

The Challenges of Climate Change and Its Effects on Food Security in the Greater Horn of Africa



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Abstract

The Greater Horn of Africa (GHOA), a semi-arid to arid region, is highly vulnerable to global climate change and variability. Home to approximately 333 million people, with over 234 million living in rural areas and endowed with rich biodiversity, the GHOA faces severe impacts from climate extremes, COVID-19, and locust invasions, which have left 80 million people food-insecure.

This study aims to highlight the challenges posed by climate change in the GHOA and its effects on food security. It employs empirical data sourced from national and international agencies, complemented by journal articles, magazines, monographs and other periodicals.

Findings reveal that the global climate change has assumed a crisis proportion in the region, driven largely by anthropogenic forces, and unleashing a humanitarian crisis. Therefore, the study proffers policy recommendations anchored in climate change mitigation and adaptation, climate-smart agriculture, global partnerships, capacity building, poverty reduction strategies, among other things.

Keywords: Climate change, food security, Horn of Africa.

1. Introduction

The Greater Horn of Africa (GHOA), home to 332.8 million people in 2025, is a region already grappling with arid and semi-arid conditions and facing one of the world's most severe climate-induced food crises. Over 80 million people in the region are food-insecure due to prolonged droughts, floods, and locust invasions. The challenges are compounded by conflict and instability, often accompanied by humanitarian crises. Despite contributing only 0.59% of global greenhouse gas emissions, the GHOA suffers disproportionate impacts, threatening regional stability and livelihoods (UNOCHA, 2022).

The GHOA, consisting of Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, and Uganda, includes the member states of the Intergovernmental Authority on Development (IGAD). Covering an area of 5.21 million km², it is located in the Sahel agro-ecological zone and is vulnerable to emerging global climate change and variability. The region is characterized by a diverse array of flora and fauna, set against the backdrop of semi-arid and arid ecological zones.

Table 1: The Profile of the GHOA

Country	Area km²	Millions in 2025	Urban pop% in 2025
Somalia	637,657	19.7	46.6%
Djibouti	23,200	01.2	71.3%
Ethiopia	1,104,300	135.5	22.5%
Kenya	580,367	57.5	31.9%
Eritrea	117,600	03.6	74.8%
Sudan	1,886,068	51.7	35.3%
South Sudan	619,952	12.2	27.7%
Uganda	241,038	51.4	30.03%
Total/Average	5,210,182	332.8	29.6%

Source: www.worldometers

As shown in Table 1, the demographic profile of the Greater Horn of Africa (GHOA) reveals significant population disparities across countries.

Ethiopia has the largest population at 135.5 million, followed by Kenya (57.5 million), while Sudan and Uganda each have about 51.7 and 51.4 million respectively. Djibouti, Eritrea, and South Sudan rank lowest, with Somalia occupying a mid-range position at 19.7 million.

In 2025, approximately 70.4% of the region's population (234.15 million) resides in rural areas, compared to only 29.6% (98.65 million) in urban centres. With the exception of Eritrea and Djibouti, the six other countries remain predominantly rural, where most livelihoods depend on rain-fed agriculture and pastoralism. This demographic pattern heightens vulnerability to climate shocks, underscoring the urgent need for adaptive strategies and resilient agricultural practices.

Climate change has emerged as perhaps the most critical development challenge of our time, posing an existential threat to both humanity and ecosystems upon which it depends for survival and prosperity. Climate change can be aptly defined as the sustained transformation of weather patterns over the long-term. The United Nations (2020) defines climate change “as long-term shifts in temperatures and weather patterns”. Indeed, climate change has emerged as a long-term transformation in the average weather patterns, which have come to define Earth's local, regional and global climates, accompanied by a broad range of observed effects that are synonymous with the concept (NASA, 2024).

The global impact of climate change has assumed worrisome dimensions, particularly since the mid-20th century, triggered by such human activities as fossil fuel burning, deforestation, soil degradation, demographic explosion, biodiversity loss and the rapid depletion of natural resources. These activities have increased the emission of heat-trapping greenhouse gases in the earth's atmosphere, and raising atmospheric temperatures. Climate scientists, assisted by computer models, employ observations from the ground, air and space to monitor and study past, present and

future climate transformation patterns. Climate data records reveal evidence of ocean temperature increases; rising sea levels; melting polar icecaps and mountain glaciers; frequency and severity of changes in extreme weather, especially hurricane, heatwaves, wildfires, droughts, floods and precipitation; as well as cloud and vegetation cover changes.

The trapping of greenhouse gases in the atmosphere has been blamed for global warming, which fuels climate change. Global warming is acknowledged as the long-term heating of the earth's surface, with a steady acceleration since the dawn revolution period (i.e. before 1850), driven in large part by anthropogenic or human activities. According to the NASA (2024) report, anthropogenic activities were estimated to have increased Earth's global average temperature by 1 degree Celsius (1.8 degrees Fahrenheit) since the pre-industrial period, in a trend that increases by more than 0.2 degrees Celsius (0.36 degrees Fahrenheit) per decade. The NASA (2024) report further reveals the steady rise in atmospheric temperatures between 1880 and 2020. It shows an accelerated increase from the mid-20th century, with 2016 and 2020 tying statistically as the hottest years on record during the period in view.

Global warming has accelerated even faster in the 21st century, driven by the heightened consumption of fossil fuels, particularly in both developed and emerging market economies. In a study by Lindsey and Dahlman (2024), findings reveal that earth's temperature has risen steadily by an average of 0.11⁰ Fahrenheit or 0.06⁰ Celsius per decade since 1850, or about 2⁰F in total. However, the rate of warming has accelerated since 1982, with more than three times as fast: 0.36F or 0.2⁰C per decade (2014-2023), with 2023 emerging with warmest temperature since global records began in 1850. The average global temperature for that year was captured at 1.18⁰ C or 2.12⁰F above the 20th century average of 13.9⁰C or 57.0⁰F. This was 1.35⁰C or 2.43⁰F above the pre-industrial average (1850 – 1900).

A United States Climate Science (2017) special report projects that the amount of future global warming will depend on how much carbon dioxide and other greenhouse gases are emitted in the coming decades. Currently, burning fossil fuels and deforestation combine to add about 11 billion metric tons of carbon (equivalent to just over 40 billion metric tons of carbon dioxide) to the atmosphere annually. Since the volume of greenhouse gas emission is higher than natural processes can remove, atmospheric carbon dioxide volume increases annually.

Climate Science Special Report, 2017 predicted that if annual carbon emissions continue to rise rapidly as they have since 2000, models project that by the end of the 21st century, global temperature will be at least 5 degrees Fahrenheit warmer than the 1901-1960 average, and possibly as much as 10.2 degrees warmer. However, should annual emissions increase more slowly and begin to decline by 2050, models project that temperature would still be at least 2.4 degrees Fahrenheit warmer than the first half of the 21st century, and possibly up to 5.9 degrees Fahrenheit warmer.

Climate change and variability are assuming increasing dimensions around the world. While atmospheric temperatures have featured remarkable increase in recent times, their spread is uneven, with considerable variability in various regions, and are unleashed droughts, rising sea levels, erosion of ozone layer in the world's polar regions, and triggered more frequent and severe weather events. Ironically, the impact of climate change has become more severe in the regions that contribute less to global carbon emissions (Igbatayo, 2018, Igbatayo and Babalola, 2018; Igbatayo *et al.*, 2022). Sub-Saharan Africa, the least industrialized region, contributes little to carbon emission, but is particularly impacted by climate change and more constrained to mitigate the threat than most other regions. In a report on the state of climate Africa, the World Meteorological Organization (WMO) (2020) affirms the increasing

climate change threat on human health, food, and water security, and socio-economic development in Africa. Recurrent droughts, especially in Sub-Saharan Africa, have triggered an increase in the number of malnourished people in the region by 45.6% since 2012. This is attributable to reducing precipitation that undermines crop productivity in rain-fed agriculture, which is prevalent across the region. The report also projects that Gross Domestic Product (GDP) in the five African sub-regions are likely to suffer significant reduction due to rising global temperatures, as illustrated in Table 2.

Table 2

*Long-term impacts of climate change on Africa's GDP (%change/year)
based on four global temperature increase scenarios
for the five sub-regions and for Africa as a whole.*

Subregions	GDP (% Change/Year)			
	1⁰ C	2⁰ C	3⁰ C	4⁰ C
North (n=7)	-0.76 ± 0.16	-1.63 ± 0.36	-2.72 ± 0.61	-4.11 ± 0.97
West (n=15)	-4.46 ± 0.63	-9.79 ± 1.35	-15.62 ± 2.08	-22.09 ± 2.78
Central (n=9)	-1.17 ± 0.45	-2.82 ± 1.10	-5.53 ± 1.56	-9.13 ± 2.16
East (n=14)	-2.01 ± 0.20	-4.51 ± 0.34	-7.55 ± 0.63	-11.16 ± 0.85
Southern (n=10)	-1.18 ± 0.64	-2.68 ± 1.54	-4.40 ± 2.56	-6.49 ± 3.75
Whole of Africa (n=55)	-2.25 ± 1.52	-5.01 ± 3.30	-8.28 ± 5.12	-12.12 ± 7.04

Source: WMO, 2020

Table 2 reveals a projected reduction in GDP across the five African sub-regions as global temperatures rise. For scenarios ranging from a 1⁰ C to 4⁰ C increase in global temperatures relative to the pre-industrial levels, the continent's overall GDP is likely to reduce by 2.25% to 12.12%. It further reveals that West, Central and East Africa exhibit higher

vulnerability patterns to the adverse impact of climate change than southern and North Africa.

The global climate change has had a disproportionate impact on the GHoA, unleashing a crisis across the region, characterized by rising atmospheric temperatures, recurrent droughts, lower crop productivity, increasing food and nutrition insecurity, as well as increasing weather events, which are unleashed with more frequency and intensity. The region is an example of how climate change and conflict converge to trigger widespread displacement, as communities struggle with climate impacts, including prolonged droughts, water scarcity, devastating floods, desertification, and erratic weather patterns.

This paper argues that the food security crisis in the GHoA cannot be adequately understood as merely a climatic phenomenon. Although recurrent droughts, erratic rainfall, and rising temperatures constitute the immediate and visible triggers, they interact with intersecting vulnerabilities embedded in landscapes already debilitated by deep-seated structural factors. Since conventional technical interventions often fail to address these complex and interrelated drivers, an effective response must be genuinely multi-dimensional, addressing not only the biophysical manifestations of climate change but also the political economy, governance deficits, and socio-political dynamics that shape the distribution and lived experience of climate-related risks.

The paper is structured into six sections. Section 1 introduces the concept and manifestation of the global climate change. Section 2 examines the causes and consequences of global climate change. Section 3 spotlights climate change and vulnerability in Africa, while section 4 discusses climate change in the Greater Horn of Africa. Section 5 provides insights into climate variability and its effects on food security in the Greater Horn

of Africa, while section 6 ends the paper with conclusion and recommendations.

2 Causes and Consequences of Global Climate Change

Understanding the complex and multifaceted phenomenon of global climate change requires an examination of both its causes and its consequences. This section provides an analysis of this phenomenon, beginning with its primary causes and then outlining the resulting consequences.

2.1 Causes of Global Climate Change

Climate scientists have attributed the causes of global climate change to both natural and anthropogenic forces (Shahzad, 2015; Hegeri *et al.*, 2019; Turrentine, 2022). On the other hand, natural forces occur through the sun's radiation, as well as volcanic eruptions and even small changes in Earth's orbit. On the other, human activities or anthropogenic forces drive climate change by transformation in the composition of the atmosphere or land use. It is however important to note that contemporary changes in the global climate system are likely fueled by anthropogenic forces, marked by rising atmospheric concentration of carbon dioxide, methane and nitrous oxide, which have accelerated since the dawn of the industrial revolution, around 1750 (Climate Path, 2018).

Climate scientists have documented evidence by analyzing a variety of indirect measures of climate patterns over the past millennia. These include examination of ice cores, tree rings, glacier lengths, pollen remains, ocean sediments, as well as studying changes in the earth's orbit around the sun. Findings reveal that climate varies naturally over a wide range of time scales. However, this variability hardly explains the observed warming since the mid-20th century. Rather, it is extremely

likely (>95%) that human activities have been the main cause of global warming (IPCC, 2014; EPA, 2025). Another EPA (2017) report reveals that over the last several hundred thousand years, carbon dioxide (CO₂) levels varied in line with the glacier cycles. During the warm “interglacial” periods, CO₂ levels were higher; and lower during the cool “glacial” periods. Therefore, the heating or cooling of the earth’s surface and oceans can affect changes in the natural sources and sinks of these gases, accompanied by variability in the greenhouse gas concentrations in the atmosphere.

The EPA (2017) report shows the trend in estimates of Earth’s changing CO₂ concentration and Antarctic temperatures based on analysis of ice core data extending back 800,000 years. The CO₂ concentrations vary from 180-300 parts per million (ppm) over the period in view. At the same time, temperature variability ranges from -2⁰F to 10⁰F.

In its fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) (2014) concluded with more than 95% probability that human activities over the past fifty years have accelerated global warming blamed for climate change. The negative trend is attributable to industrial activities of modern civilization, triggering increased levels of atmospheric carbon dioxide from 280 parts per million to about 417 parts per million over the past 151 years.

It is important to note that anthropogenic factors in the GHoA are contributing to the global climate change. The negative activities, particularly the emission of greenhouse gases from burning fossil fuels, deforestation, as well as land degradation, continue to threaten the environment and vulnerable communities across the region. Across the region, households rely on fuelwood, which they burn for cooking. This development triggers deforestation and undermines carbon sequestration, in a development that drives climate change.

2.2 Consequences of Global Climate Change

The consequences of climate change are both severe and multi-dimensional. These range from rising atmospheric temperature, rainfall variability, recurrent droughts, increasing weather events, melting polar icecaps and mountain glaciers, depletion of the ozone layer, etc. The European Commission (2025), in a report, identified the following natural consequences of global climate change: (i) high temperature; (ii) drought and wildfires; (iii) water scarcity; (iv) flooding and erosion; (v) sea-level rise in coastal areas; (vi) biodiversity loss; and (vii) soil degradation. The report also identified the following social threats: (i) increasing human health challenges, (ii) unemployment, and (iii) challenges in education system. The report further identified threats to various sectors of the economy, including: (i) energy, (ii) agriculture, (iii) forestry and (iv) tourism.

A similar report by the United States National Oceanic and Atmospheric Administration (NOAA) (2025) examines climate change impacts. Findings reveal that climate change affects the environment in a variety of ways, including rising temperatures, sea-level rise, drought, flooding, among others. These events affect the resources that humans depend upon for survival and prosperity, such as water, energy, transportation, wildlife, agriculture, ecosystems and human health. According to the NOAA (2025) report, the global food chains depend on favorable climate and weather conditions, which are increasingly threatened by rising temperatures, recurrent droughts, water stress, diseases, and extreme weather events. The report also reveals that changing weather conditions are posing threats to human lives in the following ways: (i) rising atmospheric temperatures are increasing incidents of heat stroke in several regions; (ii) as ocean temperatures rise, hurricanes, cyclones and tsunamis get stronger and wetter, accompanied by increasing loss and damage; (iii) dry conditions fuel drought and wildfires; (iv) increased

flooding leads to the spread of water-borne diseases, injuries, death and chemical hazards; and (v) as geographic ranges of mosquitoes, ticks and other pests expand, they carry diseases to new locations, increasing human mortality and morbidity.

The impact of the global climate change is particularly severe in the GHoA, with grave consequences for the region's fragile ecosystems, and its vulnerable population. Atmospheric temperature across the region is rising twice as fast as the global average. Compounded by recurrent droughts over the past several decades, the negative trend is undermining agricultural output, threatening the major source of livelihoods for millions, as well as food and nutrition security. In Ethiopia, Eritrea, Kenya, Djibouti and Somalia, the climate crisis has unleashed humanitarian emergency, with millions of men, women and children displaced, while others flee across national borders to become refugees, relying on humanitarian aid from the international community (UNOCHA, 2022). In the GHoA, climate change has fueled depletion of such critical natural resources as freshwater, pastures, arable land, among others. Consequently, competition for these resources has risen across the region, often provoking conflict that turn violent, leading to loss of human lives, livestock, and other properties.

3 Climate Change and Variability in Africa

Climate change and variability pose profound and disproportionate challenges for Africa, where development and livelihoods are closely tied to climate-sensitive sectors such as agriculture, water resources, and natural ecosystems. Understanding the continent's vulnerabilities and the socio-economic consequences of climate change is therefore essential for shaping effective adaptation and resilience strategies. This section examines these dynamics, highlighting Africa's heightened exposure to climate change and its implications for sustainable development. The

analysis further shows how climate change operates as a threat multiplier, exacerbating existing challenges and placing the continent's future at a critical crossroads.

3.1 Climate Change and Africa's Risks and Vulnerability

Africa is particularly vulnerable to climate change, driven by challenges associated with its reliance on climate-sensitive-sectors like agriculture and its limited adaptive capacity. Africa's risks and vulnerability are captured in the Notre Dame Global Initiative (ND-GAIN Index), which reveals that 9 out of 10 countries most vulnerable and least resilient to climate change are located in Africa. The countries are Chad, the Central African Republic, Guinea-Bissau, Eritrea, Democratic Republic of Congo, Sudan, Niger, Zimbabwe and Liberia (Arrieta and Mbungu, 2023).

Africa has witnessed increasing impacts of climate change across the continent, particularly since the mid-20th century. This is characterized by an increase in average and extreme temperatures, with more frequent and longer heatwaves, and accompanied by increasing weather events, which have assumed more frequency and severity. Some sub-regions are experiencing more and recurrent droughts, attributed to higher evaporation rates from soils and plants. Lower precipitation is increasing across the continent, with seasonal and decade variability assuming severe dimensions. The GHoA is especially vulnerable to the impacts of climate change in Africa, with rising atmospheric temperatures, recurrent droughts, declining and irregular rainfall patterns, as well as the prevalence of more frequent and severe weather events.

In a study by Graig, Okem, Hunter, North and Robers (2022), the authors reveal that multi-year droughts have assumed more frequency in West Africa, and the 2015-2017 drought in Cape Town (South Africa) was

three times more likely to occur under current patterns of climate change. The study also affirms the vulnerability of Africa to the threats posed by the global climate change, given its fragile socioeconomic, political and environmental challenges. Africans largely derive their livelihoods from climate-exposed sectors, particularly agriculture, which employs about 55-62% of Sub-Saharan Africa's workforce. Also, 95% of cropland in the region is rain-fed. An emergent demographic explosion is also compounding Africa's vulnerability to climate change, and fueling unsustainable urbanization. Thus, the accompanying rate of urban land conversion, mostly from forest and agriculture, is highest in Africa, according to Graig *et al.*, 2022. Increasing urban exposure to climate hazards - floods and erosion, extreme heat, and droughts - places African cities and settlements at the hotspots of climate risks, with 70% of African cities highly vulnerable to climate shocks. Available data reveal that 15 times more people die from floods, storms and droughts in such highly vulnerable countries as Mozambique, Somalia and Nigeria, compared to countries with low vulnerability.

3.2 Climate Change and its Socio-economic Consequences in Africa

The Sixth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC) (2022) reveals that Africa is one of the lowest contributors to greenhouse gases blamed for global climate change, yet key development sectors across the continent have been exposed to severe loss and damage attributable to human-induced climate change, including biodiversity loss, water shortages, reduced crop production, loss of lives and reduced economic growth.

Highlights of the report are as follows:

(i) Biodiversity loss: Accelerated reduction in the stock of plants and animal species across the continent is projected to be widespread and

escalating with 0.5⁰C increase above current global warming. Above 1.5⁰C, one-half of assessed species are projected to lose over 30% of their population.

(ii) Food production: In Africa, agricultural productivity has been reduced by 34% since 1961, attributable to climate change, more than any other region.

(iii) Water scarcity: Recent extreme variability in rainfall and river discharge across the continent has negative impacts across water-dependent sectors.

(iv) Cities and settlements: Exposure of people, assets and infrastructure to climate hazards is increasing across the continent, against the backdrop of rapid urbanization, infrastructure deficits, and growing population in slums. The report projects that by 2030, 108-116 million people in Africa will be exposed to sea level rise, compared to 54million in 2000, increasing to 190-245 million by 2060.

(v) Economy: Climate change has reduced economic growth across the African continent, increasing income inequality, both within and between countries, as well as between the continent and developed market economies. Across nearly all African countries, GDP per capita is projected to be at least 5% higher by 2050 and 10-20 % higher by 2100 should global warming be held to 1.5⁰C, compared to 2⁰C.

(vi) Heritage: African cultural legacy is already at risk from climate hazards, including sea-level rise and coastal erosion.

(vii) Health Challenges: Mortality and morbidity associated with climate change is assuming alarming dimensions across Africa, placing health systems at risk. Above 2⁰C of global warming, distribution and seasonal transmission of vector-borne diseases is expected to increase, exposing

tens of millions of people, particularly in west, east and southern Africa. Above 1.5⁰C, risk of heat-related mortality is projected to rise sharply, with at least 15 additional deaths per 100,000 annually across large parts of Africa.

(viii) Migration: Africa is particularly vulnerable to migration, arising from environmental degradation, driven by global climate change. More than 2.4million and 3.4million new weather-related displacements occurred in Sub-Saharan African in 2018 and 2019. Climate change is projected to fuel more migration in the region. With 1.7⁰C global warming by 2050, 17-40million people could migrate internally in Sub-Saharan Africa, increasing to 56-86 million for 2.5⁰C.

Concerning the impact of climate change on human health in Africa, the AfDB (2025) report reveals that climate change may increase the burden of a range of health outcomes through its impact on such climate sensitive diseases as malaria and meningococcal meningitis, as well as health conditions, such as water-borne illnesses, particularly cholera and diarrhea. Climate change is a multiplier of existing health vulnerabilities, particularly insufficient access to safe drinking water and improved sanitation, food insecurity, as well as inadequate access to healthcare and education. The scourge is also expected to increase the threat of malnutrition, with the most severe impact on children.

In one of the latest reports on climate change in Africa, the World Meteorological Organization (WMO) (2024) acknowledged 2023 as one of the three warmest years in Africa over 124 years of record keeping. The mean temperature was placed at 0.61⁰C higher than the 1991-2020 average, and 1.28⁰C higher than the 1961-1990 average. Also, the region warmed at a rate of 0.3⁰C/decade between 1991 and 2023, a slightly faster rate than the global average. Indeed, 2023 emerged as the warmest year on record in many African countries, including Mali, Morocco, Tanzania,

and Uganda. Table 3 shows the 2023 temperature anomalies relative to the 1991-2020 and 1961-1990 reference periods across Africa's sub-regions (the range of anomalies among these data sets is indicated in the brackets).

Table 3
Atmospheric Temperature Anomalies in $^{\circ}\text{C}$ for 2023
Relative to the 1990-2020 and 1961-1990 Reference Periods

	1991-2020	1961-1990
North Africa	1.84 $^{\circ}\text{C}$ [0.69 $^{\circ}\text{C}$ -1.00 $^{\circ}\text{C}$]	1.68 $^{\circ}\text{C}$ [1.52 $^{\circ}\text{C}$ -1.86 $^{\circ}\text{C}$]
West Africa	0.64 $^{\circ}\text{C}$ [0.43 $^{\circ}\text{C}$ -0.81 $^{\circ}\text{C}$]	1.29 $^{\circ}\text{C}$ [0.99 $^{\circ}\text{C}$ -1.48 $^{\circ}\text{C}$]
Central Africa	0.59 $^{\circ}\text{C}$ [0.37 $^{\circ}\text{C}$ -0.86 $^{\circ}\text{C}$]	1.17 $^{\circ}\text{C}$ [0.90 $^{\circ}\text{C}$ -1.34 $^{\circ}\text{C}$]
East Africa	0.61 $^{\circ}\text{C}$ [0.38 $^{\circ}\text{C}$ -0.86 $^{\circ}\text{C}$]	1.29 $^{\circ}\text{C}$ [1.18 $^{\circ}\text{C}$ -1.46 $^{\circ}\text{C}$]
Southern Africa	0.4 $^{\circ}\text{C}$ [0.20 $^{\circ}\text{C}$ -0.58 $^{\circ}\text{C}$]	0.98 $^{\circ}\text{C}$ [0.86 $^{\circ}\text{C}$ -1.09 $^{\circ}\text{C}$]
Indian Ocean Island Countries	0.54 $^{\circ}\text{C}$ [0.49 $^{\circ}\text{C}$ -0.64 $^{\circ}\text{C}$]	1.08 $^{\circ}\text{C}$ [0.98 $^{\circ}\text{C}$ -1.19 $^{\circ}\text{C}$]
Africa	0.61 $^{\circ}\text{C}$ [0.47 $^{\circ}\text{C}$ -0.81 $^{\circ}\text{C}$]	1.28 $^{\circ}\text{C}$ [1.18 $^{\circ}\text{C}$ -1.40 $^{\circ}\text{C}$]

Source: WMO, 2024

Table 3 reveals the anomalies in the 2023 atmospheric temperatures across Africa's sub-regions relative to the 1991-2020 and 1961-1990 reference periods. Southern Africa recorded the lowest 2023 temperature anomalies, compared to the 1991-2020 average: 0.40 $^{\circ}\text{C}$ [0.20 $^{\circ}\text{C}$ – 0.58 $^{\circ}\text{C}$].

The WMO (2024) report also reveals that the rate of sea-level rise around Africa was nearer or higher than the global average of 3.4mm/annum. The highest rate of sea-level rise, 4.1mm per year, was observed at the Red Sea. Also, precipitation was considerably higher than normal in Angola and coastal areas north of the Gulf of Guinea. However, regions with marked rainfall deficits included the western part of North Africa, the Horn of Africa, parts of southern Africa, as well as Madagascar. Portions of Morocco, Algeria, Tunisia, Nigeria, Cameroon, Ethiopia, Madagascar, Zambia, Angola and the Democratic Republic of Congo witnessed severe drought in 2023. Climate extremes are assuming more severity and frequency, and disproportionately affecting African economies and societies. On average, climate-induced hazards triggered economic losses in African countries, estimated at 2-5% of annual GDP, with many diverting up to 9% of their budgets to address climate extremes, according to the WMO (2024) report.

4 Climate Change in the Greater Horn of Africa

This region is one of the most at risk from climate change, where fragile environments, weak economies, and political instability combine to worsen humanitarian crises and threaten livelihoods. Home to over 330 million people in 2025, the region's mostly dry lands, which depend on rain-fed farming and livestock herding, are very sensitive to changes in climate. This section looks at how climate change is affecting the GHoA, its social and environmental impacts, and how it increases instability, making the region a key hotspot of Africa's climate crisis.

4.1 The Manifestation of Climate Change in the GHoA

Climate change and variability in the Horn of Africa has assumed a crisis dimension, characterized by rising atmosphere temperature, severe and recurring droughts and increasing weather events, which have unleashed

humanitarian crises in recent times. The Greater Horn of Africa is home to 332.8 million people in 2025 and located in fragile ecosystems, sandwiched between the Sahara Desert to the north, and the Savanna grassland to the South. It has faced recurring droughts, flooding, and rising and shrinking lakes, making the region one of the most climate-vulnerable on the continent. Rain-fed agriculture and pastoralism, the major sources of livelihoods for the majority of the population, are threatened. Climate change and variability in both temporal and spatial dimensions are severely impacting livelihoods of the people.

In 2021 and 2022, the region witnessed severe drought, fueled by reduced rainfall, which had plagued the region for many years. The case of Somalia is particularly alarming, with recurrent droughts lasting for more than a decade. The trend undermines crop production, livestock and water resources, exacerbating food and nutrition insecurity and displacement. The nation's vulnerability is further compounded by its arid and semi-arid ecosystems, widespread deprivation, and political instability, leaving it particularly susceptible to climate-related disasters.

Similarly, both arid and semi-arid ecosystems in Ethiopia have witnessed back-to-back droughts for more than seven years. Increasing temperatures, combined with rainfall variability have fueled water shortages, with severe impacts on human and livestock populations. Consequently, livestock losses have increased significantly in recent times, impacting pastoralist communities and their livelihoods. In Kenya, the 2022-2023 drought was acknowledged as the worst on record since 1981 (Gabrehwot, 2024). The drought undermined food security for more than 21 million people, leaving more than 8.9 million livestock dead across the region.

Eritrea is similarly vulnerable to climate change, with temperatures rising by 1.7⁰c since 1960 - at an average rate of 0.37⁰c per decade. This

development has led to recurrent droughts during the last 30-60 years, threatening the nation's fragile biodiversity. Eritrea also suffers from extreme weather events, particularly flooding. It faces recurrent desert locust infestation, which damages agricultural production, a source of livelihoods for approximately 80% of the population.

4.2 Climate Change and Instability in the GHoA

Gavin (2022), in a study, examined climate change and regional instability in the Horn of Africa. The author reveals that the region is both environmentally and politically fragile. While Kenya and Ethiopia feature variable climates with temperate zones, both nations are predominantly arid or semi-arid. In Sudan, climate change has contributed to instability through impacts like droughts, floods and changing rainfall patterns, which compound existing vulnerabilities and conflicts. These developments unleash challenges that disproportionately affect agricultural livelihoods, food security and displacement, leading to increased competition for scarce resources and further aggravating tensions. In Eritrea, climate change has increased drought frequency and severity, exacerbating such existing vulnerabilities as food and nutrition insecurity and endemic poverty. The climate-related challenges are accompanied by broader instability, impacting livelihoods and potentially contributing to social unrest.

Somalia's landscape is approximately 80% arid and semi-arid, making it particularly vulnerable to drought. In 2011, severe drought left about 250,000 Somalis dead. Despite its arid ecosystem, the nation also faces the risk of catastrophic flooding attributable to increasingly violent cyclones along its long coastline. Similarly, Djibouti's ecosystem features 90% aridity, accompanied by rising sea levels, with increasing prospects of saltwater intrusion into its aquifers, with serious consequences for farmlands. On the other hand, South Sudan is far less dry than other

countries in the region, but still suffers from alternating periods of droughts and flashfloods, with the latter increasing the risk of water-borne diseases.

In an assessment of climate change in the Horn of Africa, Ghebregabher, Yang, Yang and Sereke (2020) affirmed the region's robust biological diversity, comprising shrubs, forests, grasslands, woodlands, savanna and desert vegetation, while shrubs and grassland are dominant. However, these diversified ecosystems are now threatened by anthropogenic activities, driven largely by farming, grazing and traditional housing. For example, deforestation rate, which was estimated at 0.22% of land cover from 1900-2000 had increased to 0.35% in the past decade. The authors reveal that 80% of the region's population derives its livelihoods from rain-fed agriculture, traditional and subsistence cultivation. However, the emergence of climate change, characterized by frequent and prolonged droughts, and flashflood, threatens livestock production. This is particularly the case since the 1970s, which had witnessed recurrent droughts, declining precipitation, accompanied by rising atmospheric temperatures.

The World Meteorological Organization (WMO) (2023), in a report on human-induced climate change in the Horn of Africa, elaborated the challenges associated with increasing dry conditions, punctuated by short, intense rainfall patterns, often leading to flash floods in the region. According to the report, the below-average rainfall in October-December 2022 season, featuring the "short rains", was the fifth consecutive failed season, including the below-average March-May "long rains" in 2021 and 2022. The resulting drought was acknowledged as the most severe in four decades. The severe drought fueled substantial harvest failure, poor pasture conditions, livestock losses, reduced water availability, as well as human conflicts. This development unleashed a humanitarian crisis, with 4.3million people in need of assistance. At least, 180,000 refugees from

Somalia and South Sudan migrated into the drought-stricken areas of Kenya and Ethiopia. The WMO (2023) report reveals drought classification in the Horn of Africa during 2021-2022 event, based on the Climate Prediction Center (CPC) Standardized Precipitation Index (SPI), reflecting the magnitudes of precipitation deficits from Jan. 2021- Dec. 2022 relative to the 1980-2010 climatology in the CPC dataset. Generally, the report shows the region to be extremely vulnerable to climate change and variability.

The WMO (2023) report also identified the Horn of Africa as one of the most impoverished regions in the world, with millions of people facing chronic food and water insecurity, malnourishment, inadequate access to such critical infrastructure as healthcare, education and social services. These conditions are now compounded by incessant droughts forcing more than 4 million inhabitants to live with food and nutrition insecurity.

In a study of climate change-attributable losses and damage in the Sahel and Greater Horn of Africa (SGHA), Pichon, Nur, Panwar, Wilkinson, Kone and Opitz-Stapleton (2024) analyze critical issues posing existential threats to humanity and the environment in the region. Findings reveal that climate-attributable losses in SGHA countries are two to three times higher than in other countries with similar income levels. Also, climate-attributable economic impacts across the region were significant, translating into more than 2% of GDP annually in 9 of 18 SGHA countries over the period, 2000-2022. The agricultural sector suffered severe impacts, with US\$500 million per year in livestock and crop losses attributable to climate change.

Over the same period, the study reveals that climate change contributed to 39% of the total 32,000 recorded human mortality associated with recurrent droughts and floods and affecting about 149million people. Most of these impacts were linked to droughts. A peak in climate-

attributable deaths occurred in 2010 during Somalia's severe drought, leading to 20,000 deaths, of which approximately one-half were linked to climate change. This development triggered a protracted humanitarian crisis, prompting international agencies to respond with emergency relief. As a result of paucity of gender-disaggregated data, it was rather unclear what relative impacts were on men and women. The study concludes with a future climate-attributable loss and damage from floods and drought, which collectively could be as high as US\$159.4billion under a 2⁰C warming scenario.

4.3 The Governance Deficit: A Critical Barrier to Resilience

Governance deficits, manifested in weak state institutions, limited administrative capacity, and entrenched corruption, significantly undermine the ability of countries in the GHoA to adapt to climate change and manage its impacts on food security. Fragile political systems and under-resourced public institutions often struggle to provide even basic services, let alone design and implement comprehensive adaptation strategies. Corruption diverts climate and development funds from priority interventions, while poor institutional performance slows the roll-out of early-warning systems, weakens disaster-response mechanisms, and impedes investment in climate-resilient agriculture and infrastructure. As a result, climatic stressors such as droughts and floods trigger more severe humanitarian and food security crises than they would in contexts with more capable and accountable governance.

The interaction between governance deficits and climatic risks creates a vicious cycle that further erodes food security. Weak institutions frequently fail to coordinate across government levels and with non-state actors, producing fragmented responses that prioritise short-term crisis management over long-term resilience. Ultimately, this highlights that climatic shocks do not operate in isolation; they are magnified by political

and institutional contexts that determine both the distribution of climate-induced food insecurity and the capacity for sustained recovery over time.

5 Climate Variability and its Effects on Food Security in the Greater Horn of Africa

The region's reliance on climate-sensitive sectors makes its populations highly vulnerable to recurrent droughts, erratic rainfall, and other extreme weather events. These climatic shocks, often compounded by conflict, pandemics, and locust invasions, have caused severe food and nutrition insecurity, widespread livestock losses, and economic disruptions. This section examines the complex nexus between climate variability and food insecurity in the GHoA, focusing on its implications for vulnerable communities and livelihoods.

5.1 The Climate Change-Food Insecurity Nexus in the GHoA

Climate change and variability have emerged as perhaps the most challenging development issue in the Greater Horn of Africa. The twin scourge poses existential threats not only to humans but also to ecosystem upon which they rely for survival and prosperity. A World Bank (2022) report reveals that the triple shocks of climate, COVID-19 pandemic, and locust invasion have compounded the plight of vulnerable populations across the Horn of Africa, triggering food and nutrition insecurity. According to the report, about 6.7million people in Somalia face heightened levels of food insecurity. Famine projected among agro-pastoral populations in southern Somalia, an area most impacted by conflict, and drought-fueled displacement since 2021 is estimated at 1.1million, while 4.6million people were internally displaced (3 out of every 10).

The alarming trend posed by climate change in the Horn of Africa prompted the World Bank to act. Leveraging upon its resources, the World Bank in 2022 embarked upon Pro-poor action plans that promoted low carbon growth and climate adaptation strategies. The action plans are encapsulated in the Horn of Africa Initiative (HoAI), featuring a new business model for regional integration, policy dialogue, investments, and political ownership. Its key priorities embrace regional infrastructure, trade and economic integration, resilience, and human capital development. The World Bank, through HoAI, places maximum emphasis on climate resilience to drive the following initiatives:

- i. a customizable US\$2.3billion Food System Resilience Program, whose initial phase will benefit 2.3million people;
- ii. a US\$385 million Groundwater for Resilience Project covering the chronic water deficit areas with climate-smart aquifer-harvesting solutions to bring improved water supply to 3.3 million people.
- iii. a US\$326.5millin De-risking, Inclusion and Value-Enhancement of Pastoral Economies in the Horn through comprehensive innovative insurance solutions to 1.6 million pastoralists; and
- iv. a US\$1billion Regional Climate Resilience Program will come as a bouquet of solutions, including climate risk financing, climate-resilience investments, climate asset management, and adaptive social protection for resilience.

In a study of climate and crisis in the Horn of Africa, Strouboulis, Tesfaye, Edwards and Yaybok (2023) analyzed the nexus of the climate change and the crises unleashed across the region. The authors reveal that 2022 marked the fifth consecutive cropping season that witnessed failed seasonal rainfall. In Somalia, Ethiopia and Kenya, the 2022 March-April-May cropping season was acknowledged as the driest since record keeping began in 1949. Ethiopia, Somalia and northern Kenya were found to be particularly vulnerable to climate – induced drought patterns, largely fueled by pastoral populations. In the case of Somalia, pastoralists

account for more than one-half of the population. It is interesting to note that pastoral livestock and meat trade in the Greater Horn are particularly vulnerable, and yet lay at the heart of the economy, valued at approximately US\$1 billion per annum.

While high international demand for livestock and meat exports have driven growth in pastoralism, there is a downside, which has fueled competition for access to dwindling reserves of water and grazing pastures. This is particularly against the backdrop of recurrent droughts, which are affecting migration patterns of pastoralists, often leading to conflicts with farmers, who are in competition for dwindling natural resources. Strouboulis *et al.*, 2023 also affirmed the prevalence of extreme food insecurity in the Horn of Africa, including Djibouti, Somalia, Sudan, South Sudan, Ethiopia, Uganda and Kenya, in a situation acknowledged as the worst hunger crisis in seven decades. In the most affected areas of the region – Ethiopia, Somalia and northern Kenya – an estimated 9.2 million livestock had been lost as in 2022, attributable to the long-running drought. The consequences of food insecurity are severe in the region. In agro pastoral communities, failed crop production has reduced crop residue harnessed to feed livestock during the dry season, a development that fuels loss of domestic animals. This development has triggered a milk crisis, making it difficult for children to have access to adequate nutrients, and leading to increasing levels of wasting in communities most affected by recurrent drought.

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) (2023), in a report on the drought in the Horn of Africa, opined that the region had endured five consecutive below-average rainy seasons, with catastrophic consequences. The severe drought surpassed the horrific droughts in 2010-2011 and 2011-2017 in both duration and severity, leaving large swathes of Somalia, southern and south-eastern Ethiopia, as well as northern and eastern Kenya with the most prolonged

drought on record in the Horn of Africa. The consequences are grave, leaving approximately 31.9million people in need of urgent life-saving and life-sustaining assistance. The victims are spread across the Horn, including 17.2million in Ethiopia, 8.2million in Somalia, and 6.4million in Kenya. These include more than 7.8million women of reproductive age (15-49 years), who face dangers to their health, against the backdrop of aggravated risks of gender-based violence, fueled by the drought. While rains are starting to ease the impacts of the prolonged drought, they have triggered flashfloods across the region, causing widespread damage that affects at least 900,000 people.

The OCHA (2023) report further reveals that more than 23.5million people were enduring high levels of acute food insecurity attributable to drought in Ethiopia, Kenya and Somalia. While famine has been largely averted in Somalia, needs remain critical, with about 6.6million people projected to experience high levels of acute food insecurity. On the other hand, approximately 11 million people in Ethiopia were found to be severely food insecure, attributable to the recurrent drought. In the case of Kenya, food insecurity also assumed widespread dimensions, leaving more than 5.4million people in Arid and Semi-Arid Lands (ASAL) with acute food insecurity, acknowledged as the highest level recorded in Kenya since the tracking of acute food insecurity prevalence in 2008. Livestock losses across the region are also huge, estimated as more than 13.2million, including 6.8million in Ethiopia, 2.6 million in Kenya, and more than 3.8million in Somalia. This has drastically reduced the quantity of milk, estimated at more than 180 million liters since the beginning of the drought, and leaving over 1.4million children under age 5 without a daily glass of milk across the region. The economic costs associated with the loss of livestock in the region is huge, estimated at more than US\$1.5billion in Kenya alone, according to the OCHA (2023) report.

The World Health Organization (2024) reports that the Greater Horn of Africa accounted for nearly 22% of the global humanitarian caseload, driven largely by recurrent and intensifying climate-induced disasters. A historic four-year drought, compounded by El Niño-related floods and ongoing conflicts, has displaced millions and deepened food insecurity across the region. By mid-2024, about 45.9 million people faced high levels of food insecurity, including 10.8 million children under five suffering from acute malnutrition.

Table 4: Projected Food Insecurity Levels
Across Different Timelines in the GHoA

Projected period	Assessed population	Crisis (IPC Phase 3)	Emergency (IPC Phase 4)	Catastrophic (IPC Phase 5)	IPC Phase 3+	IPC 3+ as % of assessed population
Djibouti July-Dec 23	1,181,675	185,312	100,102	0	285,414	24%
Kenya Asal counties April-June 24	16,617,000	1,197,750	25,750	0	1,223,500	7%
Somalia April-June 24	18,706,931	2,695,880	714,360	0	3,410,240	18%
South Sudan April-July 24	12,613,120	4,684,000	2,336,000	79,000	7,099,000	56%
Sudan Oct.23-Feb.24	48,190,706	12,828,395	4,898,486	0	17,726,881	37%
Uganda Karamoja	1,285,000	293,150	48,440	0	341,590	27%
Sub-Total		21,884,487	8,123,138	79,000	30,086,625	
Ethiopia 2024		People in need of food assistance			15,800,000	13%
Total food insecure population in need of assistance					45,886,625	

Source: WHO, 2024

The Food and Agriculture Organization (2022) similarly underscores the worsening humanitarian outlook, attributing the crisis to prolonged droughts, erratic rainfall, and recurrent climatic shocks that have devastated crops, livestock, and livelihoods across Kenya, Somalia, Ethiopia, and Djibouti.

Drought has emerged as a triggered of climate hazard in the Horn of Africa, with devastating consequences for food and nutrition security. The region is already facing food insecurity before the onset of recurring droughts. The FAO (2022) report projects that 18.4 million people were in crisis (Integrated Food Security Phase Classification (IPC) Phase 3 or worse levels of high acute food insecurity attributable to drought in Ethiopia, Kenya and Somalia. In the ASAL region of Kenya, 4.1 million people were likely to face high levels of acute food insecurity through June 2022, including 1.1million in IPC Phase 4 (Emergency). Also, in Somalia, 7.1million people were projected to face high acute food insecurity (IPC Phase 3 or above) through at least September, 2022, including 2.1million people in Emergency (IPC Phase 4) and 213,000 people in catastrophic (IPC Phase 5). Food insecurity has assumed alarming dimensions in the Horn of Africa, drawing attention from the global community, which has responded with humanitarian assistance.

5.2 Vulnerability of Rural Populations to Climate Change and Food Insecurity in the GHoA

Rural populations in the GHoA are particularly vulnerable to climate change and food insecurity, owing to a combination of such factors as dependence on climate-sensitive livelihoods, limited access to resources, and inadequate social and physical infrastructure. It is noteworthy that climate change impacts, including drought frequency and severity, rising atmospheric temperatures, and erratic rainfall, directly affect agricultural productivity and water availability, leading to food shortages and

malnourishment. In addition, pre-existing vulnerabilities like extreme deprivation and limited access to social and economic infrastructure compound the situation, making rural communities especially susceptible to climate-related shocks in the GHoA.

In a report on food insecurity and drought in the GHoA, the WHO (2022) reveals that countries across the region are witnessing one of the worst episodes of food insecurity in decades. According to the report, the GHoA is experiencing one of the worst droughts in recent history, with an estimated 15-20 million people severely affected by drought in Kenya, Somalia and Ethiopia – more than 3, 5 and 7 million people in each country, respectively. These people are severely food insecure, with households adopting coping measures to survive, while others leave their homes and are in constant search for food, water and pasture.

In a disturbing development, pastureland and water points are drying up across the GHoA. Indications are that pastoralists and rural communities, whose subsistence depend on natural resources, are witnessing the death of their livestock, as well as loss of livelihoods. Thousands of acres of crop have been lost and, in Kenya alone, 1.4 million livestock died in late 2021, in a development attributed to drought. In addition, some three million livestock have died across southern Ethiopia and arid and semi-arid regions of Kenya, while in Somalia, up to 30% of households' herds have died since mid-2021, according to the WHO (2022) report.

Challenges associated with climate change and its impacts on food insecurity in the GHoA prompted the Intergovernmental Authority on Development (IGAD) in Eastern Africa to initiate some development initiatives aimed at fostering climate change mitigation and adaptation. These include IGAD Climate Adaptation Strategies (2023-2030), strengthening climate early warning systems through such critical programs as climate services, or ClimSA, and enhancing drought

resilience through IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI). Other projects also focus on building climate-resilient agriculture with improved agronomic practices, including sustainable land management, and innovative food systems, which are supported by robust international partnerships and well focused on vulnerable communities in IGAD - member states.

5.3 Fragile Livelihoods of Pastoralists and their Livestock in the GHoA

Pastoralists and their livestock in the GHoA face a multitude of interconnected challenges that render their livelihoods exceptionally fragile. These challenges include climate change impacts like droughts, conflicts over natural resources, and insufficient access to basic services like water, veterinary care and markets. These factors contribute to food insecurity, social instability, and ultimately, hinder the sustainable development of the region.

The GHoA is home to the largest population of pastoralists in the world. Pastoralist communities in the region are nomadic, living primarily in arid and semi-arid agro-ecological zones and depend for their livelihoods on livestock – cattle, sheep, goats and camels. They rely on access to water and pasture land. However, these natural resources are increasingly scarce, often bringing pastoralists in conflict with ranchers, farmers, and urban communities. The emergent global climate change and variability are blamed for increasing resource scarcity in the region.

Pastoralism is a wealth contributing sector in the GHoA, accounting, on average, for 38.8% of agricultural GDP in Africa. Its contribution to agricultural GDP is even higher in the GHoA, estimated at 90% in Djibouti, 43% in Kenya and 40% in Somalia.

5.4 Rain-fed Agriculture and Climate Change in the GHoA

Rain-fed agriculture can be aptly defined as a farming system that relies on natural precipitation for water supply to cater for crops planted until they are mature for harvesting. This type of agriculture is particularly vulnerable to climate variability, especially short-term dry spells and long-term droughts. Unlike developed market economies, where agriculture is driven by irrigation systems, in developing countries, agricultural practices often rely on rain-fed agriculture because small-holder farmers, who dominate crop production in developing countries, are resource-poor and lack access to irrigation facilities.

The economies and livelihoods of countries in the GHoA are highly dependent on rain-fed agriculture, which is extremely sensitive to weather and climate variability. Climate hazards in the region have resulted in increased livestock, crop and human diseases, land degradation, reduced crop output, increased crop failures, as well as livestock deaths. These often lead to economic losses for farmers and governments, causing diversion of development resources, food and nutrition insecurity, and loss of livelihoods in affected areas – particularly arid and semi-arid zones across the region (World Food Program, 2018).

6. Conclusion and Recommendations

The findings of this study are interpreted within the broader discourse on climate change, food insecurity, and socio-political vulnerability in the Greater Horn of Africa. The analysis underscores how climatic variability, governance gaps, and socio-economic fragilities interact to heighten the region's vulnerability. The recommendations that follow present integrated, evidence-based strategies to enhance adaptive capacity, strengthen resilience, and inform policy and research.

6.1 Conclusion

Climate change poses an existential threat to humanity and ecosystems, undermining human livelihoods across the world. While climate change is attributed to natural and anthropogenic forces, climate scientists have blamed the current climate crisis on human activities. Specifically, the heightened consumption of fossil fuels since the dawn of the industrial revolution in the 18th century has generated emission of greenhouse gases into the atmosphere, raising atmospheric temperatures. Other features of climate change include depletion of the ozone layer, melting of polar icecaps, rising sea levels and increasing weather events that are accompanied by severe loss and damage around the world.

While climate change is a global phenomenon, its impact is distributed unevenly. Some regions that generate minor emissions of carbon compounds blamed for climate change suffer disproportionate impacts. The Greater Horn of Africa, located in the Sahel region of Africa, is particularly vulnerable, experiencing severe and recurring climate shocks. The region has faced recurrent droughts since the mid-20th century, with devastating consequences for crop production. Declining and unpredictable precipitation over recent decades has significantly contributed to widespread food and nutrition insecurity.

Farmers in the Horn of Africa largely depend on rain-fed agriculture, making them highly susceptible to climate variability. Recurrent droughts have increasingly been compounded by cyclones and flooding, resulting in substantial loss and damage. In Ethiopia, Somalia, Djibouti, Kenya, Sudan, and South Sudan, climate-related drought and extreme weather events have fueled food insecurity, leaving more than 40 million people in urgent need of assistance. These overlapping hazards underscore the interconnected nature of climate stressors and persistent human vulnerability in the region.

6.2 Recommendations

The food security crisis in the Greater Horn of Africa arises not solely from climatic variability, but from deeply embedded governance deficiencies, institutional fragilities, and socio-economic vulnerabilities. The recommendations below therefore propose an integrated, evidence-based approach that systematically addresses these structural determinants, enhances adaptive and systemic resilience, and contributes to breaking the entrenched cycle of recurrent crises.

The recommendations are as follows:

1. **Prioritizing Climate-Smart Agriculture (CSA):** Promote drought-tolerant crop varieties, water-harvesting techniques, agroforestry, and sustainable rangeland management. These practices enhance agricultural productivity while strengthening ecosystem resilience to climate shocks.
2. **Accelerating the Transition to Clean Energy:** Invest in decentralized solar, wind, and geothermal energy to power irrigation, cold storage, and community services. This reduces reliance on biomass and fossil fuels, thereby mitigating the region's contribution to global warming.
3. **Mainstreaming Climate Adaptation into Governance:** Integrate adaptation strategies at all policy levels, focusing on nature-based solutions, robust early-warning systems, and climate-resilient infrastructure. This systematic approach reduces vulnerability to both current and projected climate impacts.
4. **Enhancing Access to Adaptive Agricultural Technologies:** Bridge the technology gap for smallholders by ensuring access to affordable irrigation, fertilizers, agricultural mechanization, and veterinary services. These efforts should be supported by tailored financing models and extension services for resource-poor communities.

5. Investing in Human Capital Development, Particularly for

Women and Girls: Strengthen education and healthcare systems while implementing skills acquisition initiatives. Empowering women and girls serves as a multiplier, improving household nutrition, agricultural productivity, and long-term community resilience.

6. Fostering Targeted Poverty Reduction and Social Protection:

Implement comprehensive strategies that include climate-responsive social safety nets, such as cash transfers, to prevent irreversible poverty after shocks. Link these initiatives to programs promoting economic diversification and sustainable livelihoods.

7. Fostering Equitable and Predictable Global Partnerships:

Collaborate with international partners to provide long-term funding aligned with national resilience strategies. Facilitate technology transfer and offer climate finance as grants to avoid exacerbating debt, rather than funding short-term, fragmented projects.

8. Promoting Conflict Sensitivity and Conflict Management:

Establish formal dialogue mechanisms for the shared governance of water, land, and pastures. Strengthen local conflict-resolution institutions and legally recognize customary land and grazing rights to mitigate farmer-herder conflicts.

These recommendations should be understood not as isolated measures but as a cohesive, integrated framework for action. Their collective implementation is essential to address the challenges of climate change and its impacts on food security in the Greater Horn of Africa, while transforming the region's long-term development trajectory. Achieving this requires a coordinated effort in which national governments, regional bodies such as IGAD, and the international community collaborate to build a foundation of enduring resilience, ensuring that climate variability no longer inevitably precipitates humanitarian crises in the region.

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