The Dilemma Food Security in Sudan

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Abstract: With the rapid increase in the population, the shrinking areas under cultivation, with the reducing productivity of land, exacerbated by the wars and conflicts, the situation of food availability and accessibility in the country is in a retarded condition and is continually in a critical situation. The country population is now over 45 million persons in 2022 and is expected to reach about 50 million persons in the next few years. With that and the declining areas, the food need to feed them is an escalating challenge. According to the FAO and the recent IPC report (2024), approximately 25.6M people across Sudan will likely experience high levels of acute food insecurity (IPC Phase 3 or above) between June and September 2024, and 755,000 are already in IPC 5 (see annex 1) where fourteen areas (localities and IDP/refugee clusters) in nine states face a risk of Famine during the same period[1] That was resulted from the intermitted cereal production, accessibility problems, intensified conflict and civil unrests since April 2023, significant economic shocks and some of the most severe weather extremes in recent years, or a combination of these drivers.
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Introduction

The term Food Security is usually associated with Nutrition Security whereby Food and Nutrition Security (FNS) denotes for the total human feeding requirement for a healthy life. The FSNS is a cross-sectoral strategy. Its objectives will be achieved through the joint actions of multiple sectors and agencies of governments, working with local and international partners, both in civil society and in the private sector. While the agricultural sector is critical to assuring the availability of food in the country, the participation of several other sectors and agencies is also necessary. Consequently, cross sectoral coordination will be required to attain the objectives of the country FNS. Nevertheless, this study will focus mainly on Food Security as the Nutrition[2] part may need more insights on the conceptual frameworks that need specificity on tackling the issues of malnutrition and energy needs for the human being.

Food insecurity levels continue to increase in Sudan, driven by the worsening macroeconomic situation, poor harvest and conflicts, which are hampering households' access to food. With significant increases in food and other commodity prices, reduced harvest in 2023/2034 season, and the continued conflict/war, acute food insecurity in Sudan continues to worsen rapidly. Latest acute food insecurity data indicates that around 25.6 million people across Sudan were highly food insecure and classified in Crisis (IPC Phase 3) or worse from June to September 2024.

The December 2018 revolution and the new era in Sudan starting from April 2019 marked a qualitative break with the legacy of corruption, divisiveness, human rights abuses, economic mismanagement, and government misrule that characterized the nation since the year 1989. Peace, reconciliation, stability, and development were the ambitions expressed by Sudanese interim period. In response, the government has energetically set about establishing the framework and process through which these ambitions are to be attained and safeguarded. Central to these efforts is the realization of food security and improved nutrition by the nation as a whole and for all Sudanese households. The

[1] Acute Food Insecurity Snapshot l April 2024 - February 2025

[2] Nutrition security goes beyond food security by considering the nutritional value of food and the systemic factors that determine an individual's nutritional status. It is about the access to essential nutrients, not just calories.

Food Security Committee has been formed chaired by the Prime Minister and implemented by a central Food Security Secretariat.

With the assistance of the United Nations Food and Agriculture Organization (FAO) and the European Union (EU), an ambitious Food and Nutrition Security Programmes through various projects since 2012 with the general objectives of improving the FNS with capacity building and provision of relevant information that permit the targeted states[3] to be aware of their food and nutrition situation and build up an early warning system for the situation. The intervention was to contribute to a more conducive and sustainable living environment for vulnerable populations, including refugees and host communities.

The Poverty Reduction Strategy Plan[4] (PRSP) that was finalized by the new interim government in 2021 highlights food security as being critical to peace and security, economic revitalization, and decreasing poverty. The security of the country as a whole is dependent in part upon that all States in the Sudan enjoying food security and good nutrition. More fundamentally and in line with food security sovereignty, all Sudanese in the States have the right to have access to sufficient safe and nutritious food and to live healthy and productive lives. Food insecurity is implicated in the fact that 61.1% of the Sudanese are below the poverty line and live with less than $1.90 per person per day. Thus, while the government has an obligation to assist them in meeting their food needs, it also makes sound economic and political senses for vigorous actions to be taken.

General Background

Sudan is bounded by many countries that are definitely mutually affecting the country's food security situation. Sudan is bordering Egypt on the north, on the eastern side by the Red Sea, Eritrea, and Ethiopia, on the south by South Sudan, on the west by the Central African Republic and Chad, and on the northwest by Libya. The area of the country after the cessation of South Sudan is 1,886,068 km^2 (728,215 sq miles) making it the Africa's third-largest country by land area exceeded by Algeria and the Democratic Republic of the Congo. The country is lying between latitudes 8° and 23°N. The country is generally flat with the exception of the Jebel Marra Mountain, the Red Sea Hills and the Nuba Mountains.

Presently Sudan has 18 states with varying areas and population (see the below map). However, and after the Juba agreement in 2021, the five Darfur States has been considered as one region and the Blue Nile State has been changed to a region. Each State is constituted by a number of localities and administered by a Governor (Wali) and the localities and the regions are administered by regional governors.

[3] The present targeted States are the Red Sea, Kassala, Gedarif, Blue Nile, White Nile and Sinnar.

[4] The interim PRSP was first issued in the year 2011 and finalized in 2021.

There are three major ecological zones in Sudan from north to south: the desert, the semi-desert and the low rainfall savannah in addition to smaller mountainous are in Jebel Marra in Darfur region. Its soils are featured mainly by the clay deposits in the central and eastern part, the stabilized sand dunes in the western and northern part, the red ironstone soils in the mountainous area, and alluvial soils along the Nile and other rivers and deltas.

Although endowed with rich natural resources, Sudan is still a poor country as a result of mainly social conflicts and civil wars at some parts of the country in addition to climate change and political instability. From 1955 until 1972 there prevailed a costly and divisive civil war, fought largely in the south but punctuated by violent incidents in the north. The Addis Ababa Agreement of 1972 ended the conflict only temporarily as the civil was resumed in the southern part in the year 1983. By this time the comparative lack of economic development in the south had become a new source of regional grievance. Attempts to end the civil war included numerous discussions, cease-fires, and agreements but yielded very little success until 2005 when the Comprehensive Peace Agreement (CPA) ended the warfare. It also granted Southern Sudan semiautonomous status and stipulated that a referendum on impartiality for the south would be held in six years and South Sudan was declared an independent country on July 9, 2011. Before the cessation, new war and conflicts erupted in Darfur in the year 2003 resulted in thousands of casualties and in fleeing of population to more than 80 IDP camps in Sudan with over 3 million IDPs.

The Sudan third revolution against the military ruling started in December 2018 and the Omer Bashir regime was over in April 2019. The first interim government was inaugurated in August 2019 upon the naming of the Prime Minister who formed his cabinet in September 2019. The cabinet was partially reconstructed in July 2020 and the second cabinet was formed in February 2021 which was abolished by the October 2021 coup lead by General Alburhan who was at the same time the Head of the Sovereign Council. For various reasons including this coup, the second person in the sovereign council attempted to take the country in 15 April 2023 that resulted in the existing destructive was which is ongoing now.

The GDP in Sudan was expected to reach US$ 36 billion by the end of 2022, according to Trading Economics global macro models and analysts' expectations. In the long-term, the Sudan GDP is projected to trend around US$ 38 Billion in 2023 and 42.00 USD Billion in 2024, according to econometric models. The GDP per capita for 2021 was $764, a 24.19% increase from 2020. and is expected to reach 862.84 USD by the end of 2024, according to Trading Economics global macro models and analysts expectations.

Since 2012 Sudan's economy has been affected by falling oil revenues due to the secession of South Sudan in July 2011 and the resultant loss of about 75 percent of the country's oil resources. As a result, inflation rates which are fluctuating was 125.41 percent in July 2022, compared to 148.88 percent the previous month, after registering 192

percent in May 2022 and reached 146.6 in 2023 These factors, as well as a high fiscal deficit of 4.4 percent in 2021 and estimated at 3.5 percent of GDP in 2024

The land use in Sudan

Substantial variations existed in land classified as actually used or potentially usable for livestock grazing.[3] The Ministry of Agriculture and the United Nations Food and Agriculture Organization (FAO) classified about 24 million hectares as pastureland. Total forest area declined from 71.2 million hectares in 1990 to 61.6 million hectares in 2000.

Table 1 Land use in Sudan (in millions)

	Hectare	Feddan		
Total Area	**250,429.00**	**596,259.52**		
Land Area	237,443.00	565,340.48	95%	of the total area
Area Under Water	12,986.00	30,919.05	5%	of the total area
Arable Land	**84,034.00**	**200,080.95**	35%	of the land area
Cultivated Area	27,300.00	65,000.00	32%	Of the arable land
Uncultivated Land	56,734.00	135,080.95	68%	Of the arable land
Forest and Wood Land	86,010.00	204,785.71	36%	of the landarea
Other	67,399.00	160,473.81	28%	of the land area

Grazing land 101 million feddans
Source: Adapted from Frida Mahjoub
The Agro-Ecological Zones in Sudan

Sudan's agro-ecological zones support a variety of food, cash and industrial crops. Vast natural pastures and forests support large herds of livestock including cattle, sheep and goats. The main exported crops are sorghum, cotton, groundnuts, sesame, sugarcane, Arabic gum, fruits and vegetables. Livestock is also important for exports.

Sudan is divided into five distinct ecological zones: desert, semi-desert, woodland savannah, flood region and montane vegetation. The ecological precincts in Sudan favour the production of many crops that needed for food security and for revenue earning for the individual farmers and for the country.

Agro ecology builds on the local and traditional knowledge of farmers to create solutions based on farmers' needs. It was found that access to diverse traditional crop varieties was essential for climate change adaptation and survival among poor farmers.

Ecological variations resulted to diversification and better integration of food production systems into complex ecological processes and created synergies with the natural habitat instead of depleting natural resources. Agro ecology and sustainable intensification are examples of approaches that improve yields and build resilience through practices such as green manuring, nitrogen-fixing cover crops and sustainable soil management, and integration with agroforestry and animal production. Agro-ecological diversification contributes also to yield stability under climatic variability (FAO, The State of Food and Agriculture 2016)

Through its focus on the interactions between plants, animals, humans and the environment, it fosters sustainable agricultural development, which in turn ensures food security and nutrition. Agro-ecology goes beyond input use efficiency and input substitution by: harnessing key ecological processes, such as natural pest predation and the recycling of biomass and nutrients; enhancing beneficial biological interactions and synergies among the components of agro-biodiversity; and optimizing the use of resources.

Table 2: Precipitation and Land use

Zone	Annual Rainfall	Wet Season	Dry Season	Main land use type
Desert	> 75 mm	July - Sep	Oct – June	Irrigated agriculture; grazing along seasonal water courses
Semi-desert	75-300 mm	July- Sep, Nov - Jan	Nov- June March - Sep	Irrigated agriculture; dry land farming with water harvesting; pastoral
Low-rainfall Savannah	300-800 mm	May-Sep	Nov - April	rain-fed traditional cultivation; mechanized farming; irrigated agriculture, pastoral; forestry
Mountainous areas	300-1000 mm	Variable	Variable	Traditional cultivation; pastoral; forestry; horticulture

Source: Adapted from "Current Status of Agriculture and Future Challenges in Sudan Farida Mahgoub 2014"

Population and Demographic Features

Progressive planning for economic development and social planning requires a thorough understanding of the population dynamics as important factors that influence the Food Security and Nutrition situation in the country. For this reason, population statistics; which depicts the size and composition of the population is essential to estimate its food requirements, health and education needs as well water and other essentials.

The current population in about 50 million and it is anticipated that the population will reach about 100 million by the year 2064 at an average growth rate of 2.42%

The population is relatively young: while slightly more than 43% are younger than 14 years old, only about 3% are older than 65. The average population density is 21.3/km2 (55.2/sq. mi). The population is highly diverse, consisting of about 19 different ethnic groups and almost 600 subgroups.

The rural population is in a declining situation over the years. While it was about 67% in the year 20120, it dropped to 65.2% in 2018 and to 64.4% in 2022 (Trading Economics 2022). This mainly because of the migration of the rural population to the cities and towns in view of the conflicts at some states, poverty at the rural areas, and seeking opportunities for better living including education and health which are in a very bad situations at the rural areas.

The food requirement for the population is as follows as of 2024

Sorghum	4 million tones
Millet	0.9 million tons
Wheat	2.8 million tones
Maize	0.05 million tones
Rice	9.09 million tones

The Cereal import requirements in 2024 are forecast at about **3.38 million tonnes**, including 2.44 million tonnes of wheat and 662 000 tonnes of sorghum. However, the limited financial and logistical capacity of the country raises concerns about the possibility of satisfying these import needs. The production of sorghum, millet and wheat in 2023 was estimated at about 4.1 million tonnes, down 46 percent from the output obtained in the previous year and about 40 percent below the average of the previous five years.

Agricultural Sector in Sudan

About two-third of the Sudan inhabitants are dependent on farming and animal husbandry for their livelihoods. Though its role in the economy has declined in the decades since independence, agriculture still accounts for about one-third of Sudan's gross domestic product (GDP).

Agriculture has long been a central part of Sudan's economy and provides livelihood to approximately two thirds of the population as it is the foundation of livelihoods for the majority of the rural population in Sudan as well as many urban population because of its importance for food security and household welfare. The sector has taken on an increased importance following the secession of South Sudan in 2011. Agriculture's share of gross domestic product (GDP), which was estimated at 24 percent in 2011, increased to 31 percent in 2018. Similarly, labour's share in agriculture, which stood at 50 percent at the time of the secession of South Sudan in 2011, increased to 54 percent in 2012.

The Agricultural sector in Sudan suffers from structural challenges that led to low productivity and high marketing costs, which weakened competitiveness for plant and animal agricultural products and reduce returns for producers, and consequently lead to challenges in food security in the country. The coverage of main food grains from domestic

production portrays a precarious situation affecting food security stability. Overall local production of grains has run short of meeting the total domestic needs of sorghum, millet, maize and rice.
Agriculture is the foundation of livelihoods for the majority of the rural population in Sudan, and for many SMEs, because of its importance for food security and household welfare and as a source of export earnings. Always vital, the sector has taken on an increased importance following the secession of South Sudan in 2011. Agriculture's share of gross domestic product (GDP), which was estimated at 24 percent in 2011, increased to 31 percent in 2018. Similarly, labour's share in agriculture, which stood at 50 percent at the time of the secession of South Sudan in 2011, increased to 54 percent in 2012. Agriculture provides livelihood to approximately two thirds of the population. Agriculture has regained its place as a key source of foreign exchange. The loss of oil revenues in 2011 after the separation of South Sudan has been followed by a resurgence in agriculture's share in the country's exports, reaching 55 percent in 2019 (United Nations International Trade Statistics Database [UNCOMTRADE] data) and helping cushion some of the impact of the loss of oil revenues. This improvement has been mainly led by the good performance of major agricultural export commodities like livestock, sesame, gum Arabic, and cotton. For at least three of Sudan's key exports—sheep, goats, and gum Arabic—the ability to export in processed form presents significant upside potential. Overall, the agricultural trade balance remains negative due to the high food import bill, which mainly goes for imports of wheat and wheat flour, sugar, and animal oil (World Bank 2015). WB Agriculture Value Chain Analysis June 2020

While there is considerable economic potential in Sudan, necessary investments in hard and soft infrastructure have long been insufficient or neglected to a point when it now constrains the business environment and restricts opportunities for sustainable growth in agriculture. A complex web of interrelated policies is in place with the desired intent of controlling food prices, protecting local business (for example, import bans on food items), maintaining food security (for example, export bans on sorghum), and limiting the impact of revenue losses from secession (for example, exchange rate controls), discouraging domestic and foreign private sector investments in agriculture. Even as sustained contributors to the economy, value chains in the agriculture sector thus remain basic and fragmented and lack integration. The key upstream, midstream, and downstream challenges for agricultural development can be summarized as follows:

- Limited resource allocation, capacity, and infrastructure
- Overall resource allocation to agriculture remains constrained. The low share of government budget spending on agriculture is aggravated by the limited access to international finance due to existing indebtedness with development partners which precludes access to international development finance. At the same time, economic isolation due to some political factors constrained foreign direct investment (FDI). Actual annual government expenditures on agriculture accounted for under 3 percent of total annual public expenditures
- Research spending is meagre and erratic, while extension services are not inclusive. Only under 5 percent of budgeted expenditure on research and development (R&D) between the ministries responsible for agriculture was actually utilized between 2011 and 2019.
- A constrained ecosystem for agriculture inputs adversely affects productivity. For example, average fertilizer use per hectare of cropland was 11.1 kg (2014), which places Sudan at 136th position among 160 countries. The limited availability of foreign exchange further restricts access to quality inputs.
- Veterinary control programs do not exist, resulting in the inability to contain frequent outbreaks of major infectious diseases.
- Limited capacity and infrastructure exist to confirm that international food safety and quality requirements are met. There is a lack of certification bodi9es, regulatory infrastructure, and labs to test for compliance with industry quality standards and sanitary and phyto-sanitary (SPS) requirements of developed markets which significantly constrain participation in high-value exports.
- Options for high-quality storage to stabilize incomes between seasons are limited, as are mechanisms to minimize post-harvest losses. Organized storage capacity is concentrated at or near port with a large share being owned by the Government through the Agriculture Bank of Sudan.
- Local distribution suffers from poor inland logistics. There are a number of ports, including dry ports, free zones, railway stations, and highways, but only a limited supply of intermodal services exists
- Weak business environment for private sector investments in agriculture. The country ranks low—171 out of 190 countries—on ease of doing business in the 2020 World Bank Doing Business Survey, slipping by 9 places compared to its 2019 ranking. Access to credit, trading across borders, protecting minority investors, and paying taxes are identified as major weaknesses

- Domestic trade even in raw/unprocessed products is highly unorganized. A large number of wholesale markets operate across the country for both livestock and crop trade, but the conditions of these markets remain wanting with lack of basic hygiene and infrastructure for key associated activities of handling, storage, packaging, and trade.
- Scaled commercial processing is limited to select commodities leaving significant untapped opportunity for growth in revenues and jobs from value addition. Sudan's formal agro-industry is currently dominated by sugar, with some flour mills leaving high untapped potential in the processing of other agro-commodities like meat and oilseeds.
- Production practices are outdated. The largest irrigation system (the Gezira scheme) has underperformed, having suffered intermittently from funding shortfalls, capacity limitations of the managing entities, and ambiguous institutional arrangements. About 70 percent of the staple food is produced by smallholder farmers who are the most resource-constrained.
- Limited access to reliable electricity. In 2016, only 39 percent of Sudan's population had access to electricity as compared to 43 percent in Sub-Saharan Africa and 98 percent in Middle East and North Africa. Uninterrupted access to electricity is critical for the costeffective development of agricultural value chains.
- Access to land constraints. Weak land markets and weak protections for land-use rights make land consolidation efforts risky for both investors and current land users and present significant reputational risk to donors. A lack of adequate land protection and planning is an overarching constraint in Sudan

Some immediate actions needed for the agricultural development:

- Development of technical and functional capacity for policy and planning.
- Enhancement of agriculture productivity and production.
- Increasing public and private sector agricultural research and development.
- Reforming land tenure and land-use systems.
- Improvement of data collection and analysis for food and nutrition security.
- Public and private investment in rural infrastructure, e.g. irrigation systems, slaughterhouses, agro processing facilities and markets.
- Rehabilitation of irrigation schemes
- Rehabilitation of rangelands (i.e. pastures and water supplies) and facilitation of fair resource sharing.
- Increasing monitoring and provision of veterinary services for better trans-boundary animal disease outbreak management.
- Expanding disaster risk management to include challenges arising from climate change

Agriculture remains a crucial sector in the economy as a major source of raw materials, food and foreign exchange. It employs the majority of the labour force, and serves as a potential vehicle for diversifying the economy. However, The situation has worsened because agriculture in particular has been neglected since the advent of oil production in the early 2000s, a time when the revenues from oil could had been employed for more investments in agriculture as a sustainable source for boosting and persisting the economy

There are many constrains to agricultural sector in the country as:

- Limited availability and use of quality seeds and planting materials, particularly faced by sesame seeds and horticulture value chains. Locally produced seeds are of low quality while imported quality seeds are very expensive. There are a limited number of nurseries for seed multiplication. Public sector allocation for R&D of improved quality seeds is very limited. Producers, therefore, use traditional low-yield seed varieties and planting materials.
- Agriculture input supply system is weak and fractured. Agriculture inputs such as fertilizer, pesticides, sprinklers, and implements are in short supply and expensive (out of the reach of smallholder farmers and producers). Local production of agricultural inputs is very limited, and for most part, inputs (quality seed, fertilizer, pesticides, and implements) are imported at a higher cost, consume a lot of time, and are not available in remote rural areas.
- Lack of farmer/producer training, advisory, and extension services. Farmers have limited knowledge, understanding, skills, and exposure to GAPs. There exists a lack of essential and practical knowledge on soil preparation, nutrient seeds, fertilizers, and recognition and prevention of pests and diseases. For most part,

producers rely on traditional production methods and technologies, and adoption of high-yielding varieties and modern production methods is limited. For example, proper techniques are not applied for horticulture harvesting to ensure good quality, texture, and size. Further, horticulture farming in greenhouses, especially for the off-season is extremely limited in Sudan. Farmer 82 cooperatives and associations are weak, are restricted to a few states, and provide limited inputs and services to producers. Public sector-led advisory and extension services are wanting with a limited outreach and irregular follow-up. The private sector advisory services are limited to contract and commercial farmers who cultivate and supply produce exclusively to select processers such as DAL group in dairy and gum Arabic.

- Access to financial services. Agriculture financial services are limited to irrigated and mechanized rain-fed areas, with very limited presence in the traditional rain-fed areas where gum Arabic, sesame seeds, livestock, dairy, and horticulture crops are produced in large quantities. The Government annually allocates and prioritizes agriculture finance for priority crops like sorghum, wheat, and cotton. As a result, hardly any financial products are available for the rest of the agricultural sector and value chains. Producers—primarily smallholder farmers—for most part are without access to formal credit and rely on local money lenders and village traders with high interest rates. The village traders monopolize the produce at a low predetermined price before the harvest (known as Selam financing system).
- Poor post-harvest handling. Post-harvest knowledge, training, skills, and required equipment and facilities are deficient and expensive for small-scale producers. Losses and contamination levels are, therefore, high as poor harvesting methods, sorting, drying, packaging, and storage incur considerable wastage and damages to the produce. Producers, collectors, and traders often use/reuse old bags/packaging materials that might have been used for fertilizer, chemicals, and other commodities. The trucks carrying the produce are not properly covered and are exposed to weather shocks, that is, high temperature, rain, dust storms, and so on.
- Power shortages. Many production areas, for example, for gum Arabic, livestock, and dairy, are either not connected with the power grid or electricity supply is highly unreliable with long power outages. Use of a generator, for those who could afford it, depends upon availability of diesel which is in short supply and getting expensive as the Government is withdrawing petroleum subsidies; it is a major constraint for post-harvest handling, warehousing, and cold storage.
- Lack of cold chain infrastructure. Integrated cold supply chain infrastructure backed up by uninterrupted electricity supply especially for livestock (meat), dairy, and horticulture—a must for export markets—is grossly underdeveloped. The prevalent hot weather, poor postharvest handling technologies, and a deficient road and transport system limit consistent supply of value chains resulting in price volatility in the markets. Cold chain facilities are limited to the capital, Khartoum, far away from the horticulture production areas.
- Lack of modern technology. With the exception of large-scale processers, for most part, value chain processing in Sudan is based on outdated technologies which are inefficient, wasteful, and not able to produce quality products for the domestic market, let alone for export. For example, Sudan is unable to tap into premium meat markets like the United States and EU as it lacks the modern technology, that is, vacuum packaging and shock freezing which increase the shelf life of processed meat products by 6–8 months.
- Poor inland logistics. The road and transport network in Sudan is underdeveloped, old, and expensive due to high maintenance and running costs. Parts of rural Sudan are difficult to access as no paved roads exist. Chronic fuel shortages and increasing fuel prices have severely restricted regular transportation of agriculture produce to domestic markets. Logistics and cargo for export are limited. The Port of Sudan is currently not working at full 83 capacity (only 1 out of 3 cranes is working), which increases the loading time and considerably delays export shipments.
- Weak market infrastructure. Along the value chains, supplies and produce change hands several times between the initial point of purchase and the final point of sale. Village, mobile, and intermediate markets are characterized by poor connectivity, weak communications, poor infrastructure, and deficient services. Even at the higher level of a value chain, that is, regional markets with relatively better information, markets do not have the adequate market infrastructure, services, and management. The markets suffer from the absence of clear rules and regulations that organize trading and define the rights and responsibilities of stakeholders. The markets, for most part, do not have a functional market information system, banking, transportation, and storage facilities. For example, a lack of market information and multiple fees and charges imposed by local authorities lead to farmers selling their produce at low prices to the village traders which diminishes their incentive to take gum Arabica as their primary source of income.
- Weak quality control for domestic markets. Based on the limited information available about the overall food safety standards and value chain-specific safety standards, it appears that regulatory safety standards require

a thorough review for domestic and export markets. The public sector lacks the financial resources, testing equipment, human resources, and logistics to enforce safety standards and ensure compliance. • Lack of knowledge, regulatory framework, and service provision for quality control for the export market. There is a dearth of awareness and understanding and weak institutional capacity in meeting the specific SPS requirements of each value chain for exports markets. For instance, while a national standard on sesame seeds was developed in 2015 by the SSMO, the implementation plan is spotty. The SSMO issued a standard on the maximum levels of myco-toxins in sesame seed (SDS2928:2005), but enforcement is not consistent. Similarly in the case of meat, the lack of internationally accredited slaughterhouses and technical knowledge and limited animal screening at slaughterhouses impede the exports of processed meat.

- Lack of traceability and certification systems. Essential information such as production region, date of handling, quality assurance certificate, batch number, and laboratory testing data cannot be traced due to the absence of a traceability and certification system developed along the value chain for export markets
- Reduced competitiveness because of low productivity and high marketing costs, which results in lower prices for farmers.
- Exports of most goods are concentrated in a few foreign markets, which make them vulnerable to disruptions, such as an import ban on sheep sales in Saudi Arabia in 2000 and 2001 and again in 2007.
- Lack of strategic planning for different agricultural sub-sectors.
- The low priority accorded to the sector, which is reflected in allocation of public expenditure (3% of the total for the country), formal banking credit (11%) and investment (3%).
- Inadequate complementarities and coordination of macroeconomic and sector policies, and persistent neglect of the role that small producers play in achieving food security and poverty alleviation.
- Instability of production that exposure to natural risks and hazards causes, in addition to price competition from subsidised imported goods.
- The low productivity of animal and crop producers because of inadequate training, and a lack of extension programmes or supportive producers' associations.
- The inefficient use of human resource capacities engaged in agriculture.
- The meagre budget allocated to agricultural research (0.04%) of public expenditure (Abbadi and Ahmed 2006).
- Inadequate social and physical infrastructure.
- Weakness of laws governing the lease and use of land.

Agricultural Systems in the Country

As mentioned, the different agro-ecological zones in the country allow for the growing of many crops based on the zones characteristics. The major agricultural systems in the country are as follows:

- The government managed irrigation schemes in the sudan are the Gezira and Managil Scheme, New Halfa pump scheme. Rahad pump schme, and Alsuki pump scheme,
- the White Nile pump schemes,
- Northern pump scheme
- The blue Nile pump schemes
- Gash Delta (spate irrigation) schemes
- Tokar Delta (spate irrigation)

There are sugar schemes irrigated from the blue and white Niles which are: Kinana, Guneid, Assalaya, Sennar, the white nile and Khashm el Girba sugar factories. The total area of the sugar farms for these factories is about 174 hectares and the total production should be about 750,000 tones per season.

Rainfed agriculture covers by far the largest area in Sudan. The area actually cultivated and total production may, however, vary considerably from year to year depending on variability of rainfall, availability of financing and needed inputs, the application of the suggested technical growing packages, the intensity of insects and diseases, and .
The rainfed farming system is characterized by a small farm size, labour-intensive cultivation techniques employing hand tools, low input level and poor yields. Crops grown in the rainfed sector include sorghum, millet, sesame, sunflower and groundnuts.
The rainfed, traditional farming systems are the main subsistence systems prevalent almost everywhere in the Sudan, accounting for an area of 9.2 million ha, mostly in Kordofan, Darfur, White Nile and Blue Nile States.

Sudan has the largest irrigated area in sub-Saharan Africa and the second largest in the whole of Africa after Egypt. The irrigated sub-sector plays a very important role in the country's agricultural production. Irrigated agriculture has become more and more important over the past few decades as a result of drought and rainfall variability and uncertainty. It remains a central option to boost the economy in general and increase the living standard of the majority of the population.

Pre-2011, Sudan was traditionally seen as the African 'bread basket' with a positive cereal balance. In 2014-2015, despite a record production of over 7.84 million tons of cereals, 20 percent of the cereals balance relied on imports, mostly for wheat.

The recurring food price hikes in recent years, continued prevalence of malnutrition, increasing scarcity of natural resources and stagnating levels of productivity growth in agriculture have brought agriculture and food security to the stage of global decision-making. A common effort is required to make the transition to a food system that provides everyone with access to nutritious food and where farming and consumption are done on a sustainable basis, ecosystem services are maintained and supported by effective governance of competitive resources, food and commodity markets are stable and there are policies in place to sustain food security pathways. Building up a multi-disciplinary evidence-base on the scarcity of resources and their geopolitical dynamics will help support this transition.

Sudan's prevalence of undernourishment is as high as 38.9 percent in 2013 (FAO, 2013). An estimated 4.6 million people (about 12% at the time) are food insecure in Sudan in 2014 despite above-average harvest by the end of 2014 (FAO, 2015). In 2022, the number of people with insecure Food security was estimated to 11 million people (about 24% of the total population) due to multiple reasons: poor harvest, influx of refugees, restrictions on trade and assistance, conflicts and increased prices. On the other hand, frequent droughts, irregular rainfall patterns, climate change, recurrent conflicts and high food prices result in that the most vulnerable people are struggling to access enough food.

Crops Production and Productivity

Sudan is endowed with most of the potentials for enhanced agricultural production. With a total of about 200 million feddans of arable lands (about 84 million Hectares), and a rainfall of about per year and a plenty of surface irrigation water as shown below, and with over 60% of the population are depending on agriculture for their livelihood, the country is expected to be in safe for adequate production, food security and economically viable in exports and import reduction.

The alarming situation states that the soil fertility is on the verge of declining as large portion of agricultural lands have been turned to arid conditions due to progressions in frequencies of soil erosion, land exploitation (deforestation and urbanization), increased genetic mutation of parasite

The Agricultural sector in Sudan suffers from structural challenges that led to low productivity and high marketing costs, which weakened competitiveness for plant and animal agricultural products and reduce returns for producers, and consequently lead to challenges in food security in the country
Coverage of main food grains from domestic production portrays a precarious situation affecting food security stability. Overall local production of grains has run short of meeting the total domestic needs of sorghum, millet, maize and rice According to the latest Sudan Food Security Outlook (October 2022-May 2023), the area planted with sorghum and millet was similar to last year and the five-year average, estimated at 33.8 million feddans (14.2 million hectares), around 65 percent of the total area was planted. Around 90 percent of the millet was planted in the traditional rain-fed sector, while 55 and 42 percent of the sorghum was planted in the semi-mechanized and the traditional rain-fed sub-sectors, respectively. In mid-September, crop conditions are better than last year in most of the rainfed and irrigated sectors.

While there is considerable economic potential in Sudan, necessary investments in hard and soft infrastructure have long been insufficient or neglected to a point when it now constrains the business environment and restricts opportunities for sustainable growth in agriculture. A complex web of interrelated policies is in place with the desired intent of controlling food prices, protecting local business (for example, import bans on food items), maintaining food

security (for example, export bans on sorghum), and limiting the impact of revenue losses from secession (for example, exchange rate controls), discouraging domestic and foreign private sector investments in agriculture. Even as sustained contributors to the economy, value chains in the agriculture sector thus remain basic and fragmented and lack integration. The key upstream, midstream, and downstream challenges for agricultural development can be summarized as follows:

- Limited resource allocation, capacity, and infrastructure
- Overall resource allocation to agriculture remains constrained. The low share of government budget spending on agriculture is aggravated by the limited access to international finance due to existing indebtedness with development partners which precludes access to international development finance. At the same time, economic isolation due to some political factors constrained foreign direct investment (FDI). Actual annual government expenditures on agriculture accounted for under 3 percent of total annual public expenditures
- Research spending is meagre and erratic, while extension services are not inclusive. Only under 5 percent of budgeted expenditure on research and development (R&D) between the ministries responsible for agriculture was actually utilized between 2011 and 2019.
- A constrained ecosystem for agriculture inputs adversely affects productivity. For example, average fertilizer use per hectare of cropland was 11.1 kg (2014), which places Sudan at 136th position among 160 countries. The limited availability of foreign exchange further restricts access to quality inputs.
- Veterinary control programs do not exist, resulting in the inability to contain frequent outbreaks of major infectious diseases.
- Limited capacity and infrastructure exist to confirm that international food safety and quality requirements are met. There is a lack of certification bodi9es, regulatory infrastructure, and labs to test for compliance with industry quality standards and sanitary and phytosanitary (SPS) requirements of developed markets which significantly constrain participation in high-value exports.
- Options for high-quality storage to stabilize incomes between seasons are limited, as are mechanisms to minimize post-harvest losses. Organized storage capacity is concentrated at or near port with a large share being owned by the Government through the Agriculture Bank of Sudan.
- Local distribution suffers from poor inland logistics. There are a number of ports, including dry ports, free zones, railway stations, and highways, but only a limited supply of intermodal services exists
- Weak business environment for private sector investments in agriculture. The country ranks low—171 out of 190 countries—on ease of doing business in the 2020 World Bank Doing Business Survey, slipping by 9 places compared to its 2019 ranking. Access to credit, trading across borders, protecting minority investors, and paying taxes are identified as major weaknesses
- Domestic trade even in raw/unprocessed products is highly unorganized. A large number of wholesale markets operate across the country for both livestock and crop trade, but the conditions of these markets remain wanting with lack of basic hygiene and infrastructure for key associated activities of handling, storage, packaging, and trade.
- Scaled commercial processing is limited to select commodities leaving significant untapped opportunity for growth in revenues and jobs from value addition. Sudan's formal agro-industry is currently dominated by sugar, with some flour mills leaving high untapped potential in the processing of other agro-commodities like meat and oilseeds.
- Production practices are outdated. The largest irrigation system (the Gezira scheme) has underperformed, having suffered intermittently from funding shortfalls, capacity limitations of the managing entities, and ambiguous institutional arrangements. About 70 percent of the staple food is produced by smallholder farmers who are the most resource-constrained.
- Limited access to reliable electricity. In 2016, only 39 percent of Sudan's population had access to electricity as compared to 43 percent in Sub-Saharan Africa and 98 percent in Middle East and North Africa. Uninterrupted access to electricity is critical for the costeffective development of agricultural value chains.
- Access to land constraints. Weak land markets and weak protections for land-use rights make land consolidation efforts risky for both investors and current land users and present significant reputational risk to donors. A lack of adequate land protection and planning is an overarching constraint in Sudan

Some of the factors affecting food production in Sudan and in other countries as well are:

- Sluggish Unbalanced Economic Growth
- Loose Land Tenure and Natural-Resource Degradation

- Weather Conditions and Climate Change
- Population Dynamics
- Low Productivity Due to Weak Technology Transfer and Beneficiaries' Involvement and Capacity Building
- Inadequate Rural Infrastructural Facilities
- Inadequate and Inequitable Spending in Agriculture
- Distortions to Agricultural Incentives
- Weak Governance
- Conflicts (Refugees and IDPs)

Agriculture in Sudan is the principal source of income and livelihood for between 60 per cent and 80 per cent of the population (Elgali, Mustafa et al. 2010), and the engine of growth for other economic sectors such as trade, industry and transport.

Cereals dominate crop production in Sudan and provide nearly 53% of the population's daily calorie requirements (FAO-SIFSIA. 2010). The same high levels of annual fluctuation as for other crops characterises the production of the major staples – sorghum, millet and wheat

Given the decline of agricultural growth over the past two decades and the secession of South Sudan in 2011, with its loss of oil revenues and subsequent downturn in the country's economy, the strengths and weaknesses of Sudan's agriculture sector could be interpreted as reflecting the need for:

- Development of technical and functional capacity for policy and planning.
- Enhancement of agriculture productivity and production.
- Increasing public and private sector agricultural research and development.
- Reforming land tenure and land-use systems.
- Improvement of data collection and analysis for food and nutrition security.
- Public and private investment in rural infrastructure, e.g. irrigation systems, slaughterhouses, agro-processing facilities and markets.
- Rehabilitation of rangelands (i.e. pastures and water supplies) and facilitation of fair resource sharing.
- Increasing monitoring and provision of veterinary services for better trans boundary animal disease outbreak management.
- Expanding disaster risk management to include challenges arising from climate change

Agriculture remains a crucial sector in the economy as a major source of raw materials, food and foreign exchange. It employs the majority of the labour force, and serves as a potential vehicle for diversifying the economy. However, The situation has worsened because agriculture in particular has been neglected since the advent of oil production in the early 2000s, a time when the revenues from oil could had been employed for more invetments in agriculture as a sustainable source for boosting and persisting the economy

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The agricultural sector was the most dominant in pre-2011 but then its share declined to the benefit of both services and industries related to the exploitation and export of mineral oil, which boomed for a decade. In 2012, the agricultural sector contributed 27.6 percent to the GDP, declined to 6.4 in 2021 compared to industry 7.4 and service 9.7 to in 2022

Agriculture employed 49 percent of the total economically active population in 2013. Almost half of the households in the northern states of pre-2011

Sudan's agro-ecological zones support a variety of food, cash and industrial crops. Vast natural pastures and forests support large herds of livestock including cattle, sheep and goats. The main exported crops are sorghum, cotton, groundnuts, sesame, sugarcane, Arabic gum, fruits and vegetables. Livestock is also important for exports.

Rainfed agriculture covers by far the largest area in Sudan. The area actually cultivated and total production may, however, vary considerably from year to year depending on variability of rainfall, availability of financing, the intensity of insects and diseases and availability of inputs. The rainfed farming system is characterized by a small farm size, labour-intensive cultivation techniques employing hand tools, low input level and poor yields. Crops grown in the rainfed sector include sorghum, millet, sesame, sunflower and groundnuts.

Sudan has the largest irrigated area in sub-Saharan Africa and the second largest in the whole of Africa after Egypt. The irrigated sub-sector plays a very important role in the country's agricultural production. Irrigated agriculture has become more and more important over the past few decades as a result of drought and rainfall variability and uncertainty. It remains a central option to boost the economy in general and increase the living standard of the majority of the population. Pre-2011 Sudan was traditionally seen as the African 'bread basket'with a positive cereal balance. In 2014-2015, despite a record production of over 7.84 million tons of cereals, 20 percent of the cereals balance relied on imports, mostly for wheat.

The recurring food price hikes in recent years, continued prevalence of malnutrition, increasing scarcity of natural resources and stagnating levels of productivity growth in agriculture have brought agriculture and food security to the stage of global decision-making. A common effort is required to make the transition to a food system that provides everyone with access to nutritious food and where farming and consumption are done on a sustainable basis, ecosystem services are maintained and supported by effective governance of competitive resources, food and commodity markets are stable and there are policies in place to sustain food security pathways. Building up a multi-disciplinary evidence-base on the scarcity of resources and their geopolitical dynamics will help support this transition.

Agriculture in the National Economy

Agriculture, accounting for about 32% of GDP and is declining due to shortages of inputs, especially fuel and fertilizers; a weak business environment, where political uncertainty discouraged private investment; as well as dampened confidence and productivity in manufacturing and construction, in addition to low allocation of budgets for the agriculture. This is although Agriculture provides a livelihood to about 70% of total population, and employs an estimated 53% of the national labour force, 50% in rural areas (ILO estimation of 2018). Agriculture is responsible for the supply of basic staple foods and animal products, in addition to the supply of raw materials to the food industry. Agricultural exports are returning to prominence as important sources of foreign exchange earnings after the decline of oil exports.

The total earning from agriculture (crops and livestock and products) was accounted for more than 4 billion dollars in the year 2021. There is seems to be an improvement in the total agricultural exports specially during the second half of the years 2021 and 2022 although the many problems and constraints in the agricultural production. However, the increase was mainly due the increased exports of cotton and gum Arabic with 171% and 143% more than the same period last year respectively, and also increase in the exports of ground nuts (179%) and livestock 97%, .

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The alarming situation states that the soil fertility is on the verge of declining as large portion of agricultural lands have been turned to arid conditions due to progressions in frequencies of soil erosion, land exploitation (deforestation and urbanization), increased genetic mutation of parasite

Compared to other countries, Sudan is ranked number 40 in wheat production in 80 wheat producing countries in the World as it produces about 0.7 million tons annually on average (2016-2021) (China is number one in the world producing about 138 million tons annually). Comparing to some regional countries, Egypt 9 million tons, Ethiopia 5.7

million tones, Algeria 3.7 million tons, Iraq 3 million tons, and Tunisia 1.2 million tons annually. This is although the available land and water is much more than the mentioned countries.

Agricultural Production and Productivity

Agriculture in Sudan is the principal source of income and livelihood for between 60 per cent and 80 per cent of the population (Elgali, Mustafa et al. 2010), and the engine of growth for other economic sectors such as trade, industry and transport.

Sudan is divided into five distinct ecological zones: desert, semi-desert, woodland savannah, flood region and montaine vegetation. The most important crop species, especially during times of drought, are the indigenous fruit *kursan* and the vegetable okra (Bashir 2001). The country is traversed by the Blue Nile and White Nile rivers, which meet in the capital Khartoum to form the main Nile River, which flows north into the Mediterranean Sea. The two Niles and their tributaries have varying degrees of influence on irrigated agriculture and livestock production systems. There are also a large number of seasonal rivers and water courses known as *wadis*, of which Gash (Mareb) and Baraka are the largest.
Sudan has constructed five dams across some of these bodies of water. The Roseires and Sinnar dams are on the Blue Nile; Khashm el Girba on the seasonal Atbara river; Jabal Awliaa on the White Nile; and Marawe on the Nile. These dams provide water for irrigation, fishing and to generate electricity. Erratic rainfall and recurrent spells of drought emphasize the importance of reliable sources of groundwater to rural areas, as well as remote urban centres. The water bearing rock strata comprise the Nubian Sandstone, the Um Rwaba Series and the basement complex (Abdalla and Karar 2010). Although Sudan lies within the tropics, the climate ranges from hot and dry to arid desert, with a rainy season between April to November that varies by region (Central Intelligence Agency 2013).
Soils in Sudan can geographically be divided into four categories: sandy in the northern and west-central areas; clay in the central region; and laterite in the south; with alluvial soils as a fourth, less extensive and widely separated category. Alluvial soils have great economic importance. They are found along the main Nile to Lake Nubia; in the delta of the Gash River in the Kassala area; in the Baraka Delta in the area of Tokar near the Red Sea in Ash Sharqi State; and along the lower reaches of the White Nile and the Blue Nile rivers (Central Intelligence Agency 1991).
The productivity on the other hand is very low compared with the similar countries and climates. The reasons are

- The situation and usage of the agricultural inputs as fertilizers, , the inappropriate extension services to the farmers, the retreating research and lpw adotability of the research outcomes, the insufficient agricultural financing,
- Reduced competitiveness because of low productivity and high marketing costs, which results in lower prices for farmers.
- Lack of strategic planning for different agricultural sub-sectors.
- The low priority accorded to the sector, which is reflected in allocation of public expenditure (3% of the total for the country), formal banking credit (11%) and investment (3%).
- persistent neglect of the role that small producers play in achieving food security and poverty alleviation.
- The low productivity of animal and crop producers because of inadequate extension and training, and a lack of extension programmes or supportive producers' associations.
- The inefficient use of human resource capacities engaged in agriculture.
- The meagre budget allocated to agricultural research (0.04%) of public expenditure
- Inadequate social and physical infrastructure.
- Weakness of laws governing the lease and use of land.

The Food Security
The agreed four crucial processes forming the food security are the following (Mwaniki 2006, Zuberi and Thomas 2012):

- Food stocks (availability) refer to supply of food, determined by nationally produced food plus the food that can be imported to feed the population. In this respect, food supply and its variety should be sufficient in quantity and of good quality (Mwaniki 2006).
- Access to food, determined by the level of poverty – and therefore purchasing power – and transportation and distribution systems, and consumer preferences within a given area.

- Food utilization, corporates aspects such as adequate diet, clean water, sanitation, and health care. It is particularly relevant for integrated food and nutrition security frameworks (FAO/SIFSIA Programme 2005).
- Food Stability refer to both the availability and access dimensions of food security.

Another component of food security is the time element. Food insecurity could be categorized as either chronic or transitory with the former representing a situation where the lack of food is a permanent feature and the latter describing a temporary shortage.

To be food secure, a population, household or individuals must have availability and access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. conflicts, an economic or climatic crisis etc) or cyclical events (e.g. seasonal food insecurity).
The concept of stability can therefore refer to both the availability and access dimensions of food security.
Another factor which is increasingly becoming accepted is: **risks** that can disrupt any one of the first four factors. To achieve the full food security objectives, all dimensions must be fulfilled simultaneously.
The USDA forecast 2022-23 total global wheat output at 774.8mn tonnes, the first decline since the 2018-19 season. Global buffer stocks are expected at 267mn tonnes, down for the second year in a row and the lowest level in six years. The present war in the major wheat producing areas has exacerbated and the problem of the global food availability.
In Sudan, although the vast cultivable areas that could be put under cropping (about 75 million Hectares), but only about one third of that area is presently under cropping by the three major agricultural systems (Traditional rainfed, mechanized rainfed, and irrigated). The production and productivity is on a declining situation (sorghum production in 2021/2022 is just sufficient for this year 2022, and the wheat produced this year is only 0.5 million tons out of the national need of 2.3 million tons).
Food insecurity remains alarmingly high in Sudan with the increased and protracted displacement, economic decline and inflation, and high food price hikes exacerbated by other factors as the impacts of the COVID-19 pandemic, the floods, and the drastic consequences of the October 2021 coup.
Food Security was defined in more than 200 definitions since the stand of the consideration of the importance of food security. In summary, in the 1974 World Food Summit was defined as: "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices". In 1983, the FAO expanded its concept to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and the supply side of the food security equation: "ensuring that all people at all times have both physical and economic access to the basic food that they need.
In the1996 World Food Summit which adopted a still more complex definition: "Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". The definition was further expressed in 2001 as "Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" which will be used for this study "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (World Food Summit, 1996). This widely accepted definition points to the following four dimensions of food security: Availability: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid). Access: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources). Utilization: Utilization of food through adequate diet, clean water, sanitation and healthcare to reach a state of nutritional well-being where all physiological needs are met. Stability: To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability therefore refers to the availability, access and utilization dimensions of food security.
The continuing evolution of food security as an operational concept in public policy has reflected the wider recognition of the complexities of the technical and policy issues involved. The most recent careful redefinition of food security is that negotiated in the process of international consultation leading to the World Food Summit (WFS) in November 1996. The contrasting definitions of food security adopted in 1974 and 1996, along with those in official FAO and

World Bank documents of the mid-1980s, are set out below with each substantive change in definition underlined. A comparison of these definitions highlights the considerable reconstruction of official thinking on food security that has occurred over 25 years. These statements also provide signposts to the policy analyses, which have re-shaped our understanding of food security as a problem of international and national responsibility.

Food security as a concept originated only in the mid-1970s, in the discussions of international food problems at a time of global food crisis. The initial focus of attention was primarily on food supply problems - of assuring the availability and to some degree the price stability of basic food stuffs at the international and national levels. That supply-side, international and institutional set of concerns reflected the changing organization of the global food economy that had precipitated the crisis.

The issues of famine, hunger and food crisis were also being extensively examined, following the events of the mid 1970s. The outcome was a redefinition of food security, which recognized that the behaviour of potentially vulnerable and affected people was a critical aspect.

Of immediate concern is the disruption to food systems and impact on food security (Torero, 2020). Food distribution channels of almost all countries across the income spectrum have been highly disrupted, with strong negative consequences for the most vulnerable. There is widespread media coverage of sudden decreases in food security due to:

- loss of income from workers who are fully or partially furloughed affecting their ability to purchase food;
- stay-at-home orders and restricted physical access to food markets and/or indigenous food gathering activities;
- closure or diminished capacity of institutions that support food social safety nets, such as food banks and school feeding programs; and
- market disruptions such as issues with the ability of supermarkets to rapidly restock from centralised distribution systems following unprecedented demand (i.e. panic buying) for pantry staples.
- wastage of fresh vegetables, fruits and milk due to inability by farmers or entrepreneurs to transport them from point of production to local markets or supermarkets in nearby towns or cities.

Three crucial processes produce food insecurity (Mwaniki 2006, Zuberi and Thomas 2012):

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- Food utilization, corporates aspects such as adequate diet, clean water, sanitation, and health care. It is particularly relevant for integrated food and nutrition security frameworks (FAO/SIFSIA Programme 2005).

A fourth concept is also increasingly becoming accepted: risks that can disrupt any one of the first three factors. To achieve food security objectives, all four dimensions must be fulfilled simultaneously.

In Sudan, food insecurity remains alarmingly high with some 9.6 million people estimated to be food insecure. This is the highest figure ever recorded in Sudan. Sudan has also witnessed historic flooding in recent months that has devastated homes, destroyed vast swaths of farmlands and crops, and affected more than 875,000 people.

The October 2021 coup in Sudan is the latest in a series of events in East Africa that negatively impact food supply chains, and everything related to them. In 2020, the outbreak of Desert Locust as well as the COVID-19 pandemic has proven to be drivers of food insecurity. This has further deteriorated the capacities of countries to feed themselves. In addition to the severe impact of a changing climate, recurring disasters and prolonged conflicts on this region, such upheavals are making food systems in this part of the world very unstable. The result is rising hunger figures for three years in a row, reversing a up to 2018 positive trend of reducing hunger. The United Nations Food & Agriculture Organisation (FAO) and Wageningen Centre for Development Innovation are looking to break the causal link between armed conflict and food insecurity. Making food systems more resilient means they should be better able to withstand long-term crises. The four-year Food and Nutrition Security Resilience Programme (FNS-REPRO), financed by the Dutch Ministry of Foreign Affairs and Climate Policy, is aimed at laying the foundations for this

Food Security in Sudan

The food security situation is consequently worsening globally and nationally. Food availability is derived by the low productivity and production and the food access is influenced by many factors comprising poverty levels and the state of macroeconomic indicators.

- The Social Protection and Social Safety Nets forms an important government intervention to mitigate food access to vulnerable households and persons
- Food insecurity widens to include refugees who continue coming from neighboring countries

- Microfinance (MF) initiative provides a powerful modality for alleviating poverty and improving food security and nutrition

Some of the factors affecting food production in Sudan and in other countries as well are:

- Sluggish Unbalanced Economic Growth
- Loose Land Tenure and Natural-Resource Degradation
- Weather Conditions and Climate Change
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- Low Productivity Due to Weak Technology Transfer and Beneficiaries' Involvement and Capacity Building
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- Distortions to Agricultural Incentives
- Weak Governance
- Conflicts (Refugees and IDPs)

For decades, Sudan was embroiled in two civil wars that ended in 2005. The first took place in 1955-72 and broke out again in 1983. Peace talks began in 2002. The second war had famine-related effects, which displaced more than 5 million people and; more than 2.5 million people died (Watch 2011). Most commentators have attributed the country's political and civil strife either to an age-old racial and ethnic divide between Arabs and Africans or to colonially constructed inequalities (Johnson 2003).

In January 2005, the final North/South Comprehensive Peace Agreement (CPA) was signed, and on 9 July 2011 South Sudan seceded and became independent. Conflicts over water and grazing rights in the western region of Darfur and elsewhere have become entwined with political rivalries on a larger scale, including in neighbouring countries. Conflict broke out in Darfur in 2003 that was estimated to have caused between 200,000 and 400,000 deaths and displaced nearly 2 million people.

The struggle has become increasingly regional in scope and has brought instability to eastern Chad. Sudan has also faced large refugee influxes from neighbouring countries primarily, from Ethiopia, Eritrea and Chad, with the attendant problems of poverty and food insecurity (UNICEF 2004

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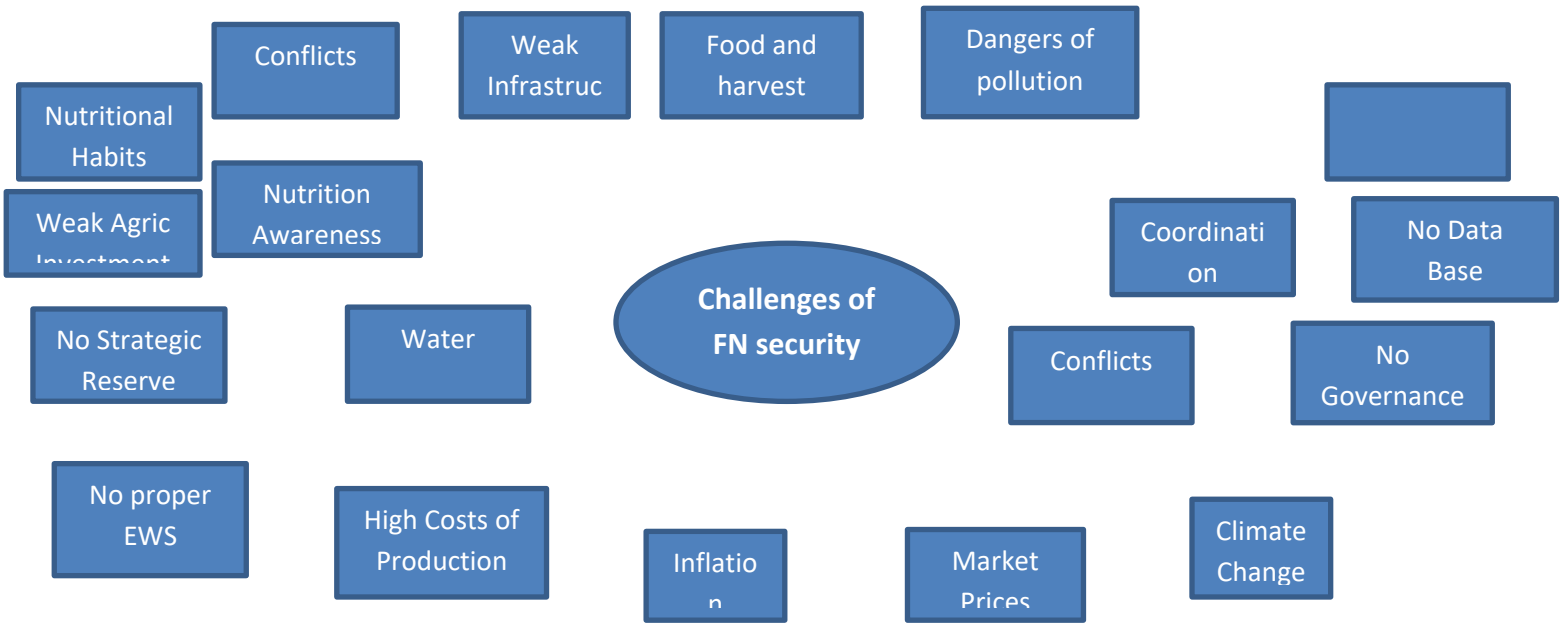
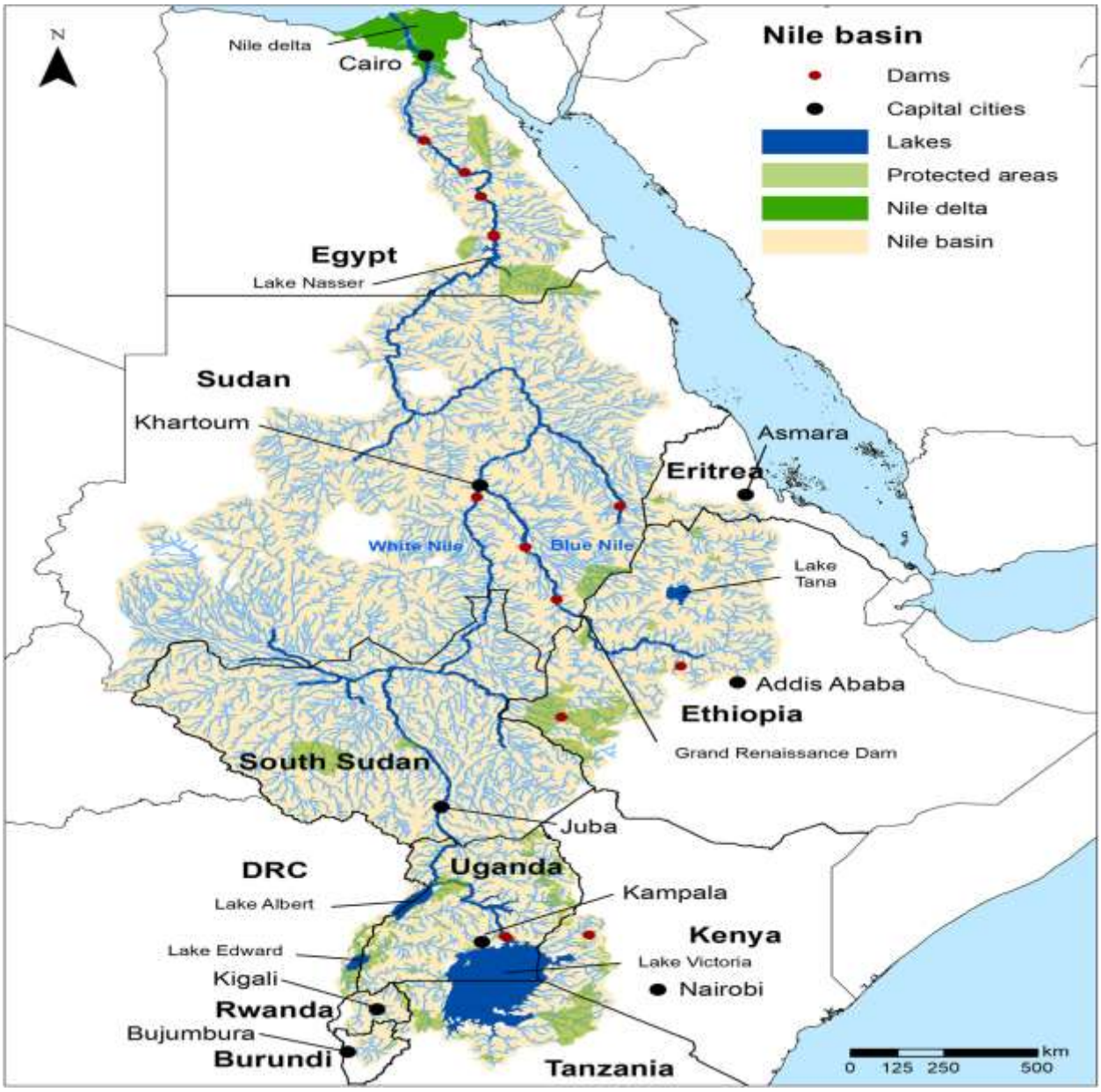
Annexes

Annex 1
Official concepts of food security
The initial focus, reflecting the global concerns of 1974, was on the volume and stability of food supplies. Food security was defined in the 1974 World Food Summit as:
"availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".
In 1983, FAO expanded its concept to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security equation:
"ensuring that all people at all times have both physical and economic access to the basic food that they need"
In 1986, the highly influential World Bank report "Poverty and Hunger" focused on the temporal dynamics of food insecurity. It introduced the widely accepted distinction between chronic food insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict. This concept of food security is further elaborated in terms of:
"access of all people at all times to enough food for an active, healthy life".
By the mid-1990s food security was recognized as a significant concern, spanning a spectrum from the individual to the global level. However, access now involved sufficient food, indicating continuing concern with protein-energy malnutrition. But the definition was broadened to incorporate food safety and also nutritional balance, reflecting concerns about food composition and minor nutrient requirements for an active and healthy life. Food preferences, socially or culturally determined, now became a consideration. The potentially high degree of context specificity implies that the concept had both lost its simplicity and was not itself a goal, but an intermediating set of actions that contribute to an active and healthy life.
The 1994 UNDP Human Development Report promoted the construct of human security, including a number of component aspects, of which food security was only one[28]. This concept is closely related to the human rights perspective on development that has, in turn, influenced discussions about food security. (The WIDER investigation into the role of public action into combating hunger and deprivation, found no separate place for food security as an organizing framework for action. Instead, it focused on a wider construct of social security which has many distinct components including, of course, health and nutrition.
The 1996 World Food Summit adopted a still more complex definition:
"Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".



Annex 2 Nile Basin



Annex 3 The Nile

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