

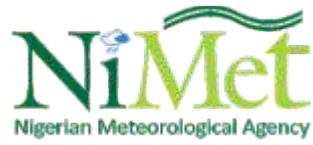


NiMet
Nigerian Meteorological Agency



2024

**STATE OF THE CLIMATE IN
NIGERIA**



2024 State of the Climate in Nigeria

A publication of Nigerian Meteorological Agency

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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

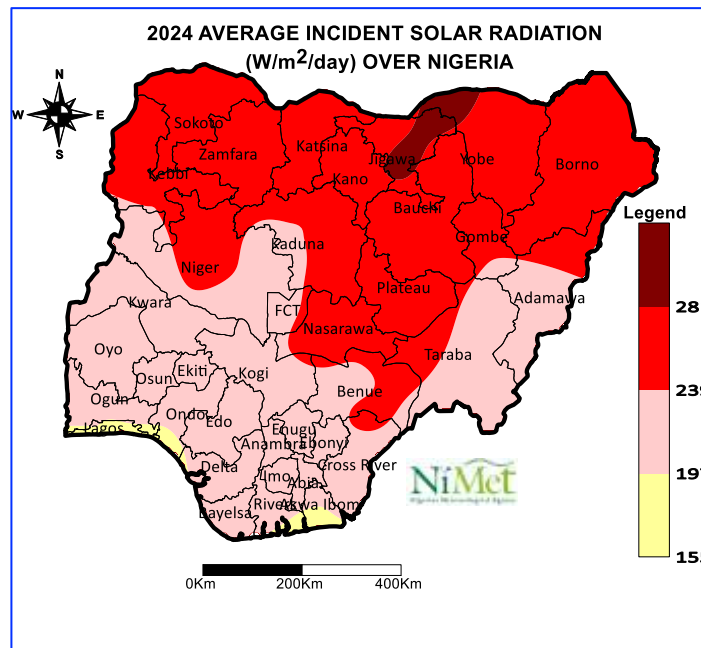


Figure 1.1: Annual Average incident Solar Radiation over Nigeria in 2024

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.

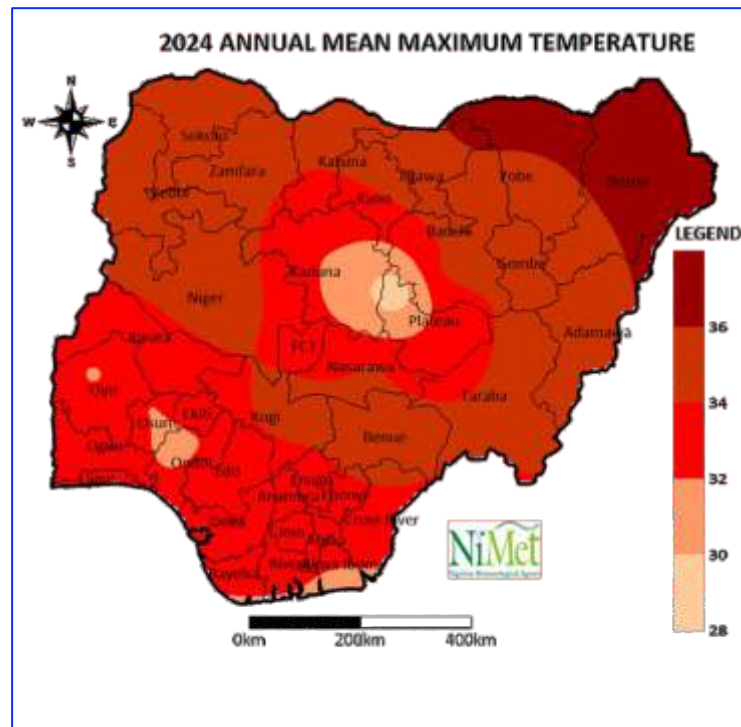


Figure 1.2: Observed Annual Mean Maximum Temperature across Nigeria in 2024

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. 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)

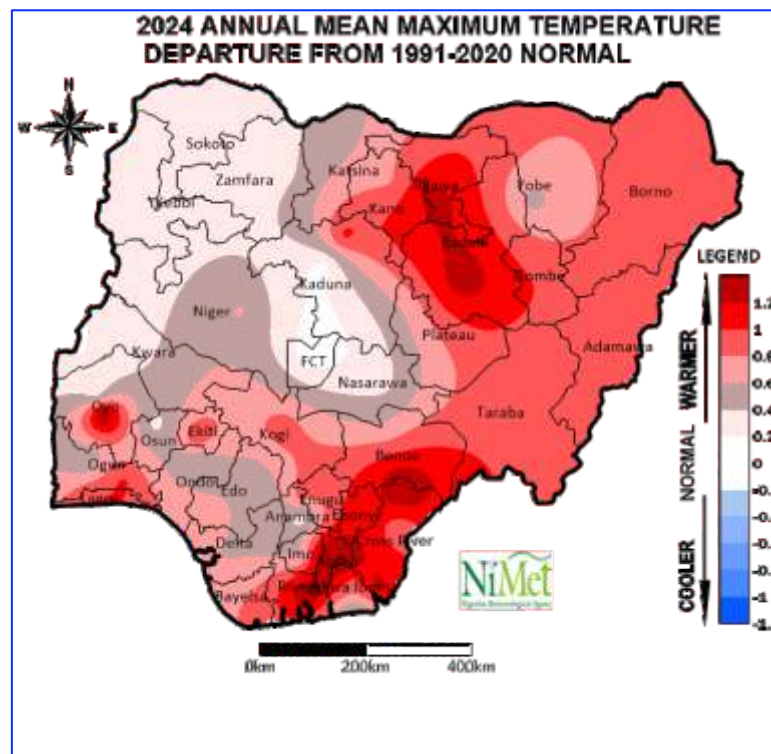


Figure 1.3: Observed annual mean maximum temperature departure from 1991–2020 average (normal) across Nigeria in 2024

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.

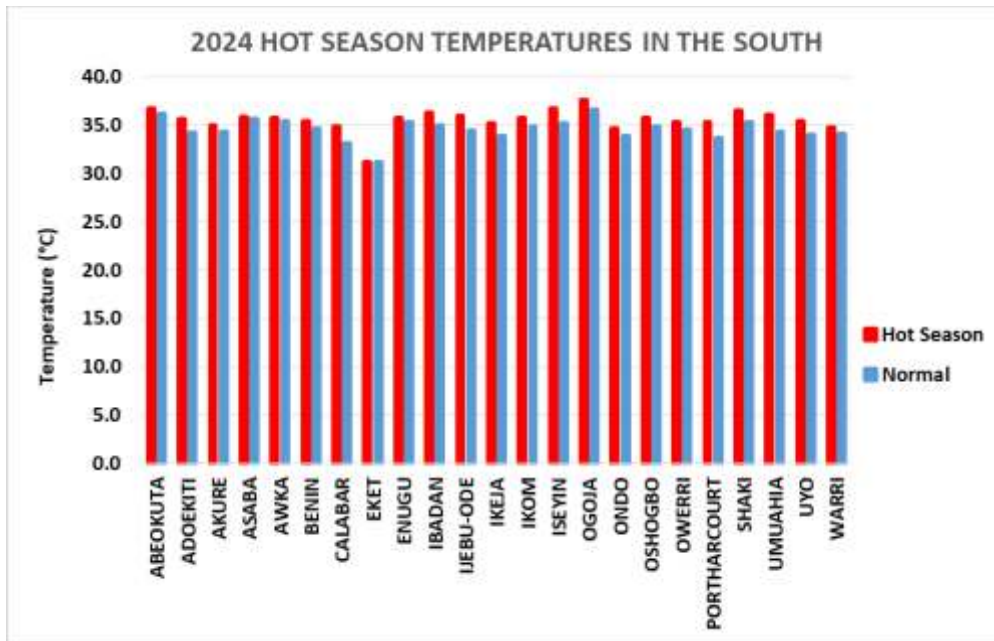


Figure 1.4: Comparison of 2024 Hot season Mean Maximum Temperatures of Cities in Southern Nigeria with the Normal (1991 – 2020 Average)

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.

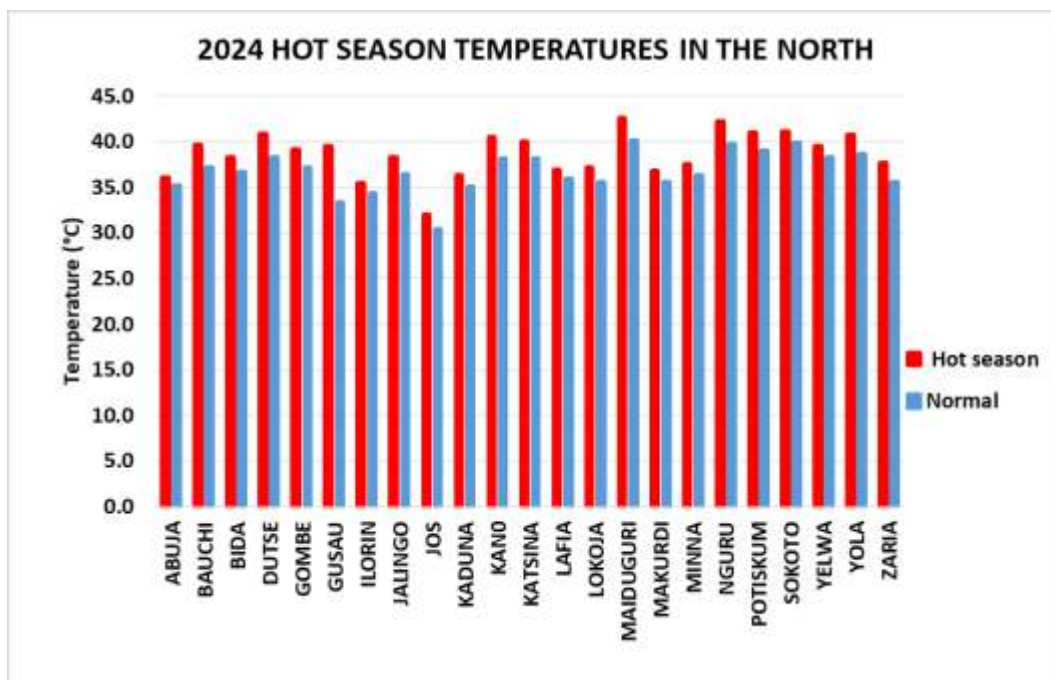


Figure 1.5: Comparison of 2024 Hot season Mean Maximum Temperatures of Cities in Northern Nigeria with the Normal (1991-2020 Average)

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).

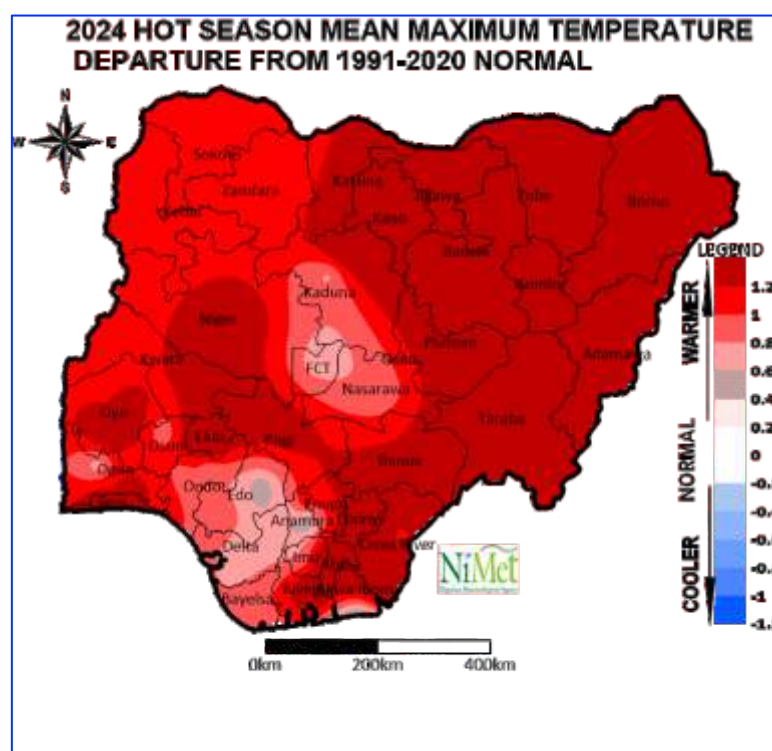


Figure 1.6: Observed Hot season mean maximum temperature Departure from Normal (1991 – 2020 Average)

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).

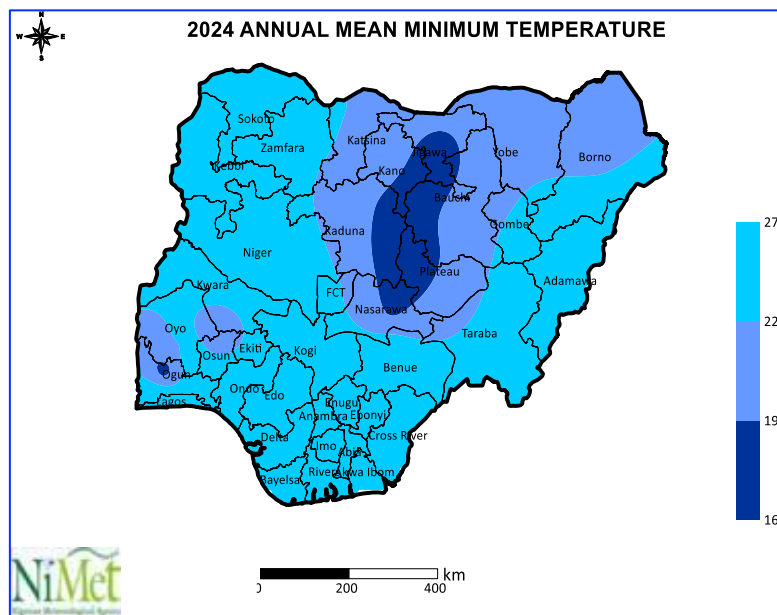


Figure 1.7: 2024 Annual Mean Minimum Temperature Across Nigeria

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).

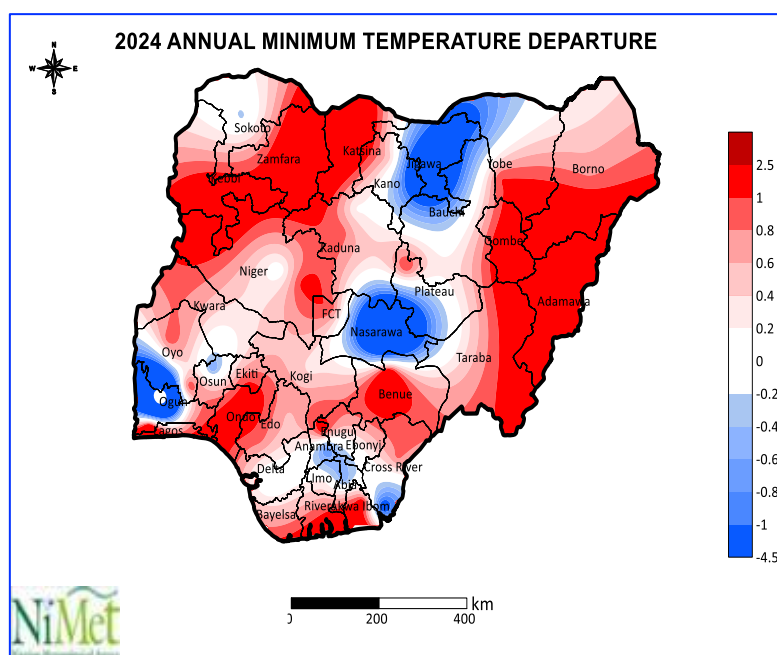


Figure 1.8: 2024 Annual Minimum Temperature Departure from Normal (1991 - 2020 Average)

.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.

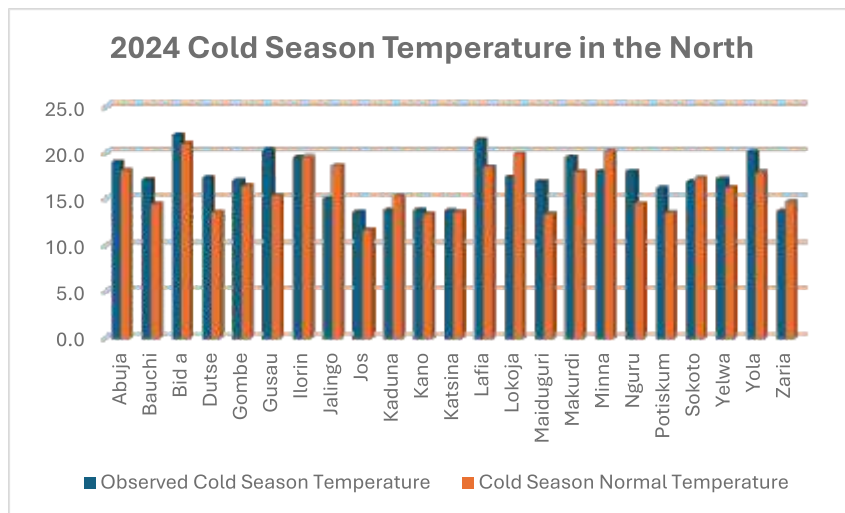


Figure 1.9: Cold season temperatures over the Northern cities in 2024

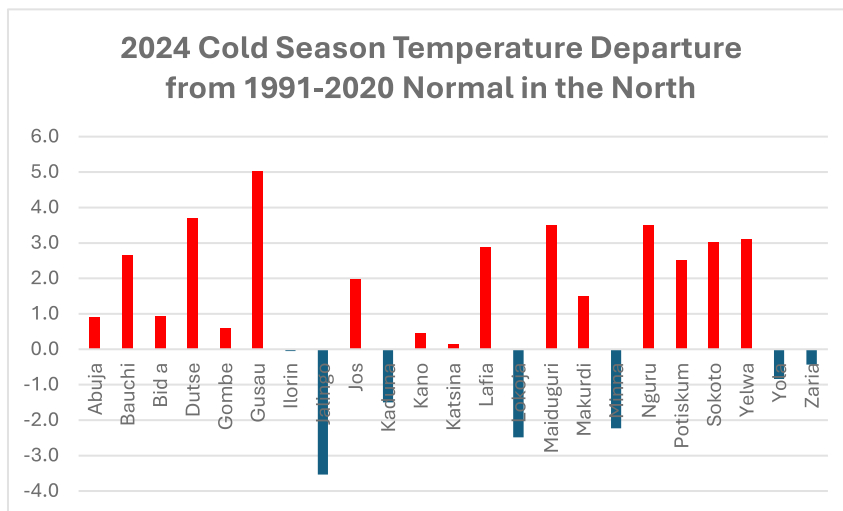


Figure 1.10: 2024 Cold Season Temperatures Departure over the Northern cities

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.

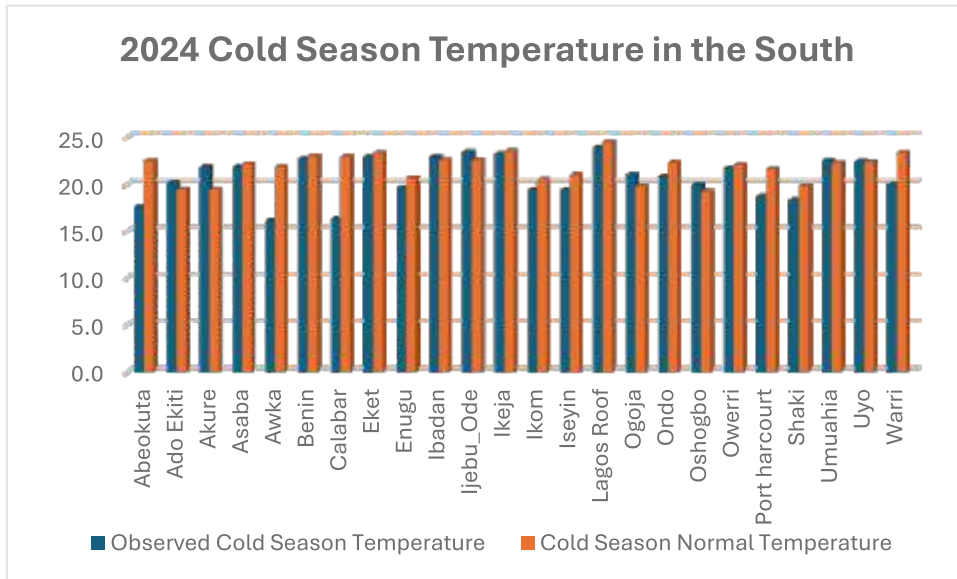


Figure 1.11: 2024 Cold season temperatures over the Southern cities

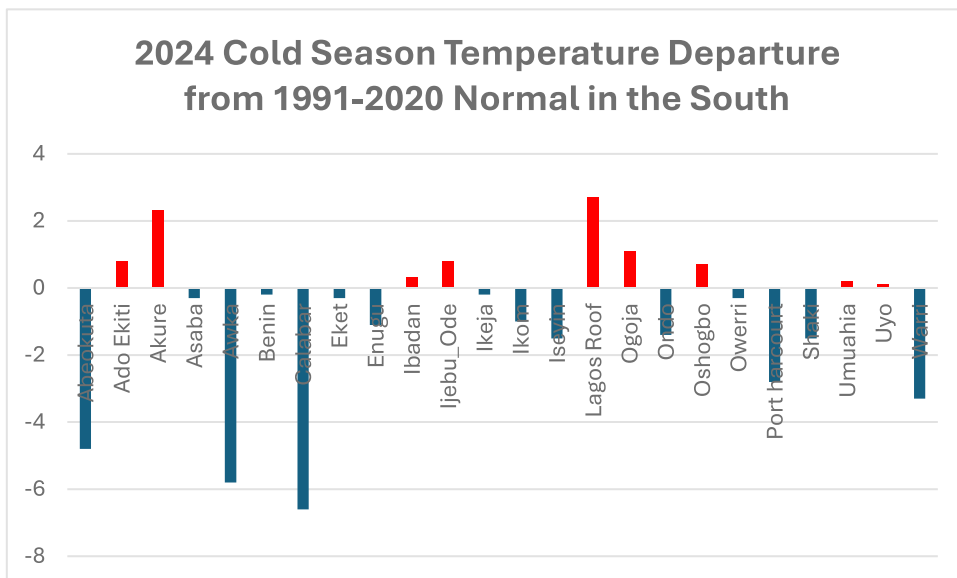


Figure 1.12: 2024 Cold season temperatures departure from long term average over the Southern cities

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).

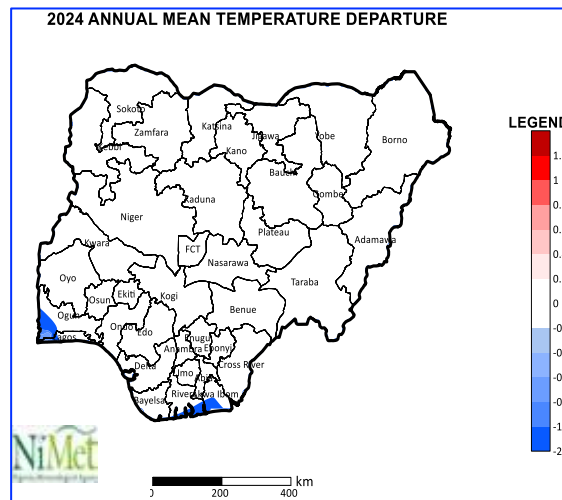


Figure 1.13: 2024 Annual Mean Temperature Departure

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.

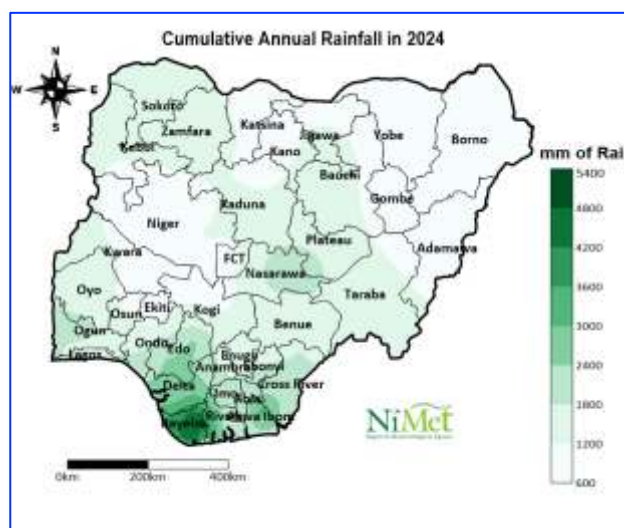


Figure 1.14: Cumulative annual rainfall Across Nigeria in 2024

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).

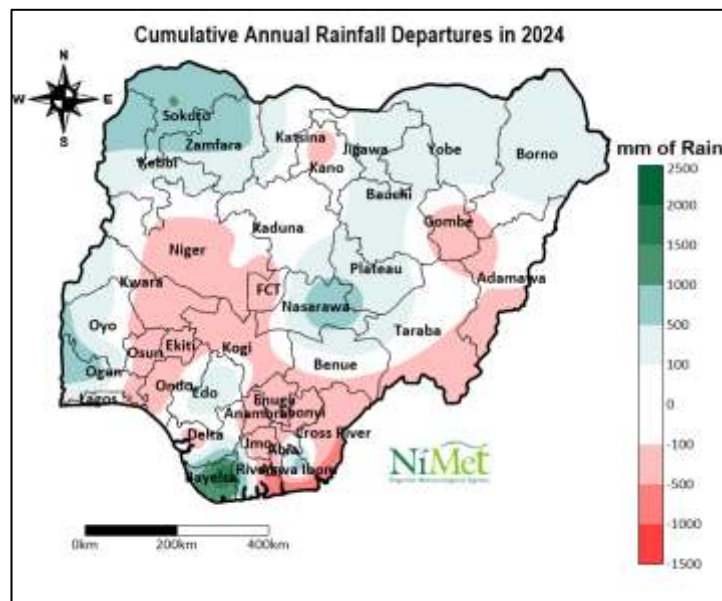


Figure 1.15(a): Cumulative Annual Rainfall Departures in 2024

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 Umuhia (-20%). (See Figure 1.15(b)).

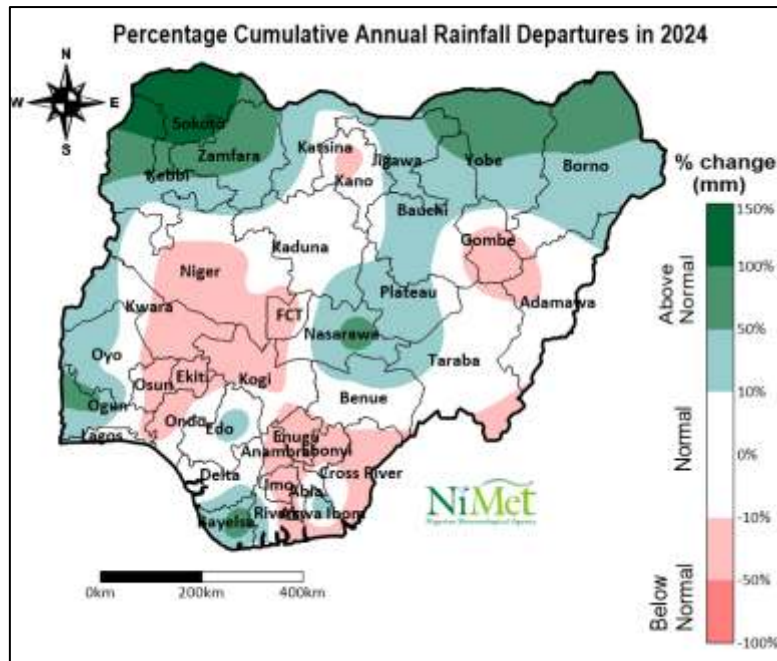


Figure 1.15(b): Percentage Cumulative Annual Rainfall Departures from Long term Average in 2024

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.

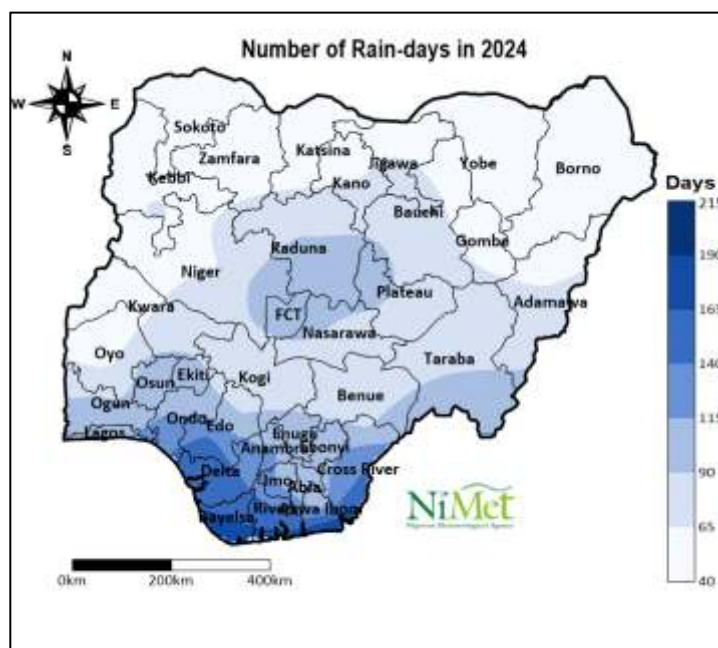


Figure 1.16: Number of rain days across Nigeria in 2024

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).

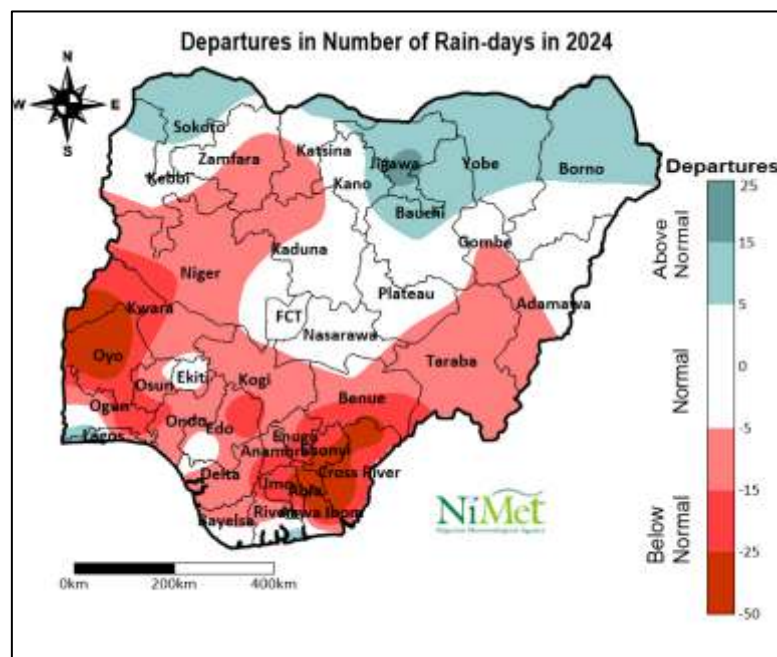


Figure 1.17: Number of Rain-Days Departures in 2024

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.

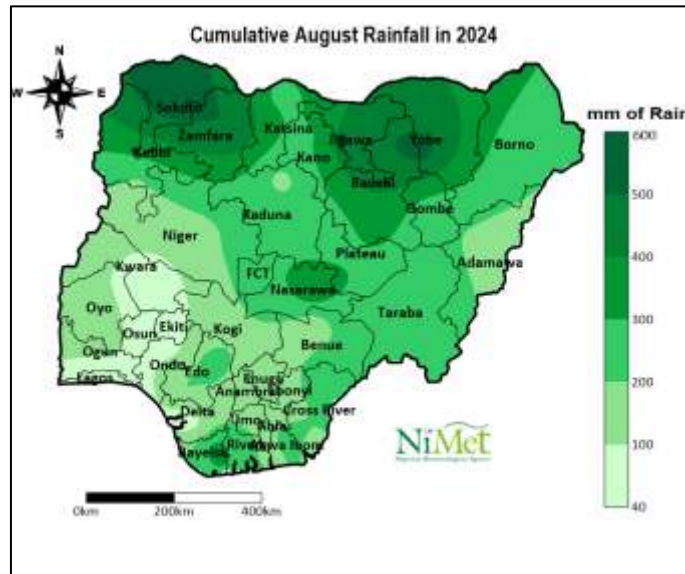


Figure 1.18: Cumulative August rainfall in 2024

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)).

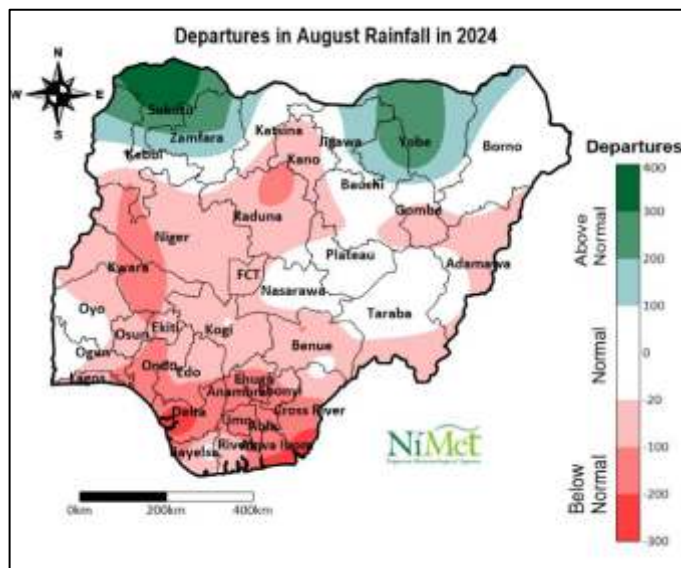


Figure 1.19(a): 2024 August Rainfall Departure from Normal (1991–2020 Long term Average)

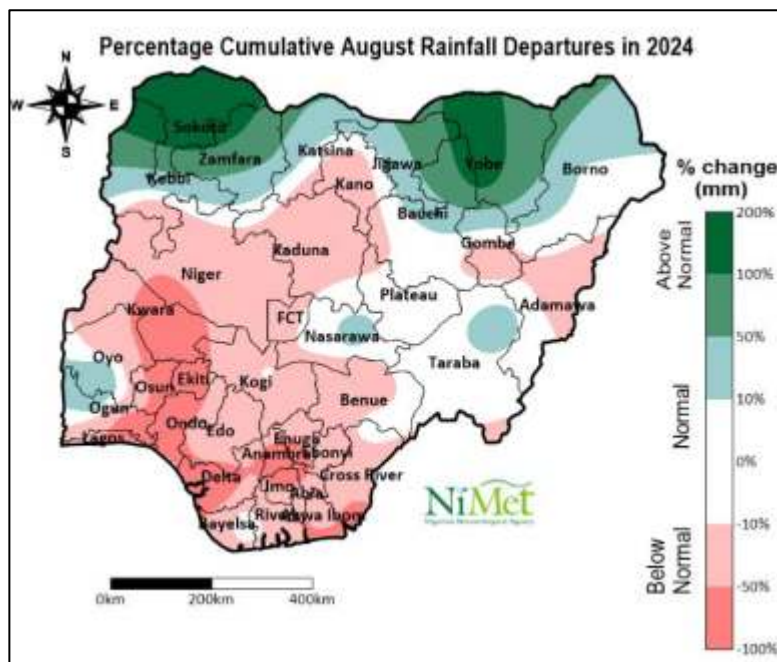


Figure 1.19(b): Percentage Cumulative August Rainfall Departure in 2024

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.

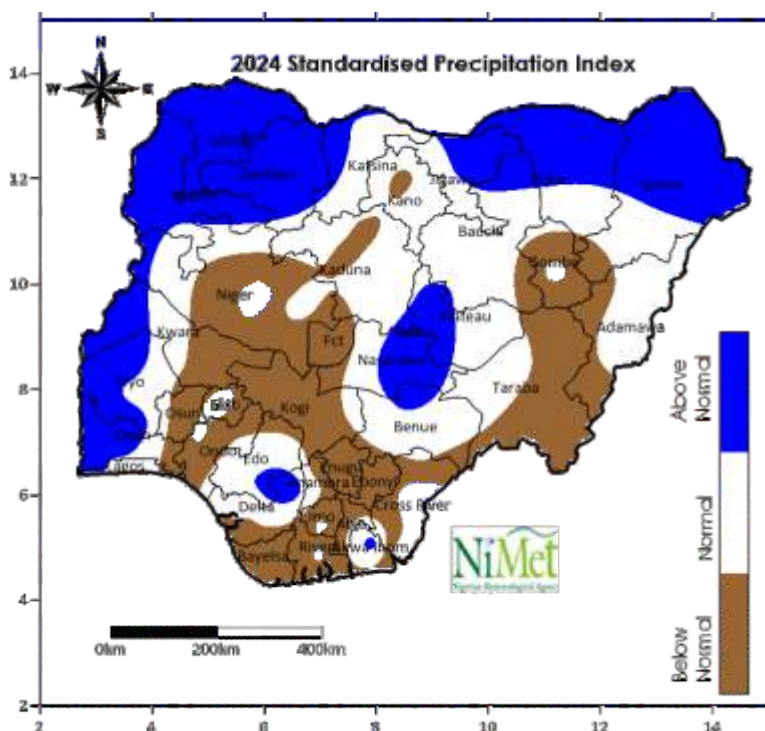


Figure 1.20: Standardized Rainfall Anomaly in 2024

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.

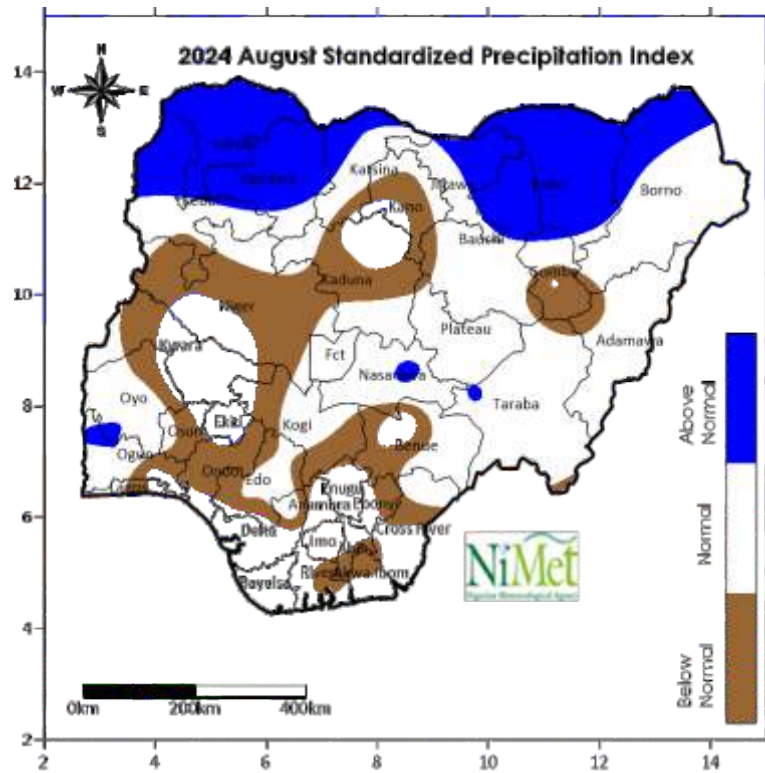


Figure 1.21: Standardized August Rainfall Anomaly in 2024

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.

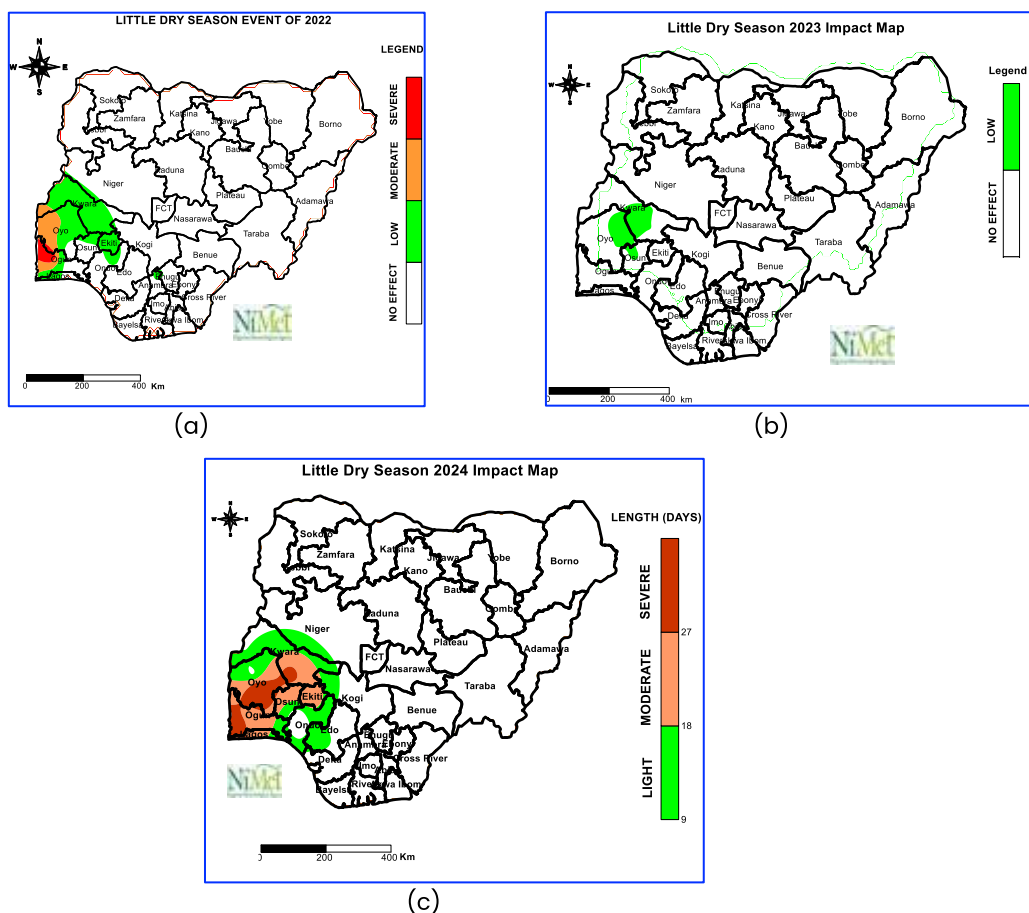


Figure 1.22: Little Dry season impact in 2024, compared to 2023 and 2022

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	22 nd July - 14 th August	24	7	8, 24
2	Akure	21 st - 27 th July, 4 th - 18 th August	7, 15	0	9
3	Ikeja	21 st July - 18 th August	29	13	10, 7, 12
4	Ijebu Ode	29 th July - 18 th August	21	8	12
5	Iseyin	6 th - 13 th August	39	7	13, 9
6	Ondo	26 th July - 1 st August, 3 rd - 12 th August	7, 10	8	10
7	Oshogbo	21 st July - 12 th August	23	7	9
8	Shaki	21 st - 27 th July, 29 th July - 5 th August. 8 th - 15 th August.	7, 8, 8	7	13, 10
9	Ibadan	21 st July - 18 th August	28	7, 7	13, 12
10	Usi Ekiti	11 th - 17 th July, 22 nd July - 19 th 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 2024

CHAPTER TWO

Systematic Changes Of 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 affected²

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).

²Source: <https://reliefweb.int/report/nigeria/nigeria-flood-overview-17-september-2024>

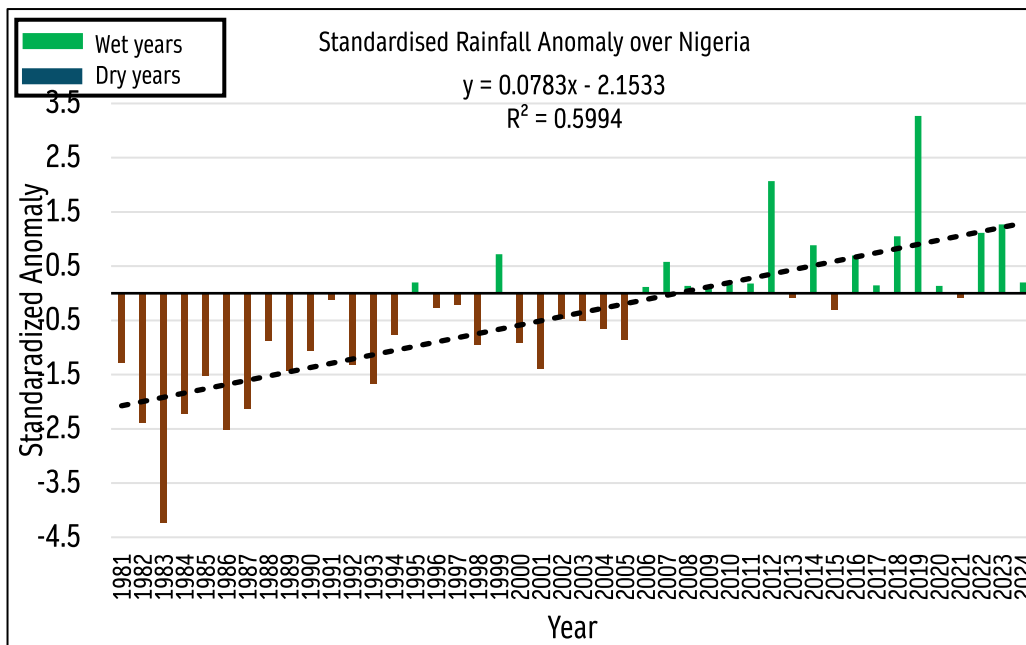


Figure 2.1: Standardised rainfall anomaly and trend over Nigeria for the period 1981–2024 based on data from 47 Meteorological stations and 1991–2020 Climatological Standard Normal

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.

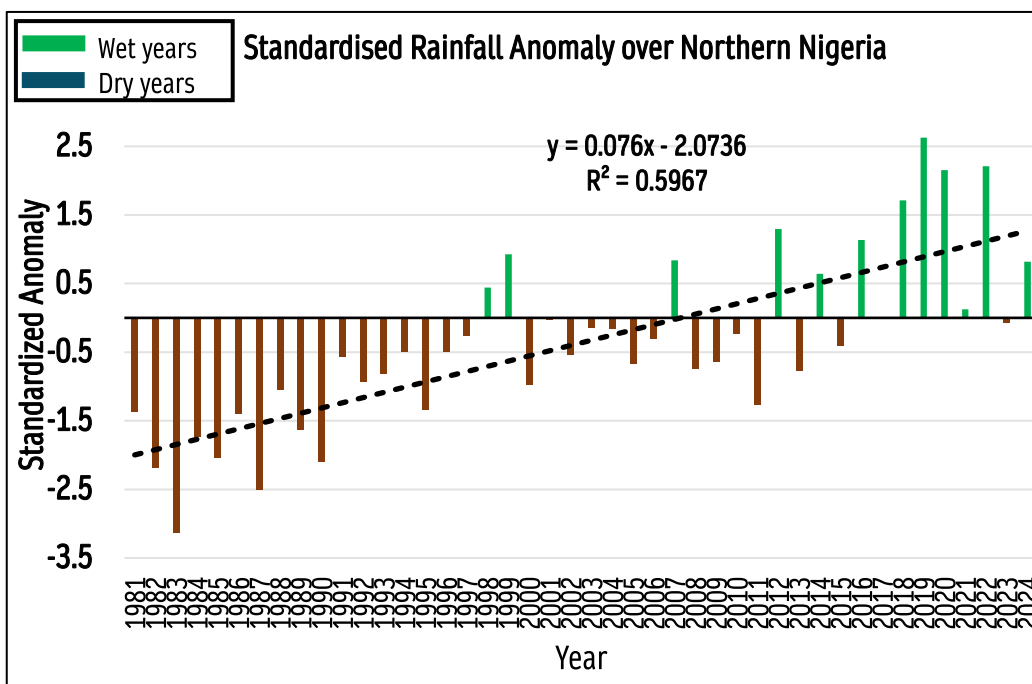


Figure 2.2: Standardised rainfall anomaly and trend over northern Nigeria for the period 1981–2024 based on data from 23 Meteorological stations and 1991–2020 Climatological Standard Normal

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.

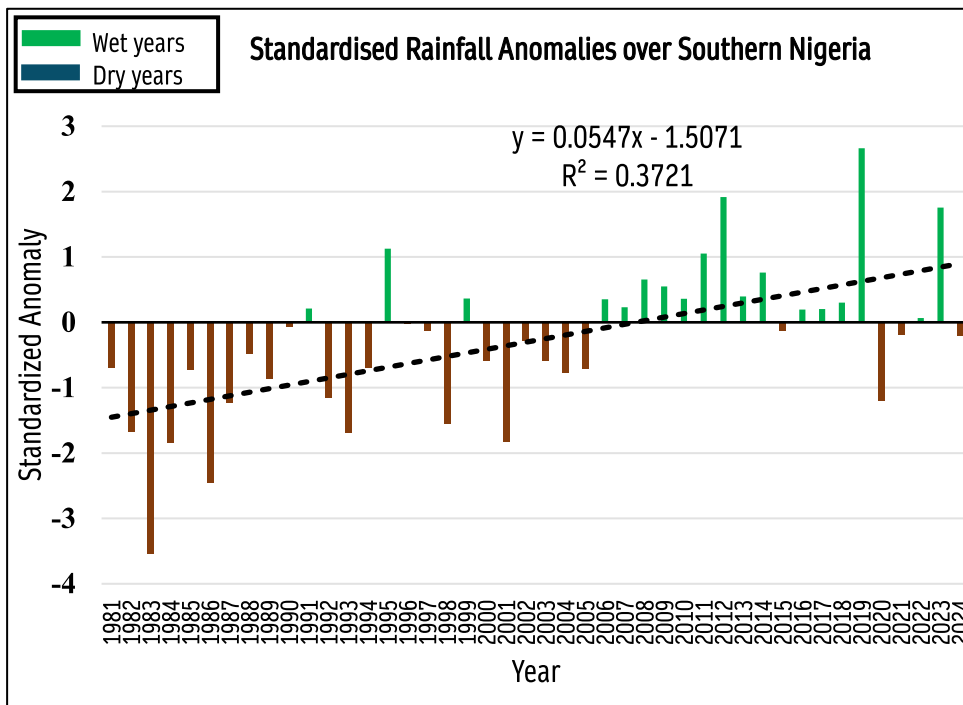


Figure 2.3: Standardised rainfall anomaly and trend over southern Nigeria for the period 1981-2024 based on data from 24 Meteorological stations and 1991-2020 Climatological Standard Normal

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

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.

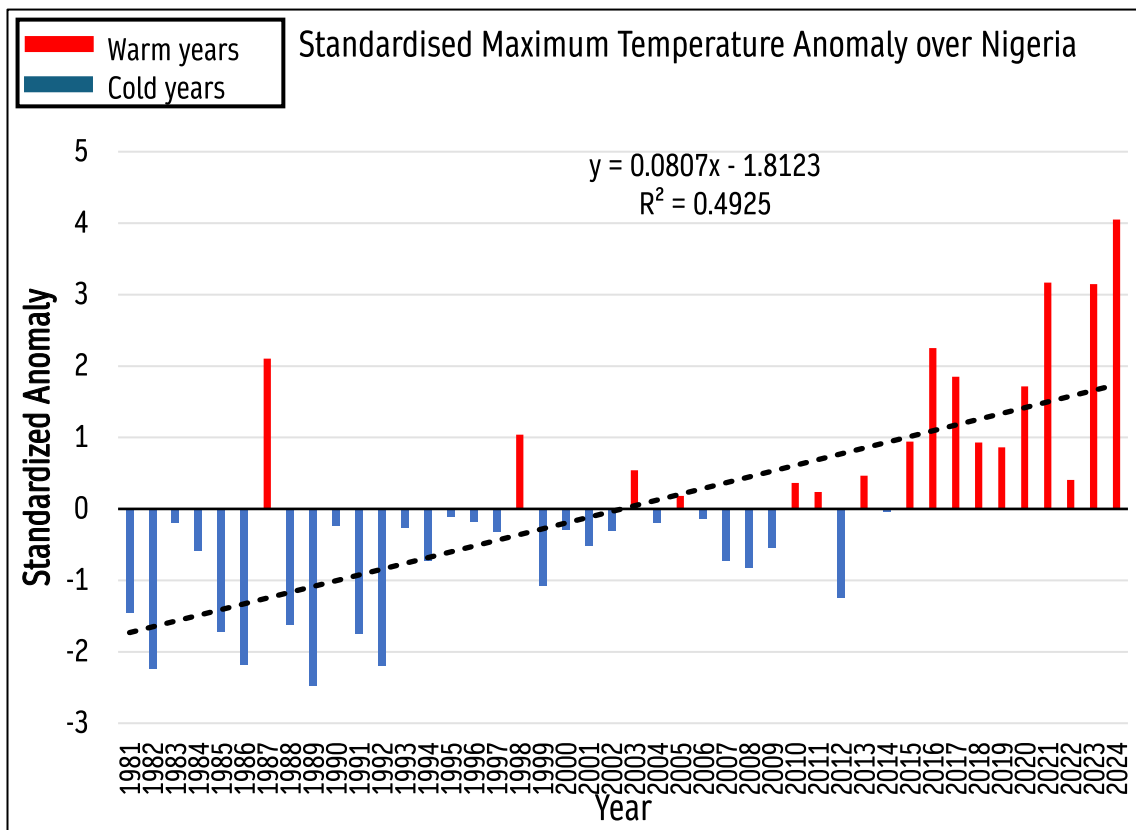


Figure 2.4: Standardised maximum temperature anomaly and trend over Nigeria for the period 1981–2024 based on data from 47 Meteorological stations and 1991–2020 Climatological Standard Normal

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

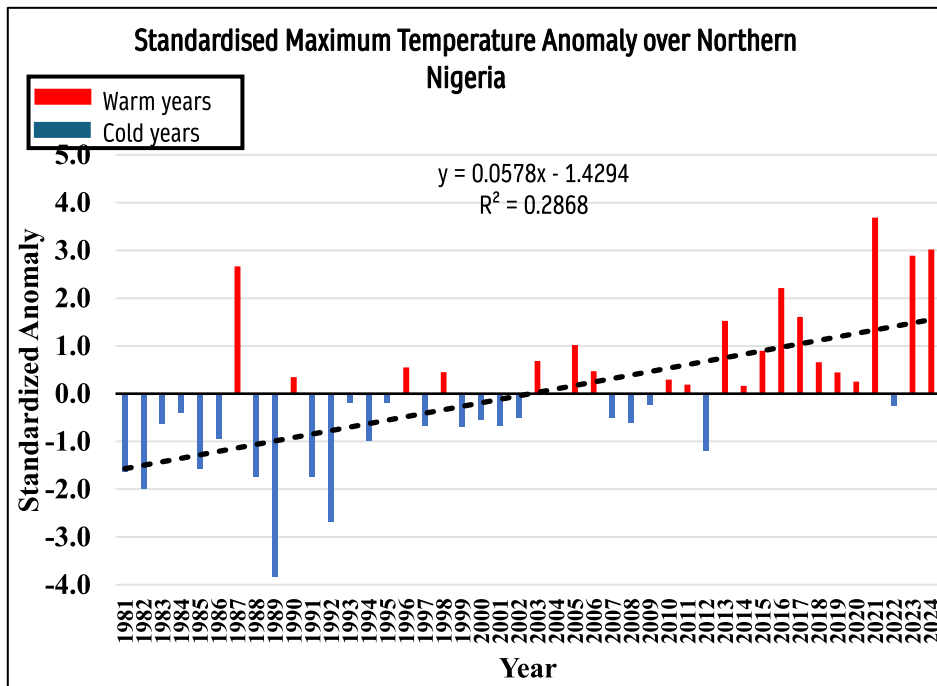


Figure 2.5: Standardised maximum temperature anomaly and trend over northern Nigeria for the period 1981–2024 based on data from 23 Meteorological stations and 1991–2020 Climatological Standard Normal

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.

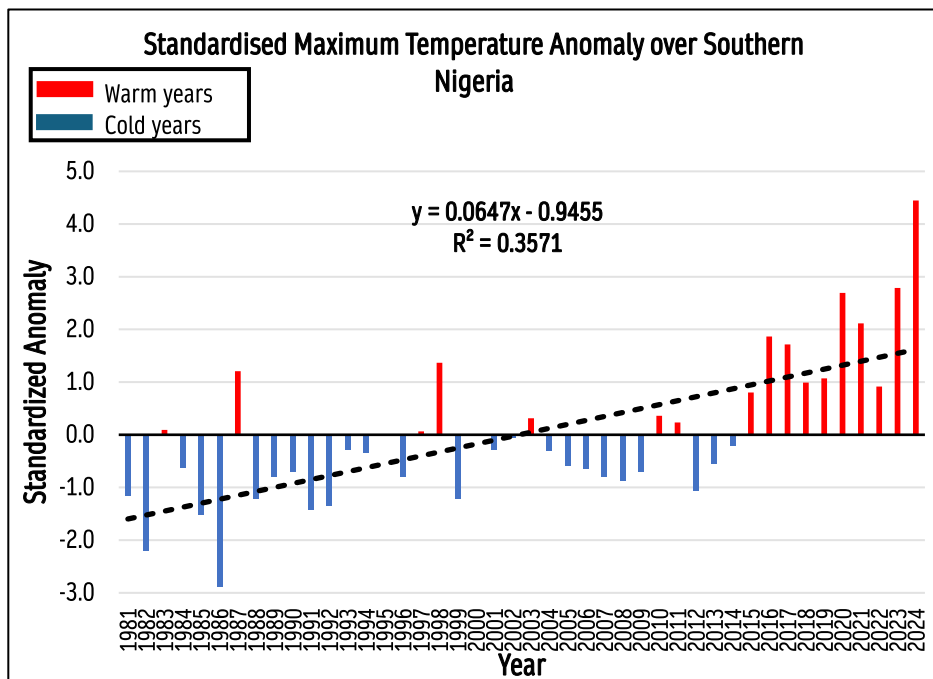


Figure 2.6: Standardised maximum temperature anomaly and trend over southern Nigeria for the period 1981–2024 based on data from 24 Meteorological stations and 1991–2020 Climatological Standard Normal

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.

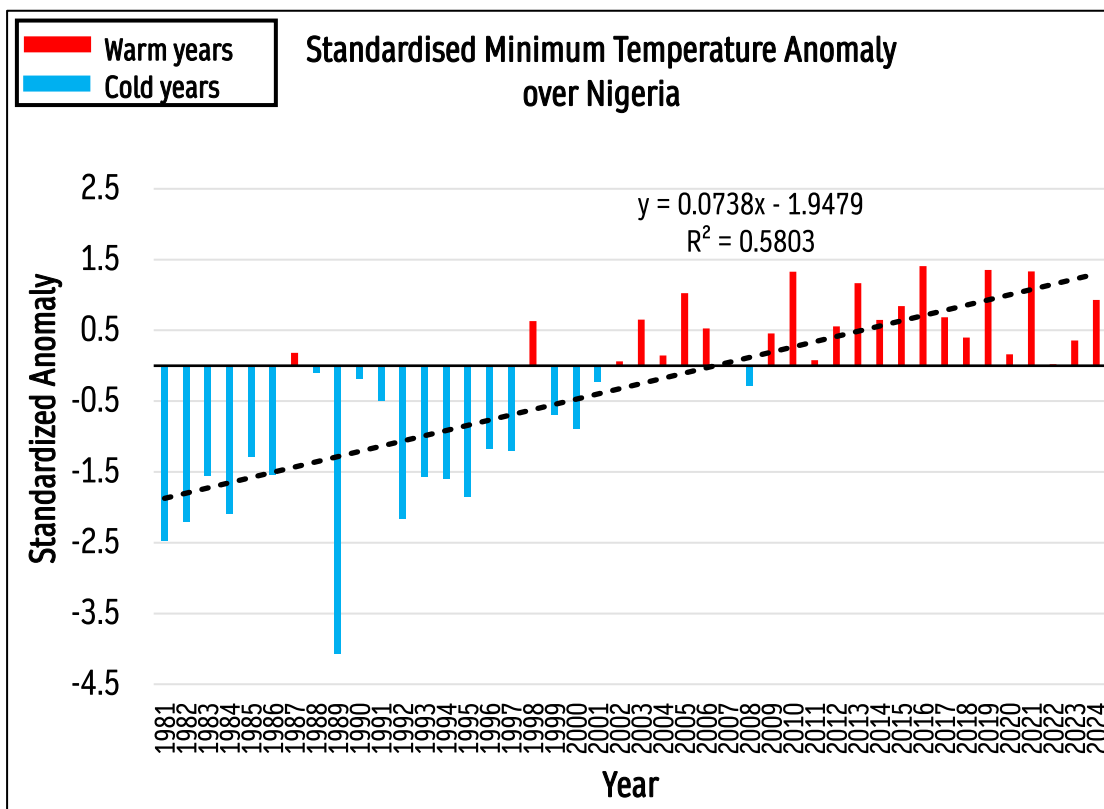


Figure 2.7: Standardised minimum temperature anomaly and trend over Nigeria for the period 1981–2024 based on data from 47 Meteorological stations and 1991–2020 Climatological Standard Normal

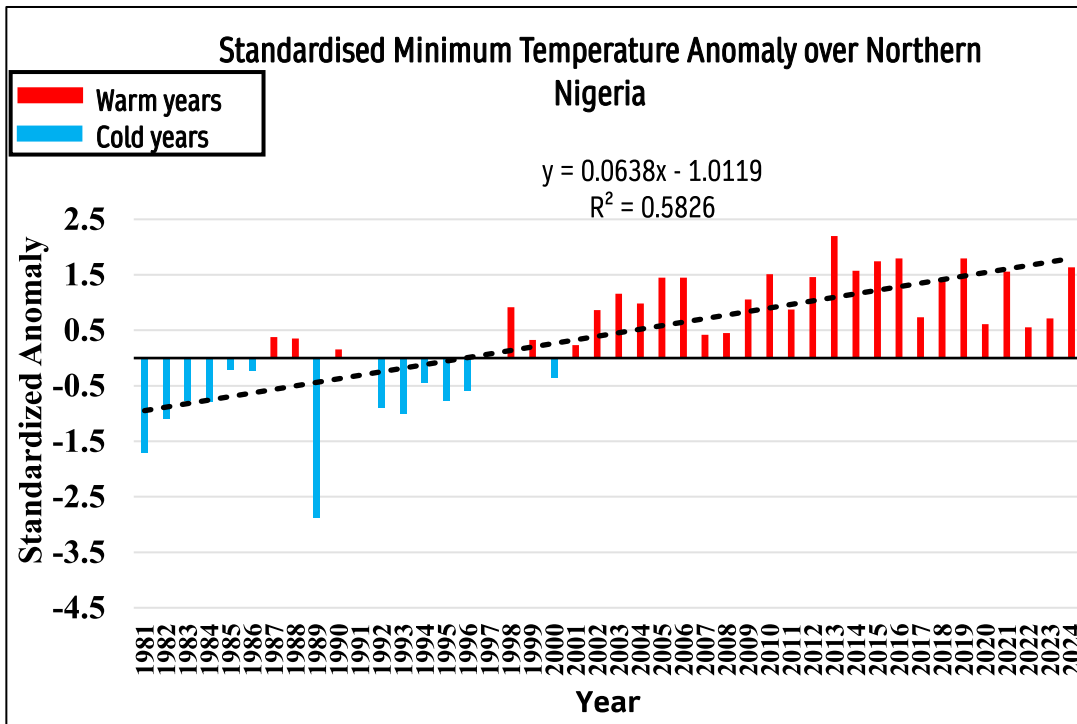


Figure 2.8: Standardised minimum temperature anomaly and trend over northern Nigeria for the period 1981–2024 based on data from 23 Meteorological stations and 1991–2020 Climatological Standard Normal

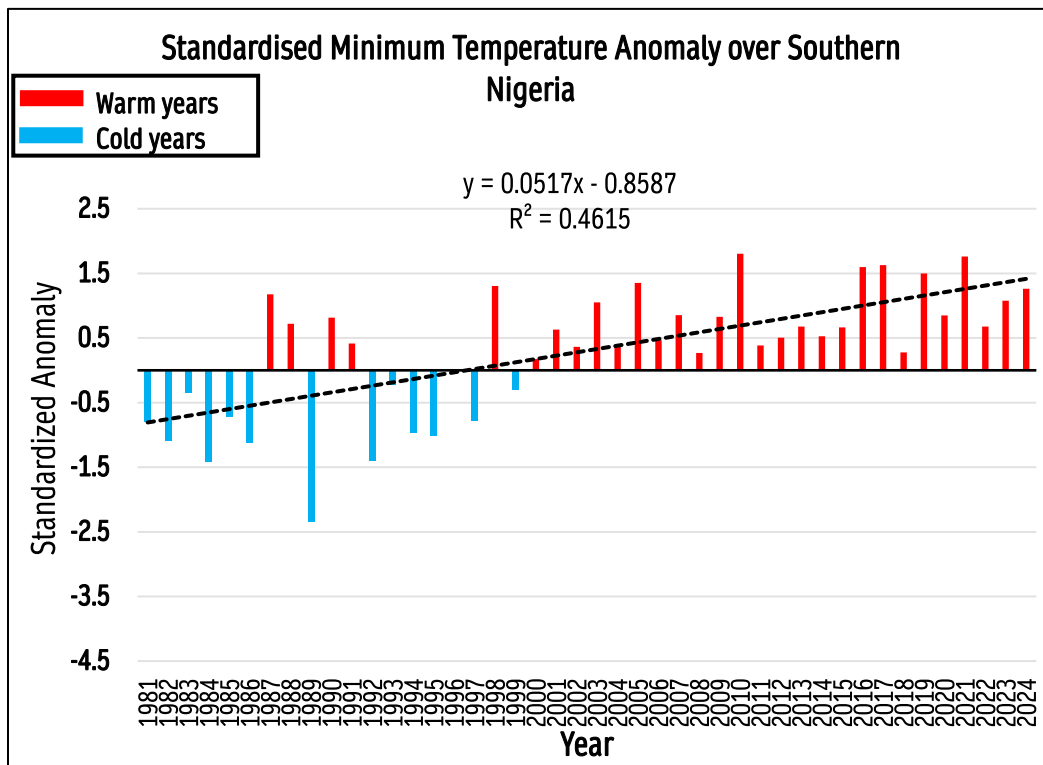


Figure 2.9: Standardised minimum temperature anomaly and trend over southern Nigeria for the period 1981–2024 based on data from 24 Meteorological stations and 1991–2020 Climatological Standard Normal

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.

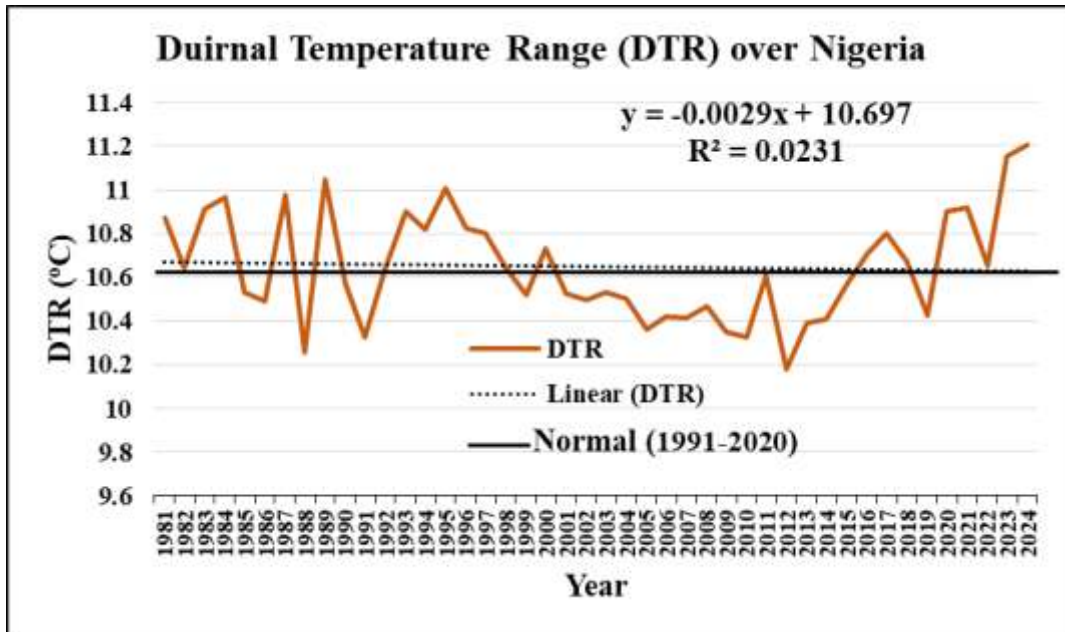


Figure 2.10: Diurnal temperature range (DTR) 1991–2020 climatological average and linear trend over Nigeria during the period 1981–2024 based on data from 47 Meteorological stations

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.

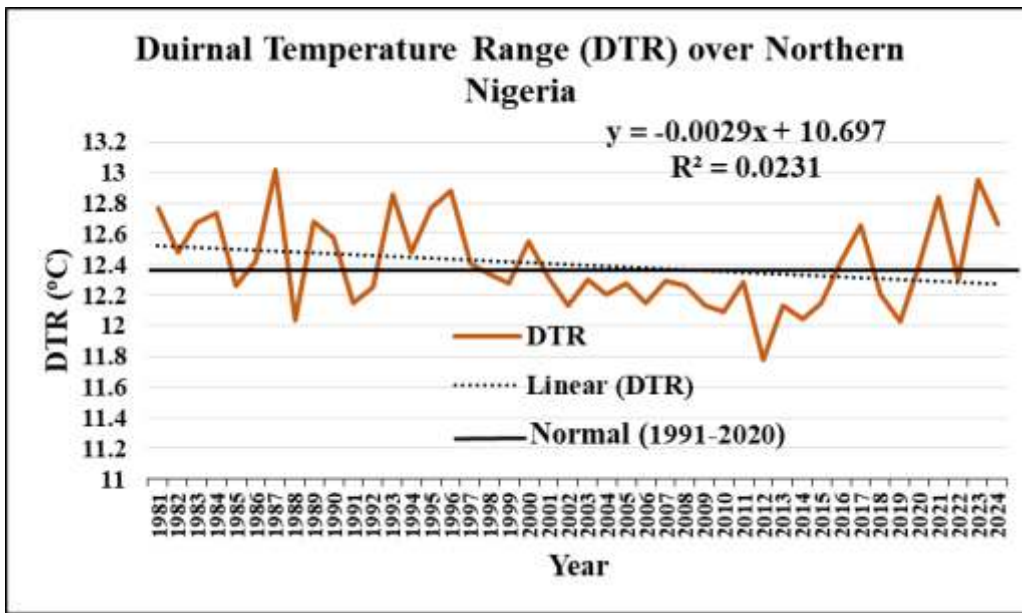


Figure 2.11: Diurnal temperature range (DTR), 1991–2020 climatological average and linear trend over northern Nigeria during the period 1981–2024 based on data from 23 Meteorological stations

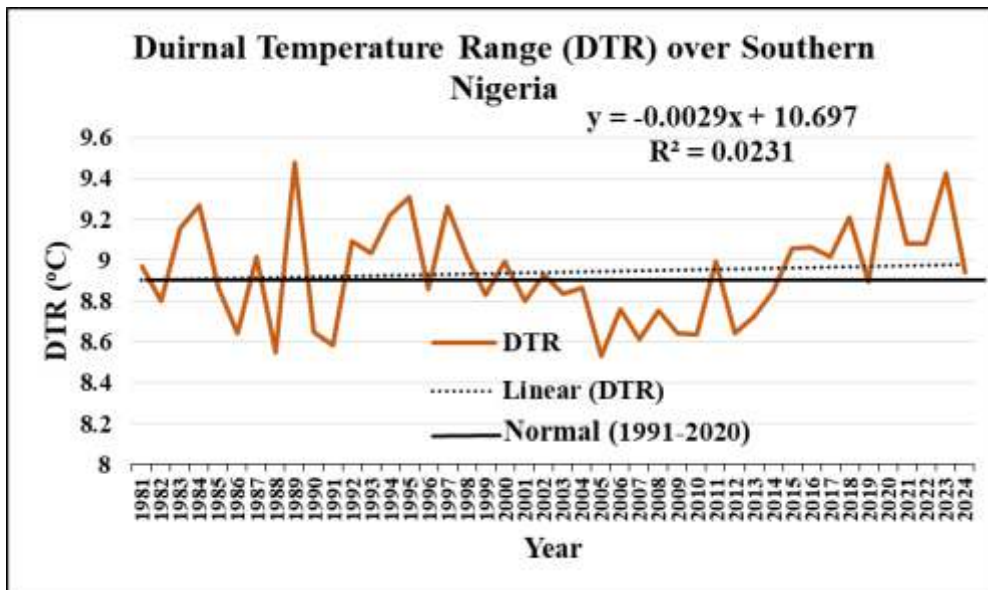


Figure 2.12: Diurnal temperature range (DTR), 1991–2020 climatological average and linear trend over southern Nigeria during the period 1981–2023 based on data from 24 Meteorological stations

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 decadal 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.

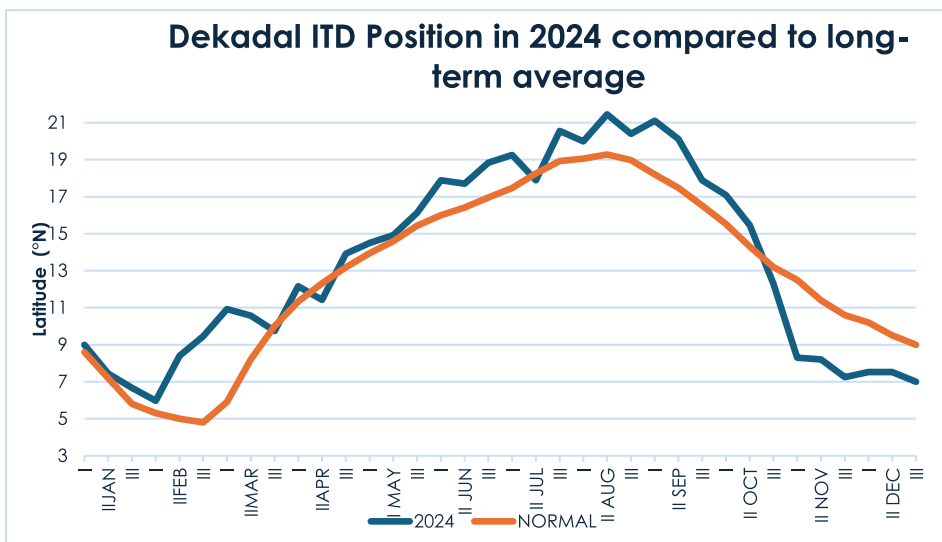


Figure 3.1: Dekadal latitudinal positions of the ITD in 2024 compared with climatological mean over Nigeria

The ITD latitudinal position 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.

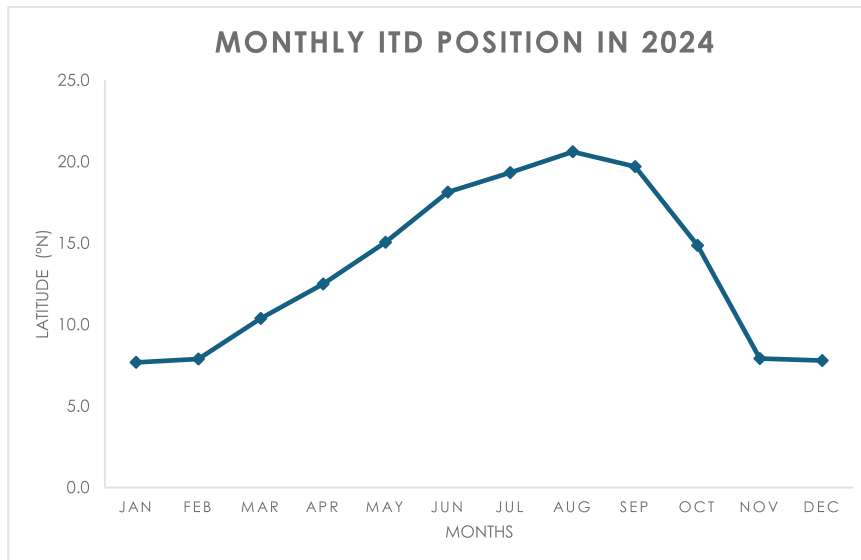


Figure 3.2: Monthly position of the ITD over Nigeria in 2024

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.

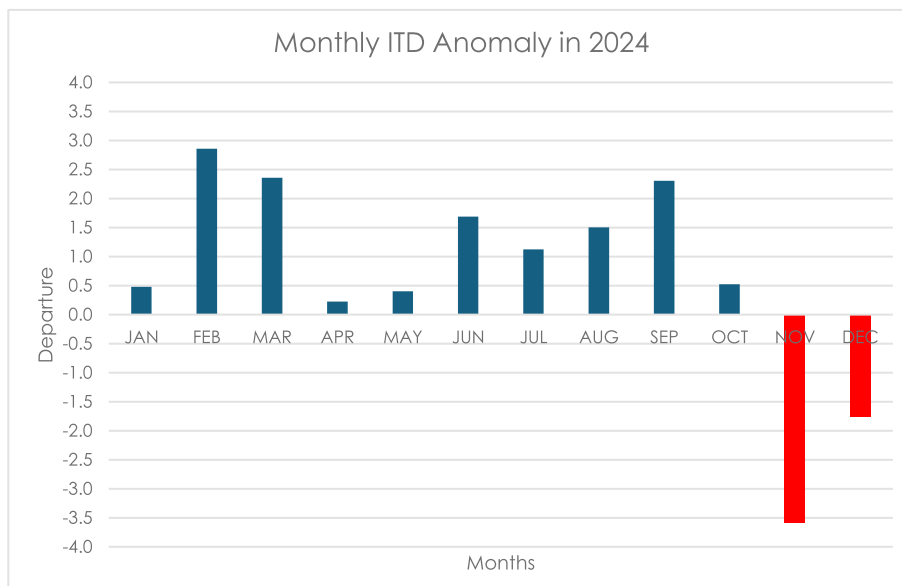


Figure 3.3: Monthly ITD Position Anomaly over Nigeria in 2024

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.

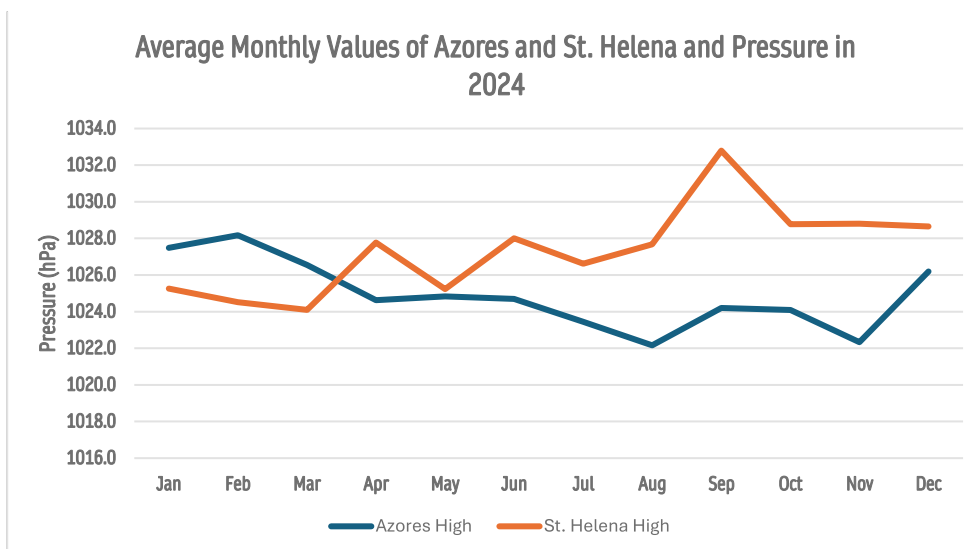


Figure 3.4: Average monthly values of Azores and St. Helena high pressure systems in 2024

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 Niño 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 Niño 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.

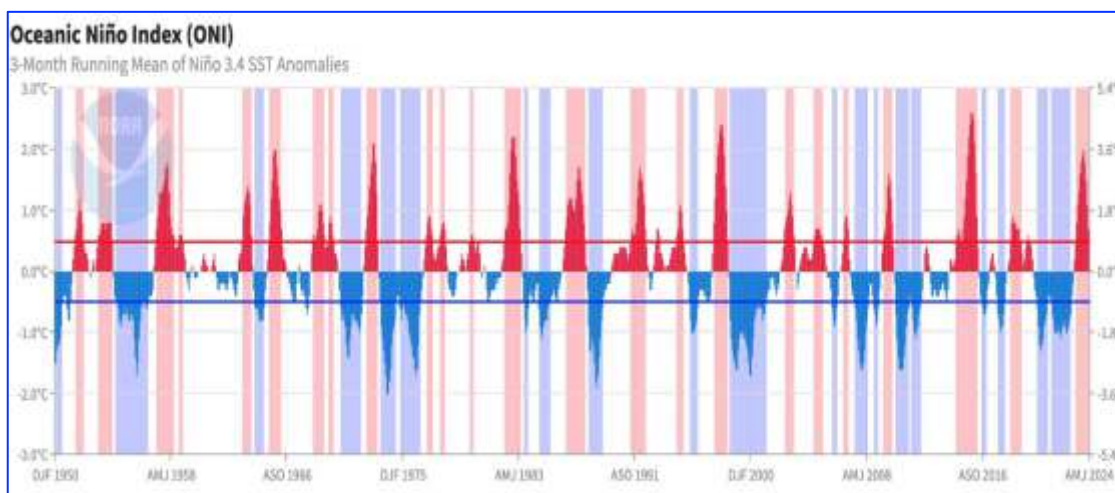


Figure 3.5: Oceanic Niño Index (Sea Surface Temperature Anomaly)³

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.

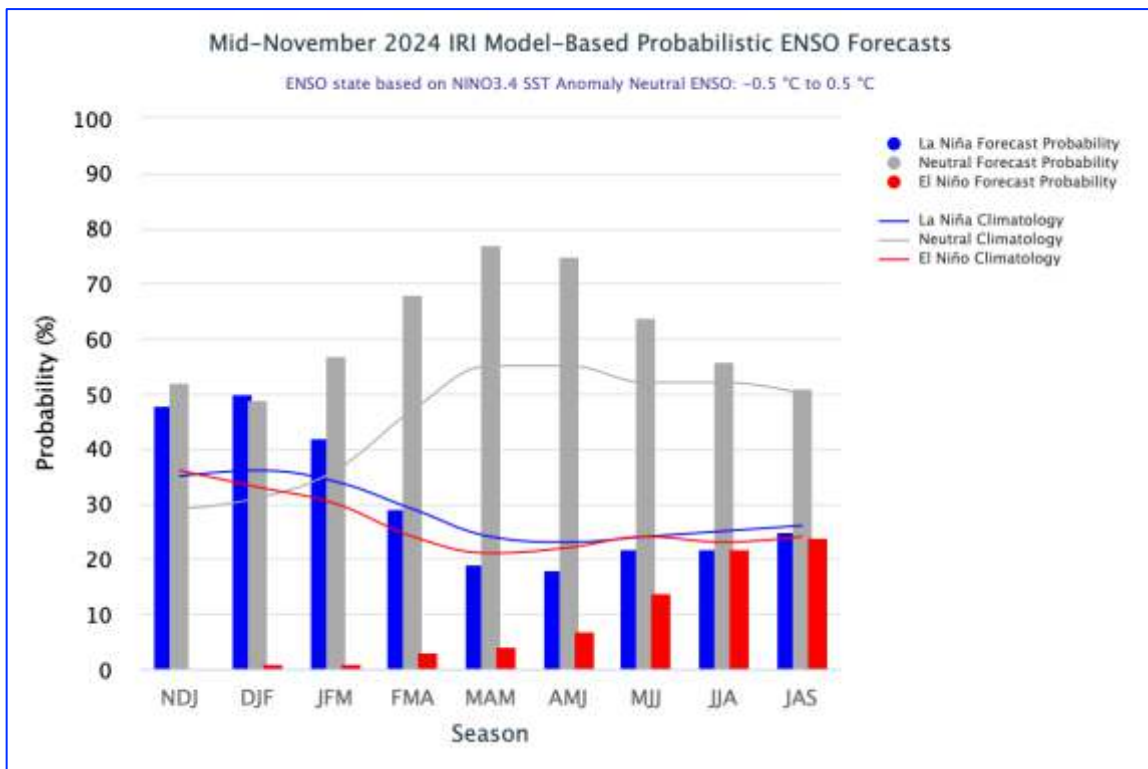


Figure 3.6: Official CPC ENSO Probabilistic ENSO Forecast

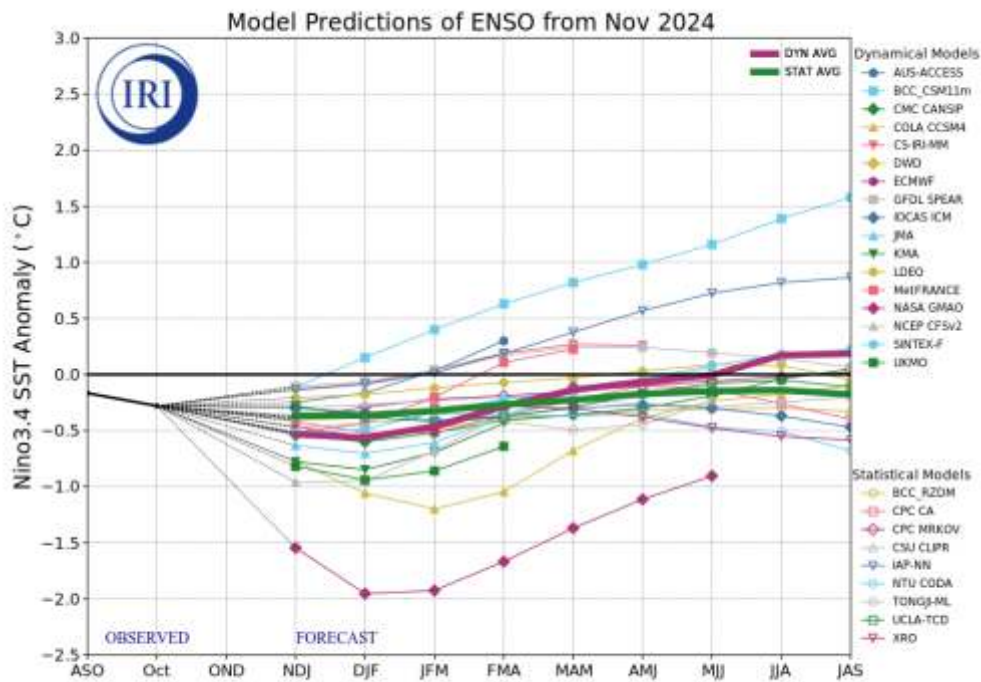


Figure 3.7: Model Predictions of ENSO⁴ from December 2023

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 °C (±0.13 °C) above the pre-industrial (1850-1900) average temperature, is the hottest year on record⁵. 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 dataset⁶.

⁴https://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](https://www.wmo.int/en/press-releases/2024-08-2024-is-on-track-to-be-hottest-year-on-record-as-warming-temporarily-hits-1.5c)

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](https://www.wmo.int/en/press-releases/2024-08-2024-is-on-track-to-be-hottest-year-on-record-as-warming-temporarily-hits-1.5c)

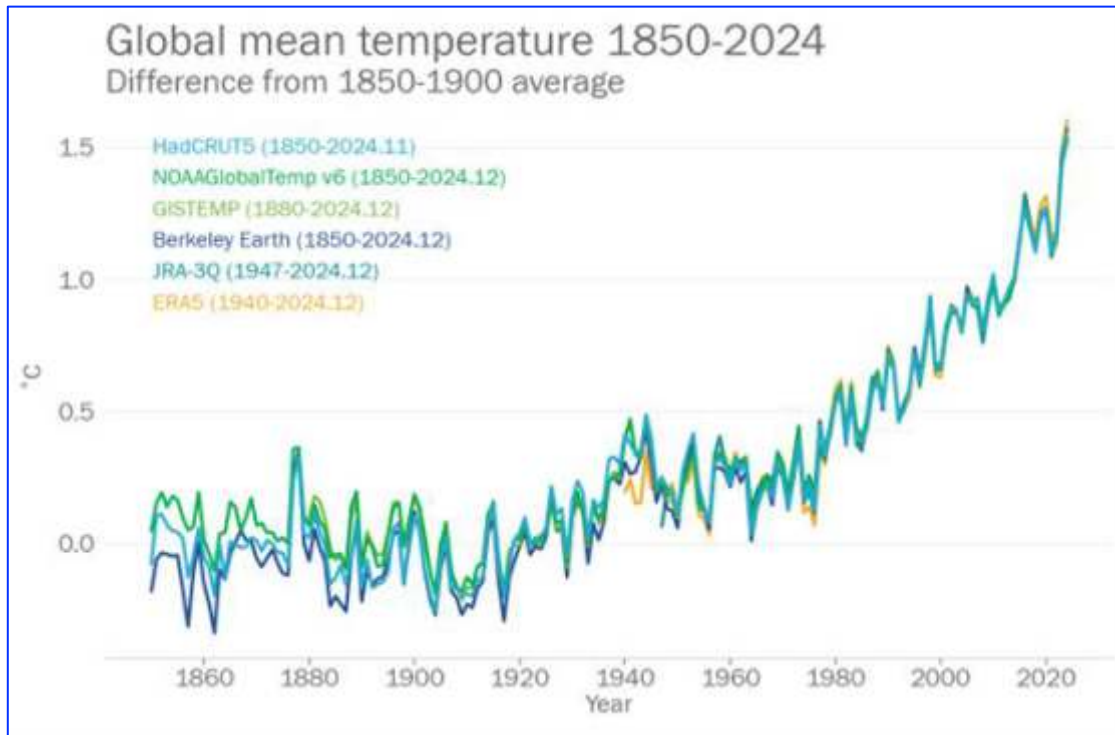


Figure 3.8: Daily Global Temperature⁷ in 2024

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 $\leq 12^{\circ}\text{C}$	Number of Days with temperature $\leq 12^{\circ}\text{C}$
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 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

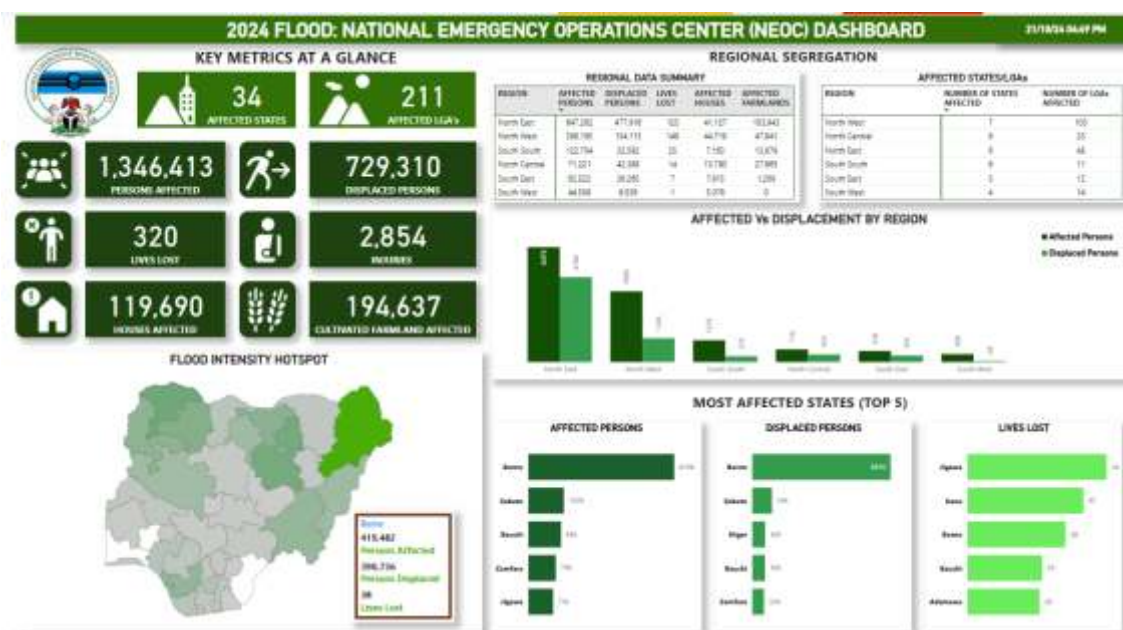


Figure 4.1: 2024 National Emergency Operations Centre (NEOC) Dashboard

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 lost⁸.

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	11 th -15 th Jan.	5	Whole country	300-5000
	26 th - 31 st Jan.	6		
3	1 st -3 rd Feb.	3	Whole country	300-5000
	5 th -8 th Feb.	4	Whole country	300-5000
	16 th -19 th Feb.	4	Whole country	400-5000
2	3 rd -4 th March	2	Whole country	1000-5000
	18 th -21 st March	4	Whole country	300-5000
2	Oct 4 th -6 th	3	North	400-5000
	Oct 8 th -14 th	7	North	500-5000
3	Nov 2 nd 4 th	3	North	700-5000
	Nov 14 th -17 th	4	North and	400-4000
	Nov 20 th -23 rd	4	Central	700-4000
3	11 th - 14 th Dec	4	Whole country	200-5000
	16 th -22 nd Dec	7	Whole country	400-5000
	25 th -30 th Dec	6	Whole country	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 (PM_{2.5}), 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, PM_{2.5} 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 PM_{2.5} 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 PM_{2.5} (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 PM_{2.5}.

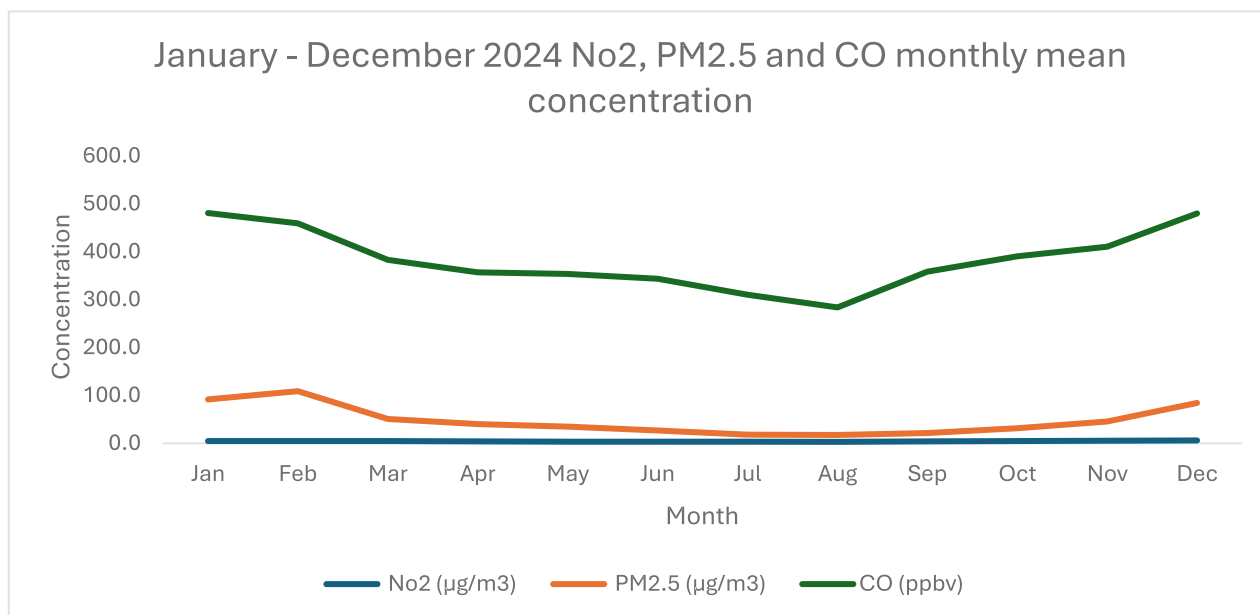


Figure 4.2: January to December 2024 Mean monthly concentration of NO₂, PM_{2.5} and CO Over Nigeria.

4.6.1 SPATIAL DISTRIBUTION OF PM_{2.5} OVER NIGERIA

The distribution of PM_{2.5} 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 PM_{2.5} concentration of 15 to 25 µg/m³.

The 24-hour concentration of PM_{2.5} 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>

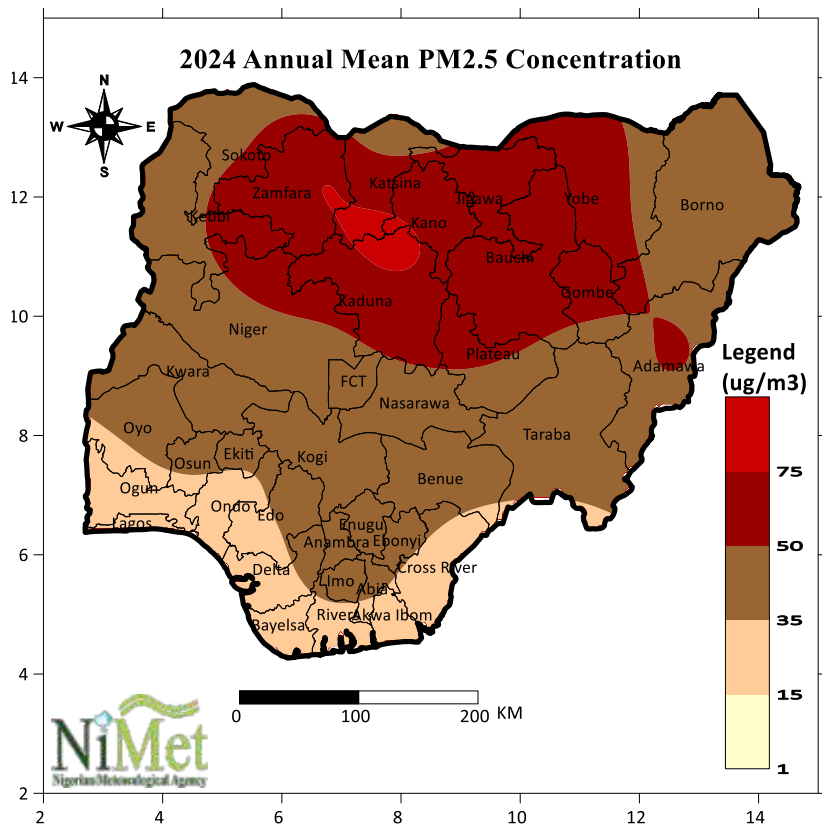


Figure 4.3: 2024 Annual Mean PM2.5 Concentration over Nigeria

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 1 st to 13 th 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 Trust, Wednesday, October 2, 2024	Flood washed away a key bridge linking Kebbi, Sokoto and Zamfara 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 (SEMA), 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

	Ekiti East	19-Apr	24-Nov	219	1513
	Ekiti South West	16-Apr	25-Nov	224	1579
	Ekiti West	18-Apr	24-Nov	220	1531
	Emure/Ise/Orun	14-Apr	26-Nov	226	1607
	Aiyekire (Gbonyin)	17-Apr	25-Nov	222	1553
	Ido/Osi	20-Apr	23-Nov	216	1476
	Ijero	20-Apr	23-Nov	217	1493
	Ikere	15-Apr	26-Nov	225	1593
	Ikole	21-Apr	23-Nov	216	1472
	Ilejemeji	21-Apr	22-Nov	215	1456
	Irepodun/Ifelodun	18-Apr	24-Nov	220	1528
	Ise/Orun	14-Apr	26-Nov	226	1607
	Moba	22-Apr	22-Nov	214	1445
	Oye	20-Apr	23-Nov	216	1477
Enugu	Aninri	25-Mar	7-Dec	257	2132
	Awgu	27-Mar	6-Dec	255	2083
	Enugu East	1-Apr	3-Dec	246	1922
	Enugu North	31-Mar	4-Dec	248	1965
	Enugu South	30-Mar	4-Dec	249	1983
	Ezeagu	30-Mar	4-Dec	249	1986
	Igbo-Etiti	3-Apr	2-Dec	243	1880
	Igbo-Eze North	8-Apr	29-Nov	235	1751
	Igbo-Eze South	7-Apr	30-Nov	237	1776
	Isi-Uzo	4-Apr	2-Dec	242	1860
	Nkanu East	28-Mar	5-Dec	252	2034
	Nkanu West	29-Mar	5-Dec	251	2013
	Nsukka	6-Apr	1-Dec	239	1815
	Oji-River	27-Mar	6-Dec	254	2076
	Udenu	6-Apr	1-Dec	239	1811
	Udi	31-Mar	4-Dec	248	1966
	Uzo-Uwani	4-Apr	2-Dec	242	1868
FCT	Abaji	13-May	15-Nov	195	1220
	Abuja Municipal	16-May	14-Nov	191	1186
	Bwari	19-May	12-Nov	187	1141
	Gwagwalada	17-May	13-Nov	190	1169
	Kuje	11-May	16-Nov	198	1258
	Kwali	12-May	16-Nov	197	1242
Gombe	Akko	3-Jun	22-Oct	129	717
	Balanga	30-May	24-Oct	135	761
	Billiri	30-May	23-Oct	134	755
	Dukku	13-Jun	16-Oct	114	632

	Funakaye	12-Jun	16-Oct	114	633
	Gombe	5-Jun	20-Oct	125	693
	Kaltungo	30-May	24-Oct	134	755
	Kwami	9-Jun	18-Oct	120	663
	Nafada	17-Jun	14-Oct	107	606
	Shomgom	27-May	25-Oct	139	789
	Yamaltu/Deba	5-Jun	3-Nov	140	696
Imo	Aboh-Mbaise	16-Mar	12-Dec	271	2396
	Ahiazu-Mbaise	18-Mar	11-Dec	268	2348
	Ehime-Mbano	20-Mar	10-Dec	265	2289
	Ezinihitte	17-Mar	12-Dec	270	2380
	Ideato North	22-Mar	9-Dec	261	2212
	Ideato South	21-Mar	9-Dec	263	2238
	Ihitte/Uboma	19-Mar	10-Dec	266	2305
	Ikeduru	18-Mar	11-Dec	268	2347
	Isiala Mbano	20-Mar	10-Dec	265	2289
	Isu	20-Mar	10-Dec	265	2287
	Mbaitoli	18-Mar	11-Dec	267	2329
	Ngor-Okpala	14-Mar	13-Dec	273	2449
	Njaba	20-Mar	10-Dec	265	2273
	Nkwerre	20-Mar	10-Dec	264	2264
	Nwangele	20-Mar	10-Dec	265	2276
	Obowo	18-Mar	11-Dec	268	2350
	Oguta	19-Mar	10-Dec	266	2305
	Ohaji/Egbema	16-Mar	12-Dec	271	2407
	Okigwe	21-Mar	9-Dec	263	2233
	Orlu	21-Mar	9-Dec	263	2234
	Orsu	22-Mar	8-Dec	261	2208
	Oru East	20-Mar	10-Dec	264	2264
	Oru West	21-Mar	9-Dec	264	2254
	Owerri-Municipal	17-Mar	12-Dec	270	2377
	Owerri North	16-Mar	12-Dec	271	2393
	Owerri West	16-Mar	12-Dec	271	2403
	Unuimo	21-Mar	9-Dec	263	2247
Jigawa	Auyo	24-Jun	18-Oct	98	603
	Babura	29-Jun	16-Oct	91	605
	Biriniwa	1-Jul	15-Oct	88	608
	Birnin Kudu	13-Jun	25-Oct	116	828
	Buji	13-Jun	25-Oct	116	827
	Dutse	17-Jun	23-Oct	110	814
	Gagarawa	27-Jun	17-Oct	94	603
	Garki	25-Jun	18-Oct	97	603

	Gumel	28-Jun	16-Oct	92	605
	Guri	29-Jun	16-Oct	91	605
	Gwaram	9-Jun	27-Oct	122	745
	Gwiwa	30-Jun	15-Oct	90	606
	Hadejia	26-Jun	18-Oct	96	603
	Jahun	21-Jun	20-Oct	104	606
	Kafin Hausa	22-Jun	20-Oct	101	604
	Kaugama	26-Jun	17-Oct	95	603
	Kazaure	29-Jun	16-Oct	91	605
	Kiri Kasamma	28-Jun	17-Oct	93	604
	Kiyawa	17-Jun	22-Oct	109	712
	Maigatari	30-Jun	15-Oct	89	607
	Malam Madori	27-Jun	17-Oct	93	604
	Miga	23-Jun	19-Oct	101	604
	Ringim	22-Jun	20-Oct	102	605
	Roni	28-Jun	16-Oct	92	605
	Sule Tankarkar	29-Jun	16-Oct	90	606
	Taura	23-Jun	19-Oct	100	604
	Yankwashi	30-Jun	15-Oct	89	607
Kaduna	Birnin-Gwari	3-Jun	16-Oct	127	879
	Chikun	27-May	20-Oct	159	931
	Giwa	7-Jun	14-Oct	143	856
	Igabi	31-May	18-Oct	153	901
	Ikara	9-Jun	13-Oct	140	844
	Jaba	13-May	27-Oct	181	1086
	Jema'a	11-May	28-Oct	184	1116
	Kachia	19-May	24-Oct	173	1022
	Kaduna North	30-May	18-Oct	156	912
	Kaduna South	29-May	19-Oct	157	919
	Kagarko	13-May	28-Oct	182	1097
	Kajuru	26-May	20-Oct	162	947
	Kaura	16-May	26-Oct	177	1055
	Kauru	24-May	21-Oct	164	964
	Kubau	4-Jun	16-Oct	148	875
	Kudan	9-Jun	13-Oct	140	846
	Lere	26-May	20-Oct	161	945
	Markafi	10-Jun	12-Oct	139	841
	Sabon-Gari	7-Jun	14-Oct	142	852
	Sanga	9-May	29-Oct	187	1143
	Soba	5-Jun	15-Oct	146	867
	Zango-Kataf	18-May	24-Oct	173	1024
	Zaria	6-Jun	14-Oct	144	860
Kano	Ajingi	19-Jun	21-Oct	113	709

Albasu	15-Jun	24-Oct	119	720
Bagwai	21-Jun	20-Oct	109	506
Bebeji	13-Jun	25-Oct	122	726
Bichi	24-Jun	19-Oct	105	503
Bunkure	15-Jun	24-Oct	119	720
Dala	20-Jun	21-Oct	111	607
Dambatta	26-Jun	18-Oct	102	503
Dawakin Kudu	17-Jun	23-Oct	116	714
Dawakin Tofa	22-Jun	20-Oct	108	505
Doguwa	4-Jun	29-Oct	135	840
Fagge	20-Jun	21-Oct	111	708
Gabasawa	21-Jun	20-Oct	109	505
Garko	14-Jun	24-Oct	121	624
Garum Mallam	15-Jun	24-Oct	119	620
Gaya	17-Jun	23-Oct	116	614
Gezawa	20-Jun	21-Oct	110	507
Gwale	19-Jun	21-Oct	112	608
Gwarzo	18-Jun	22-Oct	113	610
Kabo	18-Jun	22-Oct	114	611
Kano Municipal	19-Jun	21-Oct	112	609
Karaye	16-Jun	23-Oct	116	615
Kibiya	12-Jun	25-Oct	123	628
Kiru	14-Jun	24-Oct	120	622
Kumbotso	19-Jun	22-Oct	113	610
Kunchi	26-Jun	18-Oct	102	503
Kura	16-Jun	23-Oct	116	615
Madobi	17-Jun	22-Oct	115	613
Makoda	25-Jun	18-Oct	103	503
Minjibir	23-Jun	19-Oct	107	504
Nasarawa	20-Jun	21-Oct	111	507
Rano	12-Jun	25-Oct	122	628
Rimin Gado	19-Jun	22-Oct	113	610
Rogo	13-Jun	25-Oct	121	626
Shanono	20-Jun	21-Oct	110	506
Sumaila	11-Jun	26-Oct	125	635
Takai	12-Jun	25-Oct	123	631
Tarauni	19-Jun	21-Oct	112	608
Tofa	20-Jun	21-Oct	111	607
Tsanyawa	23-Jun	19-Oct	105	503
Tudun Wada	9-Jun	27-Oct	127	642
Ungogo	20-Jun	21-Oct	110	507
Warawa	19-Jun	22-Oct	113	610
Wudil	16-Jun	23-Oct	117	616

Katsina	Bakori	14-Jun	24-Oct	118	722
	Batagarawa	3-Jul	14-Oct	89	512
	Batsari	1-Jul	15-Oct	91	509
	Baure	2-Jul	15-Oct	91	509
	Bindawa	30-Jun	15-Oct	93	507
	Charanchi	29-Jun	16-Oct	96	505
	Dandume	11-Jun	26-Oct	122	733
	Danja	11-Jun	26-Oct	123	734
	Dan Musa	23-Jun	19-Oct	104	554
	Daura	4-Jul	13-Oct	87	466
	Dutsi	3-Jul	14-Oct	89	463
	Dutsin-Ma	26-Jun	18-Oct	100	553
	Faskari	15-Jun	24-Oct	117	670
	Funtua	12-Jun	25-Oct	121	820
	Ingawa	29-Jun	16-Oct	95	455
	Jibia	4-Jul	13-Oct	87	466
	Kafur	14-Jun	24-Oct	117	721
	Kaita	7-Jul	12-Oct	83	474
	Kankara	19-Jun	21-Oct	110	558
	Kankia	26-Jun	17-Oct	99	453
	Katsina	4-Jul	13-Oct	86	466
	Kurfi	30-Jun	15-Oct	93	457
	Kusada	27-Jun	17-Oct	98	553
	Mai'adua	6-Jul	12-Oct	83	473
	Malumfashi	17-Jun	22-Oct	113	562
	Mani	3-Jul	14-Oct	89	462
	Mashi	6-Jul	12-Oct	83	473
	Matazu	24-Jun	19-Oct	103	453
	Musawa	21-Jun	20-Oct	108	456
	Rimi	2-Jul	14-Oct	90	460
	Sabuwa	10-Jun	26-Oct	124	588
	Safana	27-Jun	17-Oct	98	454
	Sandamu	3-Jul	14-Oct	89	463
	Zango	4-Jul	13-Oct	87	465
Kebbi	Aleiro	1-Jul	19-Oct	89	603
	Arewa-Dandi	7-Jul	16-Oct	81	605
	Argungu	7-Jul	16-Oct	81	605
	Augie	11-Jul	14-Oct	75	613
	Bagudo	10-Jun	26-Oct	117	636
	Birnin Kebbi	4-Jul	18-Oct	86	603
	Bunza	29-Jun	20-Oct	93	605
	Dandi	17-Jun	22-Oct	107	613

	Danko Wasagu	12-Jun	25-Oct	115	630
	Fakai	12-Jun	25-Oct	115	628
	Gwandu	4-Jul	17-Oct	85	603
	Jega	29-Jun	20-Oct	93	605
	Kalgo	23-Jun	19-Oct	97	603
	Koko/Besse	11-Jun	25-Oct	116	633
	Maiyama	19-Jun	21-Oct	104	609
	Ngaski	30-May	1-Nov	134	706
	Sakaba	8-Jun	27-Oct	122	650
	Shanga	9-Jun	27-Oct	120	645
	Suru	15-Jun	23-Oct	110	617
	Yauri	5-Jun	29-Oct	127	669
	Zuru	13-Jun	25-Oct	114	627
Kogi	Adavi	25-Apr	24-Nov	188	1547
	Ajaokuta	22-Apr	26-Nov	193	1607
	Ankpa	22-Apr	26-Nov	193	1618
	Bassa	27-Apr	24-Nov	186	1516
	Dekina	23-Apr	25-Nov	191	1582
	Ibaji	13-Apr	1-Dec	207	1834
	Idah	17-Apr	29-Nov	201	1739
	Igalamela-Odolu	17-Apr	29-Nov	201	1741
	Ijumu	28-Apr	23-Nov	184	1491
	Kabba/Bunu	1-May	21-Nov	180	1429
	Kogi	3-May	20-Nov	176	1380
	Lokoja	3-May	20-Nov	176	1382
	Mopa-Muro	2-May	21-Nov	177	1402
	Ofu	21-Apr	27-Nov	195	1647
	Ogori/Magongo	23-Apr	26-Nov	192	1600
	Okehi	26-Apr	24-Nov	187	1529
	Okene	22-Apr	26-Nov	192	1605
	Olamabolo	18-Apr	28-Nov	199	1700
	Omala	27-Apr	23-Nov	186	1509
	Yagba East	2-May	21-Nov	177	1399
	Yagba West	4-May	20-Nov	175	1368
Kwara	Asa	7-May	18-Nov	170	1317
	Baruten	18-May	12-Nov	153	1136
	Edu	14-May	14-Nov	160	1202
	Ekiti	1-May	21-Nov	179	1416
	Ifelodun	9-May	17-Nov	167	1276
	Ilorin East	9-May	17-Nov	168	1285
	Ilorin South	7-May	18-Nov	170	1314
	Ilorin West	7-May	18-Nov	170	1307
	Irepodun	3-May	20-Nov	176	1388

	Isin	4-May	20-Nov	175	1368
	Kaiama	20-May	11-Nov	149	1102
	Moro	13-May	15-Nov	161	1211
	Offa	3-May	20-Nov	177	1394
	Oke-Ero	2-May	20-Nov	177	1397
	Oyun	3-May	20-Nov	177	1392
	Pategi	10-May	16-Nov	165	1260
Lagos	Agege	3-Apr	2-Dec	244	1891
	Ajeromi-Ifelodun	31-Mar	4-Dec	248	1959
	Alimosho	2-Apr	3-Dec	245	1905
	Amuwo-Odofin	30-Mar	4-Dec	249	1975
	Apapa	30-Mar	4-Dec	249	1977
	Badagry	30-Mar	4-Dec	249	1978
	Epe	31-Mar	4-Dec	247	1952
	Eti-Osa	31-Mar	4-Dec	248	1970
	Ibeju/Lekki	31-Mar	4-Dec	248	1973
	Ifako-Ijaye	3-Apr	2-Dec	243	1876
	Ikeja	2-Apr	2-Dec	244	1900
	Ikorodu	2-Apr	3-Dec	244	1903
	Kosofe	2-Apr	3-Dec	245	1906
	Lagos Island	1-Apr	3-Dec	246	1936
	Lagos Mainland	1-Apr	3-Dec	247	1942
	Mushin	1-Apr	3-Dec	246	1925
	Ojo	31-Mar	4-Dec	248	1967
	Oshodi-Isolo	2-Apr	3-Dec	245	1920
	Shomolu	1-Apr	3-Dec	246	1924
	Surulere	1-Apr	3-Dec	247	1944
Nasarawa	Akwanga	16-May	13-Nov	182	1171
	Awe	4-May	20-Nov	200	1368
	Doma	3-May	20-Nov	202	1392
	Karu	17-May	13-Nov	180	1152
	Keana	3-May	20-Nov	201	1382
	Keffi	13-May	15-Nov	186	1218
	Kokona	14-May	14-Nov	184	1193
	Lafia	11-May	16-Nov	189	1251
	Nasarawa	6-May	19-Nov	197	1338
	Nassarawa Egon	11-May	16-Nov	189	1241
	Obi	5-May	19-Nov	197	1340
	Toto	5-May	19-Nov	199	1354
	Wamba	15-May	13-Nov	182	1174
Niger	Agai	14-May	9-Nov	180	1200
	Agwara	10-Jun	26-Oct	138	889
	Bida	16-May	8-Nov	176	1161

	Borgu	4-Jun	29-Oct	147	934
	Bosso	23-May	4-Nov	165	1060
	Chanchaga	24-May	4-Nov	164	1055
	Edati	15-May	9-Nov	177	1177
	Gbako	19-May	7-Nov	172	1122
	Gurara	19-May	6-Nov	171	1115
	Katcha	16-May	8-Nov	176	1161
	Kontagora	5-Jun	28-Oct	146	929
	Lapai	13-May	10-Nov	180	1208
	Lavun	17-May	7-Nov	174	1146
	Magama	4-Jun	29-Oct	147	937
	Mariga	8-Jun	26-Oct	140	899
	Mashegu	26-May	3-Nov	160	1026
	Mokwa	17-May	7-Nov	174	1147
	Muya	26-May	2-Nov	160	1025
	Paikoro	22-May	5-Nov	167	1081
	Rafi	1-Jun	30-Oct	152	965
	Rijau	13-Jun	24-Oct	132	863
	Shiroro	29-May	1-Nov	156	992
	Suleja	18-May	7-Nov	173	1139
	Tafa	19-May	7-Nov	172	1124
	Wushishi	24-May	4-Nov	163	1049
Ogun	Abeokuta North	11-Apr	28-Nov	230	1675
	Abeokuta South	10-Apr	28-Nov	232	1699
	Ado-Odo/Ota	2-Apr	3-Dec	244	1901
	Egbado North	10-Apr	28-Nov	233	1713
	Egbado South	5-Apr	1-Dec	240	1829
	Ewekoro	7-Apr	30-Nov	237	1774
	Ifo	4-Apr	1-Dec	241	1845
	Ijebu East	6-Apr	30-Nov	238	1802
	Ijebu North	4-Apr	1-Dec	241	1843
	Ijebu North East	8-Apr	29-Nov	235	1755
	Ijebu Ode	5-Apr	1-Dec	240	1837
	Ikenne	7-Apr	30-Nov	237	1786
	Imeko-Afon	17-Apr	24-Nov	221	1541
	Ipokia	2-Apr	3-Dec	244	1901
	Obafemi-Owode	7-Apr	30-Nov	237	1775
	Odeda	12-Apr	27-Nov	229	1658
	Odogbolu	5-Apr	1-Dec	240	1824
	Ogun waterside	30-Mar	4-Dec	249	1988
	Remo North	8-Apr	29-Nov	236	1759
	Shagamu	5-Apr	1-Dec	240	1825
Ondo	Akoko North-East	16-Apr	25-Nov	223	1571

	Akoko South-East	14-Apr	26-Nov	225	1605
	Akoko South-West	14-Apr	26-Nov	227	1621
	Akoko North-West	18-Apr	24-Nov	220	1534
	Akure North	11-Apr	28-Nov	230	1678
	Akure South	11-Apr	28-Nov	231	1687
	Ese-Odo	28-Mar	5-Dec	252	2035
	Idanre	8-Apr	30-Nov	236	1768
	Ifedore	13-Apr	27-Nov	228	1639
	Ilaje	26-Mar	7-Dec	256	2113
	Ile-Oluji-Okeigbo	12-Apr	27-Nov	229	1662
	Irele	1-Apr	3-Dec	246	1931
	Odigbo	4-Apr	2-Dec	242	1862
	Okitipupa	1-Apr	3-Dec	245	1921
	Ondo East	9-Apr	29-Nov	234	1736
	Ondo West	8-Apr	29-Nov	235	1756
	Ose	9-Apr	29-Nov	234	1735
	Owo	10-Apr	28-Nov	233	1714
Osun	Atakumosa East	13-Apr	27-Nov	228	1642
	Atakumosa West	16-Apr	25-Nov	223	1577
	Aiyedade	13-Apr	27-Nov	228	1644
	Aiyedire	16-Apr	25-Nov	223	1571
	Boluwaduro	21-Apr	22-Nov	215	1458
	Boripe	20-Apr	23-Nov	217	1481
	Ede North	18-Apr	24-Nov	220	1522
	Ede South	17-Apr	24-Nov	221	1542
	Egbedore	19-Apr	23-Nov	218	1503
	Ejigbo	19-Apr	23-Nov	218	1500
	Ife East	13-Apr	27-Nov	228	1641
	Ife North	11-Apr	28-Nov	230	1675
	Ife South	11-Apr	28-Nov	230	1676
	IfeCentral	15-Apr	26-Nov	225	1601
	Ifedayo	22-Apr	22-Nov	214	1450
	Ifelodun	21-Apr	22-Nov	215	1462
	Ila	22-Apr	22-Nov	214	1451
	Ilesha East	16-Apr	25-Nov	222	1560
	Ilesha West	17-Apr	24-Nov	221	1545
	Irepodun	20-Apr	23-Nov	216	1478
	Irewole	14-Apr	26-Nov	227	1625
	Isokan	12-Apr	27-Nov	229	1663
	Iwo	17-Apr	24-Nov	221	1545
	Obokun	19-Apr	23-Nov	218	1505
	Odo-Otin	22-Apr	22-Nov	214	1442
	Ola-Oluwa	19-Apr	24-Nov	219	1515

	Olorunda	20-Apr	23-Nov	217	1483
	Oriade	16-Apr	25-Nov	224	1580
	Orolu	21-Apr	22-Nov	216	1470
	Osogbo	19-Apr	24-Nov	219	1509
Oyo	Afijio	19-Apr	23-Nov	219	1508
	Akinyele	16-Apr	25-Nov	224	1578
	Atiba	26-Apr	20-Nov	207	1365
	Atigbo	28-Apr	19-Nov	205	1339
	Egbeda	13-Apr	26-Nov	227	1627
	Ibadan North	14-Apr	26-Nov	226	1617
	Ibadan North East	13-Apr	27-Nov	227	1630
	Ibadan North West	14-Apr	26-Nov	226	1620
	Ibadan South East	13-Apr	27-Nov	228	1642
	Ibadan South West	13-Apr	27-Nov	228	1635
	Ibarapa Central	14-Apr	26-Nov	226	1607
	Ibarapa East	17-Apr	25-Nov	222	1551
	Ibarapa North	17-Apr	24-Nov	221	1543
	Ido	15-Apr	26-Nov	224	1589
	Irepo	7-May	14-Nov	190	1178
	Iseyin	20-Apr	23-Nov	217	1484
	Itesiwaju	25-Apr	20-Nov	209	1383
	Iwajowa	22-Apr	22-Nov	214	1443
	Kajola	23-Apr	21-Nov	212	1424
	Lagelu	15-Apr	26-Nov	225	1595
	Ogbomosho North	25-Apr	20-Nov	210	1392
	Ogbomosho South	24-Apr	21-Nov	211	1412
	Ogo Oluwa	22-Apr	22-Nov	214	1450
	Olorunsogo	4-May	15-Nov	195	1228
	Oluyole	11-Apr	28-Nov	231	1690
	Ona-Ara	12-Apr	27-Nov	230	1666
	Orelope	4-May	15-Nov	195	1221
	Ori Ire	27-Apr	19-Nov	206	1345
	Oyo East	21-Apr	23-Nov	216	1472
	Oyo West	21-Apr	22-Nov	215	1464
	Saki East	3-May	16-Nov	197	1248
	Saki West	1-May	17-Nov	200	1275
	Surulere	24-Apr	21-Nov	211	1414
Plateau	Barikin Ladi	20-May	1-Nov	165	861
	Bassa	27-May	29-Oct	155	788
	Bokkos	15-May	4-Nov	173	936
	Jos East	24-May	30-Oct	159	818
	Jos North	25-May	30-Oct	158	806
	Jos South	23-May	31-Oct	161	829

	Kanam	19-May	2-Nov	167	878
	Kanke	18-May	3-Nov	169	897
	Langtang North	13-May	5-Nov	177	969
	Langtang South	6-May	9-Nov	186	1070
	Mangu	18-May	3-Nov	169	896
	Mikang	12-May	5-Nov	177	973
	Pankshin	16-May	4-Nov	172	926
	Qua'an Pan	10-May	7-Nov	181	1018
	Riyom	20-May	1-Nov	165	866
	Shendam	9-May	7-Nov	182	1021
	Wase	13-May	5-Nov	176	965
River	Abua/Odual	8-Mar	16-Dec	284	2678
	Ahoada East	10-Mar	15-Dec	280	2585
	Ahoada West	10-Mar	15-Dec	280	2597
	Akuku Toru	3-Mar	19-Dec	291	2841
	Andoni	3-Mar	19-Dec	291	2840
	Asari-Toru	6-Mar	17-Dec	287	2735
	Bonny	3-Mar	19-Dec	291	2845
	Degema	4-Mar	19-Dec	290	2811
	Eleme	6-Mar	17-Dec	287	2740
	Emohua	7-Mar	17-Dec	284	2689
	Etche	10-Mar	15-Dec	280	2582
	Gokana	5-Mar	18-Dec	288	2778
	Ikwerre	10-Mar	15-Dec	280	2584
	Khana	4-Mar	18-Dec	289	2789
	Obia/Akpor	7-Mar	17-Dec	285	2704
	Ogba/Egbema/Ndoni	15-Mar	12-Dec	272	2422
	Ogu/Bolo	5-Mar	18-Dec	288	2778
	Okrika	5-Mar	18-Dec	289	2780
	Omumma	11-Mar	15-Dec	279	2564
	Opobo/Nkoro	3-Mar	19-Dec	291	2846
	Oyigbo	7-Mar	17-Dec	284	2681
	Port-Harcourt	6-Mar	17-Dec	286	2729
	Tai	6-Mar	17-Dec	287	2736
Sokoto	Binji	7-Jul	29-Sep	72	525
	Bodinga	2-Jul	1-Oct	79	510
	Dange-Shuni	2-Jul	1-Oct	79	511
	Gada	14-Jul	25-Sep	61	558
	Goronyo	10-Jul	27-Sep	68	535
	Gudu	11-Jul	26-Sep	65	543
	Gwadabawa	11-Jul	26-Sep	66	541
	Illela	14-Jul	25-Sep	61	557
	Isa	8-Jul	28-Sep	71	527

	Kebbe	19-Jun	8-Oct	100	509
	Kware	6-Jul	29-Sep	73	522
	Rabah	5-Jul	30-Sep	75	518
	Sabon Birni	12-Jul	26-Sep	64	546
	Shagari	27-Jun	4-Oct	86	504
	Silame	4-Jul	30-Sep	76	516
	Sokoto North	5-Jul	29-Sep	74	519
	Sokoto South	5-Jul	30-Sep	75	518
	Tambuwal	25-Jun	5-Oct	90	503
	Tangaza	12-Jul	26-Sep	64	545
	Tureta	28-Jun	4-Oct	86	504
	Wamako	5-Jul	30-Sep	75	518
	Wurno	8-Jul	28-Sep	70	530
	Yabo	1-Jul	2-Oct	81	508
Taraba	Ardo-Kola	5-May	7-Nov	171	966
	Bali	24-Apr	13-Nov	188	1165
	Donga	17-Apr	16-Nov	198	1291
	Gashaka	14-Apr	18-Nov	203	1360
	Gassol	28-Apr	11-Nov	182	1083
	Ibi	27-Apr	11-Nov	183	1098
	Jalingo	6-May	6-Nov	170	950
	Karim-Lamido	10-May	4-Nov	164	891
	Kurmi	10-Apr	20-Nov	209	1459
	Lau	9-May	4-Nov	164	897
	Sardauna	6-Apr	23-Nov	216	1564
	Takum	14-Apr	18-Nov	203	1363
	Ussa	7-Apr	22-Nov	215	1540
	Wukari	22-Apr	14-Nov	190	1186
	Yorro	5-May	7-Nov	170	955
	Zing	6-May	6-Nov	170	952
Yobe	Bade	30-Jun	1-Oct	79	507
	Bursari	30-Jun	1-Oct	80	506
	Damaturu	17-Jun	8-Oct	99	512
	Fika	11-Jun	11-Oct	108	532
	Fune	17-Jun	8-Oct	99	512
	Geidam	29-Jun	2-Oct	81	506
	Gujba	10-Jun	12-Oct	110	537
	Gulani	5-Jun	15-Oct	118	568
	Jakusko	26-Jun	3-Oct	85	503
	Karasuwa	3-Jul	30-Sep	74	513
	Machina	5-Jul	28-Sep	71	519
	Nangere	17-Jun	8-Oct	99	513
	Nguru	3-Jul	29-Sep	74	514

	Potiskum	15-Jun	9-Oct	102	517
	Tarmua	24-Jun	5-Oct	89	503
	Yunusari	7-Jul	28-Sep	69	523
	Yusufari	7-Jul	27-Sep	68	527
Zamfara	Anka	20-Jun	7-Oct	95	607
	Bakura	27-Jun	3-Oct	83	604
	Birnin Magaji	27-Jun	3-Oct	84	603
	Bukkuyum	19-Jun	7-Oct	96	608
	Bungudu	22-Jun	6-Oct	92	604
	Gummi	19-Jun	7-Oct	96	708
	Gusau	19-Jun	8-Oct	97	710
	Kaura Namoda	27-Jun	3-Oct	84	604
	Maradun	1-Jul	1-Oct	78	608
	Maru	16-Jun	9-Oct	102	717
	Shinkafi	4-Jul	29-Sep	72	616
	Talata Mafara	25-Jun	4-Oct	86	603
	Tsafe	18-Jun	8-Oct	97	610
	Zurmi	3-Jul	30-Sep	75	612



Glossary

1. **Accumulated Rainfall:** The total amount of rainfall collected over a specific period, which may be relevant when assessing pre-season rainfall and its sufficiency for early crop growth or water management.
2. **Adaptation:** Adjusting systems, practices, and policies to reduce vulnerabilities and improve resilience to current or expected climate impacts.
3. **Agro-meteorological information:** Weather and climate information that, if applied to guide agricultural activities, improves yields and enhances coping strategies against the adverse impact of climate-related hazards in the sector.
4. **Annual rainfall amount:** the total amount of rainfall observed and recorded in the year under reference.
5. **Antibiotics:** Medications used to prevent and treat bacterial infections by killing the bacteria or inhibiting their growth.
6. **Antimicrobial Resistance (AMR):** The ability of microorganisms (bacteria, viruses, fungi, parasites) to resist the effects of medications that once successfully treated infections.
7. **Aquaculture:** The cultivation of aquatic organisms (e.g., fish, shellfish, seaweed) in controlled environments for food, research, or restoration.
8. **Cessation date of rainy season**—it marks the end of the season in a state and occurs when the water content in the soil's root zone drops below 20% needed for plant growth without supplemental irrigation.
9. **Climate change** refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer due to natural and human-induced changes in climate. It could result to changes in temperature, precipitation, wind patterns, and other climate system elements.
10. **Climate variability** refers to fluctuations in climate conditions that occur over short to medium time scales (e.g., from months to decades) and are caused by both natural processes and phenomena. These variations can result in periods of warmer or cooler temperatures, wetter or drier conditions, and other shifts in climate patterns.
11. **Comfort Index** is a measure used to assess how comfortable the environment is for human health and activity. It combines various environmental factors such as temperature, humidity, and sometimes wind speed, and solar radiation to evaluate overall comfort.
12. **Decision Support System** for Agrotechnology Transfer (DSSAT): is an advanced, comprehensive computer-based simulation model used for crop modelling and agricultural research.
13. **Dehydration:** is a condition that occurs when the body loses more fluids than it takes in, resulting in an inadequate amount of water and electrolytes necessary for normal body functions.

14. **Departure:** It describes how much a current climatic condition deviates from the expected or Normal climatic conditions for a specific period, such as a month, season, or year.
15. **Diarrhoea** is characterized by frequent, loose or watery stools that occur three or more times per day than normal.
16. **Drought:** A prolonged period of low or no rainfall that leads to a shortage of water, affecting ecosystems, agriculture, and human activities.
17. **Dry-season farming** refers to cultivating crops during the dry or non-rainy period.
18. **Dry Spells:** Periods of minimal or no rainfall within a season, often occurring due to suppressed phases of oscillations. This potentially impacts crop growth and water availability for farming.
19. **Early Warning System (EWS):** is a comprehensive system designed to provide timely information to help reduce the risk and impact of natural hazards such as severe weather, climate, or hydrological events.
20. **Ecological Zones:** Refer to regions or areas characterized by distinct climatic and environmental conditions that influence the types of ecosystems within them.
21. **El Niño** is a complex climate phenomenon characterized by the periodic warming of sea surface temperatures in the central and eastern Pacific Ocean, significantly impacting global weather patterns, climate variability, and ecosystems.
22. **El Niño-Southern Oscillation (ENSO)** is a climate pattern representing the interaction between the ocean and atmosphere in the tropical Pacific Ocean. ENSO significantly influences global weather and climate, leading to variations in temperature, precipitation, and atmospheric pressure patterns worldwide.
23. **ENSO-Neutral:** A phase when sea surface temperatures and atmospheric conditions in the tropical Pacific do not show significant deviations from average, resulting in normal climate patterns.
24. **Extreme Rainfall Event:** A weather event where rainfall exceeds the typical annual or daily average in a short period, often leading to flooding.
25. **Extreme weather** refers to unusual, severe, or unseasonal weather conditions that deviate significantly from the typical climate of a region. Extreme weather events are characterized by their intensity, duration, and impact on human life, ecosystems, and infrastructure.
26. **Flash floods** are sudden surges of water that can submerge areas quickly, often resulting from localized, intense rainfall over a short period, or from the sudden release of water from a dam.
27. **Global warming** refers to the long-term increase in the Earth's average surface temperature due to human activities, primarily the emission of greenhouse gases such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).
28. **Greenhouse effect:** refers to the natural process by which the Earth's atmosphere traps some of the energy from the Sun, warming the planet and making it suitable for life.
29. **Harmattan:** Cold, dry, dusty, north-easterly trade wind from the Sahara predominant during the winter season over West Africa.
30. **Heat stress** occurs when the body cannot effectively cool itself and maintain a healthy temperature due to excessive heat.
31. **Heat stroke** is a serious medical emergency resulting from prolonged exposure to extreme heat, where the body fails to regulate its temperature, which can lead to critical damage to organs, dehydration, and even death if untreated.
32. **Heat waves:** are typically defined as prolonged periods of excessively high temperatures, often accompanied by high humidity.
33. **High-intensity rainfall:** Rainfall that is characterised by a high amount of precipitation,

- often lasting more than 10 hours, and may be accompanied by strong winds above 20 knots.
34. **Hydroelectric Power:** Electricity generated by harnessing the kinetic and potential energy of moving or falling water, typically using turbines and generators.
 35. **Intergovernmental Panel on Climate Change (IPCC):** An international body established by the United Nations and the World Meteorological Organization (WMO) to assess the science related to climate change, its impacts, and potential adaptation and mitigation strategies.
 36. **Indian Ocean Dipole (IOD):** is a climate phenomenon characterized by the difference in sea surface temperatures (SSTs) between the western and eastern parts of the equatorial Indian Ocean.
 37. **Intra-seasonal rainfall patterns** refer to variations in rainfall distribution and intensity that occur within a single season.
 38. **La Niña** as a climate pattern characterized by the periodic cooling of sea surface temperatures in the central and eastern tropical Pacific Ocean.
 39. **Length of rainy season:** The number of days between the onset and cessation of the rainy season
 40. **Madden-Julian Oscillation (MJO):** A major driver of intra-seasonal variability in the tropics, characterized by an eastward-moving wave of enhanced and suppressed convection (rainfall) that travels around the globe along the equator over 30 to 60 days.
 41. **Meningitis:** is an inflammatory condition of the meninges, the protective membranes covering the brain and spinal cord. It can be caused by bacterial, viral, fungal, or parasitic infections, as well as non-infectious factors like certain drugs or diseases. Meningitis, particularly cerebrospinal meningitis, is viewed as a climate-sensitive disease.
 42. **Mitigation:** Actions to reduce the rate or magnitude of climate change by curbing greenhouse gas emissions or enhancing carbon sequestration.
 43. **Modulators** generally refer to variables or factors that can influence or modify atmospheric conditions and weather patterns.
 44. **Monsoon:** A large-scale seasonal wind system characterized by a reversal of prevailing wind directions, usually accompanied by significant changes in precipitation.
 45. **Northeasterly winds:** are winds that blow from the northeast towards the southwest.
 46. **Normal:** A term refers to a period where observed climate parameter is referenced over a standard baseline period, typically 30 years. It could also be termed long-term average or climatological norm.
 47. **Near Normal:** a condition where a particular climate variable (such as temperature, precipitation, or atmospheric pressure) falls within a range that is close to the long-term average for that location and time period.
 48. **Neutral signal:** a state or condition that indicates neither an increase nor a decrease in the parameters being observed.
 49. **Onset date** of rainy season: is the date at which the available water content of the root zone at the beginning of the cropping season reaches 50%.
 50. **Pathogen:** are microorganism (such as bacteria, viruses, fungi, or parasites) that can cause disease in plants, animals, or crops.
 51. **Pre-Season Rainfall:** The term refers to rainfall that occurs before the official start of a designated rainy season or monsoon period. They are usually short-lived and could come because of periodic incursion of extra-tropical modulators
 52. **Perishable Goods:** Agricultural products that have a limited shelf life and can decay or spoil quickly if not stored or handled properly. Examples include fruits, vegetables, dairy products, meat, and seafood.
 53. **Rainfall Anomaly:** The deviation of observed rainfall from the long-term average or expected

value during a specific period.

54. **Renewable Energy:** Energy from natural sources like solar, wind, and hydro, which produce little to no greenhouse gas emissions.
55. **Ruminant Animal:** A unique type of livestock that is capable of regurgitating and re-chewing its food to aid in digestion through its four-chambered stomach.
56. **Sustainable Development Goals (SDG):** A collection of 17 global objectives established by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development.
57. **Sea Surface Temperature Anomaly (SSTA):** The difference between the observed SST and the average SST for a specific period (the baseline or climatology). Positive anomalies indicate warmer-than-average conditions, while negative anomalies indicate cooler-than-average conditions.
58. **Seasonal Climate Prediction:** The process of forecasting climate variables (such as temperature, precipitation, and drought) over a period of weeks to months (usually 1-12 months) ahead, typically focused on the upcoming season.
59. **Seasonal Forecasts:** Predictions made for a specific season based on meteorological data, including rainfall totals and distribution projections.
60. **Short-duration rainfall** is defined as rainfall that occurs over a short time period, typically less than an hour.
61. **Teleconnections:** large-scale, long-distance climate interactions that occur between different regions of the globe. These interactions are essential for understanding how weather patterns in one part of the world can influence weather and climate in other, often distant, regions.
62. **Warmer-than-Normal** refers to a period in which the average temperature is higher than the baseline or reference value for a specific region and time of year. The baseline is typically defined based on a 30-year period (e.g., 1991–2020) and is used to assess long-term climate trends.
63. **Wind shear** refers to the variation in wind speed and/or direction over a short distance in the atmosphere. It can occur in both the vertical and horizontal dimensions and is a critical factor in weather and aviation safety.

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