# El Niño 2023-2024 status and its possible impact on Food security in African continent

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## Background

Africa, despite of having low GHG emission and its small contribution to global warming, remains the most vulnerable (AFDB) continent to climate change. This higher vulnerability is mainly because of their low adaptive capacity and their higher dependency on agricultural activities for their sustenance and livelihood. Agriculture and allied activities, which are highly dependent on climate, has a significant share in the country's GDP and employment in the African continent. Many countries in the continent have been a net importer of food grains. This can be ascribed to the fact that cultivable area under irrigation is only 6% in Africa compared to Asia (37%) and Latin America (14%; IFPRI, 2019). Therefore, any change in regional weather will have a profound impact on the food production in the region and thus food security of its inhabitants.

Atmospheric teleconnections, namely El Niño Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), Atlantic Multi-decadal Oscillation (AMO) etc. play an important role in modulating the regional climate, and thus can be used to describe the interannual climate variability observed in African continent, especially in the eastern and southern parts of Africa. El Niño characterised by weakened trade winds, results in concentration of warm water over the tropical eastern Pacific ocean, and thus affects climate across the globe. Although Africa is far away from the Pacific ocean, the changes in sea surface temperature and atmospheric pressure in Pacific ocean during El Nino episode affects the weather pattern in eastern and southern Africa.

## Current strength of El Niño

In January 2024, the National Oceanic and Atmospheric Administration (NOAA) issued warning that El Niño is anticipated to continue for the next several seasons, with a 73% chance that ENSO-neutral condition will be favoured during April-June 2024 **(** https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml**.** El Niño and La Niña are opposite phases of the El Niño-Southern Oscillation (ENSO) cycle. ENSO is a recurring climatic pattern involving changes in the sea surface temperature in the

central and eastern tropical pacific ocean. During a typical El Niño year, there is warming of sea-surface temperature (SST) above the average, resulting in weakened monsoon winds, and associated warm and dry conditions (below-normal rainfall) in Western and Southern Africa, India, Southeast Asia, Australia, the northern regions of South America, and Central America. Conversely, wetter conditions are usually observed in some parts of east Africa, eastern Asia, southern and central Asia, as well as southern parts of North and South America. This is a irregular recurring event happening every two to seven years. An El Niño episode may last from nine months to a year or more in exceptional cases. Most of these events begin during boreal spring/summer and reach peak between November and January (Trenberth, 1997).

El Niño episodes are characterized by Oceanic Niño Index (ONI) greater than or equals to +0.5ºC (Lindsey, 2009). ONI developed by NOAA is one of the measure of the El Niño-Southern Oscillation (ENSO). It is the 3 month running mean of ERSST.v5 Sea Surface Temperature (SST) anomalies in the Niño 3.4 region (5ºN-5ºS, 120º-170ºW), based on centred 30-year base periods updated every 5 years. For the present analysis, the base period used was 1991-2020. These events are categorised into four categories based on the SST anomaly: *weak* (anomaly ranging between 0.5 to 0.9), *moderate* (1 to 1.4), *strong* (1.5 to 1.9), and *very strong* (≥2; NOAA). The magnitude of this index (3 consecutive overlapping 3-month periods; OND) in December is +1.9, hence this is classified as a *strong* event as of now. The evolution of present El Niño is somewhat similar to the El Niño event observed in year 1972 (https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php). The present El Niño event is the fifth strongest event (2015-16, 1997-98, 1982-83, 1965-66, 1972-73) as of now, since 1950.

**Expected global impact with a focus on African continent**

The current strength of the El Niño episode and its expected development, according to World Meteorological Organisation's (WMO) probabilistic multi-model ensemble (MME) suggest high probability of wetter than normal precipitations in Eastern Africa, parts of East and Central Asia, and parts of South America in November continuing till March 2024 (https://www.wmolc.org/seasonPmmeUI/plot_PMME). Such wetter conditions may enhance crop yields in these regions. They also may enable groundwater, reservoirs, and catchment recharge, thus improving the water supply for household, agricultural and industrial uses. In particular, this have facilitated gradual recovery from three-year droughts in the Horn of Africa and in Afghanistan. However, the risk of flooding, desert locust multiplication, and outbreak

of several vector-borne diseases may also increase. Elsewhere, warm and dry conditions are expected to prevail during the coming November-May (i.e., the rainy season of the southern hemisphere). This concerns especially in Australia, parts of South-East Asia, Central America, and Southern Africa.

Vast geographical extension of the African continent (23W-52E, 35S-38N) along with its uneven topography, bestows the continent with wide variety of climatic condition i.e. desert in the north to tropical rainforest near the equator, and again relatively dry conditions in its southern corner. Furthermore, seasonality observed in the climatic conditions (rainy, winter and summer months) between the two hemispheres, and differential distribution of rainfall even within the countries, makes each country and its regions unique, in terms of challenges and opportunities. To give a brief account of the rainfall distribution, rainfall is bimodal in East Africa i.e., has two wet seasons - March to May and October to December. The western Africa (Sahel) region however, receives about 90% of its mean annual precipitation during the June-September period. In southern Africa, the rainy season typically lasts from October to April. The ongoing El Niño is expected to result in above-normal temperature across the continent during October to may, but will have differential impact on rainfall in the region. It is very likely (>70%) that air-temperature will be above-normal in the countries located between 15ºN – 30ºS. This includes parts of western, central, east, and southern Africa (https://www.wmolc.org/seasonPmmeUI/plot_PMME).

With regards to rainfall, the WMO probabilistic multi-model ensemble (MME) forecast indicates that Eastern Africa is expected to receive more rainfall i.e. will have wetter-than normal condition. As of November 2023, cumulative rainfall across much of the Kenya and Uganda were above 150% and between 90-200% respectively, of the long-term average, with great spatial variability (FEWS- NET, 2023). Flooding affected about 19 counties in the Kenya, and displaced around 136,000 people. Since October, heavy rainfall received in the central and southwest Somalia, and in the southern and southeast Ethiopia – which were earlier under the grip of historical drought during 2020-23- have led to the displacement of millions of population, cutting them off from the market and food supply (UNOCHA, 2023a &b). In Somalia, raingauge station in Baidoa (Bay region) indicate that over 1000 mm of rainfall have been received in the past two months (October and November), which is estimated to be 4-5 times higher than the normal. Meanwhile, northern areas of the country received relatively lower but still above-average rainfall. South Sudan has also witnessed heavy rainfall induced flooding and resulting losses. The western part of the east-Africa region (Rwanda, Burundi,

and Southwest Uganda) is however, expected to receive normal rain (Fig. 1). Concurrently, El Niño-induced drought is likely to affect the northern pastoral lands and *meher* crop-producing areas of Ethiopia.

**Expected impact on agriculture sector and food security**

Food security conditions in all these countries remains to be of concern. The varying nature and degree of climatic shocks that have affected the region in the past have already pushed back the countries agriculture sector and total food production. Most of the countries are dependent on import to meet their dietary requirements. Although the ongoing rains replenish surface and ground water resources, boosts growth of field crops as well as the pastures, and support livestock, flood-affected regions may have to bear crop damage and livestock loss. The above-average rainfall forecasted through December is likely to damage the maturing legume crops in east African countries (FEWS-NET, 2023). In Uganda, early green harvest have slightly improved food availability. In Kenya, the staple food prices remain high compared to the 5-year average: Maize prices were about 95%; and dry beans around 15-80% higher (FEWS NET, 2023). Also, there is an increased risk of water and vector-borne diseases for human and livestock.

Across the southern Africa region, 2023 harvest was already below-average due to the weather shocks and other social and institutional issues (FEWS-NET, 2023). By the end of November, the region (including Zimbabwe, Mozambique, Malawi, Southern Angola, and Sothern Madagascar) have not received enough rainfall to start farm operations for its main agricultural season. The ongoing El Niño is anticipated to cause a further delay in the receipt of effective rainfall, with a 40-50% probability that the season will receive below-normal rainfall (Fig. 1). Below-normal rainfall during their main planting season, combined with above-normal temperature is likely to cause widespread crop failure in the region and thus below-average 2024 harvest. The price of coarse grains in West Africa and staples in East Africa were stable to decreasing (FEWS NET, 2023). However, the maize prices in Southern Africa - especially in countries such as South africa, Zambia, Malawi, and Zimbabwe – increased due to supply constraints. Supply of staple food was already low due to the past weather shocks, low food reserve among the households, increasing staple food prices, and low purchasing power of the households. The ongoing El Niño event is anticipated to further aggravate the current situation by negatively affecting the food production in these countries which are mainly rainfed. The negative impact of ongoing El Niño is expected to be most

severe on crop yields of rainfed farms (owned by majority of the farming community), and not the irrigated farms (owned by few market-oriented farms).

**Relevant information**


Climate Prediction Center. (2023). ENSO: Recent Evolution, Current Status and Predictions. Accessed 26 October 2023

FEWS NET. (2023, September). Southern Africa Price Bulletin. https://fews.net/sites/default/files/2023- 09/PB_SA_202309.pdf. Accessed 27 October 2023

FEWS NET. (November, 2023). Crisis (IPC Phase 3) outcomes are emerging as the lean season begins amidst the El Niño. https://fews.net/southern-africa

Lindsey, R. (2009, August 30). Climate Variability: Oceanic Niño Index. National Oceanic and Atmospheric Administration.

IFPRI (2019). How Can Africa Achieve an Agricultural Transformation Through Smart Irrigation Strategies? https://www.ifpri.org/event/how-can-africa-achieve-agricultural-transformation-through-smart-irrigation-strategies#:~:text=Currently%2C%20only%206%20percent%20of,a%20continuous%20supply%20of%20food.

Trenberth, K. E. (1997). The definition of El Niño, B. Am. Meteorol. Soc., 78, 2771–2777.

UNOCHA (2023a). Somalia: Flood situation snapshot (As of 22 November 2023). https://www.unocha.org/publications/report/somalia/somalia-flood-situation-snapshot-22-november-2023).

UNOCHA (2023b). https://reports.unocha.org/en/country/ethiopia

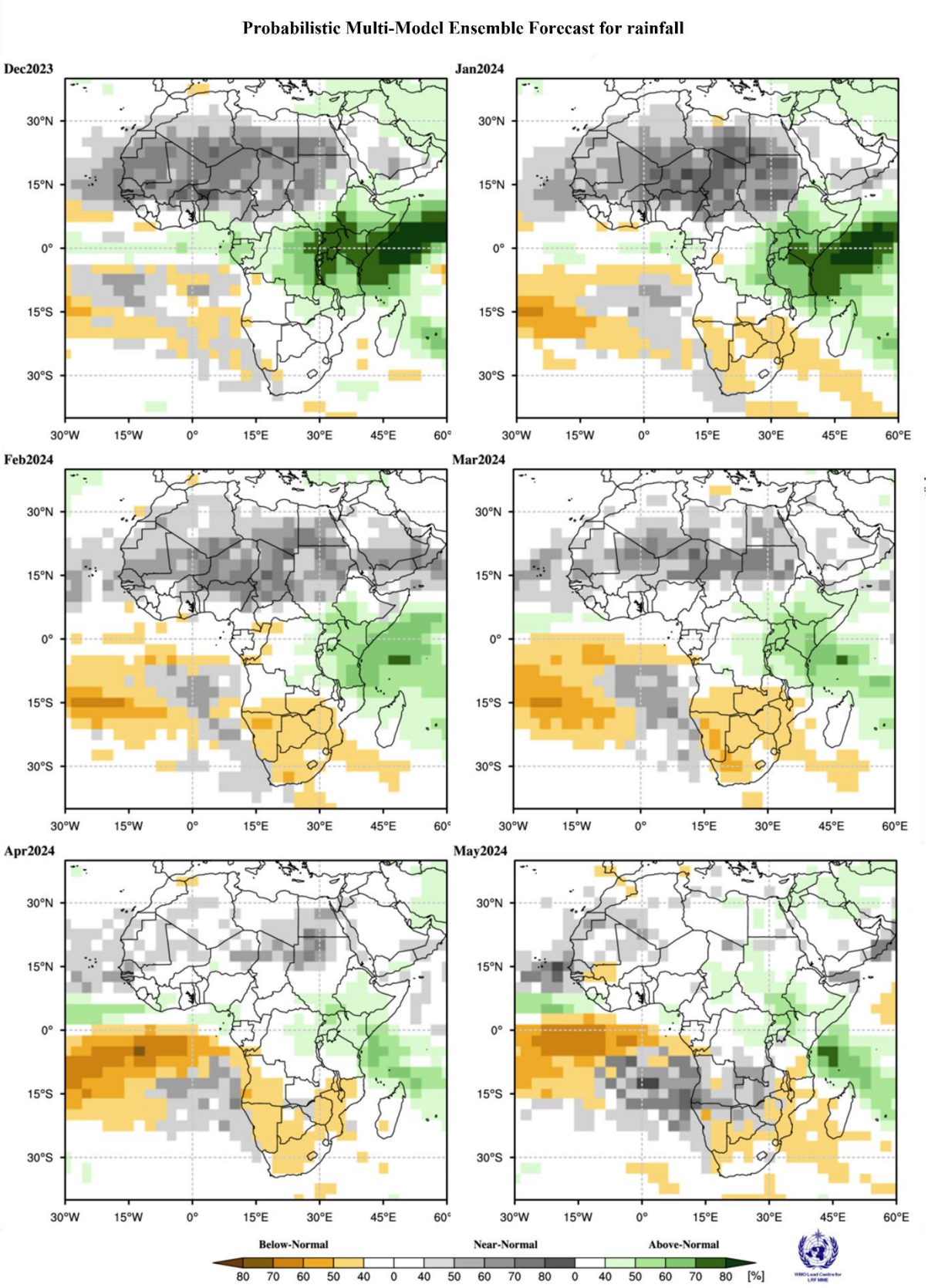


*Figure 1. Probabilistic Multi-model ensemble forecast for precipitation over African continent issued in December 2023*