



CLIMATE AND HEALTH BULLETIN

JULY 2023



NiMet
Nigerian Meteorological Agency



MONTHLY DISEASE & MEDICATION INSTABILITY VIGILANCE FOR NIGERIA

ISSUED: JULY 1ST, 2023.

VALID UNTIL: JULY 31ST, 2023.

THE CLIMATE IN JULY 2023.

In July 2023, the ITD will move above Nigeria, indicating that rainfall activities are now well-established all over the country due to the large amounts of moisture advected into the country by the south-westerly winds from the Atlantic Ocean.

The highlights of the Bulletin for July 2023 are as follows:

- The expected maximum temperatures will range from 25.0°C to 35.0°C while the minimum (nighttime) temperature anticipated over the country will range from 17.0°C to 25.0°C.
- The total monthly precipitation will likely range from 0.0mm to 160mm over the northern and the Central, while over the Southern states it is anticipated to be between 240mm and 800mm.
- Climatic conditions for *High malaria vigilance* are anticipated over most cities of the Southern and Central states, with moderate cases of malaria expected over Sokoto, Kebbi, Zamfara, Kano, Katsina, Jigawa Yobe, Borno and Adamawa while low cases of malaria are expected over parts of Borno, Yobe, Kano, Katsina, Sokoto and Zamfara.
- Climatic conditions for *High cholera vigilance* are expected over the Northeastern and south-western cities of the country with moderate cases expected over the other parts of the country.
- Climatic conditions for *High vigilance* are recommended for medication instability in the central and most parts of the northern states while moderate vigilance is expected over the south and some cities in the northern fringes of the country.
- *High caution* for Heat Index is recommended over the northwestern part of Sokoto state. Climatic conditions for moderate to low Heat Index *Caution* are expected for most parts of the country.

1.0 GENERAL OUTLOOK FOR 1ST TO 31ST JULY 2023

1.1 The Inter-Tropical Discontinuity (ITD) is expected to move northwards to approximately 20.2N in July (Figure 1), implying that there will be an increase in the influx of moisture into the country.

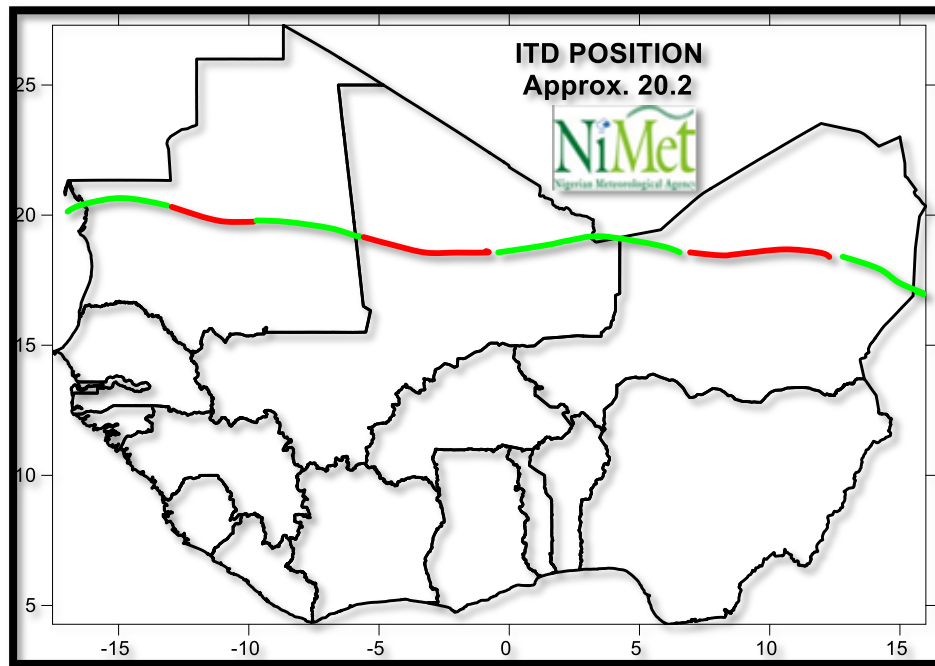


Figure1: Projected ITD position in July 2023

1.2 Rainfall: The predicted rainfall for the country for July 2023 shows the prospect of normal to above normal (above average) cumulative rainfall amounts over the southern and central cities, with a 35% probability of normal to above normal rainfall. On the other hand, there is a 40% probability of average rainfall amount over the Northeastern and the Southwestern parts of the country (Figure 2).

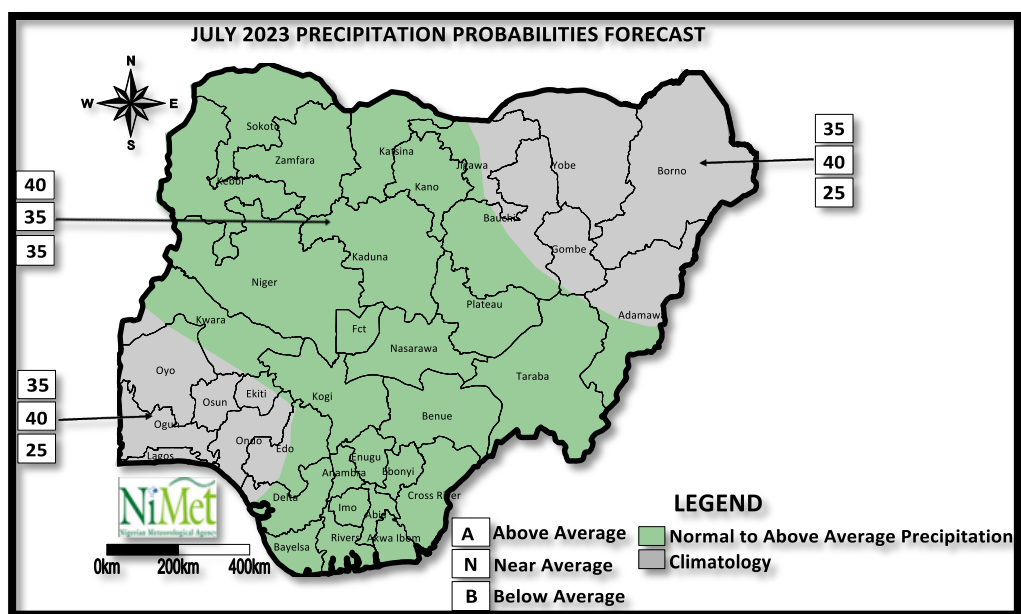
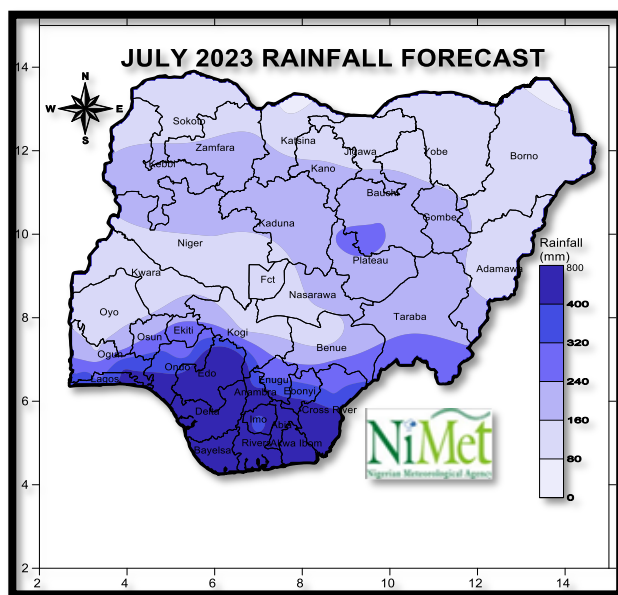


Figure 2: NiMet rainfall forecast for July 2023

1.2. Rainfall Amount



The total monthly precipitation will likely range from 0.0mm to 160mm over the northern and the Central states, while over the Southern states, between 240mm and 800mm of rainfall is anticipated.

Figure 2: July 2023 rainfall amount forecast

1.3 Relative Humidity (RH)

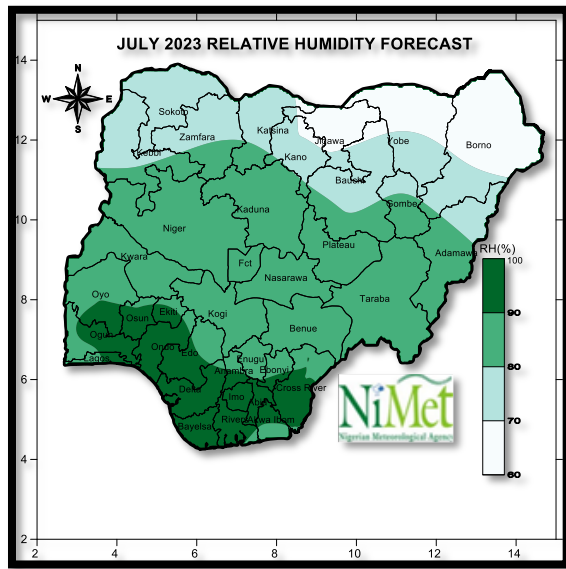


Figure 3: July 2023 relative humidity forecast

The relative humidity is predicted to range between 60% and 100% over the country. The lower range (60% to 70%) is anticipated over parts of Borno, Yobe and Jigawa. While the upper range (90% to 100%) is expected over the states in the south-south, as well as Imo, Abia, Ondo parts of Lagos, Ogun, Osun, Ekiti and Oyo states.

1.4 Mean Temperature

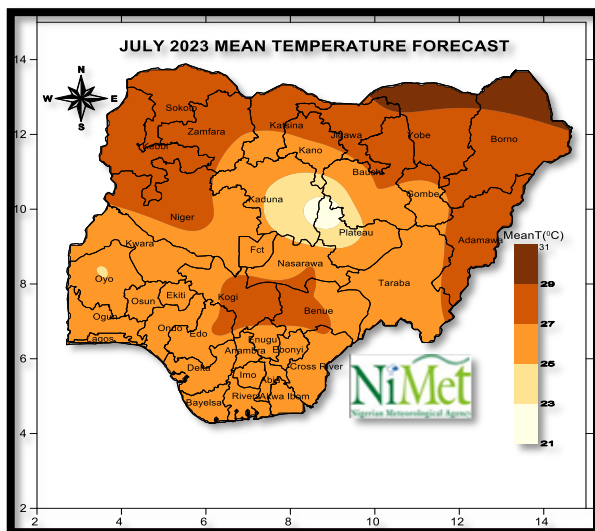


Figure 4: Mean temperature forecast for July 2023.

The distribution of projected mean temperature across Nigeria for July 2023 is shown in Figure 4. It is projected that the different parts of the country are likely to experience mean temperatures between 21.1°C and 29.3°C, with the lowest temperature of 21.1°C expected over Plateau state and its environs, while the highest temperature of 29.3°C is expected over Nguru, Yobe State.

1.5 Maximum Temperature

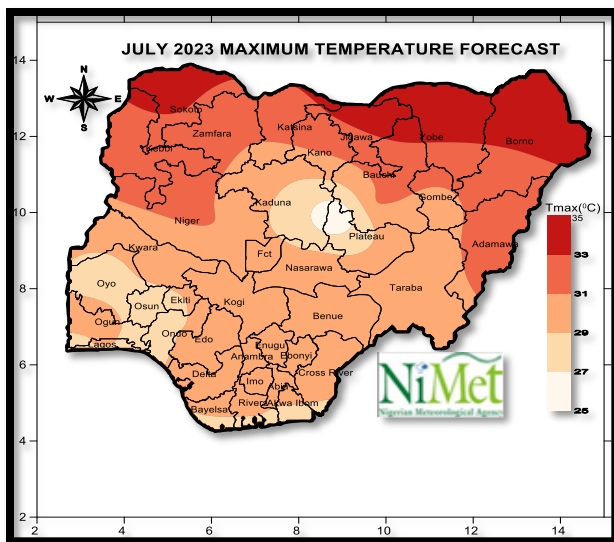


Figure 5: Maximum temperature forecast for July 2023

Figure 5 shows the projected maximum temperatures across the country for July 2023, which range from 25.0°C to 35.0°C. Higher temperatures of 35°C are expected over the Northeast and Northwest with Jos anticipating to have the lowest maximum temperature of 25.0°C.

1.6 Minimum (Nighttime) Temperature

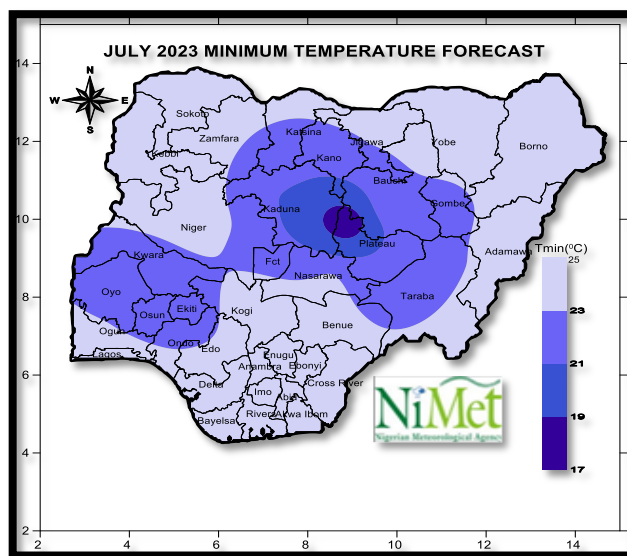


Figure 6: July 2023 minimum temperature forecast

Figure 6 shows the distribution of the projected minimum (nighttime) temperature over Nigeria. It is estimated to range from 17.0°C to 25.0°C. Parts of Plateau, Bauchi, and Kaduna states are anticipated to experience low temperatures of 17.2°C, 22.6°C and 20.9°C, respectively.

2.0 MALARIA VIGILANCE

Changes in temperature, rainfall, and relative humidity due to climate change as well as their natural variabilities are expected to influence the incidence of malaria directly by modifying the behaviour and geographical distribution of malaria vectors and by changing the length of the life cycle of the parasite. The climate is also expected to affect occurrence of malaria indirectly

by changing ecological relationships that are important to the organisms (vector, parasite, and host) involved in malaria transmission. Rainfall increases the chances of egg-laying by increasing the number of potential breeding sites for anopheles mosquitoes. The eggs can develop and reach adulthood within nine to twelve days which is necessary for the mosquito life cycle¹.

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

2.1.1 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.

2.1.2 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, the faeces are easily transported by flowing water and deposited into water bodies such as rivers, streams and lakes, used by people for cooking and drinking, especially in rural communities.

¹ Dave E. E., Eunice A. S., Johnson A. O., Dare A. 2023. Spatio-temporal analysis of environmental and climatic factors impacts on malaria morbidity in Ondo State, Nigeria. Heliyon 9 (2023) e14005. 1-11. <https://doi.org/10.1016/j.heliyon.2023.e14005>

2.1.3 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 patient². The composition of medicines is affected by weather conditions such as air temperature and relative humidity. When the maximum temperature is above 30°C and relative humidity exceeds 75%, the conditions are considered unsafe and unsuitable for the storage of medicines.

2.2 Heat Index (HI) is a measure of how hot the weather feels to the human body due to the combined effects of relative humidity and air temperature. It is also known as felt air temperature; its unit is degrees Celsius (°C) or degrees Fahrenheit (°F). When the ambient temperature is high, the human body naturally strives to maintain normal body temperature by dissipating excess heat through perspiration. The body cools when sweat evaporates from the surface of the skin. This process is impaired, and the body persistently feels hot if the humidity is high or the air is still (i.e., there is no breeze). This could lead to heat stress. Revealing signs of heat stress include panting, increased respiration rate, persistent thirst, loss of appetite, and fatigue. HI is calculated using Air temperature and Relative Humidity. Hot and humid conditions (or high HI) can affect human well-being. Different levels of caution are therefore prescribed. The levels of caution for the heat index 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°C .
- (v) *Extreme Danger* if HI is $\geq 52^{\circ}\text{C}$.

² Afifi N.A. (2016). Drug stability. Faculty of Vet. Med. Cairo University.

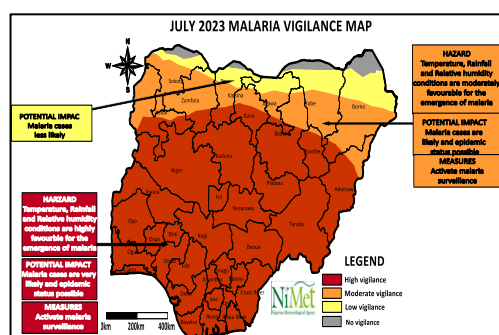
3.0 DISEASE VIGILANCE

3.1 MALARIA

3.1.2 Malaria vigilance

MALARIA VIGILANCE FOR JULY 2023

High probability of malaria cases is expected in most cities of the Southern and Central states, with moderate cases of malaria expected over Sokoto, Kebbi, Zamfara, Kano, Katsina, Jigawa, Yobe, Borno and Adamawa, while low cases of malaria are expected over parts of Borno, Yobe, Kano, Katsina, Sokoto and Zamfara and no cases of malaria are expected over the northern borders of the country.



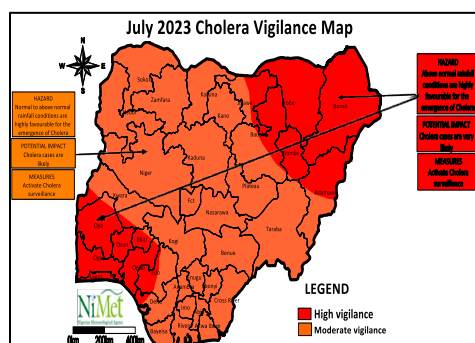
Climate Conditions	Hazard	Potential Impacts	Advisory/Measures
Temperature between 25°C and 32°C Relative humidity > 80%, Rainfall > 80 mm	High probability of occurrence of malaria cases.	Malaria could be fatal if not treated on time and properly.	As much as possible, avoid mosquito bites by using insecticide-treated 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.	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.	Malaria patients usually feel very sick with high fever and shivering chills.	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 between 18°C and 32°C Relative humidity < 60% Rainfall < 80 mm	occurrence of Malaria cases unlikely.		

3.2 CHOLERA

3.2.1 Cholera vigilance

CHOLERA VIGILANCE FOR JULY 2023

High probability of emergence of cholera cases is expected in the Northeastern cities and Southwestern cities, with moderate cases expected in the other parts of the country.



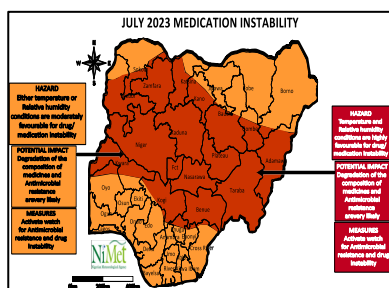
	Climatic Conditions	Hazard	Potential Impacts	Advisory/Measures
	Probability of above-normal rainfall.	The outbreak of cholera is highly probable.	Patients are likely to be more susceptible to stooling and vomiting at the same time.	Wash hands frequently with soap and clean water.
	Probability of normal rainfall	The outbreak of the diseases is unlikely.		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	Dehydration, stooling and vomiting, and in if not treated my lead to Death.	Infected patients are advised to drink plenty of clean water.

4.0 MEDICATION INSTABILITY

4..1 Medication Instability Vigilance

MEDICATION INSTABILITY VIGILANCE FOR JULY 2023

High probability of occurrence of medication instability cases is expected in the central and most parts of the northern states, while moderate vigilance is expected over the south, Northeast, and part of Northwest.



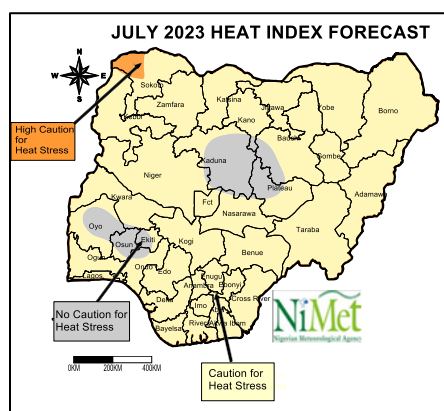
Climatic Conditions	Hazard	Potential Impacts	Advisory/Measures
Air temperature > 30°C and Relative humidity > 75%.	These conditions are considered unsafe and unfavourable or inconducive for the storage of medicines.	(i) Drugs may lose their potency. (ii) Microorganisms that cause some diseases may develop antimicrobial resistance (AMR). (iii) Recovery of patients will be retarded when they are treated with antibiotics that have been exposed to weather conditions that affect their stability.	In areas with high vigilance thresholds, there is a need for greater caution when moving and storing medications. Medicines should always be stored and transported using facilities with controlled temperature and humidity.
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 been exposed 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, Relative humidity between 70% and 75%.	Unconducive weather conditions tend to shorten the shelf life of medicines and could affect their overall potency.		Medical professionals should also advise patients on the proper storage of their medications to avoid degradation and loss of potency.

5.0 HEAT INDEX

HEAT INDEX VIGILANCE FOR JULY 2023

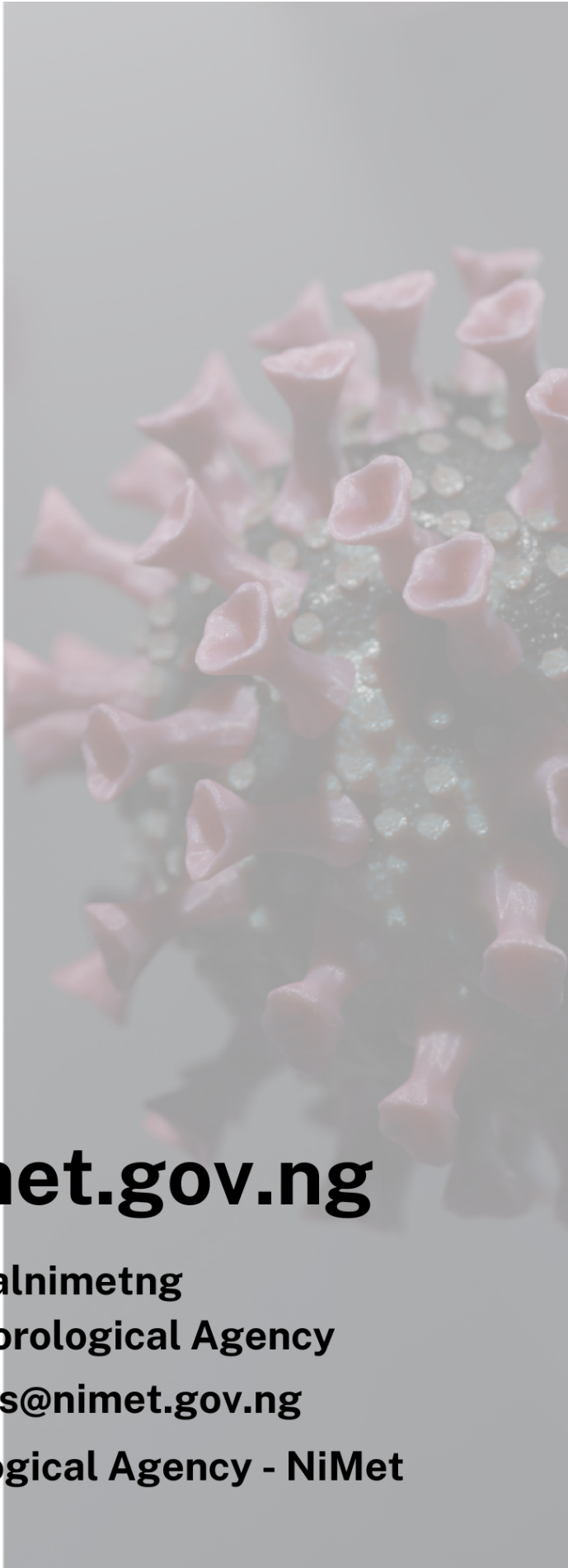
There is high probability of occurrence of Heat Stress in the northeastern part of Sokoto state. *High Caution* is therefore recommended in this area. Heat Index *Caution* is recommended for the rest of the country, with the exception of parts of Ekiti, Osun and Oyo states in the southwest, as well as Kaduna, Bauchi and Plateau states in the north.

5.1 Heat Index Vigilance



	Climatic Conditions	Hazard	Potential Impacts	Advisory/Measures
	Heat Index between $40^{\circ}\text{C} \geq 52^{\circ}\text{C}$	The danger, and extreme danger of heat stress is probable.	Patients are likely to be more susceptible to panting leading to sudden collapse	Use shades when engaging in outdoor activities to avoid direct exposure to heat from the sun.
	Heat Index between 33°C to 39°C	Moderate probability of Heat stress.	Persistent and increased respiration rate can lead to sudden 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 $\leq 26^{\circ}\text{C}$	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.

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