CHAPTER 1

Introduction: Nutrition, Sustainable Agriculture and Climate Change Issues in Africa

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INTRODUCTION: NUTRITION, SUSTAINABLE AGRICULTURE AND DEVELOPMENT ISSUES

According to the United States Department of Agriculture (USDA), nutritional security refers to ‘a situation that exists when all people, at all times, have physical, social and economic access to sufficient safe,
and nutritious foods that meets their dietary needs and food preferences for an active and healthy life. In Sub-Saharan Africa (SSA), increasing population growth and expanding demand for agricultural commodities are consistently mounting pressure on land and water resources, thereby posing huge challenges on the region’s capacity to achieve nutritional security related to United Nations Sustainable Development Goals (SDGs), especially SDGs 2 and 4. Although SSA boasts of vast, fertile and uncultivated arable lands, its capacity to contribute to feeding its current and future population is seriously being undermined by factors such as low or poor adoption and utilization of innovations and digital tools, impact of climate change, environmental degradation, weak political will, limited interest in farming, lack of government support, etc. However, and in spite of these constraints, sustainable agriculture, food and nutrition security in SSA can be achieved by adopting a multipronged approach, which includes improved agricultural mechanization, adoption of high yielding crop varieties, market access, use of ICT, digital tools, GIS, public investments to facilitate access to improved technologies, provision of rural infrastructure, etc. The purpose of this book is to provide innovative policy tools for enhancing SSA’s capacity to achieve sustainable agriculture, food and nutrition security in this digital age and in the face of climate variability. In addition, this book will present some smart strategies for increased production, reduced food wastes as well as enhanced nutritional outcomes through transformative discoveries in agricultural research, education and advisory or extension services.

Despite its wealth of natural resources, youthful population and emerging technological base, it is seemingly unthinkable that Africa currently holds over 60% of the remaining arable land on earth, while it spends billions of its scarce foreign exchange earnings. In other words, and with limited strategic food reserves in the face of natural calamities such as flooding, epidemics and droughts, many African countries rely heavily on food imports to feed its citizens (World Bank 2020). According to Abrams and Smedley (2020), for every US$1 billion that Africa spends on food imports is equivalent to its annual income of 334,000 farming households, which invariably represents 670,000 on-farm jobs and 200,000 off-farm jobs. This Africa’s food import situation shows the unsustainability characteristics of its agri-food systems. One lesson to be learnt as Africa strives to manage its post-COVID-19 economies is the need for a more pro-poor, resilient and sustainable agri-food systems, which include its supply chains, markets, infrastructure and capacities to
respond proactively to future exogenous shocks in the post-COVID-19 world.

Every year, millions of children and mothers die and suffer from both physical and mental impairment due to poor nutrition during a critical 1000-day period (Child Health 2020). Based on the global food and nutrition security (FNS) metrics, one out of every three persons are undernourished, overweight or obese; one in five children under five (or approximately 161 million) are stunted; and many countries lose some of their GDP due to undernutrition—up to 11% in the hardest-hit African and Asian countries (Brookings 2017). Relating this to undernutrition at the global level, in 2016, 155 million children under five were estimated to be stunted (too short for age), 52 million were estimated to be wasted (too thin for height), 41 million were overweight or obese and 45% of child deaths are associated with undernutrition (UNICEF 2017). This ongoing global dynamic has resulted in increasingly renewed focus on the need to make agricultural policies more ‘nutrition-sensitive’ (FAO/IFAD/UNICEF/WFP/WHO 2017; BMGF 2012; FAO 2012).

However, civilization, changing culture, technology and global land investment dynamics are creating markets for land, thereby influencing the land access—nutrition outcomes relations at communal, national, continental and international levels.

In April 2016, the UN General Assembly endorsed the outcome documents of the Second International Conference on Nutrition (ICN2), aimed at achieving the global nutrition targets set by the World Health Assembly, and declared the period 2016–2025 as the United Nations Decade of Action on Nutrition. The primary objective of the Decade of Action on Nutrition is to increase nutrition investment and implement policies and programmes to improve food security and nutrition within the ICN2 framework (FAO/IFAD/UNICEF/WFP/WHO 2017; FAO/WHO 2013; Herforth et al. 2012). For Africa, the

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1 FAO/WHO Work Programme of the UN Decade of Action on Nutrition (2016–2025). The Decade of Action on Nutrition provides an opportunity for all partners to work together, mobilize action and accelerate efforts towards eliminating hunger, food insecurity and all forms of malnutrition, meeting the SDGs by 2030.

2 The 2017 State of Food Security and Nutrition in the World (SOFI) Report marks the beginning of the new era in consistent monitoring of progress made towards achieving the food security and nutrition targets set by the United Nations Sustainable Development Goals (UN SDGs) 2030 Agenda, with specific focus on ending hunger (SDG Target 2.1) and all forms of malnutrition (SDG Target 2.2). This coincides with the launch
Comprehensive Africa Agriculture Development Programme (CAADP) shows that the prevalence of undernourishment, underweight, stunting and wasting in children under five years of age have all decreased since the launch of CAADP in 2003, although rather slowly (Jones et al. 2010; Covic and Hendricks 2016; Sahn and Younger 2017).

African poor small farm holders are dependent on land in order to access credit and related input resources. However, securing access to arable productive land has been on a declining trend as a result of the pressure of teeming population, worsening land degradation due to changing climate and more importantly land grabbing (FAO 2010). From a gender perspective, when women are self-employed as farmers, they generate limited incomes because they do not have rights to own or inherit land and to access input or credit markets. Further, land grabbing influence nutrition outcomes, vis-a-vis the different roles and responsibilities of men and women in securing adequate food and nutrition at the household level (Dumas et al. 2018; Owusu et al. 2016; Menon et al. 2014; Vogl 2007). This shifting gender roles due to land ownership dynamics can affect household welfare where women access to productive resources, especially land, may influence children’s nutrition (Allendorf 2007; Galiani and Schargrodsky 2004). In view of this, the Bill and Melinda Gates Foundation (BMGF)’s actionable impact objective on nutrition ‘ensures that all women and children have the nutrition they need to live healthy and productive lives.’

**Rationale, Expected Contribution to Knowledge and the Value Add**

Over time, nutrition has been a neglected area of global public health, accounting for less than one per cent of the global development aid largely due to its over-hidden contribution to child illness and deaths (Child Health 2020). At the SSA level, this is also evident in the fact that its food and nutrition landscape is characterized by hunger (undernourishment, micronutrient deficiencies, stunting and child mortality), inadequate food consumption, food insecurity and volatile food prices, thereby posing as a huge impediment to socioeconomic and sustainable development.

of the United Nations Decade of Action of Nutrition (2016–2025), adding impetus to these nutrition-related commitments from a broadened perspectives and multi-partnership platform which comprises global actors such FAO, IFAD, WHO, UNICEF and WFP.
This is evident in a vicious cycle of underdevelopment in which poor communities consist of unhealthy inhabitants with high rates of illness and disability, and whose health systems are inefficient, thereby lacking the adequate capacity to deal with complicated nutrition challenges or preventing them from happening in the first place.

In recent years, access to resources, mainly land, markets and institutions have been, and will continue to be subject to tremendous pressure with both positive and negative implications for agricultural development and food security and nutrition (FSN) in Africa. Consequently, much debate has been raised on whether foreign direct investment in land property and institutions is inimical or beneficial for agricultural development in Africa. However, there ongoing discussion on philosophical paradigms policies and management techniques to ameliorate the risks and therefore, optimize on the workable land policy reform opportunities, as well as on the significant role being played by local governments in strengthening land institutions and adapting climate smart agriculture practices in Africa.

Furthermore, an advanced understanding of climate change policies and nutrition pathways should help improve CSA policy development and programme design for improved nutrition outcomes in SSA. Nutrition outcomes can be enhanced by all community partners—general education, Health, Dental Health, Nutrition, Education, Family Services, Disabilities and Mental Health. In addition, Governments, the United Nations, FAO, IFAD, UNICEF, WFP, WHO, BMGF, bilateral organizations, Alive & Thrive, Helen Keller international, HarvestPlus, Global Alliance for Improved Nutrition, notable universities and the private sector can collaborate towards developing, testing, and rolling out innovative solutions and addressing the obstacles to effective implementation, particularly barriers to reaching women and girls and addressing social and gender norms. In spite of all these efforts and in the face of emerging research over the past few decades, global knowledge about the immediate and underlying causes of undernutrition remains minimal and incomplete, while this same challenge becomes increasingly precarious for SSA with particular focus on fragile countries like politically tensed Cameroon and post-civil war (and post-Ebola) Sierra Leone. Thus,

3 HarvestPlus support countries globally to test and release biofortified nutritious crops so that farmers and consumers can enjoy the benefits of these crops—Beans, Cassava, Maize, Pearl Millet, Rice, Wheat and Orange Sweet Potato.
the purpose of this book aligns with the BMGF’s strategy which focuses on developing new tools and platforms to enable timely collection and analysis of data; supporting global efforts to standardize the collection and monitoring of nutrition data; and use evidence to develop effective policies and guidelines towards combating malnutrition, land degradation, climate variability and socioeconomic shocks like the COVID-19 pandemic.

Over the past decade, there has been an increasing need for the adoption of innovative tools, evidence-based research and novel solutions towards scaling up/out nutrition and CSA interventions. According to the BMGF, fully scaling up current interventions would address only about half of the burden of malnutrition because of its complex causes. Against the background that quite a few studies have been undertaken to examine land property rights, climate unpredictability and nutrition outcomes nexus in SSA, this book will build on earlier research attempts to further our understanding of sustainable agriculture and climate smart pathways in addressing mal- and undernutrition challenges in these SSA countries. In addition to discussing the pros and cons of climate change-ability, land-related FDI, this book will also collect the most recent data to identify new issues, as well as look at the available evidence and case studies that discuss the relationship between land ownership and selected measurements of undernutrition in West and Central Africa. Thus, the research will discuss how sustainable agriculture policy, especially for agriculture (and for women) has evolved over the past four decades in the region. This research will also capture some of the contemporary policy-oriented nutrition research, with the aim of documenting recent findings and developing new solutions. As a follow-up to other recent work on the impact of agricultural development interventions on children nutrition outcomes (Dumas et al. 2018; Owusu et al. 2016), this study will generate relevant and most updated information for updating and developing appropriate gender-sensitive policies on climate change and nutrition relations. In other words, this study will provide more understanding on the full range of issues on the climate change—nutrition outcomes nexus, as well as recommend evidence-based policy interventions. This will strengthen the level of existing knowledge by producing and delivering a new body of evidence and narrative that are geared towards policymakers’ needs on what works and what does not work, thereby deepening capacity for nutrition-informed policymaking in selected West and Central African countries.
Based on the seemingly inadequate amount of studies and documentation on the role of ineffective land property rights in influencing nutrition outcomes, this research will be leveraging on the combination of mainstream and out-of-the-box thinking to generate more novel ideas on the impact of land rights on strategically selected nutrition outcomes—undernourishment, micronutrient deficiencies, stunting, etc. As one of the value added of this study, it is expected that some of the outcomes of the study will propose effective policies that could address the underlying contribution of gender inequality to the land rights—malnutrition dynamics, placing particular emphasis on women’s economic and social empowerment, and through that promoting nutrition outcome (Dumas et al. 2018; Owusu et al. 2016; Allendorf 2007; Galiani and Schargrodsky 2004).

Due to high dependence and monetary/cultural attachment to land and agriculture as the main sources of livelihood, women face more severe constraints in accessing land, markets and other factors of production when compared with their men counterparts. Thus, the roles of women cannot be overemphasized in promoting improved nutrition outcomes through nutrition-sensitive land reforms and Climate Smart Agriculture (CSA) interventions (Menon et al. 2014; Allendorf 2007).

This book will fill the yawning nutrition-specific policy gap by demonstrating an association between climate change and nutrition outcomes, while placing emphasis for the role of gender, as well as production of targeted nutrition-rich crops, homestead gardens and diversification of agricultural production systems towards fresh fruits, vegetables, spices and related horticultural crops.

**Objective**

In recent years, access to resources, mainly land markets and institutions have been, and continue to be, subject to tremendous pressure with both positive and negative implications for agricultural development and food security and nutrition (FSN) in Africa. Consequently, much debate has been raised on whether foreign direct investment in land property and institutions is inimical or beneficial for FSN, and agricultural development in Africa.
The broad objective of this book is to discuss the relevant and current policy issues aimed at enhancing nutrition outcomes and sustainable agriculture within changing climatic and environmental scenarios in Africa. Specifically, this study will:

- Understand the political economy of nutrition security, sustainable agriculture and climate change in Africa.
- Review the relevant literature towards expatiating on the factors that drive nutritional outcomes in the region.
- Based on these findings and lessons generated thereof, evidence-based policy recommendations will be articulated for dissemination to the relevant policy makers, non-government organizations and stakeholders.

**The Flow and Organization of Chapters**

This book provides a comprehensive analysis on the relationship between nutrition, health, climate change, environment, agriculture and sustainable development, with a special interest in sustainably enhancing Africa’s nutritional outlook in the post COVID-19 pandemic era. It examines the contributions of nutrition, community development and agricultural transformation-related policies, programmes, tools and initiatives in the face of changing climate and agribusiness ecosystem. The authors recommend innovative conceptual frameworks, appropriate initiatives and workable policy nuggets towards realizing continental nutritional agenda within a climate-smart agricultural topography.

This book comprises twelve chapters. The book chapters present compelling discussions on the opportunities to improve nutrition and sustainable agricultural development policy processes in Africa. As a follow-up to this introductory chapter, the second chapter of this book discusses how crop and livestock production respond to rainfall and temperature variability in West Africa. Chapter 3 adopts a panel data analysis approach to examine food and nutrition security (FNS) and agricultural value-added nexus towards the realization of United Nations Sustainable Development Goals (UN SDGs) 2 in West Africa.

From a sustainable agricultural viewpoint, Chapter 4 analyzes the effect of infrastructural expansion on rural transformation, via increased investment agricultural research and development (R&D) in Nigeria.
Along similar discourse, Chapter 5 expatiates on the responsiveness of cassava and maize seed supply sustainability to public investment in R&D infrastructure in Nigeria.

While Chapter 6 presents a political economy understanding of the nutrition, health, climate change, deforestation and land access nexus in Africa, based on a few lessons from the United States, Chapter 7 adopts a gender lens in recommending policies for rural community development organizations towards alleviating poverty and malnutrition among women households and other vulnerable groups.

Chapter 8 assesses the short and long-run effect of agricultural production and farm management practices on Greenhouse Gas (GHG) Emissions in Cameroon. Chapter 9 uses data collected from structured questionnaires to conduct productivity analysis among smallholder rice farmers and the policy implications for nutrition security in Cameroon. Chapter 10 adopts the Ordinary Differential Equation (ODE) approach to examine how public expenditure and foreign direct investment could be leveraged for maximizing agricultural policy space in Cameroon.

The impact of climate change knowledge management cannot be overemphasized in enhancing nutrition and climate change adaptation capacities in Africa. In view of this, Chapter 11 epitomizes the role of modern knowledge management tools such as digital libraries in making African agriculture and policies much smarter. Finally, Chapter 12 concludes on the workable policy recommendations for fostering nutrition security and adapting to the changing climate through sustainable agriculture in a post-COVID-19 African ecosystem.

It is our expectation that readers and target audience will enjoy the nontechnical language which is adopted in discussing Africa’s nutrition and sustainable agriculture prospects and challenges presented in this book and articulated by African practitioners and academics. It is written in a style that should interest anyone interested in Africa’s nutrition and regional development. The references that support every chapter will expand readers’ horizons of understanding and applying workable policy instruments and lessons for fostering Africa’s nutritional outcomes.
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