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Food Security, Nutrition, Health, and Food Safety Technical Working Group (TWG) 3 Report

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Abbreviations and Acronyms

ACFS	African Center for Food Security
AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
AGRA	Alliance for a Green Revolution in Africa
AI	Artificial Intelligence
ARSO	African Organisation for Standardisation
ASF	African Swine Fever
AU	African Union
AUC	African Union Commission
AU-IAPSC	African Union Inter-African Phytosanitary Council
AU-IBAR	African Union InterAfrican Bureau for Animal Resources
AU-PACA	African Union Partnership for Aflatoxin Control in Africa
BRR	Biennial Review Reporting
CABI	Centre for Agriculture and Biosciences International Archives
CAADP	Comprehensive Africa Agriculture Development Programme
CNDN	Conseil National de Développement de la Nutrition
DALYs	Disability-Adjusted Life Years
DRC	Democratic Republic of the Congo
ECOWAS	Economic Community of West African States
EUS	Epizootic Ulcerative Syndrome
FANRPAN	Food, Agriculture, and Natural Resources Policy Analysis Network
FAO	Food and Agriculture Organization of the United Nations
FAO-RAF	FAO Regional Office for Africa
FBD	Food-Borne Disease
FMD	Foot and Mouth Disease
GAIN	Global Alliance for Improved Nutrition
GDP	Gross Domestic Product
HLPE-FSN	High-Level Panel of Experts on Food Security and Nutrition
IFPRI	International Food Policy Research Institute
IPC	Integrated Phase Classification
JICA	Japan International Cooperation Agency
KHV	Koi Herpes Virus
NCDs	Non-Communicable Diseases
NRI	Natural Resources Institute
PPR	Peste des Petits Ruminants
SDGs	Sustainable Development Goals
SMEs	Small and Medium-sized Enterprises
SPS	Sanitary and Phytosanitary
TWG	Technical Working Group
UG	University of Ghana
UKZN	University of KwaZulu-Natal
UN	United Nations
WFP	World Food Programme
WHO	World Health Organization
WSSV	White Spot Syndrome Virus

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This report was developed by the members of Technical Working Group 3 (TWG3) under the overall coordination of the convener – University of Ghana, and co-convener, Food and Agriculture Organization of the United Nations (FAO).

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Editorial

Since its adoption by the African Union (AU) in 2003, the Comprehensive Africa Agriculture Development Programme (CAADP) has been Africa's primary policy framework for agricultural transformation, wealth creation, food security, economic growth, and prosperity. It guides the African Union Commission (AUC), AUDA-NEPAD, Regional Economic Communities (RECs), and Member States in driving food security and agricultural transformation toward a self-reliant and productive Africa.

The continent has witnessed robust economic growth since the launching of the agenda, producing rising average incomes and household consumption expenditures. Evidence indicates steady decreases in the prevalence of poverty and improvement in food security and nutrition, with undernourishment declining in the 2000s and early 2010s and child malnutrition declining consistently throughout the CAADP period. However, progress on many of these indicators has slowed and, in the case of undernourishment, reversed in recent years, especially with recent economic disruptions related to the Russia-Ukraine war, the COVID-19 pandemic, and the climate crisis.

As Africa phases out of ten years of implementing the Malabo Declaration set to conclude in 2025, the Kampala (Post-Malabo) Agenda aims to deepen CAADP's impact and accelerate progress. In early 2024, the AU Department of Agriculture, Rural Development, Blue Economy and Sustainable Environment (AUC-DARBE) and AUDA-NEPAD, in collaboration with critical technical partners, launched the process to develop a Post-Malabo Agenda for Action on CAADP. The CAADP Post-Malabo Agenda development process set out to leverage an inclusive, multistakeholder effort to build on 20 years of CAADP successes while addressing emerging challenges like sustainable food systems, climate change, and resilience to shocks.

Under the framework of the Post-Malabo Agenda development process, AKADEMIYA2063, as a technical partner to AUC-DARBE, was designated to facilitate the **Data and Analytics Workstream**. This entailed the mobilization of African centers of excellence and think tanks organized across 13 Technical Working Groups (TWGs) to lead the research, data, and analytical work to inform the thematic design of the successor to the existing CAADP Agenda. This process leveraged extensive stakeholder consultations, research, and analysis to guide the formulation of a new strategy for the next decade of CAADP implementation.

With the Kampala CAADP Declaration on "Building Resilient and Sustainable Agrifood Systems in Africa" and the associated CAADP Strategy and Action Plan (2026-2035) endorsed by the Extraordinary AU Summit in January 2025 and entering into force in January 2026, there is a real opportunity to leverage knowledge and evidence to enhance Africa's preparedness for its implementation.

The ***Kampala Technical Paper Series*** presents research developed by the 13 TWGs comprised of African academic institutions, think tanks, centers of excellence, and various CAADP constituencies deployed during the Post-Malabo Agenda development process. The series proposes comprehensive technical content designed to feed into the thematic core of the Kampala Agenda to ensure inclusive, sustainable, and resilient agrifood systems and livelihoods in Africa over the next decade.

With this series, AKADEMIYA2063 aims to make the research available to a wide range of stakeholders and development practitioners while providing insights into the critical priority areas for the continent's agrifood systems transformation. This move is motivated by the belief that the evidence-based recommendations for policy and programmatic interventions will help move the needle toward an agriculture-led, broad-based economic transformation across Africa.

Executive Summary

Meeting future food demand from Africa's rapidly growing, urbanizing population poses complex challenges amidst the need for more affordable, nutrient-dense, diversified food baskets. Rapid population growth, increasing incomes, and unprecedented urbanization and migration are driving the industrialization of food systems, challenging the environment, social justice, and human health. Ongoing armed conflicts lead to starvation, displace populations, and divert resources away from development and progress. With African food systems failing to produce enough affordable, nutritious, and safe food to nourish their populations and promote equity, food system transformation is imperative to ensure human health and environmental sustainability. Actions taken in the Post-Malabo Agenda will determine the continent's potential to ensure that by 2035, all people at all times have adequate and equitable access to affordable, diverse, nutritious, and safe foods that are produced and consumed sustainably. New and innovative, collaborative governance systems based on principles of inclusion and transparency are required to implement a comprehensive package of complementary food security and nutrition policies and programs that:

(i) Protect the right to food and access to water and sanitation for all.

(ii) Ensure food security and inclusive access to nutritious and safe foods.

(iii) Strengthen preparedness to prevent and address existing and emerging animal, aquatic, and plant diseases and pests, food safety hazards as well as natural and manmade shocks to the food system.

(iv) Shape the future development of sustainable food systems to ensure they are resilient, with the capacity to withstand and recover from conflicts and economic, climate, and environmental shocks.

(v) Enable active participation in the diverse livelihood opportunities offered by agriculture, fisheries, and processing for rural and urban populations.

(vi) Provide safety nets for those unable to provide for themselves, including vulnerable populations and those affected by crises.

(vii) Ensure inclusive, fair, safe, and healthy food systems.

(viii) Celebrate and enjoy the benefits of Africa's culture, heritage, and traditional food systems.

1-Scope and Rationale

Meeting future food demand from Africa's rapidly growing, urbanizing population poses complex challenges amidst the need for more affordable, nutrient-dense, diversified food baskets. Significant progress has been made through the Comprehensive Africa Agriculture Development Programme (CAADP) regarding food production and productivity gains over the past decades. However, increased agricultural investment has not fully realized the CAADP goal of food security or improved nutrition, except for reduced levels of child wasting (the most severe form of undernutrition) (Kamenya et al. 2023; Benin 2017). Multiple global crises, including pandemics such as COVID-19 and global supply chain disruptions, have already hampered progress on these targets. Meanwhile, Africa's preparedness to cope with multiple, connected future challenges remains stretched. Rapid population growth, increasing incomes, and unprecedented urbanization and migration are driving the industrialization of food systems, challenging the environment, social justice, and human health. Ongoing armed conflict in over 35 regions in Africa disrupts agricultural production, leads to starvation, displaces populations, and diverts resources away from development and progress (Geneva Academy 2024).

African food systems fail to produce enough affordable, nutritious, and safe food to nourish their populations and promote equity (IPCC 2019; IFPRI 2020). Stubbornly high rates of all forms of malnutrition highlight the urgent need to transform multiple systems, including food and health systems (AUC 2023; FAO 2020; FAO et al. 2023). Africa's agriculture sector is still largely dependent on a healthy human workforce for production and productivity – both at the household and the GDP levels (AUC 2014). It is estimated that US$30.4 billion is lost annually in Africa due to low labor productivity and high healthcare and educational costs attributed to child wasting and stunting (AUC 2021). Food has become less affordable, constraining access to adequate, diverse, and healthy diets. Crowded urban food environments also pose public health issues, including food safety. Meanwhile, increasingly globalized, industrialized, and consolidated food chains increase public health risks (Patterson et al. 2020).

Current food systems contribute to ill health and disease at every stage, from agricultural production through to consumption (Patterson et al. 2020). Food system transformation is imperative because our existing food systems struggle to meet their primary role of ensuring human health and environmental sustainability (von Braun et al. 2023; Lartey et al. 2018). Changing climates and the intensification of food systems threaten the environment, ecosystems, and health, including food safety and zoonoses (Hendriks et al. 2022). Therefore, future food security, nutrition plans, and food systems need to be more sustainable in the context of this climate uncertainty, characterized by extreme weather events and land and water constraints (Benton et al. 2022).

Meeting future demand for diverse, healthy, nutritious, and safe food will require the development of the processing sector, which may be constrained by energy, infrastructure, and water capacity, with potential consequences for the environment and human health. Weak national food control systems and a low level of compliance with international sanitary and phytosanitary (SPS) and food safety standards prevent trade and place a strain on human and animal health systems (Unnevehr 2022).

The evolving complexity of the interconnectedness of agriculture, food security, nutrition, food safety, and food systems poses significant challenges for policymakers and CAADP stakeholders. While the CAADP began as an agriculture sector program with food security as a goal, today, we understand more clearly that:

- Food is a basic human right, as are access to water and sanitation.
- Achieving food security requires six elements – food availability, accessibility, utilization/nutrition, stability/resilience, agency, and sustainability (HLPE 2020).
- Nutrition is fundamental to achieving food security. It is a component of food security (utilization) and an outcome when food security is achieved.
- Malnutrition includes undernutrition (stunting, underweight, and wasting), micronutrient deficiencies, and overweight and obesity.

- Food systems seek to deliver affordable, diverse, healthy, nutritious, and safe foods that are produced, prepared/processed, transported, packaged, sold, consumed, and disposed of sustainably (von Braun et al. 2023).
- Sustainable food systems contribute to food security, nutrition, and food safety.

This understanding provides the foundations for cross-sectoral coordination and governance of comprehensive packages of policies and programs that simultaneously achieve commitments across sectors in support of the CAADP agenda. Far greater collaboration is needed across the agriculture, environment, health, nutrition, education, finance, trade, and welfare sectors to resolve the complexity of achieving the goals of the Post-Malabo Agenda. This report sets out to discuss the key drivers of food security, nutrition, food safety, and food systems and identify priorities for action in the Post-Malabo Agenda.

2-Drivers of Change and Progress

Before discussing the key drivers behind the continent's lack of progress in terms of food security, nutrition, and food safety – and the key drivers of rapid food system development in Africa – it is important to take stock of the essential status indicators that have guided the Malabo period from 2014 to 2024.

2.1. Status assessment

The continent is not on track to meet the target of ending hunger and all forms of malnutrition by 2025 (AUC 2023). Between 713 million and 757 million people faced hunger in 2023 – one out of 11 people in the world and one out of every five in Africa (FAO et al. 2024). Hunger is still on the rise in Africa but has remained relatively unchanged in Asia, while notable progress has been made in the Latin American and Caribbean regions. It is projected that 582 million people will be chronically undernourished at the end of the decade, with more than half of them in Africa (FAO et al. 2024). This means the continent is off-track in meeting Sustainable Development Goal 2 (SDG2) of eliminating hunger and all forms of malnutrition by 2030. Further, the continent is off track in meeting the Malabo Targets of 2025, with less than a year remaining.

Few improvements have been seen since the first BRR. The continental scores from the 2023 BRR relevant to TWG3 for 2023 were as follows (AUC 2023):

- Access to agriculture inputs and technologies was 3.43 (out of 9.58)
- Increased agricultural productivity was 1.73 (out of 9.00)
- Reduction of post-harvest loss scored 2.37 (out of 9.00)
- Social protection scored 5.02 (out of 10.0)
- Food security and nutrition indicators scored 2.35 (out of 9.00)
- Improvements in sanitary and phytosanitary (SPS) measures scored 2.51 (out of 9.00)

The proportion of people experiencing chronic hunger in Africa remained stable between 2004 and 2023, but the number of affected people has increased (FAO et al. 2024). In 2023, only Kenya was classified as having an extremely critical food insecurity situation (with more than 30 percent of the population classified as Integrated Phase Classification (IPC) Phase 5) due to the multi-season drought (FSIN and GNAFC 2024). The Central African Republic, Chad, Democratic Republic of the Congo, Djibouti, Kenya, Mali, Mozambique, Niger, northern Nigeria, Somalia, South Sudan, and Uganda were classified as having a critical level of food insecurity (15–30 percent of children with acute malnutrition equivalent to IPC Phase 4) (FSIN and GNAFC 2024).

As seen from the trends in Table 1, over the last decade, stunting in Africa has decreased by four percentage points, from 34 percent in 2012 to 30 percent in 2022 (FAO et al. 2023). The social and economic impact of malnutrition raises morbidity and mortality rates, curtails educational attainment, and reduces physical and intellectual capacity in adulthood (Wells et al. 2021).

Table 1. Prevalence of undernourishment, moderate/severe food insecurity, and other forms of malnutrition for the World and Africa

Region	Prevalence of undernourish-ment%		Moderate/severe food insecurity %		Child wasting % <5yrs	Child stunting % <5yrs		Child overweight <5yrs		Adult obesity % ≥18 yrs		Anaemia in women % 15-49 yrs	
	2004-6	2020-23	2014-16	2020-23	2022	2012	2022	2012	2022	2012	2022	2012	2019
World	12.0	9.1	21.7	29.0	6.8	26.3	22.3	5.5	5.6	12.1	15.8	28.5	29.9
Africa	19.9	19.9	46.3	57.7	5.8	34.4	30.0	5.0	4.9	12.8	16.2	39.2	38.9
Northern Africa	7.7	7.5	28.6	33.4	6.3	23.5	21.7	11.8	12.3	25.9	31.	31.9	31.1
Sub-Saharan Africa	23.0	22.7	50.4	63.2	5.7	36.2	31.3	3.8	3.7	8.5	1.4	41.2	40.7
Eastern Africa	32.4	29.0	58.5	65.4	5.0	38.6	30.6	3.9	3.6	4.9	8.1	31.4	31.9
Middle Africa	33.0	28.9	n.a	7467	5.6	37.9	37.4	4.5	4.6	6.6	9.3	46.1	43.2
Southern Africa	4.8	9.4	21.5	24.1	3.5	23.4	22.8	12.3	11.4	27.3	29.7	28.5	30.3
Western Africa	12.2	15.0	39.7	60.7	6.7	34.5	30.0	2.3	2.4	8.1	11.6	52.9	51.8

Source: FAO et al. (2023).

Note: Red shading indicates deterioration in the trend, while green indicates some progress over time.

Countries in Africa south of the Sahara are at different stages of the nutrition and epidemiological transition, with some suffering primarily from undernutrition and others with a high prevalence of obesity and non-communicable diseases (NCDs). The prevalence of obesity among adults in Africa has increased from 12.8 percent to 16.2 percent alongside non-communicable disease incidence over the period 2012 and 2022 (FAO et al. 2023). The economic impact of overweight and obesity in the African Region in 2020 was estimated at US$21 per capita or 1.2 percent of global GDP. If current trends continue, this could increase to US$28 per capita or 1.4 percent of GDP in 2030 and to US$79 per capita in 2060 or 2.1 percent of GDP (Okunogbe et al. 2022). It is estimated that the proportion of adults who are overweight or obese in the African region will increase from 39 percent (or about 238.2 million people) in 2025 to 47 percent (or about 386.4 million people) in 2035 (World Obesity Federation 2024).

Underlying the malnutrition situation is the growing unaffordability of healthy diets (FAO et al. 2021). Over one million people in Africa cannot afford a healthy diet (FAO et al. 2023). The cost of a healthy diet is a key nutrition-sensitive indicator that reflects the food environment and affects people's ability to have access to healthy diets. In 2021, 24 million adults were estimated to be living with diabetes, representing a 4.5 percent prevalence, affecting more women than men of all ages (IDF 2022). The number of adults aged 20-79 years in Africa south of the Sahara with diabetes is projected to more than double from 14.7 million in 2011 to 33.4 million in 2030 (IDF 2021). Diabetes-related health expenditure per capita is expected to increase from US$763 to US$1,886. More than half of diabetes cases are undiagnosed, with potential complications of kidney failure, cardiovascular diseases, and amputations.

The prevalence of hypertension has increased in Africa south of the Sahara, reaching 48 percent (CI. 42–54 percent) in women and 34 percent (CI. 29–39 percent) in men in 2019 (Zhou et al. 2021). It is projected that by 2030, this figure will remain alarmingly high, potentially affecting millions (NCD Risk Factor Collaboration 2017). About 93 percent of hypertensive individuals are at high risk of complications, including strokes, myocardial infarction, heart failure, kidney disease, and blindness (Olowoyo et al. 2024).

Food safety hazards result in an estimated 137,000 deaths annually in Africa, the highest per capita globally (WHO 2019), and cost Africa US$24 billion a year (Jaffee et al. 2019). The per capita burden of food-borne disease (FBD) was conservatively estimated as 160 million episodes and 210,000 FBD-related deaths, or 20 million lost disability-adjusted life years (DALYs), in Africa in 2023 (including northern Africa) (Amare et al. 2023), extrapolating from the WHO and Foodborne Disease Burden Epidemiology Reference Group (FERG, undated) studies. Children under five account for 40 percent of the health burden. Africa south of the Sahara has the highest per capita burden of food-borne disease, but most of these incidences are preventable (Amare et al. 2023).

The productivity losses from FBDs alone in Africa south of the Sahara are estimated at US$16.5 billion, which is 17 percent of the total loss for low- and middle-income countries (Amare et al. 2023). FBDs commonly cause diarrhea and, more rarely, chronic, life-threatening disorders, cancer, and death. Gastrointestinal illness reduces the absorption of nutrients, with repeated episodes linked with malnutrition. Some hazards, such as aflatoxins, are directly associated with stunting. Foods contaminated with pathogens are linked with environmental enteric dysfunction (Kosek et al. 2017). Africa's staple grains are prone to contamination by mycotoxins, leading to recurrent fatal aflatoxin poisoning outbreaks and contributing to 40 percent of global liver cancer cases from aflatoxin exposure (Liu and Wu 2010; Sirma et al. 2018).

2.2. Mapping of key drivers of change

The key drivers of the trends set out in section 2.1, and those likely to drive or hinder progress on food security, nutrition, food safety, and SPS in the next decade, are discussed below.

2.2.1. *Political instability, conflict, and competing crises*

Geopolitical tensions and global health crises have profound implications for food security and food systems. They disrupt supply chains, create shortages and price volatility, affect labor availability, alter trade dynamics, and strain health and food systems (WHO 2021; UNCTAD 2022; IFPRI 2022). Political instability due to conflicts and political unrest at the national, regional, and global levels disrupts agricultural activities, displaces populations, and destabilizes markets (FSIN and GNAFC 2024).

The recent COVID-19 pandemic and global food supply challenges caused by conflicts have exposed the reliance of many African countries on food imports and led to higher levels of undernutrition (Wudil et al. 2022). Increased national import bills and indebtedness threaten food security (FAO 2024), and ongoing conflict puts increasing pressure on global food assistance (Emediegwu 2024). While hotspots of acute hunger characterized the African context in 2014 when the Malabo Declaration was signed, the severity, frequency, intensity, and reach of crises related to climate, conflict, and health have now significantly increased global levels of hunger and malnutrition (FSIN and GNAFC 2024).

Major global food crises have almost doubled since 2017 (FSIN and GNAFC 2024). The Democratic Republic of the Congo (DRC), Ethiopia, and Nigeria all have conflict-driven food crises, placing these countries among the 10 largest ongoing food crises globally. Côte d'Ivoire and Senegal recently reached the threshold for classification as major food crises (FSIN and GNAFC 2024). The influx of displaced persons from conflict zones intensifies the competition for scarce resources and humanitarian aid (FSIN and GNAFC 2024). In the case of Egypt, the influx of refugees is also from other regions beyond Africa.

The risk of a food crisis increases when countries are net importers of staple foods (FSIN and GNAFC 2024). Price volatility exposes net exporting and net importing countries to risks. Lower global food prices reduce export revenue, while higher borrowing and domestic currency devaluation raise costs for countries that import agricultural inputs, fuel, and food (FSIN and GNAFC 2024). Africa's debt burden will pose challenges to its food systems over the next decade. High debt levels constrain government investments in agriculture, reducing productivity and food security, while austerity measures cut essential public spending (World Bank 2022). Net food-importing countries have recently faced a double debt burden with a strong dollar causing currency depreciation, raising food and fuel prices, and eroding household purchasing power (FSIN and GNAFC 2024). Advocating for debt relief can free resources for critical investments in food systems (World Bank 2022).

2.2.2. *Population growth*

Africa is demographically the world's youngest continent. By 2050, the estimated number of young people entering the labor force will exceed that of the rest of the world combined (Fox 2019). Life expectancy in African countries has been increasing (currently ranging from 53.7 to 77.3 with an average of 63 years) (Statistica 2024a). Africa's total population as of 2023 is about 1.46 billion and is expected to reach 2.485 billion by 2050 (Statistica 2024b). Countries in Africa south of the Sahara are expected to continue growing through 2100 and to contribute more than half of the global population increase anticipated through 2050 (Statistica 2024b; Vollset et al. 2020). More than half of the projected increase in global population by 2050 will likely be concentrated in just eight countries: the DRC, Egypt, Ethiopia, India, Nigeria, Pakistan, the Philippines, and the United Republic of Tanzania (United Nations Department of Economic and Social Affairs, Population Division 2022).

Africa's young population could bring positive labor force expansion. However, rapid population growth will strain natural resources, exacerbating land degradation and water scarcity (IFPRI 2019). This will exert significant pressure on food systems, requiring innovative approaches to increase food production to meet increased consumption sustainably (Benson 2020). Population growth will drive higher demand for food products, providing opportunities for market expansion and economic growth (Daszkiewicz 2022). However, a growing population can enhance the agricultural labor force, which is essential for boosting productivity (Christiansen et al. 2021). A younger population could embrace and adopt innovative, modern agricultural practices, but rapid population growth also necessitates the intensification of agriculture (FAO et al. 2023) and the increased use of antibiotics, fertilizer, herbicides, pesticides, and water, resulting in health and environmental risks (UNEP 2022). Urbanization and competition for land for housing versus food production could put pressure on natural resources and lead to increasing tension over land rights and access.

2.2.3. Climate change

Food systems rely on agriculture, infrastructure, transport, and well-functioning markets, all highly susceptible to environmental change (Benton et al. 2022). Food supply disruptions due to climate-related impacts are becoming more common (Benton et al. 2022). Frequent and severe (mega) droughts, floods, fires, and heatwaves may lead to hunger and famine, with dire consequences for livelihoods and migration and a greater need for humanitarian food assistance (Benton et al. 2022). The poorest are most vulnerable to such disruptions.

Climate change poses both immediate and long-term threats to agricultural sustainability, leading to decreased food availability, increased prices, and reduced accessibility, which in turn results in food insecurity (Hendriks et al. 2022). For example, extreme heat can disrupt local production, but global extreme heat events can disrupt local food availability through trade impacts (Benton et al. 2022). Climate change directly affects health through heat stress and dehydration and could affect nutrition as food availability falls (IPCC 2022). Africa's fragile economies and weaker scientific and technological capacity to predict, adapt, or mitigate climate-induced events put the continent at higher risk (Wudil et al. 2022). Evidence shows that traditional knowledge and practices play a critical role in biodiversity conservation and sustainable resource management (Harrison et al. 2022). However, **c**ultural resistance to adopting new agricultural technologies and practices can hinder progress (Bosc 2018).

More frequent and severe (mega) droughts, floods, fires, and heatwaves may lead to famine with dire consequences for livelihoods, migration, and the need for humanitarian food assistance (Hendriks et al. 2022). Increasing temperatures, altered precipitation patterns, and extreme weather events are already impacting food production systems (IPCC 2022). Changes in the intensity and frequency of rainfall patterns, along with temperature increases, may shorten growing seasons and reduce yields, productivity, and nutrient content, affecting incomes, food security, nutrition, food safety, and the spread of vector-borne diseases (Hendriks et al. 2023).

Climate change has caused changes in dietary patterns in many parts of Africa (Holdsworth and Bricas 2016) and increased conflict related to land and water access and rights (Scheidel et al. 2020). Climate change will also affect fisheries production (Maulu et al. 2021), with rising sea levels threatening homes, infrastructure, and livelihoods along the coasts. Rising water temperatures affect ocean and freshwater production systems (Griffith and Grobler 2020). The expansion of agricultural production competes with freshwater sources, increases contamination and run-off from agricultural inputs, and may lead to conflict (Mendenhall et al. 2020). Existing and projected climate change impacts on African aquatic ecosystems are contextually specific, with severe social and economic consequences (Maulu et al. 2021).

Changes in climate over the coming decades will make production more volatile, influencing crop and livestock viability and requiring investment in more resilient production systems (Canales et al. 2019). There may need to be changes to what is produced and where it is produced (Benson et al. 2022). Climate change is also likely to change ecosystems. Indirect changes owing to climate change may occur through a shift in weed flora and a greater prevalence of animal and plant diseases, pests, parasites, and vectors (for example, locust plagues in East Africa and bluetongue disease in cattle) (Hendriks et al. 2022). While seasonal improvements due to more favorable weather conditions temporarily alleviate hunger, new and unseen drivers can change the situation (FSIN and GNAFC 2024). El Niño-driven drought conditions led Malawi, Zambia, and Zimbabwe to declare national disasters in February and March 2024 (FSIN and GNAFC 2024). Population growth and competition for

land brings wildlife closer to human settlements and may increase disease transmission, especially zoonotics (García-Moreno 2023). Disease outbreaks may lead to higher use of antimicrobial agents and antimicrobial resistance (Samreen et al. 2021). These changes demand that we revisit our approach to solving complex challenges. The One Health approach has emerged to consider the interlinkages between human, animal, plant, and ecosystem health to prevent, predict, detect, and respond to health threats (WHO n.d.).

Weather-related crises pose risks in terms of food safety. These risks include infrastructure damage due to storms, tornadoes, and floods that destroy water and wastewater infrastructure, contaminating the environment and drinking water. Flooding and crowded conditions in shelters spread disease (National Institute for Disease Control 2022). Higher temperatures could lead to faster rates of deterioration for food and raise the need for improved cold storage facilities and transport. Spoilage would increase food loss and waste and affect food safety. Many of the fuel sources used in Africa contribute to climate change, driving the need for innovation to provide solutions, which would include embracing the principles of sustainability in production and consumption (Mutezo and Mulopo 2021; Laar et al. 2022a).

2.2.4. Trade and sanitary and phytosanitary challenges

Trade can positively drive Africa's food systems by enhancing market access, boosting agricultural productivity, fostering regional integration, and improving food security and resilience (AfCFTA 2018). Africa's dependence on external markets and trade barriers negatively impacts local food systems, increasing vulnerability to global market fluctuations (van Berkum 2021). In 2021, Africa's food exports were valued at over US$60 billion, with significant contributions from fruits, vegetables, and fish (Galal 2024). This export focus deprives the continent of essential nutrients, creating artificial shortages and increasing the cost of healthy diets.

Africa's food systems face significant challenges from FBD, plant pests, and animal diseases, which profoundly impact food security, nutrition, public health, and overall socioeconomic development. Animal diseases, such as *peste des petits ruminants* (PPR), Foot and Mouth Disease (FMD), African swine fever (ASF), and Epizootic Ulcerative Syndrome (EUS) of fisheries, have a significant negative impact on livestock productivity and market access, costing the sector over US$30 billion annually (Grace et al. 2015). Transboundary aquatic animal diseases such as Epizootic Ulcerative Syndrome (EUS), Koi Herpes Virus diseases (KHV), and White Spot Syndrome Virus (WSSV) affect both wild and cultured aquatic animals throughout Africa, while the notorious ice-ice disease affects the production of red seaweeds and has a significant impact on the livelihoods of communities dependent on these aquatic resources. Harmful fishing and aquaculture practices contribute to the decline of fish stocks and the contamination and transformation of aquatic ecosystems (Bashir et al. 2020). It is important to strengthen veterinary services, disease surveillance systems, and early anticipatory actions to safeguard the health of livestock and the livelihoods that depend on them. Plant health is similarly jeopardized by pests and diseases, threatening food security and nutrition (García-Moreno 2023). Recent examples include the desert locust and fall armyworm plagues and the spread of the banana wilt disease. Integrated pest management strategies and the use of resilient crop varieties are essential to protect agricultural productivity (Richard et al. 2021). Various agricultural practices and processes contribute to ill health and disease. These include harmful agronomic and poor food hygiene practices during handling and the contamination of food and drinking water with agrochemicals and microbials (WHO 2022). Banned or dangerous pesticides still used in crop production are common in vegetable production, while antimicrobial residues are frequently found in livestock products (Kapeleka et al. 2020; Haggblade et al. 2023).

The African Continental Free Trade Area (AfCFTA), which aims to create a single continental market, has further enhanced food security by reducing trade barriers and promoting intra-African trade (AfCFTA 2018). Yet, trade rejections due to non-compliance with sanitary and phytosanitary (SPS) standards present a major barrier to Africa's participation in global markets and pose challenges to the implementation of the AfCFTA. Enhancing regulatory frameworks and building capacity for compliance with international standards are vital for improving market access and fostering economic growth. Trade is constrained by weak national food control systems and a low level of compliance with international animal and plant health and food safety standards. The private sector in Africa lacks sufficient incentives to engage in formal, regulated trade. Furthermore, government officials have limited capacity and capability to properly monitor and enforce sanitary and phytosanitary (SPS) standards.

2.2.5. Poverty

Africa's economic landscape is characterized by significant disparities, which can influence food systems in multifaceted ways (von Grebmer et al. 2023). Africa has the highest extreme poverty rate globally, estimated at 35.5 percent, making it 6.8 times higher than the average for the rest of the world (ISS Africa 2022). Economic instability, high unemployment rates, income inequality, and economic policies play a role in raising poverty levels (Outreach International 2023). Youth unemployment makes it difficult for young people to secure a stable livelihood. Economic disparity is growing rapidly in Africa, affecting individual families and spreading through entire communities, preventing progress and development. Income inequality and an extremely uneven distribution of wealth leaves many struggling to meet even their most basic household needs (ISS Africa 2022; Outreach International 2023).

The triple burden of malnutrition underscores the deep inefficiencies and disparities within these systems (Gómez et al. 2013). Problems of affordability imposed by economic inequalities and high poverty levels limit access to nutritious food, exacerbating malnutrition (FAO et al. 2021). Low-income people often do not have adequate physical and economic access to fruits, vegetables, animal-source foods, and sometimes even legumes (Thompson 2022). The most affordable foods are starchy staple foods and oils, meaning that low-income people are likely to depend on consuming a high-calorie and starch-heavy, nutritionally inadequate diet that perpetuates the intergenerational cycle of poverty and malnutrition (FAO et al. 2021). It is well known that social protection programs play a crucial role in supporting food security and nutrition (Alemu et al. 2017; Khan et al. 2023). Poverty limits food choices, and this can lead to obesity (Thompson 2022). The rise in the co-existence of undernourishment and obesity, even in rural African populations, demonstrates the impact that limited income has on dietary composition (McIntyre and Hendriks 2016; Hendriks et al. 2016). The design of social protection programs matters in determining the extent of empowerment achieved and nutritional outcomes.

2.2.6. Urbanization

Africa is urbanizing rapidly. Since 1990, the number of cities in Africa has doubled – from 3,300 to 7,600 – and their cumulative population has increased by 500 million (OECD et al. 2022). The 2018 United Nations projections indicated that Africa's cities would grow by an additional 900 million inhabitants before 2050, becoming home to two-thirds of Africa's population (OECD et al. 2022). Social and cultural factors deeply influence agricultural practices and food consumption patterns. Urbanization is reshaping spatial patterns of food demand and affecting consumer preferences, changing how, where, and what food is produced, supplied, and consumed (FAO et al. 2023). There has been a geographical decoupling of cities from sources of food supply, with urban and peri-urban land use being reoriented for more profitable uses, encroaching on peri-urban agricultural lands that have historically provided fresh and healthy food (FAO 2023). Often, regulations in cities and the market value of land limit opportunities for local production.

Rapid urbanization can contribute to unhealthy food environments, driven by the demand for ready-to-eat foods, convenience, the high cost of fuel, and a lack of cooking facilities and time. Where urbanization is accompanied by rising incomes, the consumption of more diverse foods, including animal-source foods, fish, legumes, fresh fruits and vegetables, and more processed foods, may increase. Access to improved infrastructure may also facilitate market access, allowing producers to sell their produce more efficiently and at higher prices in urban settings (World Bank 2020). Informal, traditional markets are a major source of the most nutritious fresh foods such as eggs, green leafy vegetables, and fish. Still, without proper storage, refrigeration, sanitation, and waste disposal, these markets can pose significant health hazards. Appropriate infrastructure can ensure more food reaches consumers and reduces waste (FAO 2019).

2.2.7. Gender and other social and cultural dynamics

Women in Africa are increasingly left behind to manage both food production and reproductive duties with limited resources, as male family members often leave to seek employment elsewhere (mining, industry, etc.). These situations entrench food insecurity and malnutrition. Industrialization is not happening fast enough in rural areas to absorb the fast-growing rural population, and this drives migration to urban areas where job prospects are not strong (Kappel 2021). Gender disparities limit women's access to resources, training, and decision-making roles, undermining agricultural productivity and equity (Puskur et al. 2023).

Gender and nutrition are not stand-alone issues. Food systems, health, nutrition, and gender are interlinked and can be mutually reinforced. Some experts consider women as the nexus of the agricultural, health, and nutritional sectors (Puskur et al. 2023). For many years, nutrition programs have been gender-insensitive (Sharma et al. 2021). Both nutrition-specific and nutrition-sensitive interventions focus on women and children, ignoring the role, responsibilities, and needs of men, adolescents, and the elderly in the promotion and management of nutrition at household and community levels and lacking the meaningful involvement of men (Mkandawire and Hendriks 2016). Understanding these dynamics is essential for designing effective interventions. Strong social cohesion can promote collective action and support sustainable agricultural practices (Huyer et al. 2021), and community-driven initiatives often lead to more resilient and adaptive food systems (Campbell et al. 2022). There is a need for intentional target-driven approaches to both recognizing the important role of women in Africa's food systems and developing gender transformative initiatives to ensure greater equality and sustainable growth throughout the sector. This requires supportive legislation to ensure women's access to factors of production, including land.

2.2.8. Unhealthy food environments

Africa is experiencing rapid migration to cities, as well as changing food environments and dietary habits (Holdsworth and Landais 2019). As populations urbanize and incomes rise, they demand foods that are more convenient to prepare. Processing helps reduce preparation and cooking time, especially for the many traditional foods that require extensive cooking times (Masters et al. 2023). This saves energy for cooking, storage, and refrigeration and frees up more time for women. In some cases, processing can make nutrients more bioavailable but may also strip foods of nutritional content, such as the dehulling of cereals. The demand for processed, ready-to-eat, packaged foods may lead to increased exposure to ultra-processed foods that are high in sugar, salt, and unhealthy fats and which contribute to diet-related non-communicable diseases such as diabetes, heart disease, and obesity (Laar et al. 2023a).

Poor urban planning limits opportunities for physical activity, and high-stress environments lead to emotional eating and reliance on comfort foods. Additionally, low incomes and a lack of time and facilities for food preparation may lead to a reliance on cheap, non-nutritious options, exacerbated by a lack of nutrition education and awareness (Masters et al. 2023). Unhealthy food environments are characterized by a high density of fast-food outlets, limited access to fresh produce, aggressive marketing of sugary and processed foods, and misleading food labels. Such environments have contributed to a rise in diet-related non-communicable diseases (NCDs) such as obesity, diabetes, and cardiovascular diseases (Reardon et al. 2021; Branca et al. 2019; Popkin et al. 2020; Laar et al. 2022a; Laar et al. 2022b). If left unchecked, the rapid transition of African food systems could erode the health benefits of traditional foods, increase public health issues, and strain healthcare systems.

Marketing and trade objectives are often at odds with nutrition and health policies, undermining the consumption of affordable and sustainable healthy diets (WHO 2021; Hawkes 2015). Socio-economic and cultural factors also play a significant role in the emergence of such environments, with urban, low-income areas often being food deserts where affordable, nutritious options are scarce, and cultural norms may emphasize unhealthy eating habits. Schools and workplaces often contribute by providing unhealthy meals and snacks, while weak food policies fail to enforce nutritional standards or regulate subsidies that favor unhealthy foods. Commercial interests can lead to the promotion of unhealthy food products, thereby increasing the prevalence of diet-related non-communicable diseases (Stuckler and Nestle 2012; Hawkes 2015). Addressing these issues requires comprehensive policy changes, community interventions, education, and improved access to healthy food (Swinburn et al. 2011; Story et al. 2008).

3-Future Outlook

This section presents the most important trends in this thematic area and the challenges that may slow down progress.

3.1. Important trends and challenges for the next 10 years

The availability of foods alone will not be sufficient to ensure adequate nutrition without addressing other drivers. Focused attention is needed on designing and implementing comprehensive and integrated plans to simultaneously address the various elements of this complexity. The solutions to food security, nutrition, and food safety are well known, and multiple declarations and commitments (including those at country level) set out the priorities for Africa in these areas. Since the launch of the Malabo Declaration, there has been growing attention to food systems, with 41 African countries having launched national pathway plans after the UN Food Systems Summit. If left unchecked, food system changes could erode progress on multiple fronts, such as environment, health, livelihoods, and poverty. Focused attention is needed on designing and implementing comprehensive and integrated plans to simultaneously address this complexity's elements.

However, little attention has been paid to the integration of these multiple priorities, as well as their financing and coordination mechanisms across government. Mechanisms for collaboration among food system actors are lacking but necessary. Helping public and private stakeholders understand the relationships between food security, nutrition, and food safety within food systems will be essential to the development of comprehensive plans of action to safeguard the (albeit modest and below expectation) gains of CAADP and ensure a more sustainable future. The tradeoffs of any actions would need to consider the implications for consumer affordability, the environment, household incomes, and health.

3.2. Leveraging opportunities to accelerate progress

Multiple opportunities exist in planning comprehensive approaches for solving the challenges related to food security and nutrition in the next decade. Increasing the amount of sustainably produced food provides opportunities for Africa's rural population while advancing the development of the food processing sector, which offers enormous potential for agricultural growth multiplier effects across the food system. If carefully planned and implemented at scale, food system development could transform economies, diets, and livelihoods. Recognizing and valuing cultural food systems and heritage in Africa would contribute to healthy and sustainable food systems.

The Post-Malabo Agenda offers an opportunity to coherently align with and accelerate key multilateral agendas and commitments related to achieving Sustainable Development Goal 2 (SDG2) and, in so doing, contributing to the other 16 SDGs. Thematic Working Group (TWG) 3 also contributed to achieving the African Union's Agenda 2063 and nutrition commitments such as the World Health Assembly nutrition and NCD targets (WHO 2014), WHO's acceleration plan to Stop Obesity (WHO 2023), and the Paris Climate Agreement (UN 2015), as well as regional initiatives emanating from the Africa Centers for Disease Control and Prevention, AUDA-NEPAD, Regional Economic Communities, and others. TWG3 is also an opportunity to integrate the Malabo theme of 'ending hunger' and the food systems pathways developed by 41 African countries as part of the 2021 UN Food Systems Summit.

Developing local and regional food production and processing capacity would offer opportunities for extending the shelf-life of perishable, nutritious foods and would decrease food loss and waste and increase the supply of nutritious foods year-round (Baumüller et al. 2021). These foods could be highly nutritious but may be too expensive for poorer households. Incentives and subsidies to include these foods in school feeding programs and public facilities could help build market demand and make them accessible to those who need nutritional support. Consumer subsidies and incentives for financing processing facilities could support the development of these businesses, promote the availability of the foods, and reduce prices. As many of the most nutritious foods are highly perishable, infrastructure development programs are necessary for perishable products.

Africa's development partners, the private sector, and governments need to promote efforts to maximize regional food trade by reducing disincentives and inefficiencies in global markets, such as dumping, subsidies, and tariff structures that disadvantage or discourage domestic production in African countries. The AfCFTA, which aims to create a single continental market, reducing trade barriers and fostering intra-African trade, can stimulate regional agricultural value chains, improve food distribution networks, and support the adoption of innovative agricultural technologies. This integration could lead to more resilient and sustainable food systems, reducing dependency on external food imports (World Bank 2022). Policies and governance must shape markets to correct market failures and serve the interests of citizens.

Creating an enabling environment through effective food-based policies is critical for fostering sustainable food systems (Laar 2021; Laar et al. 2022b; Laar et al. 2023a). Investment in basic infrastructure services and logistics makes it easier to link producers of nutritious foods to markets, reducing food costs (IFPRI 2024). Creating an enabling environment will require a bundling of interventions, notably investments and programmatic and policy interventions. This calls for a mix of low-agency and high-agency interventions and a mix of demand-side as well as supply-side interventions – including food policy measures – that seek to inform and empower, guide and influence, incentivize the production of healthier foods, and discourage or restrict exposure of the consumer to unhealthy foods (Laar 2021). African food system actors, especially policymakers, need to recognize and appreciate the value of this mix of interventions. "Intervention agency" refers to the resources (e.g., personal, psychological, cognitive, financial, material) on which individuals draw to engage successfully with an intervention (Adams et al. 2016). Those interventions that require individuals to invest fewer personal and psychological resources are described as low-agency (e.g., fortification of food with micronutrients, marketing restrictions, fiscal policies (taxes or subsidies), and product reformulations). High-agency interventions such as educational interventions, mass media campaigns, and nutrition labeling (especially back-of-pack labeling) require substantial agency in terms of accessing, understanding, and applying the information provided (Laar 2021; Laar et al. 2023).

The peculiar heterogeneity of African food environments and their diverse political economies need to be considered when such policies are developed (Laar 2021; Laar et al. 2023b). Policies must be designed to ensure they do not disproportionately impact low-income populations, who may have limited choices and access to healthier food options (UN Children's Fund and UN Special Rapporteur on the Right to Food 2019).

There are opportunities for innovation to address the associated risks and challenges. This includes innovation in energy provision, digitization, automation, mechanization, packaging, etc. Mechanization offers many benefits for women, both in terms of playing a more active role in the food system and in terms of time-saving opportunities (Masset et al. 2023). Innovative incentives for this type of innovation could include reform of trade regimes to make them more fair and inclusive. This would benefit domestic growth and ensure the prioritization of women and youth, advancing the goals of the AfCFTA. Value chain development across the food system is essential and needs a package of interventions and investments by the public and private sectors, as well as complementary investments in infrastructure (Reardon et al. 2019). Policy priorities that focus on strengthening and harnessing local food markets could encourage innovation in the production and processing of climate-resilient and indigenous food products with research and development finance to back them. Private entities play a role in on-farm investments that raise productivity and incomes. The private sector is a key stakeholder and actor in the ongoing mid-level agrifood system transformations, including large numbers of SMEs and some large agribusinesses (Reardon et al. 2019; Reardon and Vos 2023).

Africa is home to a wealth of food resources, which have sustained the growth and expansion of healthy populations throughout the continent. Indigenous and wild plant and animal foods have played a critical role in the diet of African communities over millennia. A decreasing trend in the use of indigenous and traditional foods has been driven by a focus on a limited diversity of priority commodity crops and livestock resources.

More systematic approaches to problem-solving, such as the One Health approach, are needed to integrate knowledge across sectors and develop workable and sustainable solutions while minimizing the potential negative tradeoffs and unintended consequences of more narrowly conceptualized solutions. Advances in biotechnology, digital tools, and mechanization have the potential to revolutionize food systems. Research and technological innovation are a cornerstone for transforming food systems. Technologies for production, post-harvest handling, information sharing, and artificial intelligence (AI) are key drivers of change that

could support improvements in food security, nutrition, health, and food safety. Technologies such as AI can boost Africa's food security: for example, precision agriculture can lead to increased productivity and resource efficiency, enhanced logistics, reduced post-harvest losses, improved market access, and farmers being connected directly with consumers, supporting the availability and affordability of safe and high-quality food.

Putting digital resources in the hands of farmers, fishers, and processors enables access to information across the system and supports effective decision-making, identification of opportunities, and transparency (Hendriks et al. 2023). Likewise, digital resources for consumers can empower decision-making for healthy diets and age-appropriate nutritional support. Such developments could lower the cost of food and drive domestic market demand, lowering demand for imported products. Increasing the potential for processing higher-value, nutrient-dense perishable food items (including dairy, fish, and horticultural products) offers higher income opportunities for producers (FAO 2019). However, the accompanying production risks for these products are high, and processing will require energy. The same digital divide can exacerbate inequalities between large-scale and smallholder farmers, limiting the benefits of technological advancements (IFAD 2021). Inconsistent policies, lack of supportive regulations, and bureaucratic hurdles have also impeded the uptake and scaling of innovations and practices that could support food security, nutrition, and health. Governments therefore need to simplify regulatory processes and reduce bureaucratic red tape.

Building early warning systems linked to remedial action and resilience in food systems to withstand shocks from pandemics, economic crises, environmental changes, shocks, and conflicts will involve enhancing surveillance, food storage capacity, processing capabilities, and distribution networks. Digitization could play a significant role in food security across a range of anticipatory, monitoring, and response applications, including early warning systems, food security, and malnutrition monitoring systems and mechanisms to respond to chronic and acute food insecurity. AI tools support early warning systems and proactive measures to mitigate the risks of weather disasters, diseases, and pests, and this can improve agricultural yields. Similarly, digitization can be used to provide context-specific social protection mechanisms targeting those most at risk of food insecurity and those already suffering from acute food insecurity due to crises and emergencies.

3.3. Core priorities to shape the CAADP Post-Malabo Agenda (2026-2035)

A priority for the next 10 years is for Africa to feed its growing population in a context-specific, stable, resilient, and sustainable manner that ensures nutritional needs are met through all stages of the lifecycle. This will require comprehensive packages of programs that seek to simultaneously achieve the six foundational elements of food security. These elements consider nutrition a necessary condition for, an element of, and an outcome of food security. Nutrition is essential for productive, healthy lives at all life stages and disease prevention.

Food security systems need to be examined to ensure they can withstand environmental changes, economic pressures, and social challenges, contributing to the overall stability and health of communities. The stability and resilience of food systems will need to be protected through active early warning systems and sound food and financial reserves for times of emergency and to mitigate against international food system risks.

Research should be a core priority for the CAADP Post-Malabo Agenda, focusing on understanding the key determinants of food production, acquisition, consumption, and food security (drivers), as well as developing programs and policies to improve food environments (solutions) (Laar et al. 2022a). Research and investment in resilient agriculture and the storage and processing of foods (including animal-source foods, fish, and other foods) are needed across Africa's diverse agroecological zones. These research priorities are crucial for guiding evidence-based policymaking and programmatic interventions.

Food production and processing will need to be diversified, intensified, and scaled up to meet the growing demand for food. There is an urgent need to build and strengthen national capacities to implement a food systems transformation agenda. Regulation and trade reform are needed to boost domestic supplies and provide fair opportunities to ensure sustainable, diversified livelihoods. Reform of public policies such as procurement policies for school feeding programs, state facilities, and workplace provisions can incentivize sustainability priorities, supporting local producers, processors, and suppliers and reduce costs. There is a need for environmentally and socially sustainable production and processing of affordable animal-source foods (such as solar and air drying of produce and fermentation techniques, including for fish) that are accessible and

targeted to people experiencing poverty. It is also important to develop market infrastructure to allow the movement of products and to establish cold chains and other means of preservation.

Sustainable food systems aim to meet current and future food needs without compromising the ability of future generations to meet their own needs. This involves adopting practices that protect natural resources, reduce greenhouse gas emissions, promote biodiversity, and support the livelihoods of all stakeholders. The internalization of externalities across the food system is essential to reduce environmental and soil degradation, water pollution, and food loss and waste while protecting living wages and preventing worker exposure to risks and exploitation (von Braun and Hendriks 2023). The internalization of externalities by all stakeholders can include many measures, including improved production practices, clean energy use, reducing loss and waste, and reforming procurement systems, subsidies, and transfer programs to reduce environmental damage and improve health and social welfare. Transparent monitoring of food system change is essential for equity and accountability (Fanzo et al. 2022). Research, development, and investment in the production, processing, and distribution of innovative African food for the future, derived from and inspired by the rich diversity of traditional foods, should be a priority for stimulating economic growth and livelihoods and preserving Africa's rich cultural heritage.

Access to affordable, nutritious food for all population groups requires the availability of diverse foods within communities, as well as the income to purchase foods or, where appropriate, social protection to enable such access for vulnerable and in-crisis populations. Well-established public health nutrition interventions such as exclusive breastfeeding, fortification, and supplementation are important foundations for promoting nutrition, particularly among children, and should be part of a comprehensive package. Early development centers and school feeding programs ensure children receive at least one nutritious meal a day. These programs can help establish healthy eating patterns, including diverse foods such as fish and other aquatic products, eggs, and dairy. Under-resourced school meal programs and poor infrastructure would need support to maximize this opportunity (Liguori et al. 2023).

Poverty is a primary factor limiting access to the healthy diets everyone needs for growth and development, health, and well-being. There is a need to invest and scale up nutrition-sensitive social protection programs targeting the poor and vulnerable. Governments should enact food environment policies to protect and promote access to healthy diets. These policies should cover local production and processing incentives, mandatory food labeling, taxing unhealthy foods, and restrictions on the marketing of unhealthy foods, especially to children. Efforts must also be made to educate consumers on nutrition and health and equip them with the ability to make healthier food choices at the household level, in institutions, workplaces, and on the streets. Implementing programs for behavior change communication and empowering consumers with information on food choices will be imperative.

Africa's food production policies must focus on quality and not just quantity, with increased attention to and investment in nutritious foods that are accessible, affordable, safe, culturally acceptable, and equitable. There is a need to realign agricultural policies and investments towards locally produced and processed nutritious foods, including fortified and biofortified foods while safeguarding the ecosystem. Comprehensive food safety programs and enhanced public awareness are needed to reduce the incidence of foodborne illnesses. It is also important to strengthen regulatory frameworks and capacity across sectors for compliance with international SPS measures, facilitating smoother access to global markets and boosting economic growth.

Food-sensitive town planning can play an influential role in shaping food environments, carefully considering transport routes, women's movement patterns, and access to healthy food provisions (Cabannes and Marocchino 2018; Minten et al. 2017). Governments should commit to routine assessment of diet quality, access to healthy diets, and food and water insecurity to understand nutritional gaps and weaknesses in the food system. The public and private sectors should cooperate in implementing public and voluntary standards and measures that support healthier food environments, for example, by reducing availability of foods known to increase the risk of NCDs, such as ultra-processed foods high in free sugar, salt, fat and saturated fat, and processed meat, all of which pose independent risks to health at the same time as displacing health-protective foods (fruits, vegetables, legumes, nuts, seeds) that are all too often unaffordable (FAO et al. 2023). There are many mechanisms to do this, including regulations to control advertising, taxes, and standards, repurposing consumer subsidies, and making interventions more nutrition-sensitive. The active participation of relevant sectors such as health, nutrition, education, social protection, women's empowerment, and the environment in food system transformation should be written into key performance metrics across sectors and stakeholders (including the private sector).

Equitable access to information across food systems supports the agency and empowerment of various actors, enabling accountability and engagement in decision-making about what is produced, by who, for who, and under what production and processing systems. Investment in appropriate tools and indicators to analyze and monitor progress towards healthy diets and improved health and nutrition outcomes is essential to track progress and hold all stakeholders across the food system accountable (Fanzo et al. 2021). When individuals and communities have agency, they can advocate for and implement sustainable practices, address inequalities, and enhance their food sovereignty, leading to more resilient and accountable food systems. Policy and program design should ensure that policies and programs are inclusive, offer equal opportunities for women and youth, and leverage the potential of these groups to drive food system transformation.

Making digital tools for decision-making available to all food system stakeholders (from farmers and fishers to consumers) could be a game-changer in accessing information, knowledge, best practices, price and market data, and opportunities for aggregation, transportation, traceability, and market opportunities. Such technology could strengthen veterinary services and surveillance systems to quickly detect and control outbreaks, ensuring livestock health and protecting farmers' livelihoods. It could promote integrated pest management strategies and resilient crop varieties to safeguard agricultural productivity and food security. Biotechnology and other tools could lower food costs and preserve food quality.

Innovative, collaborative governance systems based on principles of inclusion and transparency will be necessary to grapple with the complex interconnectedness and potential tradeoffs of policy decisions related to food security, nutrition, and food systems (Battersby 2029). Effective governance will depend on data availability and tools for evidence-based decision-making, accountability, and progress monitoring. It will be essential to strengthen SPS regulatory systems to establish and monitor compliance with conformity to international SPS requirements, register local and imported food products, restrict the advertising of children's foods and beverages, and undertake post-market surveillance with respect to food safety, nutrition, and public health concerns.

3.4. Key goals and ambitions for African countries

Actions taken by African governments post-Malabo will determine the potential of the continent to achieve food security and improve nutrition and resilience among a rapidly growing population. These actions should ensure that all people in Africa have adequate and equitable access to affordable, diverse, nutritious, and safe foods that are produced in sustainable ways. A comprehensive package of policies and programs – designed, implemented, coordinated, governed, and monitored in inclusive ways – should seek to achieve the following ambition: by 2035, innovative, collaborative governance systems based on principles of inclusion and transparency will oversee the implementation of a comprehensive package of complementary food security and nutrition policies and programs. These policies and programs must:

(i) Protect the right to food and access to water and sanitation for all;

(ii) Ensure food security and inclusive access to nutritious and safe foods;

(iii) Strengthen preparedness to prevent and address existing and emerging animal, aquatic, and plant diseases and pests, food safety hazards, as well as natural and manmade shocks to the food system;

(iv) Shape the future development of sustainable food systems to ensure they are resilient in terms of capacity to withstand and recover from conflict and economic, climate, and environmental shocks;

(v) Enable active participation in the diverse livelihood opportunities that agriculture, fisheries, and processing offer for rural and urban populations alike;

(vi) Provide safety nets for those not able to provide for themselves, including vulnerable populations and those affected by crises;

(vii) Ensure inclusive, fair, safe, and healthy food systems and;

(viii) Celebrate and enjoy the benefits of Africa's cultural heritage and traditional food systems.

4-Conclusion

In the decade since the Malabo Declaration was envisioned, Africa has made progress in several key areas, including agricultural productivity and trade. However, this progress has not translated into improved access to healthy diets and nutritional outcomes, leaving the continent grappling with a triple burden of all forms of malnutrition and NCDs. A confluence of interconnected factors will drive and shape Africa's future food security, nutrition, and food systems. The implementation of the comprehensive Post-Malabo Agenda will require careful navigation through a range of underlying drivers and multifaceted challenges. Across the continent, changing geopolitical complexities, persistent debt, uneven trade dynamics, weak infrastructure, and an increasingly erratic climate present fundamental, evolving, but not insurmountable obstacles. Africa's rapid demographic transition and urbanization pose risks for food security if unmanaged. However, with appropriate social support and infrastructure development, this demographic dividend has the potential to propel the ambitious agenda forward to deliver sustainable food systems, healthy diets, and prosperous populations.

Africa's policies must be adaptive and resilient, addressing both opportunities and challenges. By leveraging positive drivers and mitigating negative impacts, Africa can achieve sustainable agricultural growth and food and nutrition security in alignment with the Post-Malabo goals and the Agenda 2063. Increasing the amount of sustainably produced food provides opportunities for Africa's rural population while advancing the development of the food processing sector, which provides enormous potential for agricultural growth multiplier effects across the food system. Pursuing food systems that promote safe, sustainable, sovereign, and healthy diets will mean confronting harmful agricultural practices, tackling food safety and hygiene issues, and limiting the power of corporate influence. Addressing these challenges will open up major opportunities for the continent.

Comprehensive packages of programs are needed to feed Africa's growing population in a context-specific, resilient, and sustainable manner that ensures that nutritional needs are met through all stages of the lifecycle. Innovative, collaborative governance systems based on principles of inclusion and transparency will be necessary to grapple with the complex interconnectedness and potential tradeoffs of policy and program design decisions aimed at achieving food security, nutrition, and food safety for all by 2035. More systematic approaches to problem-solving, such as the One Health approach, are needed to integrate knowledge across sectors and develop workable and sustainable solutions while minimizing the potential negative tradeoffs and unintended consequences of more narrowly conceptualized solutions. The collaboration, coordination, and active participation of relevant sectors such as agriculture and fisheries, education, environment, health, nutrition, social protection, trade, and women's empowerment will be essential for success at all levels of government and regions. Ensuring that policies and programs are inclusive and offer equal opportunities to women and youth will leverage their potential to drive food system transformation.

The key priorities for such packages include elements focusing on the six foundational elements of food security:

- *Availability:* Food production and processing (across crops, livestock, and fisheries) will need to be diversified, intensified, and scaled up to meet the growing demand for food. This will require research, development, and investment in the production, processing, and distribution of innovative African food for the future, derived from and inspired by the rich diversity of traditional and wild foods. Technological advancements offer potential solutions but require careful integration and balancing of risks versus benefits. The approaches to achieving this need to be climate-smart, resilient, and sustainable. Biotechnology and digital technology, including everything from precision agriculture to digital marketplaces, can improve food systems. Innovative financing models and systems to boost collateral for financing are urgently needed, especially in the fisheries, livestock, and horticultural sectors.

- *Access:* It is important to address the underlying poverty that drives malnutrition, as doing so will improve access to affordable, nutritious food for all population groups. Investing and scaling up nutrition-sensitive social protection programs targeting the poor and vulnerable can support the purchase of healthy foods among vulnerable and in-crisis populations. Investment in infrastructure – transport, roads, storage systems, and logistics – will make it easier to link producers of nutritious foods to markets.

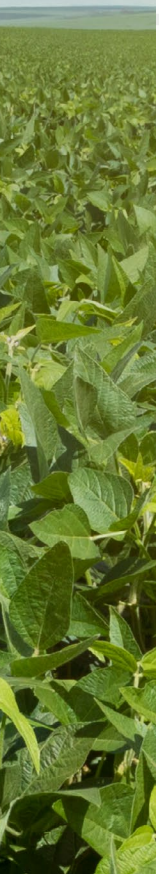
- *Utilization/nutrition:* Africa's food production policies must focus on quality and not just quantity, with increased attention to and investment in healthy diets that are accessible, affordable, safe, culturally acceptable, and equitable. Creative and appropriate town planning can shape nutritionally sensitive environments that take women's needs into consideration.

- *Stability/resilience:* It is crucial to build resilience in national food systems so that they can withstand shocks such as pandemics, conflicts, and economic and environmental shocks. Doing so involves enhancing surveillance, food storage, processing capabilities, and distribution networks. Strengthening early warning systems and ensuring robust food and financial reserves will be essential to tackle emergencies and mitigate international food supply risks. Funding is needed for research and investment in resilient agriculture, storage, and processing across diverse agroecological zones.

- *Agency:* Equitable access to information can support agency and empowerment and enable accountability and engagement in decision-making. Effective governance will depend on data availability and tools for evidence-based decision-making, accountability, and monitoring of progress (Fanzo et al. 2022). It is essential to make digital tools for decision-making available to all food system stakeholders (from farmers and fishers to consumers, including the private sector) to support agency in food system change. Policies should produce healthier food environments by reducing the availability of some foods, such as ultra-processed foods while promoting health-protective foods. Investment is needed in appropriate tools and indicators to analyze and monitor progress toward healthy diets and improved health and nutrition outcomes.

- *Sustainability:* Building and strengthening national capacities to implement food system transformation will require realignment of agricultural and fisheries policies and investments in nutritious foods produced, processed, distributed, consumed, and disposed of in ways that safeguard the ecosystem. Food system sustainability should be ensured through the internalization of externalities across the food system to reduce environmental impacts (including soil degradation and water pollution) and food loss and waste. Internalization of these costs can also protect living wages and prevent worker exposure to risks (including health) and exploitation. Regulation and trade reform are needed to boost domestic supplies and provide fair opportunities to ensure sustainable, diversified livelihoods.

The key indicators to track progress will include the current set of indicators for the BRR, supplemented by indicators that cover the scope of food security, nutrition, food safety, SPS, and food systems more comprehensively. Including an indicator to track direct and indirect (nutrition-sensitive) investment alongside direct investment in agriculture in TWG2 will provide a more direct measure of the impact of these investments.



References

Adams, J., O. Mytton, M. White, and P. Monsivais. 2016. "Why Are Some Population Interventions for Diet and Obesity More Equitable and Effective Than Others? The Role of Individual Agency." *PLoS Med*, 13(4): e1001990. https://doi.org/10.1371/journal.pmed.1001990

Alemu, G., M. Kassie, and A. S. Taffesse. 2017. "The impact of Ethiopia's productive safety net programme and its linkages." *Journal of Development Effectiveness*, 9(2), 267–289. https://doi.org/10.1080/00220380902935907

Amare, A., F. O. Kareem, and D. Grace. 2023. "A paradigm shift in food safety for Africa." In *African Food Systems Transformation and the Post-Malabo Agenda*, edited by J.M. Ulimwengu, E. M. Kwofie, and J. Collins, 106-120. Kigali: AKADEMIYA2063; Washington DC: IFPRI.

AUC (African Union Commission). 2014. *Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods*. Addis Ababa. https://www.resakss.org/node/6454?region=aw/retreive

—. 2018. *Agreement Establishing the African Continental Free Trade Area*. Addis Ababa. https://au.int/sites/default/files/treaties/36437-treaty-consolidated_text_on_cfta_-_en.pdf

AUC (African Union Commission) and AUDA-NEPAD (African Union Development Agency-New Partnership for Africa's Development). 2024. *Fourth CAADP Biennial Review Report 2015-2023*. Addis Ababa. https://au.int/sites/default/files/documents/43556-doc-EN_4th_CAADP_Biennial_Review_Report-COMPLETE.pdf

Badiane, O., S. L. Hendriks, K. Glatzel, et al. 2023. "Policy options for food system transformation in Africa and the role of science, technology, and innovation." In *Science and Innovations for Food Systems Transformation*, edited by J. von Braun, K. Afsana, L. O. Fresco, and M. H. A. Hassan, 713-736. Cham: Springer.

Bashir, I., F. A. Lone, R. A. Bhat, S. A. Mir, Z. A. Dar, and S. A. Dar 2020. "Concerns and Threats of Contamination on Aquatic Ecosystems." In *Bioremediation and Biotechnology*, edited by K. Hakeem, R. Bhat, and H. Qadri. Cham: Springer.

Battersby, J., and V. Watson (Eds). 2019. *Urban Food Systems Governance and Poverty in African Cities*. London: Routledge.

Baumüller, K., A. Admassie, S. Hendriks, G. Tadesse, and J. von Braun (Eds.). 2021. *From Potentials to Reality: Transforming Africa's Food Production - Investment and Policy Priorities for Sufficient, Nutritious and Sustainable Food Supplies*. Berlin: Peter Lang.

Benin, S. 2015. *Returns to Agricultural Public Spending in Africa South of the Sahara*. Washington, DC: IFPRI.

Benson, S. 2020. *Growing better: Ten critical transitions for transform food and land use*. London: The Food and Land Use Coalition. https://policycommons.net/artifacts/11317094/growing-better/12202777/

Benton, T. G., G. Castro de la Mata, J. Fanzo, R. Guinto, S. L. Hendriks, H. Montgomery, and S. Myers. 2022. "Food security and health in a changing environment: Recognizing and mitigating risks." Doha: World Innovation Summit for Health.

Bosc, P. M. 2018. "Empowering Through Collective Action." IFAD Research Series 29. https://ssrn.com/abstract=3285068

Branca, F., A. Lartey, S. Oenema, and S. Aguayo, et al. 2019. "Transforming the food system to fight non-communicable diseases." *BMJ*, 364, l296. https://doi.org/10.1136/bmj.l296

Cabannes, Y., and C. Marocchino. 2018. *Integrating Food into Urban Planning*. Rome: Food and Agriculture Organizations of the United Nations (FAO).

Campbell, C. G., A. Papanek, A. DeLong, J. Diaz, C. Gusto, and D. Tropp 2022. "Community food systems resilience: Values, benefits, and indicators." *Journal of Agriculture, Food Systems, and Community Development*, 11(4), 89–113. https://doi.org/10.5304/jafscd.2022.114.006

Canales Holzeis, C., V. ter Meulen, J. von Braun, et al. 2019. "Food systems for delivering nutritious and sustainable diets: perspectives from the global network of science academies." *Global Food Security*, 21, 72-76. https://doi.org/10.1016/j.gfs.2019.05.002

CDC (Centers for Disease Control and Prevention). 2022. "Health risks associated with flood disasters." *Communicable Diseases Communique*, 21: 17-18.

Christiaensen, L., Z. Rutledge, and J. E. Taylor 2021. "Viewpoint: The future of work in agri-food." *Food Policy*, 99, 101963. https://doi.org/10.1016/j.foodpol.2020.101963

Daszkiewicz, T. 2022. "Food Production in the Context of Global Developmental Challenges." *Agriculture*, 12(6): 832. https://doi.org/10.3390/agriculture12060832

Emediegwu, L. 2024. *Update: how is the war in Ukraine affecting global food prices?* Economics Observatory. https://www.economicsobservatory.com/update-how-is-the-war-ukraine-affecting-global-food-prices

Fanzo, J., L. Haddad, K. R. Schneider, et al. 2021. "Viewpoint: Rigorous Monitoring is Necessary to Guide Food System Transformation in the Countdown to the 2030 Global Goals." *Food Policy*, 104,102163. https://doi.org/10.1016/j.foodpol.2021.102163

FAO (Food and Agriculture Organization of the United Nations). 2024. *Global and Regional Food Security Outlook.* FAO Regional Conference for Africa. Rome. https://openknowledge.fao.org/server/api/core/bitstreams/495345dc-7764-4065-8791-0975ca0a2049/content

—. 2019. *The State of Food and Agriculture 2019. Moving Forward on Food Loss and Waste Reduction*. Rome.

FAO (Food and Agriculture Organization of the United Nations), IFAD (International Fund for Agricultural Development), UNICEF (United Nations Children's Fund), WFP (World Food Programme), and WHO (World Health Organization). 2021. *The State of Food Security and Nutrition in the World: Transforming Food Systems for Affordable Healthy Diets*. Rome.

—. 2023. *The State of Food Security and Nutrition in the World 2023: Urbanization, Agrifood Systems Transformation and Healthy Diets Across the Rural-Urban Continuum*. Rome.

—. 2024. *State of Food and Nutrition Security in the World 2024: Financing to End Hunger, Food Insecurity and Malnutrition in All Its Forms*. Rome.

Foodborne Disease Burden Epidemiology Reference Group. 2024. https://www.foodbornediseaseburden.org/ferg

Fox, L. 2019. *Three myths about youth employment in Africa and strategies to realize the demographic dividend.* Brookings. https://www.brookings.edu/articles/three-myths-about-youth-employment-in-africa-and-strategies-to-realize-the-demographic-dividend/

FSIN and Global Network Against Food Crises. 2024. *2024 Global Report on Food Crises*. Rome. https://www.fsinplatform.org/grfc2024

Galal, S. 2024. "Value of food exports from Africa, by item." Statista. https://www.statista.com/statistics/1289793/value-of-food-exports-from-africa-by-item/#:~:text=In%202021%2C%20Africa's%20total%20value,at%20773%20million%20U.S.%20dollars

García-Moreno, J. 2023. "Zoonoses in a changing world." *Journal of BioScience*, 73 (10), 711-720. https://doi.org/10.1093/biosci/biad074

Geneva Academy. 2024. *Today's Armed Conflicts*. https://geneva-academy.ch/galleries/today-s-armed-conflicts#:~:text=Africa%3A%20More%20than%2035%20Armed%20Conflicts&text=Several%20armed%20groups%20%E2%80%93%20fighting%20against,Mozambique%2C%20Nigeria%2C%20and%20Somalia

Gómez, M. I., C. B. Barrett, T. Raney, et al. 2013. "Post-green revolution food systems and the triple burden of malnutrition." *Food Policy*, 42, 129-138. https://doi.org/10.1016/j.foodpol.2013.06.009

Grace, D., M. Songe, and T. Knight-Jones 2015. "Impact of neglected diseases on animal productivity and public health in Africa." Presentation at the 21st conference of the World Organisation for Animal Health (OIE) Regional Commission for Africa, Rabat, Morocco, February 16-20, 2015. Nairobi: ILRI.

Griffith, A. W., and C. J. Gobler. 2020. "Harmful algal blooms: A climate change co-stressor in marine and freshwater ecosystems." *Harmful Algae*, 91, 101590. https://doi.org/10.1016/j.hal.2019.03.008

Haggblade, S., N. Keita, A. Traore, P. Traoré, A. Diarra, and V. Thériault 2023. "Unregistered pesticides: Prevalence, risks and responses in Mali." *Agricultural Economics*, 1-15. https://doi.org/10.1111/agec.12772

Harrison, R. D., K. Shono, V. Gitz, A. Meybeck, T. Hofer, and S. Wertz-Kanounnikoff. 2022. "Mainstreaming biodiversity in forestry." *FAO Forestry Paper*, No. 188. Rome: FAO; Bogor: CIFOR. https://doi.org/10.4060/cc2229en

Hawkes, C. 2015. "Smart food policies for obesity prevention." *The Lancet*, 385(9985), 2410-2421. https://doi.org/10.1016/S0140-6736(14)61745-1

Hendriks, S. L., C. van der Merwe, M. S. Ngidi, et al. 2016. "What are we measuring? A comparison of household food security indicators from a sample of households in the Eastern Cape Province, South Africa." *Ecology of Food and Nutrition*, 55(2): 141-162. https://doi.org/10.1080/03670244.2015.1094063

Hendriks, S. L., T. Benson, O. Badiane, et al. 2022. "Climate, COVID-19 and conflict threaten health, food security and nutrition." *British Medical Journal*, 378: http://dx.doi.org/10.1136/bmj-2022-071534

Hendriks, S., J. F. Soussana, M. Cole, M. Kambugu, and D. Zilberman. 2023. "Ensuring access to safe and nutritious food for all through the transformation of food systems." In *Science and Innovations for Food Systems Transformation*, edited by J. von Braun, K. Afsana, L. O. Fresco, and M. H. A. Hassan, 31-58. Cham: Springer.

High-Level Panel of Experts on Food Security and Nutrition (HLPE). 2018. *Nutrition and Food Systems*. Report 12. http://www.fao.org/3/a-i7846e.pdf

Holdsworth, M., and N. Bricas. 2016. "Impact of climate change on food consumption and nutrition." In *Climate Change and Agriculture Worldwide*, edited by E. Torquebiau, 227-238. London: Springer.

Huyer, S., E. Simelton, N. Chanana, A. A. Mulema, and E. Marty 2021. "Expanding opportunities: A framework for gender and socially inclusive climate resilient agriculture." *Frontiers in Climate*, 3:718240. https://doi.org/10.3389/fclim.2021.718240

IDF (International Diabetes Federation). 2021. *IDF Diabetes Atlas 10th Edition*. https://diabetesatlas.org/idfawp/resource-files/2021/07/IDF_Atlas_10th_Edition_2021.pdf

IFAD (International Fund for Agricultural Development). 2021. *Transforming Food Systems for Rural Prosperity. Rural Development Report 2021*. Rome.

IFPRI (International Food Policy Research Institute). 2020. *2020 Global Food Policy Report*. Washington, DC. https://doi.org/10.2499/9780896293670

—. 2022. *Global Food Policy Report 2022: Climate Change and Food Systems*. Washington DC. https://doi.org/10.2499/9780896294257

—. 2024. *2024 Global Food Policy Report: Food Systems for Healthy Diets and Nutrition*. Washington, DC. https://hdl.handle.net/10568/141760

IPCC (Intergovernmental Panel on Climate Change). 2019. *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*. Geneva. https://www.ipcc.ch/srccl/

—. 2022. *Climate Change 2022: Impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Geneva. https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/

ISS (Institute for Security Studies) Africa. 2022. *Africa is losing the battle against extreme poverty*. Pretoria. https://issafrica.org/iss-today/africa-is-losing-the-battle-against-extreme-poverty

Jaffee, S., S. Henson, L. Unnevehr, D. Grace, and E. Cassou 2019. *The Safe Food Imperative: Accelerating Progress in Low- and Middle-income Countries*. Washington, DC: World Bank.

Kamenya, M., S. Hendriks, C. Gandidzanwa, J. Ulimwengu, and S. Odjo. 2022. "Public Agriculture Investment and Food Security and Nutrition in ECOWAS." *Food Policy* 113: 102349. https://doi.org/10.1016/j.foodpol.2022.102349

Kapeleka, J. A., E. Sauli, O. Sadik, and P. A. Ndakidemi 2020. "Co-exposure risks of pesticides residues and bacterial contamination in fresh fruits and vegetables under smallholder horticultural production systems in Tanzania." *PLOS One* 15(7): e0235345. https://doi.org/10.1371/journal.pone.0235345

Kappel, R. 2021. "Africa's Employment Challenges: The Ever-Widening Gaps." Berlin: Friedrich-Ebert-Stiftung. https://nbn-resolving.org/urn:nbn:de:0168-ssoar-79401-5

Khan, Y., U. Daraz, and Š. Bojnec 2023. "Enhancing Food Security and Nutrition through Social Safety Nets: A Pathway to Sustainable Development." *Sustainability*, 15(19): 14347. https://doi.org/10.3390/su151914347

Laar, A. 2021. "The role of food environment policies in making unhealthy foods unattractive and healthy foods available in Africa." *EClinicalMedicine*, 36. https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(21)00188-7/fulltext

Laar, A. K., P. Addo, R. Aryeetey, et al. 2022a. "Perspective: Food environment research priorities for Africa: Lessons from the Africa food environment research network." *Advances in Nutrition*, 13(3): 739-747.

Laar, A., H. A. Osei-Kwasi, M. E. Laar, et al. 2022b. "Monitoring food environments and systems for sustainable diets in Africa: Lessons from Ghana, Kenya, Senegal, and South Africa." In *Routledge Handbook of Sustainable Diets*, edited by P. Prosperi, and K. May Kevany, 673-691. Abingdon and New York: Routledge.

Laar, A., J. M. Amoah, L. M. Massawudu, et al. 2023a. "Making food-related health taxes palatable in sub-Saharan Africa: lessons from Ghana." *BMJ Global Health*, 8: e012154. https://gh.bmj.com/content/8/Suppl_8/e012154.info

Laar, A., J. Tagwireyi, and H. Hassan-Wassef. 2023b. "From dialogues to action: commitments by African governments to transform their food systems and assure sustainable healthy diets." *Current Opinion in Environmental Sustainability*, 65, 101380. https://doi.org/10.1016/j.cosust.2023.101380

Lartey, A., J. Meerman, and R. Wijesinha-Bettoni 2018. "Why food system transformation is essential and how nutrition scientists can contribute." *Annals of Nutrition and Metabolism*, 72(3), 193-201. 10.1159/000487605

Liguori, J., H. A. Osei-Kwasi, M. Savy, S. Nanema, A. Laar, and M. Holdsworth. 2023. "Public Procurement for School Meal Programmes in Sub-Saharan Africa: Nutritional Outcomes, Implementation Challenges and Programme Enablers." *Proceedings*, 91(1). https://doi.org/10.3390/proceedings2023091051

Liu, Y., and F. Wu. 2010. "Global Burden of Aflatoxin-Induced Hepatocellular Carcinoma: A Risk Assessment." *Environmental Health Perspectives*, 118(6), 818-824. 10.1289/ehp.0901388

Madalitso, A. Kamenya, S. L. Hendriks, C. Gandidzanwa, J. Ulimwengu, and S. Odjo. 2022. "Public agriculture investment and food security and nutrition in ECOWAS." *Food Policy*, 113, 02349. https://doi.org/10.1016/j.foodpol.2022.102349

Masset, E., S. Kapoor Malhotra, N. Gupta, et al. 2023. "PROTOCOL: The impact of agricultural mechanisation on women's economic empowerment: A mixed-methods systematic review." *Campbell Systematic Reviews*, 19(3), e1334.

Masters, W. A., E. M. Martinez, F. Greb, et al. 2023. "The Cost and Affordability of Preparing a Basic Meal Around the World." In: *Science and Innovations for Food Systems Transformation*, edited by J. von Braun, K. Afsana, L. O. Fresco, and M. H. A. Hassan, 603-624. Cham: Springer.

Maulu, S., O. J. Hasimuna, L. H. Haambiya, et al. 2021. "Climate Change Effects on Aquaculture Production: Sustainability Implications, Mitigation, and Adaptations." *Frontiers in Sustainable Food Systems*, 5. https://doi.org/10.3389/fsufs.2021.609097

McIntyre, A. M., and S. L. Hendriks. 2018. "Interpreting food security and nutrition research findings with rural South African communities." *Global Journal of Health Science*, 10(5), 183-196. 10.5539/gjhs.v10n5p183

Mendenhall, E., C. Hendrix, E. Nyman, et al. 2020. "Climate change increases the risk of fisheries conflict." *Marine Policy*, 117, 103954. https://doi.org/10.1016/j.marpol.2020.103954

Minten, B., T. Reardon, and K. Chen 2017. "Agricultural value chains: How cities reshape food systems." In: *Global Food Policy Report 2017*: 42–49. Washington, DC: International Food Policy Research Institute (IFPRI).

Mkandawire, E., and S. L. Hendriks. 2019. "The role of the man is to look for food: Lessons from men's involvement in maternal and child health programs in rural Central Malawi." *PLOS One* 14(8). https://doi.org/10.1371/journal.pone.0221623

Mutezo, G., and J. Mulopo. 2021. "A review of Africa's transition from fossil fuels to renewable energy using circular economy principles." *Renewable and Sustainable Energy Reviews*, 137, 110609. https://doi.org/10.1016/j.rser.2020.110609

NCD-RisC (NCD Risk Factor Collaboration). 2017. "Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19.1 million participants." *The Lancet*, 389(10064): 37-55. https://doi.org/10.1016/S0140-6736(16)31919-5

OECD (Organisation for Economic Co-operation and Development), UNECA (United Nations Economic Commission for Africa), and AfDB (African Development Bank). 2022. *Africa's Urbanisation Dynamics 2022: The Economic Power of Africa's Cities*. Paris: OECD Publishing. https://doi.org/10.1787/3834ed5b-en

Okunogbe, A., R. Nugent, G. Spencer, J. Powis, J. Ralston, and J. Wilding. 2022. "Economic impacts of overweight and obesity: current and future estimates for 161 countries." *BMJ Global Health*, 7(9), e009773. https://doi.org/10.1136/bmjgh-2022-009773

Olowoyo, P., P. Barango, A. Moran, et al. 2024. "Priorities to reduce the burden of hypertension in Africa through ACHIEVE." *The Lancet Global Health*, 12(2), e192-e193. https://doi.org/10.1016/S2214-109X(23)00540-5

Outreach International. 2023. *Poverty in Africa: Causes, Effects, and Community-Led Solutions*. Kansas City. https://outreach-international.org/poverty-in-africa-causes-effects-and-community-led-solutions

Patterson, G. T., L. F. Thomas, L. A. Coyne, and J. Rushton. 2020. "Moving health to the heart of agri-food policies; mitigating risk from our food systems." *Global Food Security*, 26, 100424. 10.1016/j.gfs.2020.100424

Popkin, B. M., C. Corvalan, and L. M. Grummer-Strawn 2020. "Dynamics of the double burden of malnutrition and the changing nutrition reality." *The Lancet*, 395(10217), 65-74. 10.1016/S0140-6736(19)32497-3

Puskur, R., H. Jumba, B. Reddy, et al. 2023. "Closing gender gaps in productivity to advance gender equality and women's empowerment." *CGIAR GENDER Impact Platform Working Paper #014*. Nairobi: CGIAR. https://hdl.handle.net/10568/129710

Reardon, T., T. Awokuse, S. Haggblade, T. Kapuya, S. Liverpool-Tasie, F. Meyer, and R. Vos 2019. "Private sector's role in agricultural transformation in Africa." In *Africa Agricultural Status Report 2019 (Issue 7)*. Nairobi: Alliance for a Green Revolution in Africa (AGRA).

Reardon, T., D. Tschirley, L. S. O. Liverpool-Tasie, T. Awokuse, J. Fanzo, B. Minten, and B. M. Popkin. 2021. "The processed food revolution in African food systems and the double burden of malnutrition." *Global Food Security*, 28, 100466. https://doi.org/10.1016/j.gfs.2020.100466

Richard, B., A. Qi, and B. D. Fitt. 2022. "Control of crop diseases through Integrated Crop Management to deliver climate-smart farming systems for low- and high-input crop production." *Plant Pathology*, 71(1), 187-206. https://doi.org/10.1111/ppa.13493

Ristaino, J. B., K. Anderson, P. Bebber, and Q. Wei. 2020. "The persistent threat of emerging plant disease pandemics to global food security." *PNAS*, 118(23), e2022239118. https://doi.org/10.1073/pnas.2022239118

Samreen, I. A., H. A. Malak, and H. H. Abulreesh. 2021. "Environmental antimicrobial resistance and its drivers: a potential threat to public health." *Journal of Global Antimicrobial Resistance*, 27, 101-111. https://doi.org/10.1016/j.jgar.2021.08.001

Scheidel, A., D. Del Bene, J. Liu, et al. 2020. "Environmental conflicts and defenders: A global overview." *Global Environmental Change*, 63, 102104. https://doi.org/10.1016/j.gloenvcha.2020.102104

Schneider, K. R., J. Fanzo, L. Haddad, et al. 2023. "The state of food systems worldwide in the countdown to 2030." *Nature Food*, 4(12), 1090-1110. https://doi.org/10.1038/s43016-023-00885-9

Sharma, I. K., S. Di Prima, D. Essink, and J. E. W. Broerse. 2021. "Nutrition-Sensitive agriculture: A systematic review of impact pathways to nutrition outcomes." *Advances in Nutrition*, 12(1): 251-275. https://doi.org/10.1093/advances/nmaa103

Sirma, A. J., J. F. Lindahl, K. Makita, D. Senerwa, N. Mtimet, E. K. Kang'ethe, and D. Grace. 2018. "The impacts of aflatoxin standards on health and nutrition in sub-Saharan Africa: The case of Kenya." *Global Food Security*, 18: 57–61. https://doi.org/10.1016/j.gfs.2018.08.001

Story, M., K. M. Kaphingst, R. Robinson-O'Brien, and K. Glanz 2008. "Creating healthy food and eating environments: policy and environmental approaches." *Annual Review of Public Health*, 29: 253-272. 10.1146/annurev.publhealth

Stuckler, D., and M. Nestle. 2012. "Big food, food systems, and global health." *PLoS Medicine*, 9(6), e1001242. https://doi.org/10.1371/journal.pmed.1001242

Swinburn, B. A., G. Sacks, K. D. Hall, K. McPherson, D. T. Finegood, M. L. Moodie, and S. L. Gortmaker. 2011. "The global obesity pandemic: shaped by global drivers and local environments." *The Lancet*, 378(9793), 804-814. 10.1016/S0140-6736(11)60813-1

Thompson, C. 2022. "Dietary health in the context of poverty and uncertainty around the social determinants of health." *Proceedings of the Nutrition Society*, 81(2), 134-140. 10.1017/S0029665121003657

Unnevehr, L. J. 2022. "Addressing food safety challenges in rapidly developing food systems." *Agricultural Economics*, 53(4): 529-539. https://doi.org/10.1111/agec.12724

Wells, J. C. K., A. A. Marphatia, G. Amable, M. Siervo, H. Friis, J. J. Miranda, H. H. Haisma, and D. Raubenheimer. 2021. "The future of human malnutrition: Rebalancing agency for better nutritional health." *Global Health*, 17(1), 119. 10.1186/s12992-021-00767-4

WHO (World Health Organization). 2014. *Global Nutrition Targets 2025: Policy Brief Series*. Geneva. https://www.who.int/publications/i/item/WHO-NMH-NHD-14.2#:~:text=achieve%20a%2050%25%20reduction%20of,to%20at%20least%2050%25%3B

—. 2019. *WHO's first ever global estimates of foodborne diseases find children under 5 account for almost one third of deaths*. Geneva. https://www.who.int/news-room/detail/03-12-2015-who-s-first-ever-global-estimates-of-foodborne-diseases-find-children-under-5-account-for-almost-one-third-of-deaths

—. 2021. *Food Systems for Health: Information Brief*. Geneva. https://www.who.int/publications/i/item/9789240035263

—. 2022. *WHO Global Strategy for Food Safety 2022 - 2030: Towards Stronger Food Safety Systems and Global Cooperation*. Geneva. https://www.who.int/publications/i/item/9789240057685

—. 2023. *WHO acceleration plan to stop obesity*. Geneva. https://www.who.int/publications/i/item/9789240075634

—. n.d. *One Health*. Geneva. https://www.who.int/news-room/questions-and-answers/item/one-health

World Bank. 2022. *Putting Africans at the Heart of Food Security and Climate Resilience*. News, October 17. https://www.worldbank.org/en/news/immersive-story/2022/10/17/putting-africans-at-the-heart-of-food-security-and-climate-resilience

World Obesity Federation. 2024. *World Obesity Atlas 2024*. London. https://data.worldobesity.org/publications/?-cat=22

Wudil, A. H., M. Usman, J. Rosak-Szyrocka, L. Pilař, and M. Boye 2022. "Reversing Years for Global Food Security: A Review of the Food Security Situation in Sub-Saharan Africa." *International Journal of Environmental Research and Public Health*, 19(22), 14836. https://doi.org/10.3390/ijerph192214836

Zhou, B., R. M. Carrillo-Larco, G. Danaei, L. M. Riley, C. J. Paciorek, G. A. Stevens, et al. 2021. "Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants." *The Lancet*, 398: 957–980.

Annex

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Conveners	**University of Ghana** Prof. Anna Lartey Prof. Amos Laar
Co-Conveners	Food and Agriculture Organization (FAO) of the United Nations Dr. Abebe Haile Gabriel Dr. Mphumuzi Sukati

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About AKADEMIYA2063

AKADEMIYA2063 is a pan-African non-profit research organization with headquarters in Kigali, Rwanda, and a regional office in Dakar, Senegal. Inspired by the ambitions of the African Union's Agenda 2063 and grounded in the recognition of the central importance of strong knowledge and evidence-based systems, the vision of AKADEMIYA2063 is an Africa with the expertise we need for the Africa we want. This expertise must be responsive to the continent's needs for data and analysis to ensure high-quality policy design and execution. Inclusive, evidence-informed policymaking is key to meeting the continent's development aspirations, creating wealth, and improving livelihoods. AKADEMIYA2063's overall mission is to create, across Africa and led from its headquarters in Rwanda, state-of-the-art technical capacities to support the efforts by the Member States of the African Union to achieve the key goals of Agenda 2063 of transforming national economies to boost economic growth and prosperity. Following from its vision and mission, the main goal of AKADEMIYA2063 is to help meet Africa's needs at the continental, regional, and national levels in terms of data, analytics, and mutual learning for the effective implementation of Agenda 2063 and the realization of its outcomes by a critical mass of countries. AKADEMIYA2063 strives to meet its goals through programs organized under five strategic areas—policy innovation, knowledge systems, capacity creation and deployment, operational support, data management, digital products, and technology—as well as innovative partnerships and outreach activities. For more information, visit www.akademiya2063.org.

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