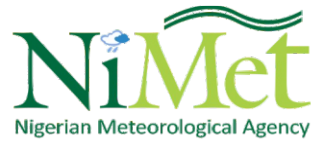


CLIMATE AND HEALTH BULLETIN

A PUBLICATION OF NIGERIAN METEOROLOGICAL AGENCY

OCTOBER - DECEMBER 2023





Climate and Health Bulletin

October – December 2023

A publication of Nigerian Meteorological Agency

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Our Mandate

To provide for the regulation of meteorology and for related matters

Our Vision

To be a World Class provider of Weather and Climate services for safety and sustainable national socio-economic development.

Our Mission

To observe Nigerian Weather and Climate and provide Meteorological, Hydrological, and Oceanographic Services in support of National needs and International Obligations

Who We Serve

Aviation, Agriculture, Building and Construction, Commerce, Health, Hydrology, Marine, Oil and Gas, Sports, Social Events, Power and Energy, Telecommunication and more...

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INTRODUCTION

In this edition of three months compilation of climate and health bulletin, we explore the dynamic interplay between October, November, and December 2023 weather patterns and public health. In this bulletin, we spotlight the contrasting meteorological forces shaping Nigeria's landscape – cold, dry, and dusty northeasterly (Harmattan) winds prevailing in the north, and warm, moist southwesterly winds dominating the south, delve into the health implications of these climatic disparities, examining the challenges posed by dry conditions in the north and the potential consequences of increased humidity in the south. Also, we unravel the impacts on states and individuals navigating the complex relationship between atmospheric conditions and public health.

This document is to help build a community of health practitioners and policymakers that can use climate information to support health delivery and improved outcomes in the context of a changing climate, with a focus on some infectious and non-diseases, and the public health outcomes of meteorological disasters. It serves as advisory for experts from governments, humanitarian agencies, development organizations, international agencies, research centers and universities.

CRITERIA FOR DETERMINING THE DEGREE OF VIGILANCE OF DISEASES AND MEDICATION INSTABILITY

Meningitis: Relative humidity, dust concentration and mean air temperatures are used in determining the vigilance threshold for meningitis. For high vigilance, relative humidity of less than 20%, a temperature within the range of 25°C to 32°C and atmospheric concentration dust of 500 to 2000 $\mu\text{g}/\text{m}^3$ is applied. For moderate vigilance, relative humidity within the range of 20 to 40%, a temperature of 20°C to 25°C and a dust concentration of 200 to 500 $\mu\text{g}/\text{m}^3$ are indicative. Low vigilance is said to prevail when relative humidity is above 40%, temperature below 25°C, dust concentration is between 50 and 200 $\mu\text{g}/\text{m}^3$, and no vigilance prevails with any significant amount of rainfall.

Malaria: According to the International Research Institute for Climate and Society (IRI), seasonal climatic suitability for malaria transmission is defined as the chance of precipitation accumulation greater than 80 mm, average temperature between 18°C and 32°C, and relative humidity greater than 60%. The combined values of these climate variables at a given location or region are an indication of the lower limit for potential malaria transmission in the area. This implies that once these conditions are

met, malaria cases are likely to occur.

The predicted rainfall, temperature and relative humidity are used in determining the degree of vigilance for malaria. When rainfall is above 80 mm, the temperature is between 25°C and 32°C, and relative humidity is greater than 80%, the region is at high risk of malaria prevalence and is placed under High Vigilance. When the temperature is between 20°C and 25°C, relative humidity is between 70% and 80%, and rainfall is above 80 mm, then Moderate Vigilance is advised. Low vigilance for malaria is recommended for any location or region if the temperature ranges from 18°C to 20°C, relative humidity is between 60% and 70%, and rainfall is above 80 mm. No Vigilance is recommended when the temperature is lower than 18°C or above 32°C, relative humidity is lower than 60%, and rainfall is below 80 mm. This is because these climatic conditions are not conducive for mosquitoes to reproduce and multiply.

CHOLERA VIGILANCE: Vigilance for cholera is determined by the probability of high rainfall that may result in flooding and pollution of drinking water. Cholera-causing bacteria (*Vibrio cholera*) are mostly found in the faeces of an infected person, and in the event of open defecation, or broken sewage the faeces are easily transported by flowing water and deposited into water bodies such as rivers, streams, and lakes used by people for cooking, drinking and other domestic uses, especially in rural communities.

Medication Stability: Medication or drug

stability is defined as the ability of pharmaceutical dosage form to maintain the physical, chemical, therapeutic, and microbial properties during the time of storage and usage by the patient. The composition of medicines is affected by weather conditions such as air temperature and relative humidity. Maximum temperatures above 30°C and relative humidities higher than 75% have negative impacts on drug stability. Such conditions are therefore considered unsafe and unsuitable for the storage of medicines.

Heat Index (HI): Heat Index (HI) is a parameter used in expressing the temperature felt by the human body. It is calculated by combining air temperature and relative humidity. Its unit is degrees Celsius (°C) or degrees Fahrenheit (°F). Severe conditions where the body is under stress due to high heat index are referred to as heat stress. Hot and humid conditions (or high HI) can affect human well-being. Revealing signs of heat stress include panting, increased respiration rate, persistent thirst, loss of appetite, and fatigue. Different levels of caution are prescribed depending on the value of the Heat Index. The levels of caution for the heat stress are classified as follows:

- (i) No Caution if HI is $\leq 26^{\circ}\text{C}$.
- (ii) Caution if HI is 27°C to 32°C .
- (iii) High Caution if HI is 33°C to 39°C .
- (iv) Danger if HI is 40°C to 51°
- (v) Extreme Danger if HI is $\geq 52^{\circ}\text{C}$.



OCTOBER

1.1 The Climate in October

In October 2023, the Inter-Tropical Discontinuity (ITD) is expected to retreat southwards from its position in the previous month and fluctuate around latitude 15 and 16 degree north.

1.2 The highlights of the Bulletin for October 2023 are as follows

- The maximum (daytime) temperatures anticipated over the country will range from 28.0°C to 40.0°C, while the minimum (nighttime) temperature over the country will range from 17.0°C to 27.0°C.
- The total monthly precipitation in the country is expected to be between 40.0mm and 480.0mm.
- The climatic conditions during the month are expected to favour different levels of malaria prevalence over some parts of the country. Consequently, moderate malaria vigilance is recommended in the central and southern region states, while low malaria vigilance advised in the northern states.
- Climatic conditions for high incidence of cholera are expected over the entire southern states and parts of the Central States, therefore high vigilance is advised. Moderate vigilance is prescribed in most of the Central and some Northern States.
- High vigilance for medication instability is recommended in vast portion of the country cutting across the north, central and southern parts of

country. However, moderate vigilance is prescribed over Kano, Jigawa, Borno, Lagos, FCT, Nasarawa, Oyo, River, and Akwa Ibom state.

- High caution for Heat Index is

recommended over parts of Yobe state, while moderate caution is recommended for entire northern states, parts of Delta, Bayelsa, Imo, Edo, and Benue.

1.3.0 GENERAL OUTLOOK FOR 1ST TO 31ST OCTOBER 2023

1.3.1 In October 2023, the Inter-Tropical Discontinuity (ITD) is expected to retreat southwards from the previous month and fluctuate around latitude 15 and 16 degree north (Figure 1). Consequently, the northern fringes of the country are projected to be under the influence of dry and dusty north-easterly wind while the southern,

central, and southern part of the north are expected to be under the influence of the warm and moist south-westerly winds from the Atlantic Ocean. The southwards movement of the ITD is expected to give rise to hazy conditions over some part of the north and thunderstorms over the central and southern states.

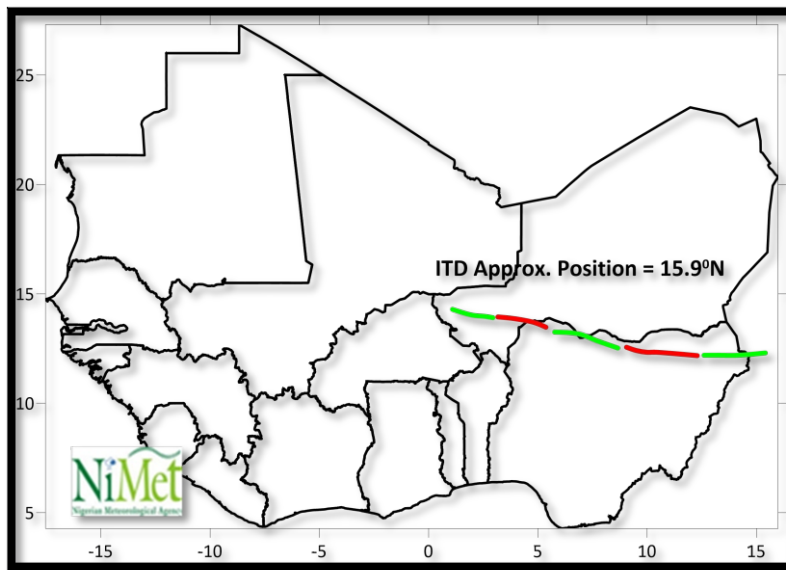


Figure 1: Projected ITD position in October 2023

1.3.2 Rainfall:

The rainfall forecast for October 2023, shows 45% chance of average-to -above average rainfall amounts across the country (Figure 2).

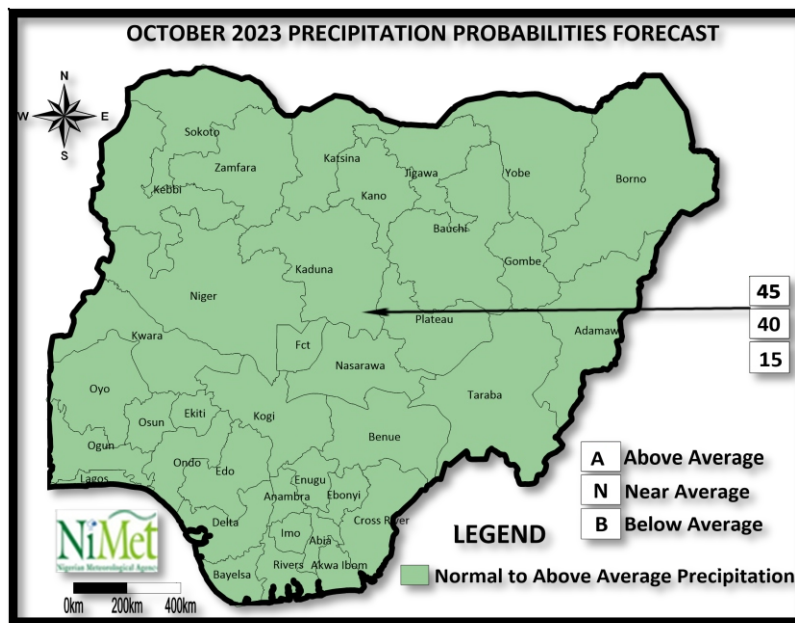


Figure 2: NiMet rainfall forecast for October 2023.

1.3.3 Rainfall Amount

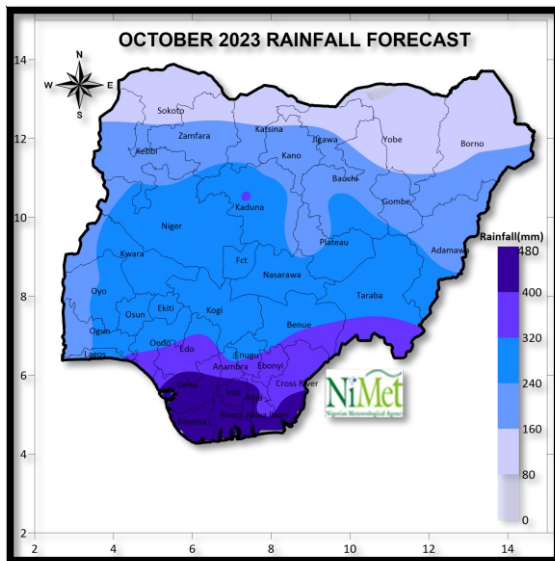


Figure 3: October 2023 rainfall amount forecast

In October 2023, the Inter-Tropical Discontinuity (ITD) is expected to retreat southwards from its position in the previous month and fluctuate around latitude 15 and 16 degree north.

1.3.4 Relative Humidity (RH)

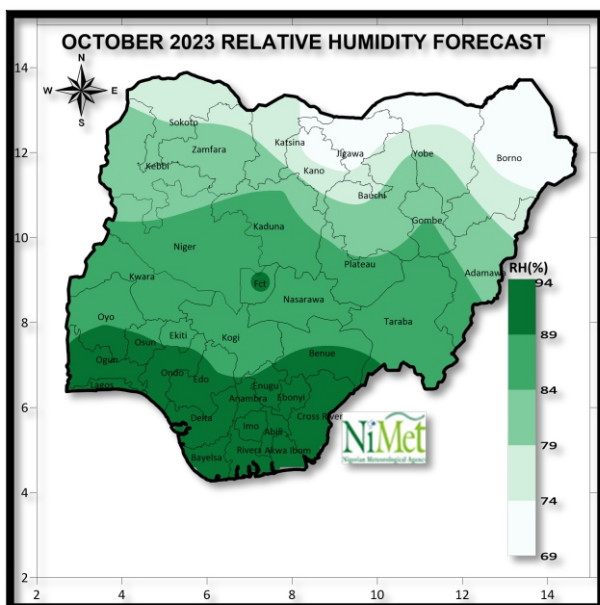


Figure 4: October 2023 Relative humidity forecast.

The relative humidity across the country is predicted to be between 69% and 94% as shown in Figure 4. The lower range (69% to 84%) is anticipated over the northern and central cities. While the upper range (89% to 94%) is expected over the coastal and inland states.

1.3.5 Mean Temperature

The distribution of projected mean temperature across Nigeria for October 2023 is shown in Figure 5. Mean temperatures are predicted to range between 22.0°C and 32.0°C across the country, with Borno, Sokoto and Yobe States expecting the highest temperature of 30.2°C, 30.3°C and 30.5°C respectively. Plateau state and its surroundings are predicted to have the lowest of 23.0°C.

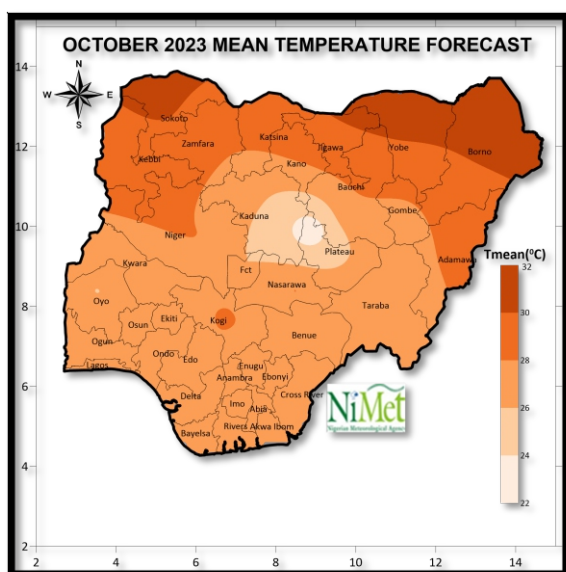


Figure 5: October 2023, Mean temperature forecast.

1.3.6 Maximum (Daytime) Temperature

Figure 6 shows the anticipated maximum temperatures across Nigeria in October 2023. The maximum temperatures are projected to range between 28.0°C and 40.0°C. Cities in the Northeast and Northwest, are expected to record highest maximum temperatures of about 37.0°C. Jos is forecasted to have the lowest maximum temperature at 28.0°C.

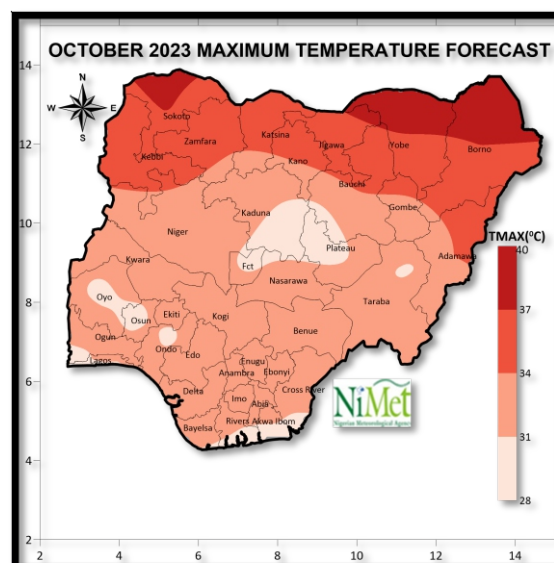


Figure 6: Maximum temperature forecast for October 2023

1.3.7 Minimum (Nighttime) Temperature

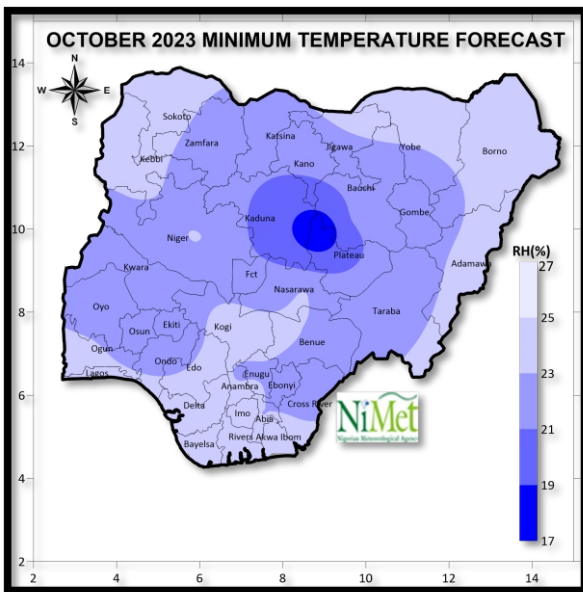


Figure 7: October 2023, minimum temperature forecast

Figure 7 shows the distribution of the projected minimum (nighttime) temperature over the country in October 2023. It is estimated to range from 17.0°C to 27.0°C. Parts of Plateau and Bauchi states are anticipated to experience low temperatures of between 17.0°C and 21.0°C respectively

1.4.0 DISEASE VIGILANCE

1.4.1 Malaria

1.4.1.1 Malaria Vigilance for October 2023

In most areas of the country, there is a significant likelihood of malaria cases, so extreme vigilance is advised. In the extreme northern states, malaria cases should be moderate, consequently, moderate vigilance is recommended, and in a few central states like Plateau, Bauchi, and Kaduna.

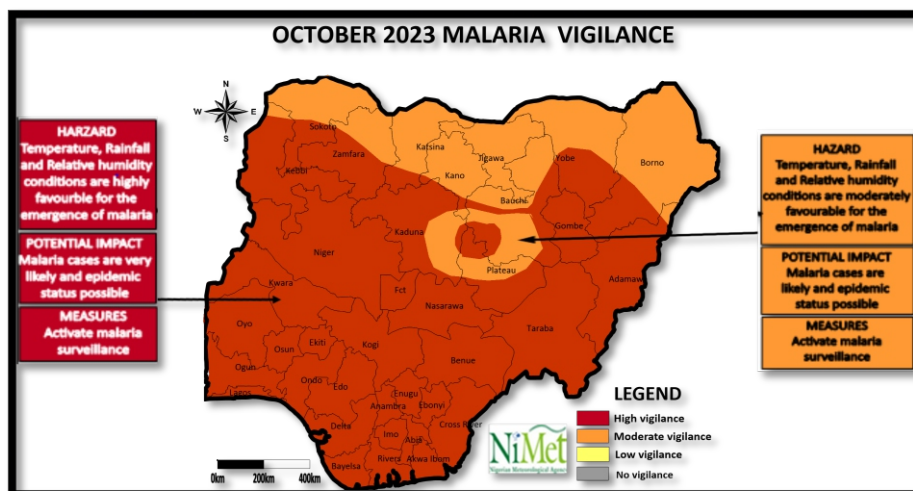


Figure 8: Malaria Vigilance for October 2023

Climate Conditions	Hazard	Potential Impacts	Advisory/Measures
Temperature between 25°C and 32°C Relative humidity > 80%, Rainfall > 80 mm	High probability of occurrence of malaria cases.	(i) Malaria could be fatal if not treated on time and properly. (ii) Procurement of drugs for the treatment of malaria is expensive and therefore has adverse impacts on financial resources of individuals and government.	As much as possible, avoid mosquito bites by using insecticide-treated mosquito nets, fumigating the environment frequently and clearing drainages.
Temperature between 20°C and 25°C. Relative humidity between 70% and 80% Rainfall ≥ 80 mm	Moderate probability of occurrence of malaria cases.	(iii) Malaria is usually accompanied by headache and body ache. This impacts negatively on the patient's daily life.	Early diagnosis and treatment should be emphasized
Temperature between 18°C and 20°C Relative humidity between 60% and 70% Rainfall ≥ 80 mm	Low probability of occurrence of malaria cases.	(iv) Malaria patients usually feel very sick with high fever and shivering chills. As a result, malaria patients are unable to undertake normal economic and social activities.	Pregnant women are encouraged to take the essential precautions to avoid contracting malaria, such as using mosquito nets coated with pesticides when sleeping and taking anti-malaria prophylaxis.

	Temperature < 18°C > 32°C Relative humidity < 60% Rainfall < 80 mm	Occurrence of Malaria cases unlikely.	

1.4.2 Cholera

1.4.2.1 Cholera Vigilance for October 2023

In the Southern States and parts of the Central States, such as Kogi, Benue, and Kwara States, the climatic conditions indicate that there is high probability of occurrence of cholera cases as a result, High vigilance is therefore advised. In most of the Central and Northern States, moderate cases are anticipated. In the extreme northern states, the emergence of cholera is unlikely. No vigilance is therefore recommended for those states.

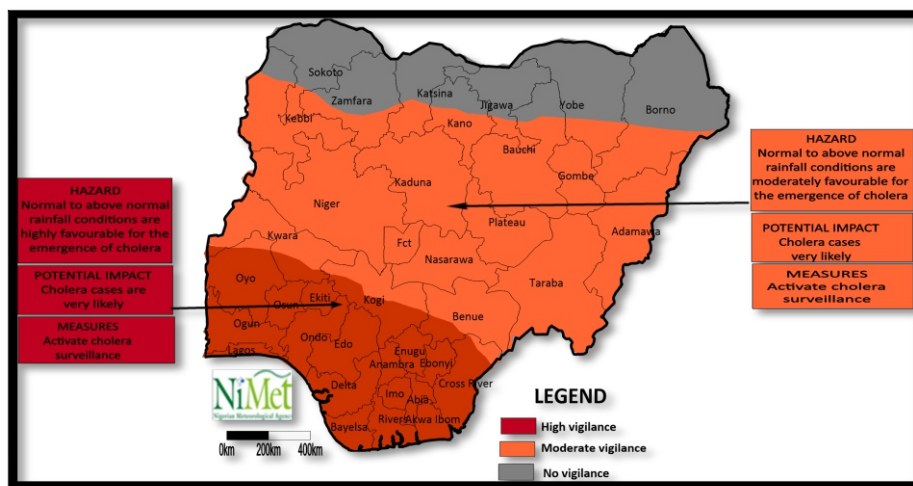


Figure 9: Cholera Vigilance for October 2023.

	Climatic Conditions	Hazard	Potential Impacts	Advisory/Measures
	Probability of above-normal rainfall.	The outbreak of cholera is highly probable.	Patients are likely to be more	Wash hands frequently with soap and clean water.
	Probability of normal rainfall	The outbreak of the diseases is moderately likely.	susceptible to stooling and vomiting at the same time.	Ensure foods and water are uncontaminated, and the environment is kept clean by ensuring that proper sanitation is observed
	Probability of below-normal rainfall	The outbreak of the diseases is unlikely		

1.5.0 Medication Instability

1.5.1 Medication Instability Vigilance for October, 2023

In most areas of the country, the expected temperature and humidity in October 2023 are likely to result in drug and medication instability. In view of this, most parts of the country should watch closely for medication instability and take necessary precautions. However, moderate caution is anticipated over certain parts of the Northeast and Northwest, as well as over the Southern cities of Lagos, Oyo, Bayelsa, Akwa Ibom, and Rivers, as well as the central cities of Plateau, Kaduna, Nasarawa, Niger, Taraba, the FCT, and Abuja.

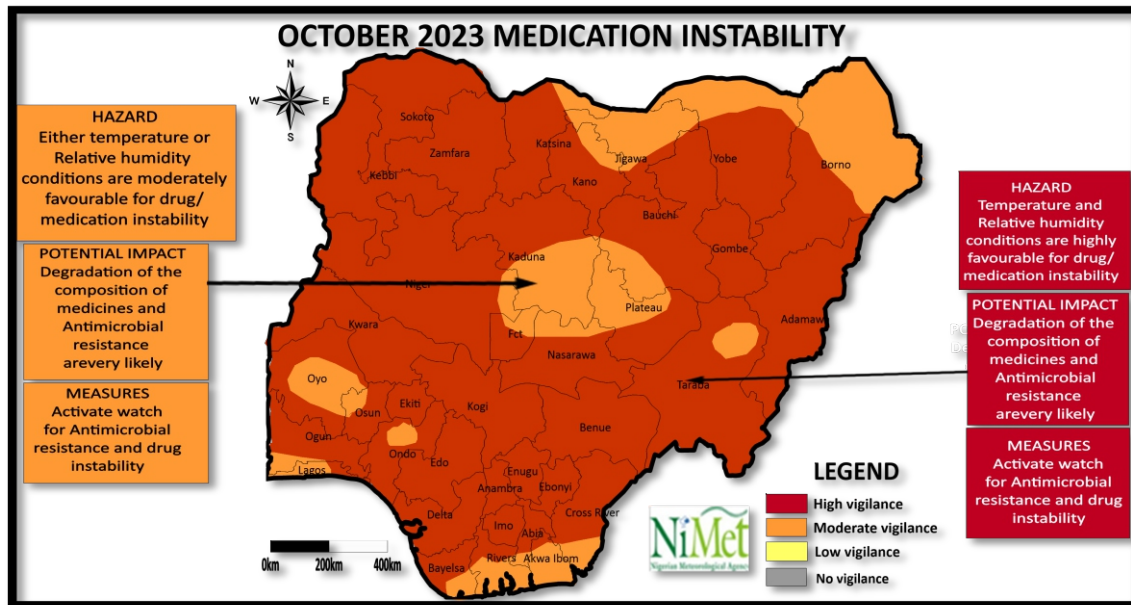


Figure 10: Medication Instability Vigilance for October 2023.

	Climatic Conditions	Hazard	Potential Impacts	Advisory/Measures
	Air temperature > 30°C and Relative humidity > 75%.	These conditions are considered unsafe and unfavourable or uncondusive for the storage of medicines.	<p>(i) Drugs may lose their potency. Consequently, patients treated with such medications are not likely to recover as desired.</p> <p>(ii) Microorganisms that cause some diseases may develop antimicrobial resistance (AMR).</p> <p>(iii) Recovery of patients will be retarded when they are treated with antibiotics that have been exposed to weather</p>	In areas with high vigilance thresholds, there is need for greater caution when moving and storing medications. Medicines should always be stored and transported using facilities with controlled temperature and humidity.

		conditions that affect their stability.	
Air temperature > 30°C and Relative humidity < 75%. OR Air temperature < 30°C and Relative humidity > 75%.	The predicted temperatures and relative humidity are likely to cause a depreciation in the quality of medicines.	Microorganisms that cause diseases are likely to develop antimicrobial resistance (AMR) when treated with antibiotics that have lost potency due to exposure to weather conditions that affect their stability.	Temperature and humidity monitoring systems for transporting and storing medicines are advised.
Air temperature between 25°C and 30°C,	Unconducive weather conditions tend to		Medical professionals should also advise patients on the proper storage of their
Relative humidity between 70% and 75%.	shorten the shelf life of medicines and could affect their overall potency.		medications to avoid degradation and loss of potency.

1.6.0 Heat Index

1.6.1 Heat Index Vigilance for October, 2023

Based on the expected temperature and humidity in October 2023, Yobe State has a high probability of experiencing heat stress, whereas extreme northern states and some cities in Benue, Edo, Delta, Bayelsa, Cross River, Imo, and Ogun states have moderate probability of experiencing heat stress. Therefore, caution is advised for most of the country, with no caution needed for certain areas of Plateau, Bauchi, and Kaduna states.

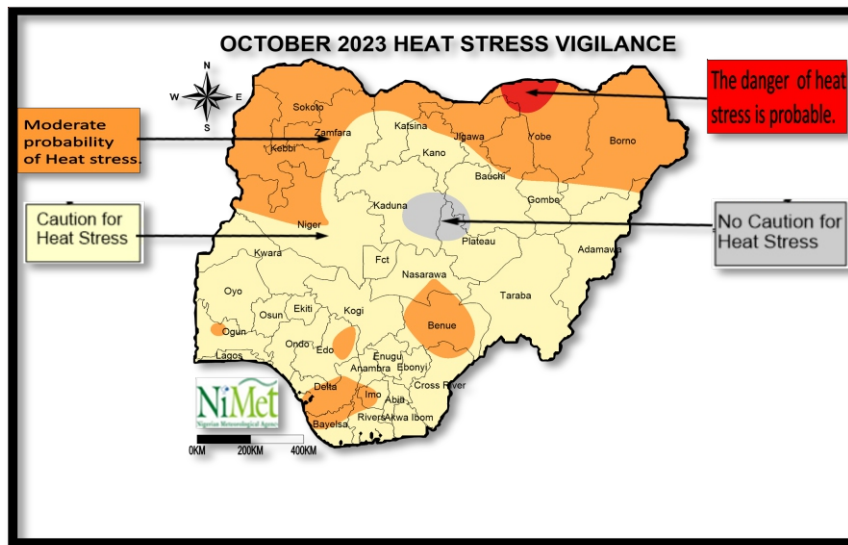
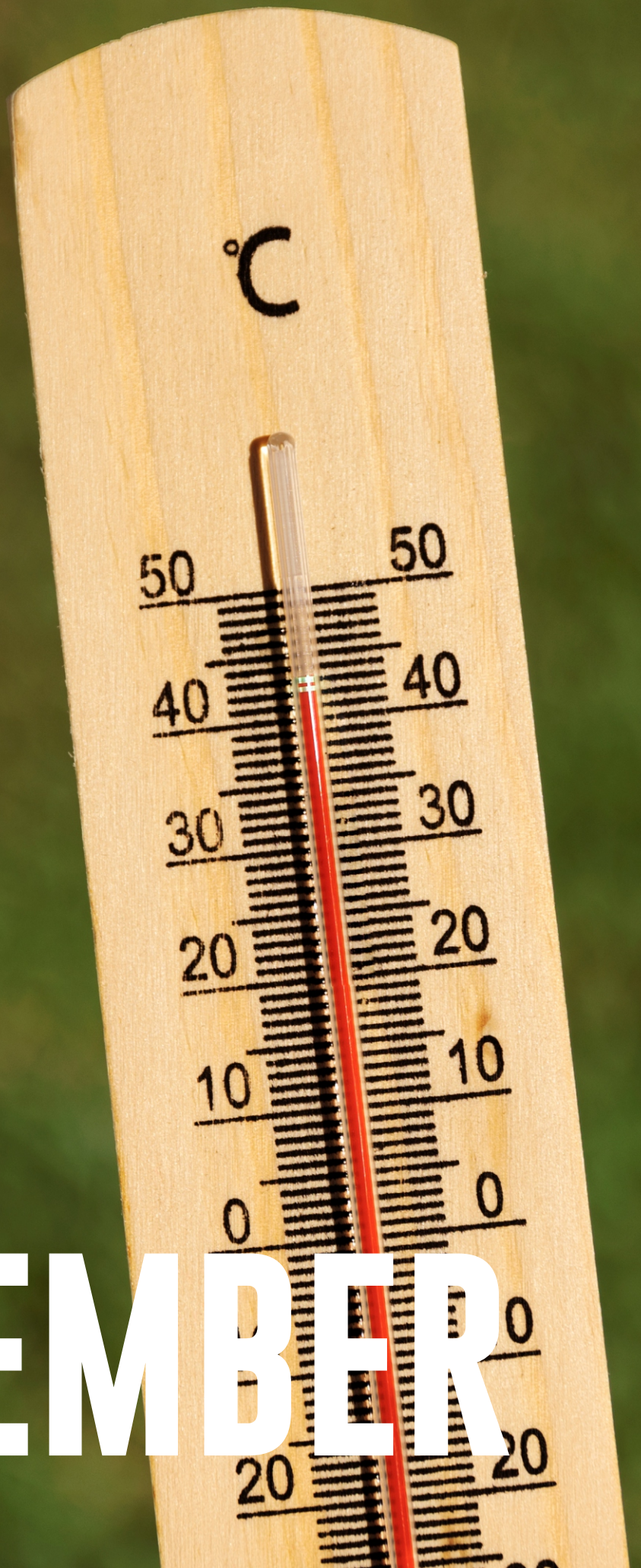


Figure 11: Heat stress Vigilance for October 2023.

	Climatic Conditions	Hazard	Potential Impacts	Advisory/Measures
	Heat Index between 40°C and 52°C	The danger, and extreme danger of heat stress is probable.	Patients are likely to be more susceptible to heat stroke, exhaustion, loss of concentration and possible damage to the brain, liver and heart, leading to collapse	Use shades when engaging in outdoor activities to avoid direct exposure to heat from the sun.
	Heat Index between 33°C and 39°C	Moderate probability of heat stress.	Persistent and increased respiration rate can lead to collapse.	Work and other outdoor activities should be carried out when the intensity of solar radiation is not severe.

Heat Index between 27°C to 32°C	Low probability of heat stress is likely.	Thirst, loss of appetite, and fatigue. Can lead to abnormal health condition.	Reduce physically demanding labour when the weather is hot.
Heat Index ≤26°C	Heat- related diseases is unlikely		Keep the body hydrated by regularly drinking adequate amounts of water or other nutritious liquids and dress in hot- weather- appropriate attire.



NOVEMBER

2.1 The Climate in November 2023

In November 2023, the Inter-Tropical Discontinuity (ITD) is expected to retreat southwards from its position in the previous month and fluctuate around latitude 15 and 16 degree north.

2.2 The highlights of the Bulletin for November 2023 are as follows:

- The expected maximum (daytime) temperatures will range from 28.0°C to 39.0°C, the lower (28.0°C) side of the range is expected over parts of Plateau, Bauchi, and Kaduna while the upper (39.0°C) side in Sokoto, Kebbi, and Adamawa States. The minimum (nighttime) temperature anticipated over the country will range from 14.0°C to 27.0°C, parts of Plateau, Kaduna, Bauchi, Kano, and Jigawa States are expected to record 14.0°C, while 27.0°C is expected in the Southern States and parts of Niger, FCT, Kogi, Nasarawa, Benue, and Taraba.
- The total monthly precipitation will likely range from 0.0mm to 10mm over the North, parts of Central States and 80mm to 220mm over the Southern States.
- It is anticipated that the month's weather will favor varying degrees of malaria prevalence in some parts of the Country. Consequently, high vigilance is advised over the South while moderate vigilance is prescribed in the Central States. Low vigilance should in place over the North.
- In the Southern States, the climatic conditions indicate

high probability of occurrence of cholera cases as a result, High vigilance is therefore advised. In most of the Central as well as some areas of the Southern States, including Oyo, Enugu, and Ebonyi, moderate cases are anticipated therefore moderate vigilance advised.

- High vigilance for medication instability is recommended in the Southern States and some parts of Central States (FCT, Nasarawa, Benue, Niger, Kwara, and Kogi). On the other hand, moderate caution is advised over the North.
- Climate conditions suggests moderate probability of occurrence of meningitis

cases over the extreme north hence moderate vigilance is advised. Parts of Kebbi, Zamfara, Kaduna, Niger, Plateau, Gombe, Bauchi and Adamawa have slim prospects of meningitis cases based on the projected climate variable. As a result, low vigilance is recommended.

- Moderate caution for Heat Index is prescribed in the Southern States and portions of the Central States, such as Benue, Kogi, FCT, Nasarawa, Kwara, and Niger, while low caution is recommended in Sokoto, Kebbi, Zamfara, Taraba, Gombe, and Adamawa States.

2.3.0 GENERAL OUTLOOK FOR 1ST TO 31ST NOVEMBER 2023

2.3.1 The ITD position will continue to move southward in November, reaching a latitude of roughly 12 degrees north of the equator. It is implied that the country's northern regions will likely be affected by dry, dusty winds, while the southern and coastal regions will likely see

warm, humid weather (Figure 1). It is anticipated that the ITD's southward movement will result in hazy conditions over the northern and central regions, whilst thunderstorms are predicted to affect the southern states.

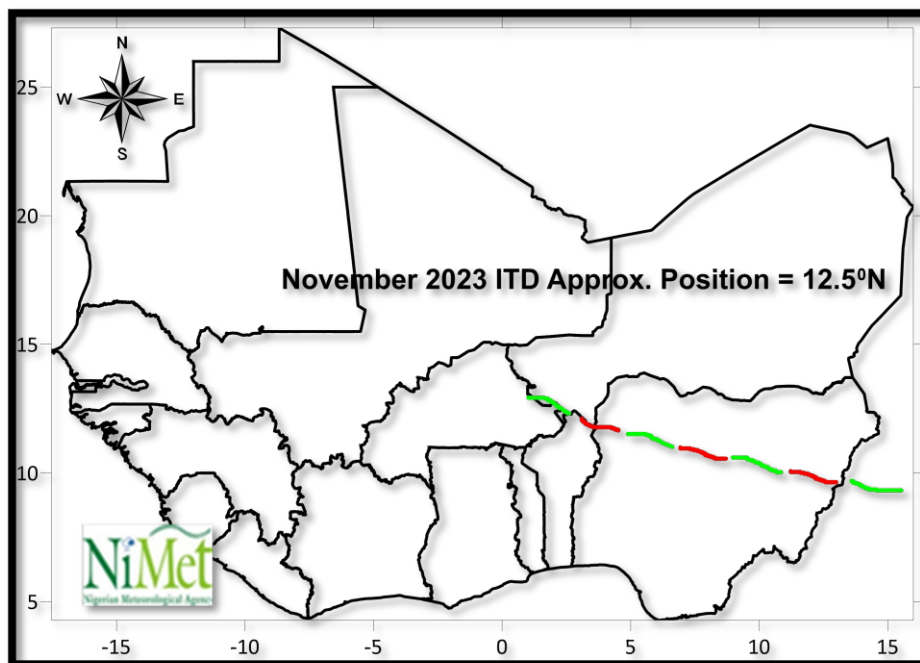


Figure 12: Projected ITD position in November 2023.



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