Taraba and other parts of the northeastern states said heatwaves made thousands sick with heat induced illnesses like

					Meningitis, cholera, heat rash, heat exhaustion, renal issues and high blood pressure.
4	Rainfall/ Flood	Anambra	Monday, March 25, 2024	THISDAY, Wednesday, March 27, 2024	Heavy rainfall washed off a newly constructed road in Ochanja area of Onitsha.
5	Rainstorm	Plateau	Saturday, 6 April	Daily Trust, Monday April 8, 2024	Over 50 houses and Shops were destroyed by a rainstorm in several Communities in Jos South Local Government Area in the state. The rainfall lasted for about three hours and was accompanied by heavy wind that blew off rooftops of several houses and rendered several families homeless.
6	Flood	Lagos/Ogun	Sunday, April 21, 2024	The Punch, Monday, April 22, 2024	Major roads were overrun by flood in several parts of Lagos and Ogun states.
7	Windstorm	Jos	Wednesday, April 24, 2024	Daily Trust, Wednesday, April 24, 2024	Windstorm destroyed more than 40 houses following a heavy downpour in the state.
8	Rainstorm	Niger	Wednesday, April 24, 2024	Daily Trust, Friday, April 26, 2024/ Vanguard, Friday April 26, 2024	Heavy downpour led to the destruction of part of the Nigeria Correctional Service facility in Suleja.
9	Rainstorm	Ogun	Sunday, April 21, 2024	Daily Trust, Friday, April 26, 2024	40 Communities in Ado-Odo/ Ota Local Government Area experienced power outage following the destruction of electric poles and cables by a rainstorm.
10	Excessive Heat	Lagos		Vanguard, Monday, May 6, 2024	The Nigeria Social Insurance Trust Fund (NSITF), Agege branch raised alarm over increased death rate at work, occupational injuries and diseases due to excessive heat as a result of climate change.
11	Rainstorm	Plateau	Monday, May 6, 2024	Daily Trust, Wednesday, May 8, 2024/	No fewer than 200 houses, shops, livestock pens and trees were destroyed in Miango District in

				The Nation, May 8, 2024	Bassa Local Government Area in the state. Three persons were injured and several others rendered homeless
12	Rainstorm	Kaduna	Thursday, May 2, 2024	The Punch, Wednesday, May 8, 2024	Over 1000 houses were destroyed following a heavy downpour that battered 10 Communities within the Kajuru Local Government Area in the state. The rainstorm that started that lasted over three hours and rendered more than 400 families homeless.
13	Flood	Lagos	Monday, May 6, 2024	The Punch, Wednesday, May 8, 2024	Amje Estaport Community Bridge in Agbado/ Oke-Odo area in the state collapsed after a downpour on Monday.
14	Windstorm	Gombe	Monday, May 6, 2024	Daily Trust, Thursday, May 9, 2024	One killed and 15 others injured following a windstorm that destroyed property worth millions of naira at the Southern bypass in the state metropolis. The incident took place at about 5pm during the first rain of the season in which over 100 houses were also destroyed.
15	Heat – waves	Adamawa		Daily Trust, Saturday, May 18, 2024	No fewer than 200 people were killed by a dangerous humid heat that was experienced from the 1st to 13th of this month in the state.
16	Rainstorm	Plateau	Thursday, June 6, 2024	Daily Trust, Friday, June 7, 2024	Rainstorm destroyed more than 100 houses in Jos North and Jos South Local Government Area in the state. The rain lasted for three hours and was accompanied by strong wind that blew off rooftops of several houses.
17	Windstorm	Zamfara	Monday, June 3, 2024	The Punch, Friday, June 7, 2024	Several buildings were destroyed after a windstorm struck communities in three Local Government Areas in the state. The affected communities include; Tsafe, Maradun and Mafara.

18	Flood	Niger	Saturday, June 8, 2024	Daily Trust, Monday, June 10, 2024	Two people were swept away by flood after a downpour.
19	Cholera	Country wide		Daily Trust, Monday June 17, 2024/ The Nation, Monday, June 17, 2024 The Nation, Thursday, June 20, 2024/ Guardian, Friday, June 20, 2024	As of June 24, there has been 1,528 suspected cholera cases and 53 deaths across 31 states and 107 Local Government Areas with a case fatality rate of 35 percent since the beginning of the year.
20	Flood	Abuja	Monday, June 24, 2024	The Guardian, Tuesday, June 25, 2024/Daily Trust, Tuesday, June 25, 2024	Two people were killed, and properties worth millions of naira was submerged after an early morning downpour in Lugbe, FCT
21	Flood	Plateau	Monday, June 24, 2024	Daily Trust, Tuesday, June 25, 2024	A bridge in Takong village, Shendam Local Government Area collapsed after a heavy downpour in the area.
22	Torrential Rainfall	Yobe	Friday, June 28, 2024	Daily Trust, Monday, July 1, 2024	Heavy downpour in Nangere Local Government Area in the state killed 3 people and injured 7 others. Over 50 houses were damaged leaving several families homeless. The affected communities include; Nangere, Pakarau, Garin Gabako, Makera, Garin Dashu, Magude and Garin Keri.
23	Flood	Lagos	Tuesday/Wednesday, July 3, 2024	Daily Trust, The Nation, Vanguard,	Flood swept away one person after a two days' downpour in many parts of the state that left many

				Thursday, July 4, 2024	communities submerged in Ikosi, Ketu Area in Lagos State.
24	Flood	Lagos	Wednesday, July 4, 2024	Sunday, Punch, July 7, 2024	Flood submerged houses and streets in Lekki, Ikoyi Area in the state.
25	Flood	Jigawa	Saturday, July 6, 2024	Daily Trust, Monday, July 8, 2024	Flood displaced residents and destroyed properties worth millions of naira in Kargo village, Garki Local Government Area in the state.
26	Flood	Akwa Ibom		The Guardian, Wednesday, July 10, 2024	Three Communities were submerged by flood in Uyo metropolis. The affected Communities includes; Nung Obio Enang along stadium road; Urua Ekpa Axis and Afaha Oku villages.
27	Flood	Edo		Daily Trust, Friday, July 12, 2024	Following two days of torrential rainfall, floodwaters submerged 85 houses and caused extensive property damage in Igarra, Akoko Edo Local Government Area in the state.
28	Flood	Lagos/Ogun	Tuesday, July 9, 2024	Vanguard, Tuesday, July 16, 2024	An early morning rainfall in the states left many communities flooded, with houses submerged and property destroyed. The areas most affected include; Surulere; Yaba; Lagos Island; Alimosho; Ayobo; Ipaja; Agege; Ejigbo; Abule-Egba; Ogba and Egbeda areas in Lagos state. Also, motorists and commuters were left stranded in Oke- Afa, Magboro in Obafemi-Owode Local Government Area in Ogun state.
29	Windstorm	Sokoto		Daily Trust, Monday, July 22, 2024	Over 50 households were displaced by windstorm in Shagari and Wamakko Local Government Areas in the state.
30	Flood	Sokoto		The Punch, Monday, July 22, 2024	No fewer than 1,664 persons were displaced as flood sacked four communities in the Gada Local

					Government Area in the state. The flood also destroyed about 779 hectares of farmland. The affected communities include; Dantudu; Balakozo; Gidan-Tudu, Tsites Towns among others.
31	Heatwave	Across the country	Monday, July 22/23	THISDAY, Monday, August 12, 2024	Earth experienced its two hottest days ever in July, with the daily global-average temperature reaching 17.16 degrees Celsius on July 22 and 23.
32	Flood	Jigawa, Yobe, Bauchi, Kebbi		Daily Trust, Tuesday, August 13, 2024	Flood wreaks havoc in several communities in Jigawa, Yobe, Bauchi and Kebbi. Five persons were reported dead and highway submerged in Jigawa. 1,076 persons were displaced in yobe and Bauchi.
33	Flood	Jigawa	Wednesday, August 14, 2024	THISDAY, Thursday, August 15, 2024/ The Nation, August 15, 2024	10 Local Government Areas in the state recorded 16 deaths and 3,936 displaced households affecting 3,834 individuals. The disaster also washed away 2,744 hectares of farmlands.
34	Drought	Adamawa, Gombe, Nasarawa, Taraba, Plateau		Daily Trust, Thursday, August 15, 2024	Farmers in Adamawa, Gombe, Taraba, Plateau and Nasarawa complain over mild drought threatening crop growth on their farms.
35	Heavy Downpour	Kano		Daily Trust, Monday, August 19, 2024	Heavy downpour led to building collapse that reportedly killed 2 people, leaving three others trapped in the debris.
36	Downpour	Jos		The Nation, Wednesday, August 21, 2024	A two-storey building collapsed during a downpour. 22 people were reported to have died and over 100 people injured.
37	flood	Adamawa		Daily Trust, Monday,	Six persons confirmed dead with 10,246 others displaced as

				August 26, 2024 The Guardian, Monday, August 26, 2024	perennial flood wreaked havoc in some communities in Madagali council Area. The catastrophe affected 1,711 households while houses shops, boreholes and many valuables were completely destroyed. 1000 hectares of land was submerged. The outbreak of diarrhea and other waterborne diseases were also reported as flood displaced over 1000 across four Local Government Areas; Numan, lamurde, Demsa, and Madagali.
38	Flood	Taraba		The Guardian, Monday, August 26, 2024	A bridge collapsed in Mayo-Kam, a Community in Bali Local Council. The collapse occurred following a heavy six-hour rainfall.
39	Flood	Gombe		Daily Trust, Tuesday, September 2, 2024	Flood left 2,517 houses, shops and 1000 hectares of farmlands completely or partially destroyed in 33 communities. The disaster ravaged communities in Dukku; Funakaye and Billiri Local Governments Areas.
40	Flood	Kaduna		Vanguard, Tuesday, September 10, 2024	Flood ravaged communities in Kafanchan and other villages in Jemaa Local Government Area in the state. Two people were swept away and 1000 residents displaced.
41	Flood	Oyo	Tuesday, September 24, 2024	The Guardian Friday, September 27, 2024	The death of one confirmed and two missing in a flood incident, leaving an inestimable property destroyed.
42	Flood	Niger	Friday, 27 September 2024.	Daily Trust, Friday, September 27, 2024. The	Flood displaced 82 persons in Mokwa and Mashegu Local Government Area. The report disclosed that as a result of flood

				Guardian, Friday, September 27, 2024. The Punch, Friday, September 27, 2024. The Nation, Friday, September 27, 2024.	this year, 529 communities were affected in 19 out of the 27 Local Government Area in the state. The State's SEMA reported that 246 school infrastructures were washed away, 18 bridges and 80 culverts were destroyed.
43	Flood	Sokoto	Saturday, August 3, 2024	The Punch, Friday, September 27, 2024.	Devastating flood that hit the state on August 3 left over 600 households displaced.
44	Flood	Kebbi, Sokoto	Monday, September 31, 2024	Daily **T**rust, Wednesday, October 2, 2024	Flood washed away a key bridge linking Kebbi, Sokoto and Zanfara State with Southern Nigeria. The bridge collapsed following heavy rainfall.
45	Flood	Plateau	October 4 to 6, 2024	The Nation, Monday 7 October 2024, The Punch, Monday October 7, 2024	Flood displaced over 80 households in Langtang South Local Government Area. This followed a downpour that lasted several hours.
46	Flood	Oyo	Friday, October 11, 2024.	Daily Trust, October 23, 2024	A bridge connecting over 50 communities collapsed due to an unprecedented downpour.
47	Flood	Anambra	Thursday, October 31, 2024.	The Punch, Friday, November 1, 2024	No fewer than 600 houses located in flood prone communities in the state were displaced as flood submerged houses following the rising water level from river Niger and other related activities.
48	Rainstorm	Cross River	Sunday, November 10, 2024	Daily Trust, Tuesday, November 12, 2024	Rainfall threw some parts of the state capital and its environs into darkness in the last three days. The storm destroyed houses, pulled down trees and left so many streets in the metropolis with darkness.

5.2 Role of NiMet in Early Warning and Disaster Risk Reduction in Nigeria

In 2024, the Nigerian Meteorological Agency (NiMet) issued warnings and weather alerts for precautionary and mitigation measures and early preparedness through the Seasonal Climate Prediction (SCP), Agro-Meteorological Bulletin, Hydro-Meteorological Bulletin, Marine Weather Bulletin, High Impact Forecast, Daily Weather Forecast and periodic updates. These products and services were disseminated to the Federal and State Government Agencies like Federal Ministry Of Agriculture And Rural Development (FMARD), National Emergency Management Authority (NEMA), Nigeria Hydrological Services Agency (NIHSA), and States Emergency Management Agencies (SEMAs), among others.

In other to raise public awareness, NiMet also translated the Seasonal Climate Prediction (SCP) document into four Nigerian languages. As part of its mandate, the Agency conducted sensitization workshops and trainings in Borno, Yobe, Adamawa, Katsina, Sokoto, Bauchi, Kogi, Taraba, Kebbi, Gombe, Kaduna, Jigawa, Niger, Plateau, Benue, Ekiti, Kwara, Osun, Lagos, Ogun, Enugu, Cross River, Anambra, Bayelsa, Delta, Abia states and the FCT. Some of these sensitizations as shown in the following figures were done in collaboration with FMAFS, NEMA, State governments and Non-governmental organisations (such as United Nations Development Programme (UNDP), International Fund for Agricultural Development (IFAD), GAIN, Harvest Plus, and Human and Environmental Development Agenda (HEDA), Global Alliance for Improved Nutrition) among others.

Figure 5.1: Capacity building for Abia, Delta and Cross River states Farmers and Extension officers on the importance of Environment and Climate information

Figure 5.2: Sensitization of the 2024 SCP for Agricultural Extension Officers and Farmers in Delta State

Figure 5.3: Downscaling the 2024 Seasonal Climate Prediction to Farmers and Agricultural Extension Officers at Katsina State

Figure 5.4: Training Sokoto State Farmers and Agricultural Extension Officers on the importance of the NiMet Seasonal Climate Prediction

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Acronyms

AQI	Air Quality Index
CAMS	Copernicus Atmospheric Monitoring Service
DTR	Diurnal Temperature Range
ENSO	El-Niño Southern Oscillation
FAO	Food and Agriculture Organisation
FCT	Federal Capital Territory
FMAFS	Federal Ministry of Agriculture and Food Security
GAIN	Global Alliance for Improved Nutrition
HEDA	Human and Environmental Development Agenda
IFAD	International Fund for Agricultural Development
ITD	Inter-Tropical Discontinuity
LDS	Little Dry Season
LGA	Local Government Area
MSLP	Mean Sea Level Pressure
NASA	National Aeronautics and Space Administration
NEMA	National Emergency Management Agency
NEOC	National Emergency Operations Centre
NiMet	Nigerian Meteorological Agency
NIHSA	Nigeria Hydrological Services Agency
ONI	Ocean Nino 3.4 Index SST
SEMAs	State Emergency Management Agencies
SPI	Standardized Precipitation Index
SCP	Seasonal Climate Prediction
UNDP	United Nations Development Programme
WHO	World Health Organisation
WMO	World Meteorological Organisation

Certech Registration Inc.

Certificate of Registration

Quality Management System

ISO 9001:2015

This is to certify that:

Nigerian Meteorological Agency

The Weather and Climate Research Center, Bill Clinton Road, Abuja Airport, Nigeria

Has earned certificate number: 17/2082

The Nigerian Meteorological Agency quality management system conforms to the requirements of ISO 9001:2015 for the following scope:

The provision of meteorological services to the aviation industry

Signed for and on behalf of Certech Registration Inc.

Director

Certificate granted on: May 16, 2017
Last revision date: July 29, 2023
Last scope change: N/A
Certificate renewal date: July 29,2023
Certificate expiry date: July 28, 2026

File number: GNG310O

Dependent locations

Murtala Muhammed International Airport Lagos, Nigeria.	**The provision of meteorological services to the aviation industry**
Mallam Aminu Kano International Airport Kano, Nigeria.	**The provision of meteorological services to the aviation industry**
Port Harcourt International Airport Omagwa, Port Harcourt, Nigeria.	**The provision of meteorological services to the aviation industry**
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