



MALABO
MONTPELLIER
PANEL



CONNECTING THE DOTS:

Policy Innovations for Food Systems Transformation in Africa



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FOREWORD

The COVID-19 pandemic has shone a light on the pinch points in Africa's food and agricultural sectors. Disrupted supply chains, job losses (especially informal employment and jobs in urban areas), rising food prices, and a reversal in dietary diversity have all severely undermined recent development gains. Even so, the sectors have proven to be a vital lifeline for urban residents and a form of social security for millions of people. COVID-19 has, in one fell swoop, dramatically exposed the interconnectedness and shared vulnerability of different sectors, including food and agriculture, nutrition and health, and environment. Business as usual is no longer an option, neither in how we understand the sectors nor in how we recover from this systemic shock.

Now and after COVID-19 we need to embrace a food systems approach to policy design and implementation. Food systems thinking needs to be at the heart of any future continental and global strategies for economic growth, food security, climate, and development. Indeed, 2021 has been labeled the "super year", playing host to several large global meetings on issues relevant to food security and improved nutrition. While the UN Food Systems Summit is an ideal moment for stakeholders to coalesce around a shared understanding of Africa's food systems, the 26th Conference of the Parties (COP26) of the UN Framework Convention on Climate Change, the UN Biodiversity Conference, and the UN Convention to Combat Desertification (UNCCD) COP15 all provide opportunities to align ambitions and targets.

At the same time as global food systems challenges are being addressed, at the African continental and sub-regional levels specific attention needs to be paid to transforming food systems in a way that enhances nutrition outcomes, improves livelihoods and protects and enhances the environment. This can be achieved through policies and interventions targeted at food and agriculture trade, infrastructure development, finance, science and technology for food systems, as well as capacity and skills strengthening.

This will be a step change from current methods and will require evidence-based and guided experimentation, policy innovations, and innovative technical solutions as well as commitment from the highest levels. Mutual accountability mechanisms such as the Comprehensive Africa Agriculture Development Programme (CAADP) Biennial Review Reports will be crucial for generating improved policies and achieving better outcomes on

food system transformation and will also help ensure that policies respond to the needs of all stakeholders, including the most vulnerable and marginalized.

In Africa, food systems are now at a crossroads. Threats and challenges persist, but there are ways to address them, either individually or collectively. This will, however, require a more integrated and nuanced approach than has been employed until now. This report—**Connecting the Dots: Policy Innovations for Food Systems Transformation in Africa**—draws on the experience and at times visionary leadership of four African countries: Ghana, Malawi, Morocco, and Rwanda. It focuses on their policy and institutional innovations, which have moved the needle toward systems-level change and transformation.

Importantly, by transforming so rapidly and continuously, Africa's food systems generate their own imbalances—demographic, sociocultural, political, infrastructural, technological, and environmental. The need to reduce these imbalances must be placed at the center of new and innovative food systems policies, which will naturally present synergies and trade-offs. Developing a shared understanding of the science and evidence among food systems stakeholders will be key to promoting inclusive, agile, and transparent policy processes that will benefit Africa's rural and urban populations and create much-needed employment opportunities for young people.

While 2021 can mark a turning point in the transformation of Africa's food systems, the momentum must be maintained well beyond the UN Food Systems Summit in order to ensure follow through on the commitments and targets that are being set and on stakeholders' shared ambitions.

The Malabo Montpellier Panel convenes 17 leading experts in agriculture, engineering, ecology, nutrition, and food security; its aim is to facilitate policy choices by African governments in order to accelerate progress toward food security and improved nutrition. The Panel identifies areas of progress and positive change across the continent and assesses what successful countries have done differently. It identifies the institutional and policy innovations and program interventions that can best be replicated and scaled by other countries. The related Malabo Montpellier Forum provides a platform to promote policy innovation; it uses the evidence produced by the Panel to facilitate dialogue among high-level decisionmakers on African agriculture, nutrition, and food security.



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THE MALABO MONTPELLIER PANEL

The core mission of the Malabo Montpellier Panel, a group of leading African and international experts from the fields of agriculture, ecology, food security, nutrition, public policy and global development, is to support evidence-based dialogue among policy makers at the highest level. The Panel's reports seek to inform and guide policy choices to accelerate progress toward the ambitious goals of the African Union Commission's Agenda 2063, the Malabo Declaration and the global development agenda. The Panel works with African governments and civil society organizations to provide support and evidence-based research that facilitate the identification and implementation of policies that enhance agriculture, food security and nutrition.



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1. INTRODUCTION

Over the last few years, multiple and persistent shocks have hindered the potential progress in transforming Africa's food systems. Natural hazards and intense climatic events, socioeconomic shocks including the COVID-19 pandemic, and conflicts are exacerbating food insecurity, severely eroding livelihoods, and jeopardizing the economic growth achieved over the past two decades.¹ This is in addition to the existing and unique set of circumstances that Africa faces, including demographic change arising from a growing urban middle class, changes in dietary preferences, and high levels of youth unemployment. Rural development will be central to sustainably transforming Africa's food systems, as will a more competitive and efficient food and agricultural sector, one which taps into regional and global markets and meets dietary preferences and nutritional needs, while preserving the environmental resource base.

Thus far, policies have not kept up with the rapid structural change taking place across food systems; nor have they kept pace with the challenges that have subsequently been introduced, including rising obesity, low productivity and incomes, rising greenhouse gas (GHG) emissions and increasingly degraded ecosystems.² In 2019, about one in every five Africans was hungry; this was a considerable increase from previous years and is pushing the continent significantly off track to achieve the Sustainable Development Goal 2 (SDG 2) of zero hunger by 2030.³

The consequences of the COVID-19 pandemic are likely to further expedite the reversal in gains made in reducing poverty, hunger and malnutrition, with millions of people set to be more are likely to fall into hunger in 2021. However, the important difference is that this is unlikely to be because food production has been affected by the pandemic. In fact, farming and livestock production has been an important fallback option during COVID-19, especially for the urban poor who migrated to rural areas, so much so that in Nigeria, Malawi and Uganda, the share of households involved in agriculture in fact rose during the pandemic.⁴

It is, rather, the measures taken by governments to reduce the spread of the pandemic that have dramatically exposed the fragility of Africa's food systems. The availability, affordability, and stability dimensions of food security have all been affected by disrupted supply chains, breakdown of domestic and export markets, the tenuousness of informality in food systems, especially in urban areas, and higher retail prices, combined with reduced incomes and the ease at which nutritious food can be sidelined in preference of staples.⁵

Box 1. Definition of sustainable food systems

Sustainable food systems are:

- productive and prosperous (availability of sufficient food)
- equitable and inclusive (access of all people to food and to livelihoods within that system)
- empowering and respectful (all people and groups—including those who are most vulnerable and marginalized—are able to make choices and exercise their voice in shaping the system)
- resilient (stability in the face of shocks and crises)
- regenerative (sustainable in all its dimensions)
- healthy and nutritious (sufficient nutrient uptake and utilization).⁶

Africa's food and agricultural sectors are therefore now at an inflection point. Although much has been achieved on the continent in terms of productivity and total production, much remains to be done if continental and global development targets are to be met. There is now a strong case for broadening our understanding of, and approach to, a systems-wide perspective.

Food systems transformation presents complex challenges and requires complex solutions involving multiple sectors, industries, and stakeholders, all of whom arrive with varying interests. This complexity means business-as-usual is no longer an option.⁷ Rather, the next level of policy-making will require a more holistic and nuanced approach—one that operates within the interlinkages of policy domains that have been historically dealt with distinctly, such as agriculture, health, education, and the environment.



Food systems transformation presents complex challenges and requires complex solutions involving multiple sectors, industries, and stakeholders, all of whom arrive with varying interests. This complexity means business-as-usual is no longer an option

As policymakers look to the future, key lessons must be drawn from the experience of the last few years; governments must reorient future trajectories so as to “build back better” and plan for beyond 2030. Importantly, policies which integrate multiple objectives must be prioritized, including those that call for a healthy and safe diet for all, decent incomes for farmers and food system workers, and minimum environmental harm.⁸ Policymakers will have an opportunity to leverage the existing strengths of their national circumstances, including trade (specifically

the new African Continental Free Trade Area), digital prowess, resilience strategies and demographic dividends—as well as the synergies within these—to transform their food systems. But they will also have to be mindful of the potential trade-offs. The “super year” 2021 will mark a turning point in transforming Africa’s food systems, but this momentum must be sustained to ensure that the commitments and targets that are being set and the ambitions that are currently shared are followed up throughout this year and well beyond.

Certain African countries have—despite significant pressures—fared better than others in managing their food security and nutrition outcomes. Key lessons can be drawn from their experience and from the visionary approach they have taken to food systems transformation. Although not explicitly, a number of countries have already been adopting a holistic approach to transforming their food systems. By combining the definition of food systems put forward by the High-Level Panel of Experts on Food Security and Nutrition (HLPE) (see Box 1) with the data provided by the latest CAADP Biennial Review, the report presents progress made in four leading countries, Ghana, Malawi, Morocco, and Rwanda.

The first part of this report begins by setting out the challenges and threats to African food systems transformation, including increased malnutrition in all its forms, high unemployment especially among

young people, climate change and environmental degradation, conflict and protracted crises, and the persistent gender gap. This is followed by a discussion around key opportunities and benefits. The emphasis here is on agricultural productivity; the promising prospects of expanded agro-processing, infrastructure development, agriculture, and food trade; new technologies and digitalization; social protection; and the emerging African science and research agenda.

The second part of the report consists of a set of four country profiles: Ghana, Malawi, Morocco, and Rwanda. These country profiles focus on policy and institutional innovations and on the ground-level programmatic interventions that have enabled these countries to move from agricultural transformation toward a systems-level change approach to transforming their food systems, with the end result of ensuring sustainable and healthy diets for all their citizens.

Drawing some key lessons from the case studies, the report concludes by offering a set of recommendations for action by African governments and their partners. These provide for a more holistic and comprehensive framework for policymakers and their advisors to address the challenges and threats facing Africa’s food systems today and into the future, as well as harness the opportunities and leverage synergies.



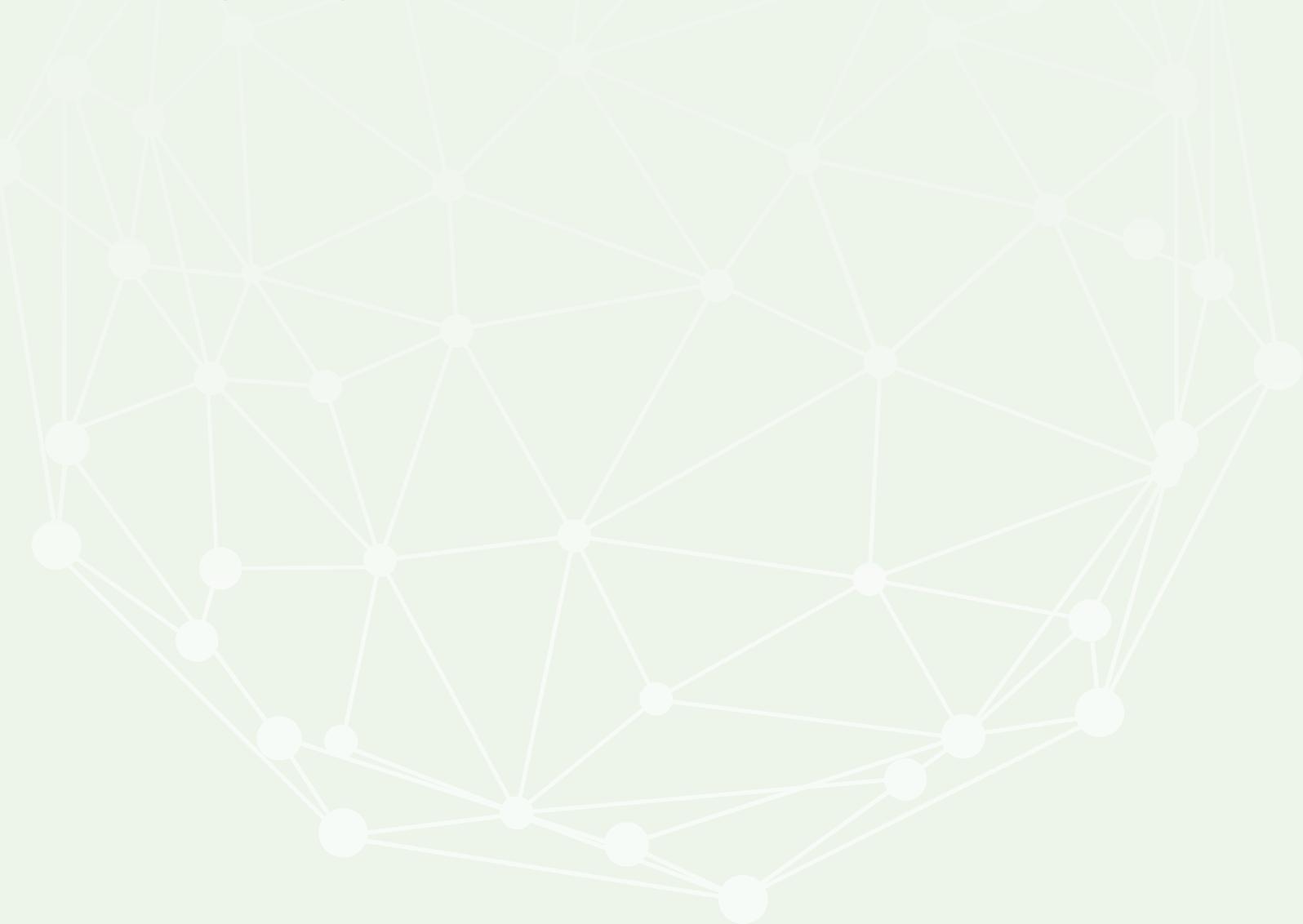
2. ACTION AGENDA

Given the inherent complexity of food systems, policy approaches are more likely to be effective if they are not compartmentalized. Rather, policy-making for food security and nutrition must move beyond agriculture and food production where it can better manage trade-offs and leverage synergies. Importantly, an environment conducive to innovation will allow for the development of creative and original policy and technical solutions by a wide range of stakeholders. Combining innovation with learning will support enhanced policy-making over the long term. Meanwhile, advocating for additional, complementary indicators within the CAADP process will ensure that the momentum arising from the UN Food Systems Summit in 2021 continues. The Action Agenda draws on the experiences in Ghana, Malawi, Morocco, and Rwanda to highlight some key factors underlying their success.¹

- 1. Ensure multistakeholder and multisectoral coordination across government departments in order to reflect the interconnectedness of food systems transformation.** African countries that have shown a measure of success in transforming aspects of their food systems show that well-coordinated national-level policies can facilitate success. Working with stakeholders from research institutions, civil society, the private sector, and development partners further ensures that there is a common vision and that policies have “buy in” across interventions, therefore making them more impactful. Rwanda has been exemplary in establishing cross-ministerial coordination groups to address the multifaceted nature of challenges facing its food systems. Meanwhile, Malawi has deployed a successful stakeholder engagement process to develop its national agriculture policy and investment plans, and Ghana has recently embarked on a comprehensive program to consult a variety of food system actors in lieu of the upcoming UN Food Systems Summit. Moreover, in advance of the UN Food Systems Summit, African countries have identified national focal points to coordinate their contributions to the event. This is an important step and is a role that must not be limited to the summit. Reorienting national efforts to adopt a food systems approach requires a lead coordinator, and as countries elevate food systems transformation to a top political priority, it would be appropriate to locate this role within higher echelons of government administration.
- 2. Facilitate evidence-based and guided experimentation and innovation of policies and accelerated science capacity for technical solutions supporting broad food systems change:** There is neither one single policy nor a unique mix of strategies that can deliver change across all objectives of a food system. Rather, policymakers will be required to forge new pathways to build sustainable, resilient, and prosperous food systems that deliver healthy and nutritious diets, improve livelihoods, and protect the environment. In this respect, both Malawi and Morocco have broken with convention to embark on large subsidy and investment programs to raise agricultural productivity. Disruptive innovations can reorient the trajectories of national and regional food security and nutrition outcomes. While policy innovations can undoubtedly have significant outcomes (as seen in this report’s case studies), an environment that is conducive to innovation allows other stakeholders such as research centers, the private sector and development partners to take part in the design and implementation of creative and original solutions to local challenges. Appropriate incentives, business models, and financing, as well as clear regulatory frameworks, skills, and infrastructure all support the development and scaling of promising innovations. In conjunction with these, systemic change is further cemented by economic tools such as taxation and subsidies, combined with proactive communication, as demonstrated in Rwanda and Morocco.
- 3. Institutionalize monitoring, evaluation and learning for impactful planning and implementation:** Even with disruptive innovations, systemic change must be an iterative process. While agile institutions have responded quickly to emerging threats and opportunities it is also essential that institutions integrate a framework for learning, in order to enhance long-term planning and implementation. Learning goes beyond accountability; it also includes a reflective environment and one that is open to failures, if only to learn from them. As policymakers transition into the use of a food systems approach, they will be required to be both introspective and outward looking. In this respect, a central role is played by reliable monitoring, evaluation, and data systems. In Ghana and Malawi, policymakers and program implementers have regularly and carefully fine-tuned programmatic interventions to maximize their impact and ensure long-term viability.

¹ See chapter 5 for country case studies on Ghana, Malawi, Morocco and Rwanda.

- 4. Integrate food systems transformation into long-term national vision, growth and development agendas:** Food systems, their challenges, and their opportunities are not homogenous across countries. Each country must prioritize its specific needs and objectives within a framework that affords it the creativity to innovate as new knowledge, ideas, processes, and systems are developed and become available. At the same time, a food systems transformation is unlikely to be rapid. Policymakers must therefore seek to elevate the transformation process beyond the impulses of political administrations. Integrating food systems transformation (including specific targets) into the long-term national vision can help transcend politics and make the transformation a national priority. This in turn builds certainty for investors and for other stakeholders who are engaged in the process; it also enables the continuity of the work required to transform food systems at the national level. Each country represented within the case studies in this report has demonstrated long-term commitments to support their agricultural sectors. Moreover, Malawi has gone so far as naming agricultural productivity and commercialization at the very top of three pillars for delivering inclusive wealth creation and self-reliance in its Vision 2063.
- 5. Enhance CAADP indicators to reflect the complexity of food systems:** This report identifies selected indicators from the CAADP Biennial Review by which to assess a country's vision and its progress toward food systems transformation. Policymakers, however, now have an opportunity to lead a continent-wide strengthening of the CAADP process. While the CAADP has undoubtedly focused national efforts in transforming agricultural sectors, it is now timely to adopt a more systemic view of food systems transformation and to go beyond the CAADP's current ambition of agricultural growth and transformation. Additional indicators are needed which better measure and reflect food systems' interconnectedness with the environment, social inclusion, nutrition and public health, youth employment, and income generation. There is an opportunity to align these additional indicators with national commitments under the various related international agreements including (but not limited to) the Sustainable Development Goals (SDGs), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention to Combat Desertification (UNCCD), and the UN Convention on Biological Diversity (CBD).



WHAT WORKS AT COUNTRY LEVEL?

African countries have made significant efforts and progress to transform their food systems to sustainably improve food security and healthy diets. The experience of four African countries that have been at the forefront of dedicated and effective actions at the institutional, policy, and programmatic levels, offers a wealth of lessons. Chapter 5 of this report describes the actions and experiences in food systems transformations in Ghana, Malawi, Morocco, and Rwanda by highlighting innovative government-led initiatives within the context of each country's complex food systems. These actions can be scaled-up and out across the continent. The table below offers a summary of some of the key actions:

<p>GHANA</p>	<p>Ghana is recognized as a leading African country in its efforts to reduce poverty and boost economic growth. A key component of success is the government's forward-thinking long-term policies that have paved the way for short-, mid-term and cross-sectoral interventions to achieve a common objective for sustained and inclusive growth. Supported by a strong and collaborative institutional framework, the government ensures inclusivity and support to all actors in the effective delivery of interventions. Moreover, Ghana's flagship Planting for Food and Jobs campaign has been successful in enhancing the involvement of the private sector in agricultural activities with significant financial support.</p>
<p>MALAWI</p>	<p>Malawi is among the top African countries that are on course to achieve continental agricultural policy reform and budget allocation targets. Recent institutional, policy and programmatic interventions demonstrate a comprehensive approach to transforming its food systems. Improvements in agricultural productivity have been driven by a successful—albeit controversial—inputs subsidy program. Malawi's policymakers chose to develop solutions that fit within their own contexts and have opted to do so inclusively. Rather than isolate a large and active development partner community, Malawi has joined forces with them to leverage their capacity and boost the impact. Dedicated nutrition policies, overseen at the highest levels, have contributed to a marked improvement in the health and well-being of Malawians. Finally, an institutional overhaul of its finance sector, combined with a financial literacy program, raised the amount of liquidity within the food and agricultural sectors and ensures its long-term viability.</p>
<p>MOROCCO</p>	<p>Morocco's commitment to sustainably develop its agriculture sector and agri-food industries to meet its food and nutritional demands from domestic production has significantly contributed to building a sustainable food system. Through the Ministry of Agriculture and several specialized agencies, the government has ensured better access to extension services and technologies and has enforced laws and regulations for more inclusive food value chains. In addition, expansion of irrigation, land restoration and agricultural insurance have significantly increased the resilience of the food system. Morocco is also facilitating access to finance in particular for smallholders, and entrepreneurship along the value chain, while promoting the participation of youth and women in agribusiness through dedicated measures such as capacity strengthening. More importantly, the adoption of the "territorialization approach"—in which policies and interventions are tailored to physical, human, financial, institutional, and cultural resources in each locality or territory—including across agricultural policies and programs, has increased the effectiveness of government interventions in the food system.</p>
<p>RWANDA</p>	<p>Rwanda has developed an extensive institutional framework that supports effective coordination between different stakeholders in the development and implementation of activities and interventions in its food systems. The government's approach centers on encouraging private sector involvement in all activities along the food value chain. Similarly, the government is encouraging Rwanda's development to be green-led, to improve resilience and climate-sensitive and smart approaches. Finally, Rwanda's land tenure reforms have further strengthened the country's ability to meet demands for food security, healthy diets, and improved livelihoods.</p>

3. CHALLENGES, OPPORTUNITIES, AND DRIVERS FOR AFRICAN FOOD SYSTEMS TRANSFORMATION

Food systems around the world play three key roles: they provide food security and nutrition; they provide livelihoods for millions, not only in agriculture and food production, but also across the broader supply chain and complementary sectors; and they contribute to the protection and enhancement of ecosystems.⁹ While these objectives may align globally, the pace at which they are being achieved varies by context. Africa faces a unique set of challenges and opportunities that shape its food systems and with which policymakers must grapple; these include a growing but young population, rapid urbanization, sustained economic growth and rising incomes, high unemployment, extreme climate vulnerability, and the transition to a digital economy. These settings have already induced fundamental changes in dietary preferences and habits, giving rise to a corresponding shift in demand for food. This has in turn evoked responses from the components of food systems, including food production, distribution, and allocation.¹⁰ These shifts in demand and supply will continue to shape the continent's food systems into the future.



Now is the time to rethink and reorient African food systems

Over the last few decades, African governments have moved to overcome the “triple challenge” of food security and nutrition, jobs and incomes, and environmental sustainability. Although interventions have not always been implemented within the context of “food systems transformation”, several of the interventions that have been carried out provide strong foundations and models for the future (see the case studies in Chapter 5). Indeed, until 2017, several African countries were making steady progress towards meeting the Sustainable Development Goals on eliminating hunger and reducing malnutrition.¹¹ But as climate change, conflicts, and the COVID-19 pandemic compound pressure on frail systems, these advances have stalled or even been reversed.¹² Policies have evolved less rapidly than the structural changes within food systems; this has resulted in the rising prevalence of obesity, increasing greenhouse gas emissions, and ecosystem degradation.

Now is the time to rethink and reorient African food systems. The scale of past achievements is remarkable, but much remains to be done. Although challenges persist and new and interlinked threats

appear, there is a multitude of opportunities available to raise productivity, provide affordable and healthy diets, create decent and profitable employment, and strengthen the resilience of farmers and other food system actors. To enable food systems to tackle the triple challenge successfully, policymakers must identify pathways for optimizing the synergies and managing the trade-offs, either by adjusting their institutional frameworks or creating an innovative and inclusive mix of policies.

CHALLENGES AND THREATS FOR AFRICAN FOOD SYSTEMS TRANSFORMATION

FOOD AND NUTRITION

Between 2000 and 2016, several African countries were able to dramatically reduce the prevalence of stunting and wasting.¹³ Since then, however, due to climate change and protracted conflicts, progress on addressing malnutrition has stalled and in some cases reversed. The COVID-19 pandemic has further hampered efforts to deliver healthy diets containing sufficient, diverse and safe food for all, including infants. Between 2015 and 2020, an additional 33 million people in Africa slipped into hunger, almost all of whom lived in Africa south of the Sahara SSA.¹⁴ In 2019, more than one in five Africans living in SSA (21 percent) were undernourished and consumed insufficient calories.¹⁵

At the same time, growing numbers of people are consuming too many calories in the form of diets that are overly rich in saturated fats, sugar, and salt, and low in fruits and vegetables. This is resulting in a rising prevalence of overweight and obesity, with a corresponding increase in diet-related diseases such as cardiovascular diseases, cancer and diabetes.¹⁶ Without urgent action to tackle the growing rates of overweight and obesity, by 2030 diet-related illnesses are likely to become the leading cause of mortality in SSA.¹⁷ Indeed, it is not uncommon to find undernutrition and obesity coexisting within the same country and even household, with girls and women being more affected by overweight/obesity than boys and men.¹⁸ This double burden of malnutrition is further straining fragile health systems and could undermine increases in life expectancy.

More needs to be done if global and continental targets to end hunger and all forms of malnutrition are to be achieved. Under- and over-nutrition costs African countries between 3 and 16 percent of their annual GDP, while child undernutrition costs an additional 1 to 11 percent of the total public health budget.¹⁹ **Eliminating malnutrition in Africa is therefore an economic imperative, with returns from**

investing in nutrition being as high as US\$ 16 for every US\$ 1 spent.²⁰ For 15 African countries,** the potential cumulative benefit of a 40 percent reduction in chronic undernutrition is US\$ 83 billion.²¹

Although the health sector has traditionally taken the lead in tackling malnutrition, it is now well established that a holistic food systems approach is required to drive change. Multisectoral, nutrition-specific and nutrition-sensitive interventions are urgently required across food value chains and within rural services and development, including health, education and sanitation. Accordingly, nutrition must be integrated into agricultural policy-making, rural development plans, social protection, water-sanitation-hygiene (WASH), and education.²² The best way to achieve the nutritionally diverse diets, which protect people from all forms of malnutrition is through the promotion of nutritionally diverse production systems together with nutrition-sensitive policies in agricultural, livestock, fisheries, and aquaculture.

One factor driving success in addressing malnutrition, as demonstrated by the Malabo Montpellier Panel's report entitled *Nourished: How Africa Can Build A Future Free From Hunger & Malnutrition*, has been the assigning responsibility at the most senior levels. Countries, such as Senegal, that have been successful have created units specifically tasked with reducing malnutrition levels, that were often accountable directly to the highest level of government. In Senegal, for example, the responsibility for nutrition-related policy-making and interventions rests at the most senior government levels. Previously, the country's Cellule de Lutte contre la Malnutrition (Unit for the Fight Against Malnutrition, or CLM) was situated within the prime minister's office and provided technical assistance on the definition and implementation of the national nutrition policy. In late 2020, however, the CLM was renamed the Conseil National de Développement de la Nutrition (National Council for Nutrition Development, or CNDN) and it is now hosted by the general secretariat of the government, which is located at the president's office. The CNDN is composed of a technical arm (the



Countries, such as Senegal, that have been successful have created units specifically tasked with reducing malnutrition levels, that were often accountable directly to the highest level of government.

** These countries include Benin, Chad, Ethiopia, Lesotho, Madagascar, Malawi, Mali, Niger, Nigeria, Rwanda, Senegal, Togo, Uganda, United Republic of Tanzania, and Zambia.

Bureau Exécutif National, or BEN), twelve relevant sectoral ministries and the private sector, all of whom are working on nutrition. It is the key multisectoral platform for political dialogue on nutrition and showcases the commitment of the Senegalese government to the improvement of nutrition and its mainstreaming toward sectoral policies. In Rwanda too, implementation of the national nutrition policy is led by an interministerial coordinating committee that is based within the prime minister's office.²³

Positive nutrition outcomes have also resulted from several policy, regulatory and programmatic interventions that have been implemented across Africa. These interventions include making nutritious foods cheaper relative to highly processed unhealthy products; promoting dietary diversity; introducing biofortified crops and fortifying staples; extending the provision of home-grown school meals; supporting exclusive breastfeeding; and updating social safety nets.²⁴

Alongside malnutrition, there is an urgent need to stem the growing incidence of foodborne illnesses. In 2015, the World Health Organization (WHO) concluded that Africa had the highest per capita incidence of foodborne illnesses and that they led to 137,000 deaths and 91 million acute illnesses annually.²⁵ Poor food safety standards disproportionately affect children, and foodborne illnesses cost SSA up to US\$ 16.7 billion annually in human capital or productivity losses.²⁶ Early efforts to update food safety laws and regulations and to harmonize regional sanitary and phytosanitary (SPS) frameworks are key to combatting both microbiological and chemical contaminations. In the medium term, bolstering compliance and enforcement mechanisms such as monitoring, inspection, surveillance, and testing capacity is essential to creating a culture of food safety among both formal and informal producers and processors and within the hospitality industry.²⁷

YOUTH, JOBS AND INCOME

Africa's young people are its most valuable asset. Currently, about 20 million young people join SSA's workforce every year, and this is expected to rise to 30 million by 2050.²⁸ While this "youth bulge" is not dissimilar in size to that experienced during the 1970s and 1980s in developing regions of Asia and Latin America, Africa's youth bulge is more concentrated in rural areas. Focusing efforts in rural areas will ensure that the new workforce has access to the same opportunities and facilities as their urban counterparts. Africa's food and agriculture systems are therefore central to government job agendas.

Food systems have significant potential to generate more and better employment opportunities. Currently, more than half of the continent's workforce is employed in agriculture.²⁹ In West Africa, 66 percent of total employment (approximately 82 million people) is in the food sector, from the farm level to processing, packaging, transportation, distribution, and retailing.³⁰ Although the share of employment in agriculture is declining, the absolute number of people employed in the sector and across food systems is still increasing.³¹ The sector has, in fact, been one of the largest employers to date and will continue to absorb labor for the coming decades.³²

Much of this employment, however, tends to be informal. The International Labour Organization (ILO) estimates that, almost all of Africa's agricultural sector (97.9 percent) is informal.³³ Informal jobs are not necessarily illegal jobs; efforts to eliminate them are also futile, and this type of employment is important for meeting food security and nutrition needs.³⁴ For producers in rural areas, informal non-farm work provides a means to diversify and increase incomes.³⁵ In urban areas too, the informal food trade offers a vital lifeline for maintaining food security, especially for the poor. Informal markets account for 72 percent



of nonagricultural employment in Africa,³⁶ and urban food traders are important intermediaries for food markets, connecting local farmers to urban consumers and to the hospitality industry. In South Africa alone, the informal food sector is worth approximately ZAR 360 billion (US\$ 20 billion) a year.³⁷

By embracing the informal food sector, governments can expedite progress in tackling malnutrition, poverty, and unemployment. As recommended by the Malabo Montpellier Panel's 2020 report entitled *Trading Up: Policy Innovations to Expand Food and Agriculture Trade in Africa*, with appropriate support systems including institutions, planning and infrastructure, informal food traders can thrive, become more efficient and generate additional jobs.³⁸ In Durban, South Africa, for example, a large informal and wet market was redesigned in partnership with the traders to provide a safe, sanitary, less-congested, and healthy environment for traders and consumers.³⁹

While informal employment will ensure that Africa's food systems can continue to provide jobs, there is an urgent need to address the quality of jobs created. A study of six eastern and southern African countries showed that less than 10 percent of jobs in the food system are beyond the farmgate: only 6 percent are concentrated in food services such as transportation and marketing and only 3 percent are in food manufacturing and industry. The lion's share of jobs in Africa's food systems (over 90 percent) are in farming;⁴⁰ these are backbreaking jobs that are plagued by risks and uncertainty. They are also often



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poor income generators. By one estimate, an average smallholder family in Kenya generates a gross income of about US\$ 1.40 per day per person (measured in 2009 prices); worse still, on farms of less than one hectare in Ethiopia, income can be as low as US\$ 0.80 per person per day.⁴¹ In the short term, greater diversification to non-farm employment and other wage jobs helps farmers supplement farm income and reduce risk.⁴² Future food systems jobs, however, will have to be stable, remunerative and meaningful.⁴³ Jobs will also have to include poor and marginalized workers and offer improved working conditions, and they will need to include access to labor rights, a safe environment and scope for advancement.

Creating jobs for young women and men is already a major policy goal in most African countries. However, few youth policies are aligned with broader rural development strategies and fewer still are implemented effectively. Youth policies often have a narrow agenda such as information and communications technology (ICT) or sports; however, this narrow focus is insufficient to truly harness the dynamism and energy of young people and it is

unlikely to empower them to address large global issues such as climate change and food security.

Africa's young people are generally better educated than their parents, more comfortable with new technology and more willing to experiment. Their energy, dynamism and entrepreneurial spirit, if channeled well, have the potential to radically reshape Africa's food systems and rural areas. Successfully navigating changing food systems will require



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increased support for overcoming structural barriers, upgrading skill sets and building confidence to pursue new, sustainable and productive livelihoods. This is particularly critical for young women in rural areas, for whom the three characteristics of being young, female and rural present a triple burden in accessing capital, raising productivity and generally prospering.⁴⁴

The future of employment within and beyond agricultural production will almost certainly be knowledge- and technology-intensive and will require a wide range of professional, technical and artisanal skills. Investing in, and promoting the uptake of new technologies such as ICT, solar power, remote sensing technologies, digital finance, and e-commerce enables food system entrepreneurs to build and seize new opportunities and enhance output.⁴⁵ To seize the opportunities that food systems offer, policymakers must cultivate an entrepreneurial mindset among Africa's youth, as well as crowd in talents and investments into the agri-food sector.

Unlike the current experience of agriculture as a backbreaking career with poor income, an attractive agrifood sector will offer high quality jobs as well as fair returns to the effort expended. In addition to an investment-friendly environment to attract private



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capital, future jobs in food systems will demand a corresponding skills upgrade. Addressing the skills gap must be a broad policy priority, with close collaboration and input from business and educational institutions. Continued investment in quality rural education will ensure that the future workforce is prepared and able to make meaningful contributions. Agricultural extension programs (in-person and digital) are essential to building capacity where traditional education systems have been less successful.⁴⁶ In addition, greater support for collective action and inclusion in cooperatives, strengthening socio-legal empowerment, promoting legal recognition of informal workers, and widening coverage of social protection systems will ensure that the jobs are fair, remunerative and appeal to a broad range of job seekers - including women.⁴⁷

THE GENDER GAP

As researchers, innovators, farmers, food processors, caretakers, chefs, business owners, marketers, and investors, women are key agents of change in the food system. More than 60 percent of the female workforce in SSA is employed in agriculture.⁴⁸ There are approximately 249 million female livestock keepers in Africa,⁴⁹ While the majority of them are backyard livestock producers, a few have elevated their production to successful commercial companies. Women are thus fundamental to the fight against hunger and malnutrition.

Evidence shows that women are as good as men when it comes to producing food. However, a persistent gender gap in accessing key inputs (especially land, finance and education) means that their productivity remains 20 to 30 percent lower than that of men in SSA.⁵⁰ Worse still, the contributions of women to agriculture and broader food systems are not always fully or formally recognized and in some cases they earn half the wages that men make.⁵¹ Moreover, with poorer access to inputs and assets—which are often also of low quality—women are less able to present collateral for financial services, which thereby reduces their resilience to income shocks.^{52,53} Women across SSA are thus exiting the agricultural sector and they are doing so faster than men. Between 2011 and 2019, there was a 10 percent drop in the share of women employed in agriculture relative to the total female workforce; at the same time, the drop in the share of men employed in agriculture fell by only 6 percent.⁵⁴ The COVID-19 pandemic is likely to exacerbate existing social inequities and make gender gaps even worse, as women tend to suffer disproportionately from job losses and girls are more likely than boys to be pulled out of school.^{55,56}

If women had the same access to resources as men, they would achieve the same yield levels. Across

Ethiopia, Malawi, Rwanda, Uganda, and the United Republic of Tanzania, closing the gender gap could raise outputs by up to 19 percent and could lift hundreds of thousands of people out of poverty.⁵⁷ Improving women's access to inputs is therefore not only a moral imperative, it is also economically important. Women's empowerment and involvement in food systems are also beneficial for household food security, dietary quality and household nutrition. Evidence shows, for example, that where women own livestock, households consume meat more frequently and have sufficient and nutritious food for more months of the year than do households where women do not own livestock.⁵⁸ It is therefore urgent to level up the playing field for women, not only so that they can engage fully and on equitable and fair terms, but also so that their efforts are recognized and valued.

Over the last three decades, the number of women engaged in supply chains for high-value horticultural export produce has risen significantly, particularly in eastern Africa. In Kenya, for example, two-thirds of the workforce producing green beans are women.⁵⁹ Women are also increasingly seen in food processing sectors, particularly in West Africa. For example, in Senegal's Casamance region, 90 percent of the fish processing sector is managed by women. Not only does this provide them with employment and income—which in turn supports their dependents—it also supplies the urban poor with inexpensive and nutritious food. Finally, in addition to their role at every stage of the “visible” parts of food chains, women play an essential role in their households; they are responsible for domestic processing and cooking, energy and water supply, and the care of all family members.



Involving women across policy-level decision-making will ensure that women's needs are represented and accounted for. Political mobilization is also a central avenue through which women's voices can influence the policies that shape the food system

Transforming food systems to be more inclusive will require approaches that not only enable women to participate and benefit equally but also empower them. Closing the gender gap in Africa's agricultural sector must begin, first, with expanding access to education for girls and young women, particularly in rural areas. Investments in women's and girls' education, specifically with regard to nutrition, can have a greater impact on the food security and nutritional status of children than will similar

investments in men.⁶⁰ Studies have also shown that women who have received secondary school education are half as likely to have stunted children than those who have no formal education.⁶¹

Second, enhancing women's legal rights to own and access resources and productive assets will strengthen their decision-making power and foster a wider household and societal transition to greater gender parity. It is also essential to design products (inputs, machinery and technology) and services (such as finance and extension) to suit the needs of women, and to tailor work schedules and learning preferences to accelerate their uptake and application by women.

Third, protecting and supporting the types of informal employment in which women are overrepresented (such as petty trade) will strengthen the social and economic resilience of women. In particular, keeping local markets open—and doing so safely and with appropriate sanitary and protective support—ensures that women will be able to continue supplying food and generating income both during COVID-19 and in the post-pandemic world.⁶²

Fourth, women's organizations are powerful catalysts for participation in the food system. They provide technical support and advice, credit, training, legal literacy, policy representation, etc. Fostering greater organization among women will enable them to participate more effectively across the variety of roles they play in Africa's food systems.

Finally, involving women across policy-level decision-making will ensure that women's needs are represented and accounted for. Political mobilization is also a central avenue through which women's voices can influence the policies that shape the food system.⁶³ Currently only Rwanda, Senegal and Mauritania have a higher female parliamentary participation rate than the African and global averages. Raising parliamentary participation by women inspires them to engage in food policy and further fosters societal transitions.

ECOLOGY AND CLIMATE

Africa's climate is changing. Average near-surface temperatures have already risen by 0.5°C above pre-industrial levels,⁶⁴ and the three hottest years on record are 2010, 2016 and 2019.⁶⁵ Precipitation patterns have also shifted discernibly as extreme events become more frequent and intense. Both southwestern Africa and the Horn of Africa have seen extended periods of drought over the last decade; in some cases it has extended over two or more years and has led to widespread crop failures.⁶⁶ In contrast, flooding in the West African Sahel has also become more frequent, occurring 8 or 12 times per year during the 2000s compared to a pre-1990 average of under twice a year.⁶⁷ Between 2019 and 2021,

fueled by one of the most active seasons on record for the southwest Indian Ocean region, northern Mozambique, southern Tanzania, Zimbabwe, and Malawi were hit by four tropical cyclones in just two years, which devastated infrastructure, livelihoods, and economies.⁶⁸

Since almost all of Africa's agriculture is rainfed, these changes in temperature and precipitation are adversely impacting the continent's food systems.⁶⁹ Studies show that because of changes in climate, crop yields for key staples such as maize and wheat are falling in the tropics, and that for every 1°C increase in temperatures above historical levels, crop productivity declines by 5 percent.⁷⁰ Moreover, as Africa's drylands become hotter and drier, livestock growth rates, productivity and reproduction capacity, especially within pastoralist systems, are also falling.⁷¹

Changes in temperature and humidity are also altering the distribution of pests and diseases, further disrupting food availability and safety. For example, as warming occurs at cooler climates and higher altitudes such as the Kenyan and Ethiopian highlands, these areas become more conducive for pests such as the coffee berry borer.⁷² Warming also affects the health of livestock. It is likely to cause an increase in the prevalence of tick-borne diseases in East and South Africa and Rift Valley Fever epidemics are likely to increase with more frequent and intense El Nino events in East Africa.⁷³



With a changing climate, policy interventions will need to address near-term impacts, while designing food systems that deliver sufficient, nutritious and safe food for future generations.

The impact of these changes is likely to be exacerbated by large-scale ecosystem degradation caused by agricultural expansion. In just two decades—from 1940 to 1960—the agricultural area for crops and grazing in Africa grew by over 40 percent.⁷⁴ Although the rate of conversion has since slowed, it is still alarming.⁷⁵ Between 1975 and 2013, cropland doubled in West Africa; this expansion was concentrated in Togo, Benin, Chad, Mauritania, and Burkina Faso.⁷⁶ In East Africa too, between 1966 and 2018, wetland areas fell by 55 percent, largely driven by agricultural development and the search for income-generating activities.⁷⁷ The resulting fragmentation and degradation of ecosystems and of biodiversity severely diminish the capacity of ecosystems to provide food, fresh water and genetic material and to play their environment- and climate-regulating role.

With a changing climate, policy interventions will need to address near-term impacts, while designing food systems that deliver sufficient, nutritious and safe food for future generations. In the immediate future, improving land-use planning and management will be at the heart of producing food sustainably. This in turn will require expanding extension and advisory services in order to enhance capacity for, and education about, sustainable land management practices; these practices include diversification of output and agro-ecological production methods such as conservation agriculture, sustainable intensification, permaculture, etc. Within livestock production too, addressing animal feed, health and genetics can support a transition to more sustainable production methods.⁷⁸



More efficient use of inputs, especially water, will further enhance agricultural output and reduce the demand for more land conversion. Rainwater harvesting, sustainable groundwater use and irrigation offer important coping mechanisms against extreme weather conditions. Although only 6 percent of land in Africa is currently irrigated, as shown in the Malabo Montpellier Panel report entitled *Water-Wise: Smart Irrigation Strategies for Africa*, several countries have made determined efforts to expand the use of farmer-led, small- and large-scale irrigation. Over the span of two decades, for example, Morocco's *Plan Maroc Vert* (Green Morocco Plan) combined innovative public private partnerships (PPPs) and tax rebates for irrigation infrastructure and technology, to almost double the amount of land equipped for irrigation.⁷⁹ Expanded investments in irrigation, however, must be coupled with better policies for sustainable use of available water resources. Water-use efficiency can be increased by adopting high-efficiency irrigation technologies and/or improving

water management, thereby reducing the overall impact of agriculture on the environment.

While these interventions limit the expansion of agriculture into (new) fragile ecosystems, restoration and conservation of high-carbon ecosystems such as forests, rangelands, wetlands, and mangroves offer multiple positive outcomes for climate mitigation, adaptation and food security over the long term.⁸⁰ At the same time, universal access to early warning systems, combined with stronger emergency responses such as weather and health insurance, social protection, and safety nets ensure that lives and livelihoods are protected and economic damage is limited.

Demand-side measures, in particular to reduce food waste and loss, can also have an impact on the sustainability of food systems. Investments in upgrading logistics, food infrastructure and processing technologies, combined with economic incentives, regulatory alignment and running awareness campaigns can help to feed more people, benefit the climate and the environment and conserve water.

CONFLICT AND PROTRACTED CRISES

Food insecurity and conflict are interlinked and potentially mutually reinforcing. Natural, economic and political shocks that result in extreme volatility in food prices and acute food shortages can deteriorate into conflict, particularly where they overlap with existing stresses such as poverty and inequality, weak institutions and poor capacity to respond effectively.⁸¹ Widespread economic impacts also disrupt employment and diminish the resilience of communities, impairing their ability to engage in coping strategies, purchase safe and nutritious food, and access social protection and health care. In 2011,



In 2016, the prevalence of undernourishment in countries affected by conflict was four percentage points higher than in those not affected by conflict

rising food prices in Egypt, for example, overlapped with pre-existing social unrest, sparking protests in the country.⁸²

On the other hand, conflicts in Africa are increasingly causing acute food crises. In 2020, the eight African countries that were experiencing active conflicts also had the largest increases in food insecurity.⁸³ Conflicts often displace farmers and other food systems actors; they are forced to abandon their land and enterprises to escape the violence, and their livestock is either

killed or stolen by raiders. Critical infrastructure such as roads, ports, airports, warehouses, and water tanks are often destroyed or blockaded. Not only does this damage production and the ability to take produce to markets, it also obstructs the distribution of humanitarian aid to affected communities. In northern Nigeria and the Lake Chad Basin, Cameroon, and the Central Sahel, conflicts have disrupted livelihoods, have led to extensive displacement, and have limited food assistance. Food insecurity in these areas is thus largely a consequence of conflicts.⁸⁴

Conflicts therefore affect all four dimensions of food security: availability, access, utilization, and stability.⁸⁵ They can create a downward spiral that can result in extended and severe food and nutrition crises. Moreover, health and nutrition failures caused by prolonged and/or protracted conflicts can have both short- and long-term morbidity and mortality outcomes. In 2016, for example, the prevalence of undernourishment in countries affected by conflict was four percentage points higher than in those not affected by conflict.⁸⁶

To prevent future conflicts from resulting in food crises, policymakers must engage constructively with early warning providers, humanitarian agencies, and development partners. Effective emergency relief and response strategies offset a need for greater certainty to intervene with preemptive, risk-based actions to avoid escalation. Such strategies would be founded upon clear trigger events and escalating actions.⁸⁷ In addition, policymakers must join the call to eliminate the use of food as a weapon of war by making these tactics illegal.⁸⁸ Matching policy responses to the underlying drivers of conflict ensures that, beyond the immediate crises, relief and development interventions and policies also promote and protect livelihoods, including the restoration of agricultural potential.⁸⁹

OPPORTUNITIES AND DRIVERS FOR AFRICAN FOOD SYSTEMS TRANSFORMATION

Despite the threats and challenges facing Africa's food systems today, several opportunities are available to counter them and raise productivity, provide affordable and healthy diets, create decent and profitable employment, and strengthen the resilience of farmers and other food systems actors.

AGRICULTURAL PRODUCTION AND PRODUCTIVITY

Africa's agricultural sector has a lot of untapped potential. Decades of post-independence underinvestment in the sector, together with poor governance, have resulted in productivity levels that fall well below global averages and have pushed many smallholder farmers into subsistence farming. Between the 1960s and 2000, a persistently low use of inputs, technology and machinery diminished



the productivity of land, labor and capital. However, since the 2000s, productivity has been on the rise.⁹⁰ Between 2010 and 2018, having recovered to pre-independence levels, annual labor productivity growth was consistent at 2 percent while land productivity grew at over 4 percent per year.⁹¹

Despite these moderate improvements, per-hectare yields of maize, wheat and rice in Africa remain 47 percent lower than global averages. The average cereal yield in Africa is only 1.6 tons/hectare (t/ha), compared to the global average of 3.9 t/ha.⁹² In 2019, the yields of various other crops were also below global averages, including bananas (49 percent below), cassava (20 percent below), groundnuts (41 percent below), and sweet potatoes (47 percent below).⁹³ Africa, as a result, imports US\$ 64.5 billion of food annually.⁹⁴



The greatest opportunities for raising Africa's agricultural yields and livestock productivity lie in addressing both demand- and supply-side constraints, expanding extension services, and increasing the availability of, and access to, modern inputs and technology

The greatest opportunities for raising Africa's agricultural yields and livestock productivity lie in addressing both demand- and supply-side constraints, expanding extension services, and increasing the availability of, and access to, modern inputs and technology. For crop farmers, access to affordable improved seed and plant varieties, fertilizers (organic and inorganic), machinery,

and irrigation technology help to overcome environmental, social and economic constraints while building resilience against stresses and shocks. Models predict, for example, that if improved hybrid maize were adopted by half of Ethiopia's farmers, the resulting increase in domestic maize production could reduce Ethiopian maize imports to zero.⁹⁵ Equally, access to quality feed, genetic material and animal health services underpins a growing livestock sector.

Fostering greater adoption of improved inputs and technologies relies on education, training and extension services to support diverse production models, as well as access to credit and basic income or savings.⁹⁶ Moreover, well-designed PPPs can transform input value chains and agricultural mechanization by leveraging the skills and capacity of the private sector. **Smart input subsidy programs combined with comprehensive extension programs, which are implemented via cutting-edge digital technology (such as e-vouchers), can ensure that delivery is steered to smallholder farmers who would otherwise not have access to affordable and timely inputs.** Nigeria's Growth Enhancement Support (GES) scheme, for instance, injected transparency into state fertilizer programs, targeted delivery directly to smallholder farmers, and within just two years had been successfully scaled up to 5 million farmers.⁹⁷ Veterinarian PPPs in the livestock sector also provide critical support to vaccination programs, particularly in remote areas.⁹⁸

The use of improved inputs and technologies, however, must go hand in hand with quality control of those inputs and that technology. Harmonizing sanitary and phytosanitary (SPS) standards among regional neighbors and removing trade barriers can broaden the uptake of, and trade in, quality inputs. To develop a fully functional and strong regional market for seeds and fertilizer, the Economic Community of West African States (ECOWAS) has made provisions for trade of inputs within the region. Regulations and certifications govern procedures for the release of new seed varieties, with mandatory licensing of all operators in the seed supply chain. Thus, with the establishment of common regulations on the quality and labeling of fertilizer blends within the region, private companies can now engage unhampered in the regional trade in fertilizers.⁹⁹ Similar efforts are underway in the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC) and in the South African Development Community (SADC).¹⁰⁰ Finally, adoption of inputs must provide appropriate returns on investment for farmers. Improving access to markets, including through agro-processing, can provide vital outlets for produce.

AGRO-PROCESSING

Agro-processing in Africa has already taken off, having been accelerated by the convergence of several structural changes. First, greater urbanization, rising incomes, more women working outside the home, and longer commutes are driving demand for first-stage processed foods such as maize flour, and second-stage processed foods such as bread and noodles. Second, higher agricultural productivity ensures a reliable supply of inputs for processors. Third, purchase and import of machinery and parts has become increasingly easy due to fiscal support from governments and better trade links with producing countries, particularly in Asia.¹⁰¹ Moreover, as the machinery is adapted to local needs and contexts, its capacity also diversifies; this enables its take up at any scale, from nano (such as backyard milling), to small and medium businesses that can process different products in varying quantities, to large, highly specialized industrial plants. These three factors make agro-processing an attractive business proposal, and the private sector has responded with enthusiasm.

The growth of agro-processing in Africa offers a multitude of benefits. Transforming, preserving and preparing food for intermediate or final consumption brings together the best of the agricultural, manufacturing and services sectors. A flourishing food processing sector alleviates seasonal shortages in food supply; it stabilizes market prices, reduces postharvest losses, unlocks demand for nutritious foods, and improves food safety standards.¹⁰² Agro-processing can also diversify the uses and applications—hence, markets—for agricultural produce. Its introduction also encourages greater



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circularity in the sector as sub- or by-products in one value chain are used as inputs for another chain. In Ghana, for example, cassava biomass is increasingly used as a raw material for bio-based products such as starch, industrial flour, ethanol, and feed formulations.¹⁰³ Where processed agricultural products are subsequently exported, they also contribute significantly to economic growth.¹⁰⁴

Since first-stage agro-processing is likely to happen close to production sites, there can be extensive impacts on rural economies. The sector has the potential to create well-paying, inclusive, off-farm jobs and can also drive both upstream and downstream value addition. Forty women in Kenya, for instance, purchased a fruit processor with support from the Arid Lands Resource Management Project. The machine produces over 10 liters of mango juice per hour and once blended with preservatives, hot water and citric acid, it sells for US\$ 1 per liter, compared to a mere US\$ 0.01 for four mangoes.¹⁰⁵

The processing sector can therefore drive value addition in a way few other sectors can. In Tanzania, as output from the meat and dairy processing sector rises, it is estimated to create a threefold economic multiplier impact, drawing higher inputs (live cattle and milk) and prompting increased household spending from new incomes and better employment.¹⁰⁶ A thriving processing sector also marshals demand for the complimentary services that are provided by engineers, energy service providers, electricians, nutritionists, food technology experts, and quality managers, as well as marketing, packaging, labeling, and compliance professionals.^{107,108}



There is thus an unequivocal case for scaling up Africa's agro-processing sector. This is particularly pertinent for Africa's indigenous, neglected, and orphan crops

There is thus an unequivocal case for scaling up Africa's agro-processing sector. This is particularly pertinent for Africa's indigenous, neglected, and orphan crops such as canarium nut (*Canarium Indicum*), marama beans (*Tylosema esculentum*),



and bambara nut (*Vigna subterranea*).^{109,110} Not only are they very nutritious and play an important role in diversifying diets, they are also drought-resistant, and can produce a reasonable crop even when grown in poor soils.^{111,112} Improving the processing and packaging of—hence nutritional awareness about—these crops will make them more acceptable among consumers and will expand their market opportunities,¹¹³ particularly among both domestic and international urban dwellers.¹¹⁴

Policies aimed at scaling up food processing should prioritize improving the enabling environment for private sector participation, rather than setting up initiatives for value addition “from scratch” or undertaking processing directly. In several African countries, governments are already steering food processing reforms in this direction. Countries such as South Africa, Ethiopia, Kenya, Morocco, and Nigeria, offer a combination of fiscal incentives and investments in critical infrastructure such as transport (connecting producers and markets), energy, and skills development to “crowd in” private sector investments to agro industries.¹¹⁵ In addition, supporting processors to meet food safety standards will further enhance returns on investment and strengthen the business case for participating in the food processing sector.

The success of agro-processing in Africa will be underpinned by the availability of affordable and good quality machinery and improved infrastructure. The growth and increased use of digital technologies can strengthen market access and the provision of information.

TECHNOLOGY AND DIGITALIZATION

Whether it is machinery, digital solutions, or biotech, agricultural technology could be a game changer in the transformation of Africa’s food systems. Although African agriculture is the least mechanized in the world,¹¹⁶ the uptake of agricultural machinery has accelerated in recent years due to the rising costs of agricultural labor and animal traction, and because of the more economical alternatives available from private commercial mechanization service providers. There are a number of examples of improvements in the capacity of smallholders and other operators to grow, store, process, transform and transport their crops and products through the successful adoption of innovative mechanization practices.¹¹⁷ A technology-led transformation is already underway and some countries such as Morocco and Ethiopia are now embarking on new efforts toward sustainable agricultural mechanization.¹¹⁸

At the same time, the use of digital technologies, tools and services across the food sector is widely visible. Digital technologies have broken down borders and



barriers in accessing markets, finance and services, allowing for competition and for a more diverse set of players to engage in food systems.¹¹⁹ In 2019, there were at least 390 distinct and active digital solutions for agriculture across the continent, nearly 60 percent of which had been launched in the three previous years. These digital solutions reach as many as 33 million smallholder farmers and pastoralists across the continent,¹²⁰ and this will increase further as mobile phone coverage grows. Combining digital solutions and machinery, for example, as done by Hello Tractor in Nigeria and TROTRO Tractor in Ghana, further amplifies the potential positive impact that technology can have on productivity.¹²¹

Without losing sight of the lessons learned from past failures in Africa and other parts of the world, the continent must capitalize on the potential benefits of ag-tech to raise yields, improve farmer livelihoods, reduce postharvest losses, unlock demand for nutritious foods, and advance food safety standards. Improving storage, refrigeration, transport, and processing reduces the quantity of food that is damaged or infested and ensures that more nutritional value is preserved. The World Bank estimates that a 1 percent reduction in postharvest losses in SSA could lead to yearly economic gains of US\$ 40 million.¹²²



Private sector skills and capital can play a leading role in scaling up the design, development, and distribution of customized technologies, solutions, and support services through innovative business models

Clear and definitive national strategies foster a broader innovation system. By prioritizing high quality skills-based education and training, especially

among young people, governments will leverage the region's inventiveness and spur entrepreneurial initiatives toward building an African ag-tech machinery industry.¹²³ Private sector skills and capital can play a leading role in scaling up the design, development, and distribution of customized technologies, solutions, and support services through innovative business models. Fiscal incentives and investments in supportive and last-mile infrastructure will facilitate access to, and use of, technologies and services across the food system. Finally, an enabling environment to support postharvest systems development must be underpinned by regulatory and monitoring frameworks for quality management and safety assurance.¹²⁴

INFRASTRUCTURE

Poor availability of, and access to, reliable and efficient infrastructure is a critical barrier to transforming Africa's food systems. Transport, storage, processing, energy, and digital infrastructure have an important impact on the connectivity, productivity and inclusivity of agricultural systems.^{125,126} Good quality, well-connected and well-integrated transport infrastructure can reduce costs and postharvest losses, can ease logistics, and can increase access to inputs, technologies and financial services.¹²⁷ In Tanzania, for example, transporting tomatoes by truck can be 10 to 30 times less expensive than haulage by foot due to efficiency gains and reductions in perishable waste.¹²⁸ Furthermore, the recent completion of the Senegambia Bridge reduces travel time between Senegal's capital, Dakar and Ziguinchor to five hours. This is a significant time saving compared to an unreliable ferry crossing or a detour around The Gambia. The 942-meter toll bridge thus reduces travel time, travel costs and food spoilage, and increases the flow of goods and people.¹²⁹

Alongside transport, effective energy infrastructure improves the efficiency and usage of agricultural machines; the sustainability of water management; the effectiveness of storage and processing facilities, especially close to production areas; and the chilled transportation of goods. Estimates show that with access to energy infrastructure, the combined use of mechanized machinery and animal power in agricultural production can yield over eight times the amount of food than can animal power alone.¹³⁰

Finally, improved digital infrastructure has an important role to play in food systems in Africa, ultimately lowering operating costs and improving productivity. Functional digital infrastructure increases knowledge sharing, improves access to service providers including providers of financial services, and enhances access to market systems.

Funding infrastructure remains a critical challenge. The World Bank estimates the investment necessary to bridge the infrastructure gap in SSA to be 9.2 percent of regional GDP.¹³¹ Of the expected US\$ 93 billion required annually, about one-third, or US\$ 30 billion, is needed for maintenance of existing transport, energy and communications facilities and the rest for the construction of new infrastructure.¹³² If met, it is estimated that GDP per capita across the



Maintaining the growth and management of Africa's infrastructure to serve its transforming food systems requires new and diverse sources of funding, new business models, and a more dynamic approach to connecting urban and rural areas

region would increase by 2 percent per year.¹³³

Although efforts to meet the demand for infrastructure financing have been increasing in the last 15 years,¹³⁴ this has not yet been sufficient.¹³⁵ Furthermore, the COVID-19 pandemic has heightened investment risk and reduced domestic and foreign investment into larger-scale infrastructure projects.¹³⁶ Maintaining the growth and management of Africa's infrastructure to serve its transforming food systems requires new and diverse sources of funding, new business models, and a more dynamic approach to connecting urban and rural areas. Pension funds, for example, can be considered as an innovative source of long-term infrastructure capital which offers an opportunity to engage the private sector. To date, however, private financing still makes up a smaller share of



infrastructure projects than do public investment, official development finance and international bonds.¹³⁷

PPPs offer an effective way to mobilize investments for effective infrastructure project implementation.¹³⁸ Strengthening the engagement between government and private entities through PPPs will help to gather finance, skills and efficiencies from the private sector, multilateral development institutions, banks, and development finance institutions, while risk on large projects is reduced by government participation. PPPs have been especially instrumental in the development and delivery of large-scale renewable energy projects such as the Lake Turkana Wind Power (LTWP) Project, geothermal projects in Kenya,¹³⁹ and the Noor Ouarzazate Solar Complex in Morocco.¹⁴⁰

Additionally, commitments of US\$ 12.5 billion to African infrastructure investment from the World Bank and the African Development Bank (AfDB) have helped catalyze resource flows and promote regional investment.¹⁴¹ By identifying opportunities for domestic and regional cooperation that involve both public and private actors, financial capital can be generated from diverse sources for the construction of accessible and reliable infrastructure. A shared public-private interest in, and control over, infrastructure development can result in joint efforts to increase finances, thus supporting the transformation of food systems into more productive and inclusive entities.

TRADE

Trade is an important engine for sustainable economic growth. If organized and managed carefully, food trade can be a key driving force for transforming Africa's food systems, generating new and much-needed employment opportunities, and improving socioeconomic development and livelihoods across the continent.¹⁴² Food trade can spur demand and drive specialization and intensification, and stimulate increases in productivity, supply, and incomes.¹⁴³ In addition, where tariff and non-tariff trade barriers are eased, food trade can provide greater diversity in supply, potentially helping to address malnutrition, especially undernourishment.¹⁴⁴ Trade liberalization can also counterbalance global price fluctuations and lower domestic food prices, thereby improving access to food.¹⁴⁵ Hence, food trade can thus increase resilience to shocks at the micro and macro levels and serve as an important risk management tool.

Africa's agricultural exports earn the continent between US\$ 35 and 40 billion per year;¹⁴⁶ at the same time, the continent currently imports approximately US\$ 45 to 50 billion worth of food,¹⁴⁷ an amount that is expected to rise to over US\$ 100 billion per year by 2025.¹⁴⁸ Clearly, there is a growing market on

the continent, one that can be served with greater intra-African trade. The establishment of the African Continental Free Trade Area (AfCFTA), which began trading in January 2021, thus presents a significant development in boosting food trade in Africa. The AfCFTA envisages a 52 percent boost in overall intra-African trade resulting simply from the elimination of import duties; if non-tariff barriers (NTBs) are also eliminated, this trade could be doubled.¹⁴⁹ Intra-African trade in agricultural products, especially sugar, vegetables, fruits, nuts, beverages, and dairy products is expected to benefit from improvements in customs procedures and logistics and is projected to rise by 20 to 30 percent by 2040.¹⁵⁰

In some African countries, part of the reason for high food imports is low agricultural productivity. Closing yield gaps in SSA could thus significantly reduce the region's food import bill. Cross-border and intraregional trade has the potential to improve food availability, especially in countries where deeper integration with world markets remains difficult.¹⁵¹

The largest share of intra-African agricultural trade is currently channeled through regional economic communities (RECs).¹⁵² Opportunities offered by intra-African food trade would benefit from scaling up successful institutional and policy design within the most active RECs. Examples of modifications that would greatly ease food trade across the continent include: fast-tracking trade facilitation arrangements by lowering tariff and non-tariff barriers; harmonizing quality and SPS standards; developing regional and continental information systems and disseminating them among transport service providers and along key transport corridors; and activating and resourcing online and phone-based helplines. Improving both physical (including digital) and institutional infrastructure is also key to ensuring that actors across the food system have access to information, can network, and can maximize the profitability of their enterprises.¹⁵³ Finally, it is essential to regularly update the policy focus such that it reflects current trends and opportunities and the needs of the leading product sectors whether they be fresh produce, meat, fish, dairy, edible oils, or packaged processed foods.¹⁵⁴

SOCIAL PROTECTION SYSTEMS

Food systems transformation has the potential to substantially reduce poverty in Africa, especially in rural areas. However, the poverty-reducing effects—particularly of agricultural growth—will depend on the “quality” (subsector, value chain, etc.) and “quantity” of growth, the sectoral location of the poor, and the degree of mobility between sectors. Until the benefits of such transformation materialize, poor households require immediate assistance to avoid being trapped in persistently low levels of poverty,

which undermines their ability to be productive both now and in the future. It is here that social protection programs can play an important role by making the process more inclusive; they can mitigate the costs that farmers face in adjusting to changes and they can enable households to diversify their income-generating activities beyond the farm level.

The rationale behind social protection is to promote dynamic, cohesive and stable societies through increased equity and security.¹⁵⁵ Social safety nets, a major component of social protection systems, are among the main instruments for protecting the poor. They usually include cash transfers in the form of welfare payments, child allowances, or pensions, but they can also include in-kind transfers such as food aid or school feeding programs, price subsidies of goods purchased by the poor, unemployment insurance, or public works or workfare schemes.¹⁵⁶

In rural SSA, there is arguably a two-way relationship between social protection and agriculture. On the one hand, poor rural households that primarily depend on agriculture for their livelihood are often affected by low levels of productivity and limited access to inputs, and these households are particularly vulnerable to shocks. Social protection is hence a powerful instrument for risk management, to reduce the economic vulnerability of households through appropriate instruments. In Malawi, in 1998, for example, improved seeds and fertilizer were provided to farmers through a universal "Starter Pack" program, under which every smallholder farmer was provided with enough seeds and fertilizer to plant 0.1 hectares of land. The program contributed to an estimated 67 percent increase in maize output, with maize production reaching 2.5 million tons.¹⁵⁷ The program was scaled down briefly but reintroduced in 2005 and has proven to be immensely successful in transforming production and productivity in the country (see Malawi case study in chapter 5).

The Lesotho Child Grants Programme (LCGP) is another such social protection program. The LCGP provided unconditional quarterly cash transfers to poor and vulnerable households with children to reduce malnutrition, improve health status and increase school enrolment. The announcements about the program explicitly stated that funds should be used in the interest of children, and this was strictly followed by participating households. In 2012 and 2013, the cash transfer was supplemented with a food grant which resulted in an increase in sorghum production among beneficiary households as well as an increase in the use of agricultural inputs such as pesticides.^{158, 159} Programs such as these help smooth consumption patterns and build basic capacities by

improving access to a variety of social services such as education, housing, income transfers, and food provision.¹⁶⁰

On the other hand, the regularity and predictability of social protection instruments helps households to improve their resilience to shocks and engage in more profitable livelihood and agricultural activities. Given that a lack of access to liquidity to invest in livestock and agriculture inputs remains one of the major barriers to agricultural production, evidence from conditional and unconditional cash transfer programs reveals that social protection programs can also increase livestock ownership and use of agricultural inputs. In Ethiopia, for example, the Productive Safety Net Programme (PSNP) has led to



For many poor households, social protection presents a lifeline that helps avoid chronic poverty, malnutrition and disease

an increase in livestock holdings among participating households.¹⁶¹ Similarly, Zambia's Child Grant Programme led to a 36 percent increase in the area of worked land and an increase in the use of agricultural inputs including seeds, fertilizers and hired labor. More households were also able to purchase livestock, particularly poultry.¹⁶²

In general, social protection programs target three groups¹⁶³: (1) the chronic poor who have limited access to income and instruments to manage risk; for these households, even small reductions in income can have dire consequences; (2) the transient poor whose income is near the poverty line and who may fall into poverty when the household, or the economy, faces a shock; and (3) individuals or households facing special circumstances, whose vulnerability may stem from disability, discrimination, displacement, "social pathologies" of drug or alcohol abuse, domestic violence, or crime. For many poor households, social protection presents a lifeline that helps avoid chronic poverty, malnutrition and disease.¹⁶⁴

SCIENCE, RESEARCH AND INNOVATION

A robust science, research and technology system that encourages interdisciplinary approaches will be at the heart of addressing the multifaceted challenges facing Africa's food systems such as improving crop and animal productivity and nutrition, tackling pests and diseases, improving storage technologies and methods, raising food safety standards, adapting to and mitigating climate impacts, or developing innovative solutions to deliver humanitarian aid to



communities in conflict. Major advances in science, technology and engineering have indeed already contributed to progress on these issues. However, the outcomes have not always delivered their full transformational potential.¹⁶⁵ While there is evidence of high potential returns on research, actual results have, in fact, been variable and slow.

Few African countries' agricultural science, research and innovation systems have kept pace with developments in the sector. Over the years, the number and diversity of actors in food systems have grown and their requirements have changed. Yet, the institutional frameworks and funding have remained largely unchanged or have even deteriorated.¹⁶⁶ To ensure that Africa's science and research agenda keeps up with its rapidly evolving and complex food systems, governments must consider a more consistent approach to evaluating the quality of education and training across countries and disciplines.



There is an urgent need to update Africa's agricultural science, research and innovation systems to make them fit for purpose

In addition, there is an urgent need to appraise the funding allocated and available for science and innovation. Over the 2015 to 2018 period, only 12 African countries^{††} are reported to have consistently invested at least 1 percent of their agricultural GDP in agricultural research and development.¹⁶⁷ Because

^{††} These countries are Angola, Cameroon, Chad, Congo, Ethiopia, Ghana, Madagascar, Mauritius, Nigeria, Seychelles, Sierra Leone, and Tunisia.

of this, much of Africa's agricultural science, research and development is often outdated and severely underfunded, in turn producing outputs that are less than conducive to an effective transformation into a 21st century food system.

There is an urgent need to update Africa's agricultural science, research and innovation systems to make them fit for purpose. Given the complexity of food systems, it is essential that research and innovation adopts an interdisciplinary approach. Nexus thinking will be better able to engage productively with the existing interdependencies, tensions and trade-offs and to build connections between previously siloed specialties.¹⁶⁸ Moreover, unlike previous systems that operated on a linear and supply-driven approach, an upgraded science, research and innovation system will be demand-driven and impact/client-oriented.¹⁶⁹ In this respect, a vibrant system will facilitate linkages between universities, agricultural research institutes, national extension services, the private sector, and users such as farmers, processors, and consumers. In conjunction with this, expanding the use of competitive grant systems that prioritize collaboration across organizations will provide space for experimentation, learning, and negotiation, and will streamline research and innovation activities to ensure that they deliver change.¹⁷⁰

A dynamic innovation ecosystem fosters close strategic partnerships between national agricultural research systems and private sector enterprises. Public and private entities, together, can scale up the production, distribution and adoption of seeds, fertilizers, feed and fodder, new animal breeds, and other locally appropriate machinery and technologies.¹⁷¹ One successful approach has

been the redesign of Uganda’s research system through the National Agricultural Advisory Services (NAADS) program. Initiated in 2001, the program rebuilt relationships between farmers and regional chiefs, district coordinators and private or semi-private service delivery companies. Farmers were able to directly define their demand for research, and through a national coordination network combined with the private sector, their research and innovation needs were met, initially at a modest cost and rising gradually to at least 50 percent.¹⁷² This new configuration has had a substantial positive impact on the availability and quality of advisory services provided to farmers and on the adoption and use of modern production technologies and practices, including greater use of postharvest technologies. Farmers also ventured into commercial marketing of commodities, thereby transitioning out of purely subsistence farming.¹⁷³

Importantly, the NAADS approach demonstrates that there is potential for research systems to diversify their sources of funding. Currently, direct institutional funding from a central or local government budget remains the most important source of funding for public research and development; however, these sources are often highly volatile and uncertain. At the other end of the scale, several countries also rely fairly heavily for research funding on donor funds, on multilateral bodies such as the European Union or the CGIAR centers) and on development banks.¹⁷⁴

African countries have not yet capitalized on private sources of funding. They are handicapped by small markets, weak public sector research programs, few skilled scientists and technicians, and a difficult business environment. If, however, the plantation and processing companies were able to capture the gains from their research and innovation, they



Deploying a systems approach thus offers policymakers a platform for creating optimal and coherent policies which can deliver positive spillover effects and manage trade-offs

could also present important positive spillover effects. The Mauritius Sugarcane Industry Research Institute, the Cocoa Research Institute of Ghana and Kenya’s Coffee Research Foundation are examples of institutions that are almost entirely funded by a tax on the proceeds of, respectively, sugar, cocoa, and coffee production.¹⁷⁵

Finally, more dynamic, impactful and sustainable research programs, in themselves, attract more scientists and technical experts to enter the field.



CONCLUSION

Africa's food systems are at a turning point. Persistent threats and challenges exist, as do opportunities to address them individually or in tandem. Policymakers can capitalize on progress made over the last two decades in the reduction of hunger and malnutrition, however the next level of policy-making will require a more holistic and nuanced approach. A systems perspective provides a useful framework for understanding and creating awareness of the potential interlinkages among policy domains that have been historically dealt with separately, such as agriculture, health, education, and the environment.

Policymakers can capitalize on the UN Food Systems Summit (UNFSS) to rethink and redesign their understanding of food and agriculture on the continent. A systems perspective also helps identify spillover effects, trade-offs and synergies across the dimensions of the triple challenge of food security and nutrition, jobs and incomes, and environmental sustainability. Raising productivity, for example, can reduce resource stress and can result in positive environmental outcomes, while diversifying production can benefit diets, environmental sustainability, and resilience. Expanding the use of agro-processing can benefit producers by creating a ready market, reducing postharvest losses, enabling the consumption of a more diversified diet, and allowing for greater inclusivity within value chains. Agro-processing facilities, however, require a reliable energy and water supply; they may also contribute to

localized pollution and, if they are not regulated well, can contribute toward worsening dietary outcomes.

Deploying a systems approach thus offers policymakers a platform for creating optimal and coherent policies which can deliver positive spillover effects and manage trade-offs. There is no unique mix of policies that will deliver every objective fully; however, robust and inclusive evidence-based processes are critical for ensuring "buy-in" from stakeholders and the development of more impactful policies. This, in turn, benefits from strong political leadership as well as close collaboration and communication with and between stakeholders and across policy domains at the local, national and international level. Furthermore, by creating appropriate incentives, providing additional support or effective regulation, policymakers can minimize the less desirable outcomes. Finally, recognizing that systems are dynamic and constantly evolving, policy interventions must also be continuous but nimble in order to take advantage of opportunities as they are presented - albeit founded upon a clear long-term vision.

As policymakers embark on this journey to a more holistic approach to food systems, four countries on the continent provide a relatively strong benchmark for how to align various elements so as to bring about a more effective transition.



4. COUNTRY CASE STUDIES

METHODOLOGY

In order to identify four African countries that are leading a food systems transformation at the country level, a methodology has been developed that combines multiple indicators.

The definition of sustainable food systems drawn up by the High-level Panel of Experts on Food Security and Nutrition (HLPE) has been widely recognized as a gold standard; it provides a set of criteria that, in a second step, can help to analyze and measure the outcomes of a sustainable food systems transformation:

Sustainable food systems are: **productive and prosperous** (to ensure the availability of sufficient food); **equitable and inclusive** (to ensure access for all people to food and to livelihoods within that system); **empowering and respectful** (to ensure agency for all people and groups, including those who are most vulnerable and marginalized to make choices and exercise voice in shaping that system); **resilient** (to ensure stability in the face of shocks and crises); **regenerative** (to

ensure sustainability in all its dimensions); and **healthy and nutritious** (to ensure nutrient uptake and utilization).(Authors' emphasis)¹⁷⁶

In the next step, these criteria—productive and prosperous, equitable and inclusive, empowering and respectful, resilient, regenerative, and healthy and nutritious— were plotted against the corresponding indicators from the CAADP Biennial Review 2020, thereby providing a framework by which to measure progress in creating sustainable food systems in Africa (Table 1).

The Biennial Review performance structure consists of 7 commitment areas, which are disaggregated into 24 performance categories and a further 47 indicators. Indicators are scored from 1 to 10 and each performance category is an aggregate of all indicators within that category and results in a “c-score”. This methodology selects performance categories that are best matched to the definition of a sustainable food system and its transformation.

Table 1. HLPE sustainable food systems definition plotted against CAADP Biennial Review performance categories

Criteria for evaluating a sustainable food system*	Corresponding indicators from the CAADP Biennial Review 2020	
	Performance category number	Item
Productive	3.1	Access to agriculture inputs and technologies
	3.2	Agricultural productivity
Prosperous	4.1	Agricultural GDP and poverty reduction
Equitable and inclusive / empowering and respectful	3.4	Social protection
	2.4	Access to finance
	4.2	Inclusive PPPs for commodity value chains
	4.3	Youth jobs in agriculture
	4.4	Women's participation in agribusiness
Resilient	6.1	Resilience to climate related risks
	6.2	Investment in resilience building
Regenerative		
Healthy and nutritious	3.5	Food security and nutrition

Note: * Taken from the definition of sustainable food systems drawn up by the High-Level Panel of Experts on Food Security and Nutrition.

In order to ensure a successful and sustained transformation, an appropriate enabling environment is required; this environment should be characterized

by policies that provide supporting structures and ensure the government's continued commitment to food systems transformation (Table 2).

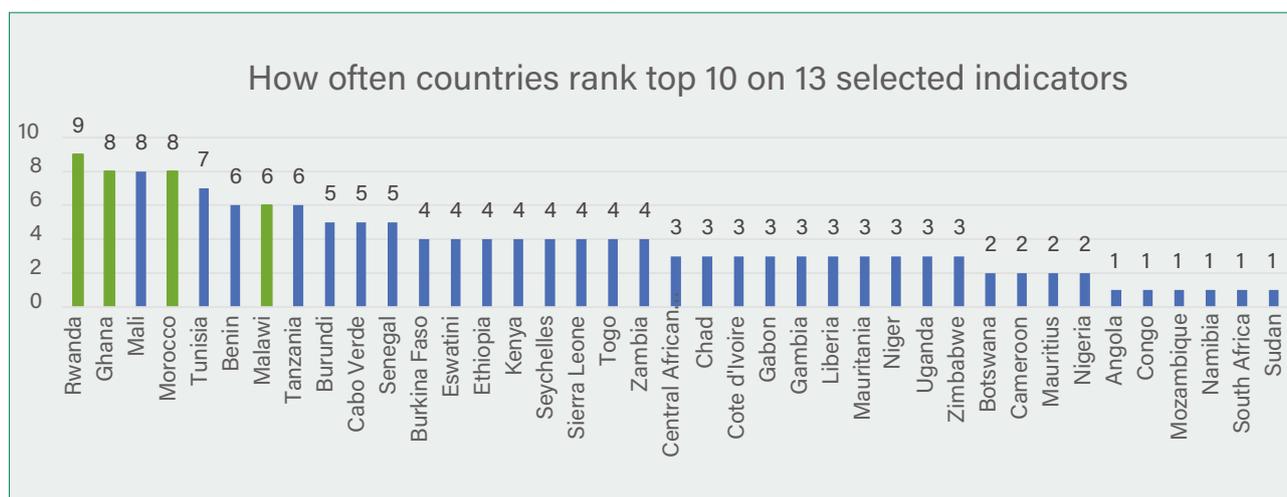
Table 2. Criteria for an enabling environment plotted against corresponding CAADP Biennial Review performance categories

Criteria for an enabling environment	Corresponding indicators from CAADP Biennial Review 2020	
	Performance category number	Item
Coordination (multisectoral and multistakeholder)	1.2	CAADP-based cooperation, partnership and alliance
Investment	2.1	Public expenditures for agriculture
Mutual accountability	7.2	Peer review and mutual accountability

Note: CAADP = Comprehensive Africa Agriculture Development Programme.

Finally, to identify those countries in Africa that are leading food systems transformation, the top 10 performers in each performance category (c-score) have been mapped. In a next step, the frequency at which each country appears in these lists has been recorded. Using this method and taking into account regional representation across the continent, the proposed case study countries are Rwanda, Ghana, Morocco, Malawi (Figure 1).

Figure 1. Top 10 performers in each performance category combined with frequency at which countries are listed



Source: Authors' calculations based on CAADP Biennial Review 2015-2018.



In the last two decades, Ghana has made major strides in poverty reduction, stability, democracy, and economic growth. It was one of the few countries that exceeded the Millennium Development Goal of halving poverty by 2013.¹⁷⁷ By 2015, it had reduced the number of hungry people by 50 percent and had witnessed significant reductions in the proportion of stunted, wasted, and underweight children.¹⁷⁸ These achievements were due in part to robust institutional design, bold policy-making, and creative programmatic interventions, often overseen at the highest levels of government. Indeed, Ghana's national contribution to the upcoming UN Food Systems Summit is being coordinated through the National Development Planning Commission (NDPC), which directly advises the President.

The country's agricultural sector has been central to its economic growth and development. Although productivity in Ghana's agricultural sector has historically been low due to a lack of usage of modern inputs, this has changed dramatically since the launch of the Planting for Food and Jobs campaign in 2017 (see the Programmatic Interventions section below). Between 2014 and 2019, the sector grew at an average of 3.6 percent per year; it has contributed more than 20 percent to GDP and employs 36 percent of the labor force.^{179,180} Cocoa is Ghana's dominant crop; in 2018, it contributed 30 percent to GDP.¹⁸¹ The success of Ghanaian cocoa on global markets has been the driving force behind growth in the agricultural sector. At the same time, production of staple crops and vegetables has been increasing, especially rice and maize which, between 2009 and 2018, saw total production rise by an average of 5 and 8 percent, respectively. Indeed, maize is a principal staple crop for consumption in Ghana, accounting for over half of cereal yields.¹⁸² Efforts have also been in place to strengthen other aspects of Ghana's food systems, including processing and transformation of produce, food safety, nutrition (especially for school-age children), and trade. The sections below provide further details.

There remain significant challenges, however, in the country's ability to transform its food systems in order to create healthy, prosperous, and sustainable communities. Although Ghana has in recent years excelled at reducing hunger and undernutrition, some northern regions experience as high as 40 percent malnutrition and stunting among children under 5, which is double the national rate of 19 percent.¹⁸³ Ghana is also currently facing an obesity crisis. In 2016, it was estimated that a staggering 43 percent of Ghanaian adults were either overweight or obese.¹⁸⁴ Children under five are also increasingly overweight

and, in 2019, overweight children represented 1.4 percent of their cohort.

Climate change is also severely impacting food security and nutrition. Extreme precipitation and droughts, combined with the country's reliance on rainfed agriculture (with less than 1 percent of agricultural land irrigated),¹⁸⁵ strain food production and contribute to price volatility. This is further complicated in the northern and rural parts of the country where road, electricity, and storage infrastructure are still under development.

Despite these challenges, the government is demonstrating a robust commitment to transforming the food sector into one which boasts high productivity, increased incomes, sustainable food production, and food security.

INSTITUTIONAL INNOVATIONS

Although the NDPC coordinates and oversees activities related to the United Nations Food Systems Summit (UNFSS) 2021, the Ministry of Food and Agriculture (MoFA) is one of the primary public institutions in Ghana that is leading a food systems transformation through the development of the agricultural sector.

National coordination of policies and programs

The creation of the NDPC in 1993 marked a turning point in terms of coordinating economic and social development activities. With regard to food systems, for instance, the NDPC played an important role in the development of Ghana's Food and Agriculture Sector Development Policy (FASDEP) I and II.¹⁸⁶ The NDPC also advises the President on development planning, policy, and strategy through its three technical divisions, the Development Policy Division (DPD), the Plan Coordination Division (PCD), and the Monitoring and Evaluation Division (MED). The DPD provides technical support to the government on policy formulation based on evidence, reviews, and analysis; the PCD oversees the coordination of all development policies, plans, programs, and projects between the national and local governments; and the MED ensures the monitoring and evaluation of government policies, programs, and projects at all levels with the help of its functional, decentralized, national monitoring and evaluation system.

National policies and programs are designed by cross-sectoral planning groups composed of representatives from various agencies, including the NDPC, relevant ministries, private sector organizations, and technical experts. Among these,

the NDPC coordinates a Cross Sectoral Planning Group (CSPG) on nutrition. It was created in 2012 following Ghana's commitment the year before to scale up effective nutrition interventions to reducing stunting among young children. The CSPG convenes representatives from government (health and non-health sectors), UN agencies, the private sector, development partners, academia and civil society to support the implementation of a national nutrition policy.¹⁸⁷ A subgroup has recently been formed to support Ghana's contributions to the UN Food Systems Summit. This UN Food Systems Summit Dialogue National Technical Working Group is responsible for coordinating stakeholder consultations across the country to ensure that sufficient inputs have been received from the broadest group of food system actors. It is led by Ghana's Technical Focal Point for the Scaling Up Nutrition Movement (SUN) and the director of the Women in Agricultural Development Directorate at the Ministry of Food and Agriculture.

The NDPC is also represented within several public bodies, including the National Council for Tertiary Education, the Council for Scientific and Industrial Research, the Local Government Service Council, the Ghana Investment Promotion Centre, the Energy Commission, and the Institute for Statistical, Social and Economic Research which promotes synergy and fosters mutual learning.¹⁸⁸

Decentralized service delivery to reach beneficiaries

The MoFA aims to modernize Ghana's agricultural sector to improve food security, create employment opportunities, and reduce poverty. It designs and implements policies and programs that promote sustainable agricultural production and flourishing agribusinesses through expansion of technology adoption, provision of effective extension services, and other support services such as training for farmers, processors and traders. The MoFA has seven technical directorates which conduct activities under the MoFA's mission to build sustainable food systems; these include: the Directorate of Crop Services (DCS), the Directorate of Agricultural Extension Services (DAES), the Plant Protection and Regulatory Services Directorate (PPRS), the Veterinary Services Directorate (VSD), the Animal Production Directorate (APD), and the Women in Agricultural Development Directorate (WIAD). The Ministry thus has clear and delineated responsibilities for crop and livestock production; these are supported by cross-cutting departments which ensure that gender is mainstreamed across the Ministry. There is also a separate Ministry of Fisheries and Aquaculture Development.

The MoFA's institutional framework reflects the country's decentralized governance structure, which is designed to provide more effective services. The MoFA is represented at the regional level by Regional Agricultural Development Units (RADUs) and at the district level by District Agricultural Development Units (DADUs); these are responsible for the coordination and implementation of agricultural projects in their respective jurisdictions.¹⁸⁹ Sixteen RADUs and 260 DADUs mirror the framework established for directorates at the national level. RADUs play an important role in "upward" communication of requirements from local levels; they also formulate effective short-, medium-, and long-term agricultural strategies such that local resources and agroecological conditions are optimized to improve farmer productivity and livelihoods. RADUs and DADUs are also central to the forging of linkages and coordination of activities among relevant stakeholders, including private sector and development partners.¹⁹⁰

Crop value chains

The Directorate of Crop Services is responsible for the development of Ghana's crop subsector, including food, horticultural, tree, and industrial crops. It guides interventions across the value chains for crops under its care, moving them from production and processing through to distribution, and from there to the marketing of food, including for export. With respect to production, the DCS collaborates with, among others, the Crops Research Institute, extension services providers, and the private sector. Through such collaborations, it facilitates the timely and affordable development and distribution of improved planting materials, such as seeds for farmers. In order to meet domestic demand, it recommends the issuance of permits and waivers for the importation of agricultural materials. The DCS also provides technical support to the regional and district agricultural development units on improved agronomic practices and on efficient use and management of soil and water resources. The DCS, in collaboration with relevant stakeholders including agricultural value chain actors, also shares information on the improved production, packaging, and marketing of crops.¹⁹¹

The core purpose of the PPRS is to reduce crop losses caused by pests and diseases to 10 to 15 percent, from their current 30 to 50 percent. To do so, the PPRS deploys a four-pronged approach: 1) it trains farmers and extension agents on timely identification of pests and diseases and on integrated control methods; 2) it monitors and certifies seed production; 3) it leads administrative and regulatory

oversight of pesticide and fertilizer use; and 4) in partnership with the DCS, it conducts phytosanitary inspection for imported plants and plant materials. The PPRSD also runs inspections to ensure that food products such as fresh fruits and vegetables that are designated for export meet marketing quality standards.¹⁹²

Livestock production and health

Within the MoFA, the Animal Production Directorate is broadly responsible for developing a successful livestock (including poultry) sector in Ghana. The APD provides technical support, enhances livestock support knowledge within extension services, and promotes agribusiness to prospective livestock sector entrepreneurs, especially to advance the dairy industry. Specific activities carried out by the APD include the promotion of appropriate technologies for livestock management, breeding, nutrition, and housing. The APD manages seven National Livestock Breeding Stations and also supports livestock farmers in intensive forage production, processing and marketing of livestock and poultry products, and the formation of water stock for livestock production in areas where water resources are scarce.¹⁹³

The primary mandate of the Veterinary Services Directorate is to oversee the provision of quality animal health care services by both public and private sector veterinary practitioners for enhanced livestock production and productivity. In addition to contributing to policy development, the VSD also provides timely, reliable, and relevant information on animal health across the country. In 2018, for example, an alert was sent out to notify the public of an outbreak of bird flu in the animal population.¹⁹⁴ The VSD complements this work with technical support for improved service quality. Working with the Food and Drugs Authority (FDA) and the Ministry of Health, the VSD contributes to the protection of public health by preventing zoonotic diseases and their transmission to humans, regulating slaughterhouses, and ensuring that imported and locally produced meat and other products of animal origin are safe for human consumption. It also improves the knowledge of farmers and the public on animal diseases and encourages them to participate in animal disease prevention and control activities.¹⁹⁵

Gender mainstreaming

Gender mainstreaming has been part of the MoFA's activities since the 1970s. At that time, work on gender was carried out by what was then called the Women in Food and Agriculture Directorate; this has since been renamed the Women in Agricultural Development Directorate, or WIAD. The WIAD aims

to enhance the livelihoods of women-in-agriculture value chains by ensuring that policies promoting the delivery of improved technologies and information on sustainable agricultural production and postharvest activities are not only gender inclusive but also actively benefit women. WIAD is responsible for implementing the Gender and Agriculture Development Strategy and contributes to nutrition education, value addition, food safety, and gender mainstreaming across policies, programs, and projects. The Directorate ensures that appropriate extension technologies and information reach women farmers, processors, and other value chain actors by coordinating operations with regional and district WIAD officers. WIAD also collaborates with research and extension services to identify challenges specific to women such as those related to integration into the food value chains. To overcome these challenges, WIAD offers training on food processing and preservation, as well as on safe production and handling of vegetables.¹⁹⁶

Agricultural extension services delivery

The Directorate of Agricultural Extension Services oversees agricultural technology diffusion through the management of extension services delivery. It identifies and selects appropriate equipment and technologies for farmers and agro-processors such as primary-processing machinery and drying and storage facilities; it then provides training on their appropriate and sustainable use. DAES extension services also include soil and water conservation management training for farmers and the identification and selection of appropriate water conveyance systems for agricultural use. It envisions establishing efficient and demand-driven extension services in a decentralized system that provides quality service to beneficiaries through partnerships between government and the private sector. In the provision of extension services and the dissemination of information, the DAES collaborates with a range of organizations and agencies including NGOs and private service providers.¹⁹⁷

Expanding irrigation coverage

Alongside the technical directorates, the MoFA also works with a public agency to develop land and water resources in Ghana. The Ghana Irrigation Development Authority (GIDA) was established in 1977 to oversee the formulation and implementation of water development programs for crop production, livestock watering, aquaculture, and agricultural industries. Its board of directors and its Chief Executive report directly to the MoFA. Under its mission, GIDA designs irrigation infrastructure and facilities such as dams, ponds, tube wells, and conveyance structures, and it provides technical and managerial services

to farmers for the effective use of this technology. Although GIDA is funded by the government, it can also borrow money on the open market for the development of some programs. GIDA ensures that its interventions safeguard the health and safety of all people living within and around its irrigation project areas; it was reported, however, that a lack of maintenance under several projects rendered some of the schemes unproductive.¹⁹⁸

Providing a lucrative market for farm produce

In 2010, the MoFA set up the National Food Buffer Stock Company (NAFCO) to guarantee a minimum—and more remunerative—farm gate price for produce, protect farmers from price volatility, and provide access to a market, particularly when production exceeds demand. To achieve this, NAFCO engages in purchasing, selling, preserving, and distributing stocks of cereals. In 2009, for instance, the total domestic production of maize amounted to 1.62 metric tons (mt), with a demand of 1.2 mt; a surplus of 0.4 mt thus had to be stored to avoid the surplus being wasted.

NAFCO sets a minimum farm gate price that takes into account the production costs of farmers plus 10 percent as profit. The profitable prices motivate farmers to increase their production and encourages others, including young people, to go into farming.¹⁹⁹ NAFCO forms three types of stocks from the purchased harvest; these include operational stocks, an emergency government stock, and food safety net stocks. Operational stocks can

be sold and distributed to the market at appropriate times to ensure a continuous food supply at stable prices. Emergency government stocks belong to the government, which uses them to assist vulnerable people during food shortages and crises; such shortages are often caused by sudden supply shocks such as natural disasters. The food safety net stock provides food for the impoverished and the chronically food insecure.²⁰⁰ Through NAFCO, agro-processing factories can access raw materials such as cereals for their operations. As most farms in Ghana are located in remote areas, NAFCO has partnered with more than 70 companies which operate on its behalf. These companies are licensed and mandated by NAFCO to reach out to farmers to buy food raw materials at the farm gate and a margin is added to the farm gate price by the licensed buying company. The committee that fixes the prices and margins takes into account factors such as transportation, drying, bagging, sewing, and handling.²⁰¹ In 2020, a study found that NAFCO's operations increased the incomes of participating smallholder maize producers by more than 12 percent.²⁰²

Centralizing youth employment

In 2006, Ghana began the process of institutionalizing its efforts to address youth unemployment. At that point it initiated the National Youth Employment Programme (NYEP) under the Office of the President. In 2012, the NYEP was replaced by the Ghana Youth Employment and Entrepreneurial Agency (GYEEDA), which was subsequently, in 2015, renamed to the Youth Employment Agency (YEA). YEA oversees



the development, coordination, and facilitation of youth employment generation through a job center that is housed within the YEA. The job center also provides technical skills, training for job seekers, and connections to employers, and it funds youth business plans including those in the agricultural sector. It accepted two proposals, one for Maize Farming in Brong Ahafo and another for Aquaculture in the Volta Region; the two projects were set to begin in early 2019 and to create 3,000 jobs for young people. Other proposals from other regions included poultry farming and hatcheries.²⁰³

POLICY INNOVATIONS

It is evident that Ghana already has a vibrant and dynamic institutional framework that can—with some fine-tuning—lead a food systems transformation. Doing so will also require well-crafted policies that guide transformations. Here too, Ghana has a strong history of creating impactful and comprehensive policies to advance its food and agricultural sectors.

Main national policy objectives

The Government of Ghana (GoG) has developed multiple strategic plans and policies across sectors which demonstrate their robust commitment to improving the country's complex food systems. The draft Long-Term National Development Plan (LTNDP) (2018–2057) is the GoG's flagship national policy for transforming Ghana into a nation that is “beyond aid” and is industrialized, inclusive, sustainable, politically stable, and globally influential. Ghana's trajectory is one which is expected to accelerate economic development and reduce poverty, and thereby improve living conditions for Ghanaians. It follows Ghana Vision 2020: The First Step (1996–2000), Ghana Poverty Reduction Strategy (GPRS) I and II (2003–2009), and the Ghana Shared Growth and Development Agenda (GSGDA) I, II, and III (2010–2017).²⁰⁴ Strategically, the LTNDP's implementation over 40 years ensures that the political agenda is structured and continuous and that it transcends short-term changes and challenges. In the medium and short term, the LTNDP will be divided into 10 medium-term policies and will be accompanied by corresponding sector policies that are prepared by successive governments under LTNDP guidelines.

The LTNDP and previous growth strategies in Ghana have integrated objectives that are consistent with international targets, notably building on the frameworks of the Comprehensive Africa Agriculture Development Programme (CAADP), the African Union's Agenda 2063, and the United Nations' Sustainable Development Goals (SDG).²⁰⁵

The latest LTNDP outlines the government contributions that are necessary for improving food security and agricultural growth. This, paired with the current Medium-Term National Development Policy Framework (MTNDPF) (2018–2021), presents a clear policy framework and guiding principles to construct successful policies that will help Ghana achieve food security and agricultural modernization and growth. The new policies build on the progress achieved and lessons learned from previous policy documents. Introduced in 2007 by the MoFA, the second Food and Agriculture Sector Development Policy (FASDEP II) is the current long-term agricultural policy that aims to combat food insecurity and improve rural development in Ghana. The Medium-Term Agriculture Sector Investment Plans (METASIP) I, II, and III are complementary plans introduced to support FASDEP in funding the implementation of Ghana's agricultural priorities and achieving sustained agricultural GDP growth. FASDEP II takes a value chain approach to increased production (particularly of staples), improved market access, technology adoption, institutional coordination, and sustainable land management, as necessary changes to stimulate improved livelihoods and food security in rural areas. Between 2005 and 2015, MoFA's focus on raising crop and livestock productivity and output by modernizing and intensifying agricultural methods resulted in an overall surge in food production; maize saw an increase in production of 40 percent, rice of 190 percent, and cassava of 80 percent.²⁰⁶ Furthermore, from 2017 to 2019, rice and maize productivity rose by 23 percent and 27 percent, respectively, while the livestock subsector grew by an annual average of 5.5 percent.^{207,208} Despite FASDEP II having no official termination date, discussions are currently taking place on a possible third FASDEP. Building on interventions and impacts to date, discussions are focused on incorporating agroecology research and development into national objectives for the next generation of agricultural development.²⁰⁹

Developed according to the guidelines of CAADP and the Economic Community of West African States (ECOWAS), the updated Investing for Food and Jobs (also known as METASIP III) investment plan—covering 2018 to 2021 and with a budget of over US\$ 1.65 billion—seeks to modernize the agricultural sector and accelerate national growth. METASIP III is divided into four programs: management and administration, crops and livestock development, agribusiness development, and sustainable utilization of resources. These are then split into specific subprograms and are supported by unique policy tools. METASIP III policy tools seek to leverage private sector investment, build cooperation and

collaboration across stakeholders engaged in the agricultural sector, and facilitate the implementation of wider programs and subprograms.

Climate resilience in agriculture and food security

In 2013, the Ministry of Environment Science, Technology and Innovation (MESTI) introduced the National Climate Change Policy (NCCP).²¹⁰ The NCCP looks to integrate a response to climate change, build resilience, and harness the opportunities of green growth across five focus areas: agriculture and food security; disaster preparedness and response; natural resource management; equitable social development; and energy, industrial, and infrastructure development. Updated in 2015, the NCCP outlines specific policy actions for 10 multisectoral areas in order to address the multifaceted impacts of climate change across the country and to operationalize the effective development of NCCP objectives. MESTI works on sectoral climate issues with the Ministry of Trade and Industry, MoFA, metropolitan, municipal, and district assemblies, the Ministry of Fisheries and Aquaculture Development, and the Council for Scientific and Industrial Research (CSIR); together they lead the implementation of the NCCP's eight specific sector programs. The Climate-Smart Agriculture and Food Security Action Plan (CSAFSAP), for example, is led by MoFA. It outlines the implementation framework necessary to mainstream climate resilience and adaptation planning into agriculture and food development activities. Totalling US\$ 950 million of both government and international donor funding, the CSAFSAP outlines eight programs and activities: strengthening national climate research and educational services, developing innovative and climate-smart production techniques and systems for agriculture and fishing, supporting smart water management, de-risking the food and agricultural sector, and improving the productive capacity of farmers and rural communities. Proposed activities include developing extension services; financing research on climate-smart agricultural technologies and processes; expanding sustainable water harvesting, storage, and irrigation systems; and establishing insurance schemes. The CSAFSAP's focus on ensuring that institutional systems are collaborative and consistent in their approach to the impacts of climate change across all activities demonstrates the policy's ability to strengthen multiple elements of Ghana's food systems and ensure sustainable agricultural development.^{211,212}

The 2011 National Irrigation Policy (NIP) aimed to improve crop production and sustainable rural development in Ghana through the expansion of irrigation across the country.²¹³ The MoFA and GIDA,

with support from the FAO and the International Water Management Institute (IWMI), developed a policy to address the challenges presented by climate change and irregular rainfall patterns. The NIP seeks to facilitate investment in irrigated crop production by implementing public and private initiatives that improve existing irrigation systems and build new ones. It also advocates for an inclusive environment for women and vulnerable groups in land and water management and works to enhance the sustainability of irrigation and agricultural practices and to provide effective services to support irrigation development. The MoFA and GIDA work with local governments and the private sector to ensure inclusive participation in the financing and management of policy activities. The policy has also contributed to wider food security and agricultural growth objectives through the commercialization of agriculture for rural growth and poverty reduction. In 2017, there were over 56 irrigation initiatives reported across Ghana covering a total area of 10,380 hectares. These different schemes, facilitated by the NIP, have been evaluated as primarily benefitting smallholders in rural communities.²¹⁴ A study conducted to identify the impact of irrigation initiatives in Ghana found that irrigated rice cultivation following from irrigation management schemes increased yields by 40 percent and farmers' incomes by 25 percent.²¹⁵

Bridging the gender gap

Ghana's past and current national agricultural plans consider the importance of integrating women and youth into promoting agricultural growth. In 2015, the MoFA released the updated Gender and Agricultural Development Strategy (GADS) II to improve gender equity in the agricultural sector. The MoFA's Women in Agricultural Development Directorate, or WIAD (see Institutional Innovations above) is responsible for the implementation and evaluation of the policy. The updated GADS aligns with FASDEP II and METASIP III in addressing inclusivity in the agricultural value chain and a private sector-led approach to agricultural growth. METASIP II (2014–2017) saw over US\$ 11 million invested in the provision of subsidies to women in agriculture for technology adoption; this included subsidies on the purchase of tractors and combines, and assistance in developing the skills for their operation.²¹⁶ Since 2014, over 115,000 women and children have also received training on the importance of nutrition in production techniques and food consumption. Notably, the success of the previous GADS (2004–2013) is seen in the improved institutional capacity of MoFA and its directorates in mainstreaming gender into policy and program planning, and successfully improving accountability



to gender sensitivity in state agricultural initiatives. As such, FASDEP II recognizes the challenges women in Ghana face in agricultural activities and consequently has made efforts to promote women's rights and to mainstream gender in MoFA activities through sector training and knowledge sharing.²¹⁷ GADS II continues to guide public and private stakeholders and development partners to build an equal, nondiscriminatory, accessible and just agricultural sector. The policy's nine objectives address challenges in access to innovative technologies, markets, inputs, extension services, and land; low female representation in on-farm decision-making; institutional capacity and coordination; and research failing to consider gender as a significant variable in development.²¹⁸ By 2018, six women-in-agriculture platforms had been established in Northern Ghana, providing technical support, knowledge sharing, training, and access to seed and fertilizer initiatives. Further, the coordination across different district women-in-agriculture platforms in conducting rice value chain research to detect shared challenges and develop solutions, saw subsequent increases in incomes and rice yields.²¹⁹

Ensuring a healthy food system

In 2012, the Ministry of Health introduced the Public Health Act (PHA) to ensure the prevention of disease and the promotion of good health before products reach human and animal consumption.²²⁰ This legislation includes specific regulations on disease control, healthcare provision, food and drink quality and distribution, tobacco control, institutional

responsibility, and sanitation. It also outlines the legal framework to which all stakeholders in the food system must adhere. These regulations were brought about to ensure access to safe and nutritious food for Ghana's population and to challenge undernutrition and obesity through access to quality food. The Food and Drugs Authority is mandated to conduct the enforcement, registration, and quality control of food and feed standards for domestic and imported goods in Ghana. The clear regulations found in the PHA, together with enforcement from the FDA, has increased overall food quality in Ghana. In 2019, over 2,896 products were tested, of which 78 percent passed the strict regulations; this constituted an increase of 2.9 percent from 2018.²²¹

Furthermore, it is noteworthy that Ghana's Ministry of Health led in the development of a national policy to combat non-communicable diseases (NCDs) resulting from inadequate diets, including heart disease, obesity and cancer. Launched in 2012, Ghana's National NCD Policy outlines actionable declarations to minimize salt, fat, trans fats, and added sugars in processed foods, including in food available in supermarkets and restaurants.^{222,223} The NCD policy is also supported by stringent legislation, included in the Public Health Act of 2012, that helps identify the accuracy of declared nutritional content thereby regulating declarations made about food that are aimed at protecting food safety and consumer health. The legal framework checks the claims of origin, ingredients and the date of processing and manufacturing for products.²²⁴

Additionally, the 2015 Food Safety Policy, as part of the wider National Health Policy, was adopted in order to integrate the importance of food safety into other national objectives for food systems, including that of FASDEP and METASIP. The policy includes strategies to increase research, education, and regulation on food safety across food systems for both domestic and exported food. This policy facilitates the process of updating and monitoring food safety and strengthens knowledge on food safety for a range of different stakeholders. This approach supports wider national goals of improving food security and public health and decreasing poverty levels. It aims to do so through ensuring that the improved nutritional values of food complement the different initiatives that seek to transform the food system. Importantly, to ensure the integration of food safety into cross-sectoral targets, the policy established a coordination mechanism for the Food and Drugs Authority and the Ministry of Local Government and Rural Development, to ensure adherence to all laws on food safety for production, storage, distribution, sale, and handling. The policy aims to bring together stakeholders from multiple sectors, including agriculture, trade, and health, to ensure that the national standards support access to quality and nutritious food.

Ghana covers several aspects of food systems transformation through the policy interventions outlined above. These interventions, overall, have been focused, far-reaching, and reflective, having learned from past experience. The country's policymakers have also complemented the policy innovations with programmatic interventions, ensuring that the impact and efficiency of their efforts is optimized.

PROGRAMMATIC INTERVENTIONS

Planting for Food and Jobs

The Planting for Food and Jobs (PFJ) program is one of five modules of a national flagship agricultural campaign of the same name. PFJ (the module, and henceforth the focus of this case study) was launched directly by His Excellency President Nana Addo Akufo-Addo in 2017. It aimed to tackle low agricultural productivity, low use of agricultural inputs and weak market linkages. The four-year program is founded on five pillars: provision of subsidized and improved seeds, fertilizer subsidies, agricultural extension services, establishment of markets, and expanded use of e-agriculture. PFJ aspires to modernize the sector, improve food security, create employment opportunities across food value chains, and reduce poverty. Importantly, the program envisions a growing role for the private sector in supporting agricultural

growth.²²⁵ In the first year, the program was directed at the maize, rice, sorghum, soybean, and vegetable (onion, tomatoes, and chili peppers) value chains. This was then expanded to include groundnuts, cowpeas, various root crops, and several additional vegetable crops.

The PFJ is implemented by the MoFA through a three-tier structure made up of a National Technical Committee (NTC), a Regional Technical Committee (RTC), and a District Technical Committee (DTC). The NTC, chaired by the Deputy Minister of Agriculture, is responsible for major national-level decisions on the strategic direction of the program. Other members of the NTC include the directors of the Directorate of Crops Services (DCS), the Directorate of Agricultural Extension Services (DAES), the Plant Protection and Regulatory Services Directorate (PPRSD), and other directorates within the MoFA. The RTC, chaired by regional ministers, reports to the NTC on day-to-day implementation and monitoring at the regional level. The DTC is chaired by metropolitan, municipal and district chief executives and reports to the RTC; it also feeds operational and seasonal plans upward to the RTC and mobilizes local public and private sector actors to support implementation.²²⁶

Seeds

To enhance the uptake of improved seed varieties, PFJ seeks to boost both the production and distribution aspects of Ghana's seed market. The program provides technical and financial support to credible and existing private sector seed producers to augment imports and eventually build self-sufficiency. The private sector, in partnership with the National Seed Trade Association of Ghana (NASTAG), distributes improved seeds at a 50 percent subsidy. Within the first year of the program, the subsidized cost to the farmer was further spread over the entire growing season, such that farmers would only pay half of the subsidized value (25 percent of the total cost) before planting, with the balance (25 percent of the total cost) due after harvest. Following low repayment by farmers, however, this system was terminated.²²⁷ Although in the first year of the program Ghana imported seeds, by the second year—despite increased demand, which was also induced by the PFJ—domestic seed production overtook demand. In the third year, however, national demand again outstripped supply. Seeds distributed through PFJ were all sourced domestically, except for hybrid maize which was still being imported. Studies published in 2021 concluded that seeds produced through the PFJ supplied 54 percent of the country's total maize production, 40 percent of its rice production, and 80 percent of its soya production.²²⁸

Alongside this growth in seed production, distributors also experienced significant benefits. A survey conducted among NASTAG's members and non-members in 2020 concluded that through PFJ the overall availability, accessibility, quality, varietal suitability, marketing, and distribution of certified seeds had improved. Input dealers, including private seed distributors, have benefitted from increased visibility and new markets, and from the opportunity to build staff capacity within the industry.²²⁹

PFJ has notably revitalized Ghana's seed sector. Sustaining this new dynamism with a view to eventually scaling back government support, however, requires careful fine-tuning of the system. In the short term, this includes timelier payments to distributors and enhanced monitoring of seed quality to build trust among suppliers and farmers. Over the long term, stronger connections with national research institutions and greater access to finance for seed companies—perhaps through a specially designed fund for them and capacity enhancing among conventional financial institutions— would cement the growth of the sector.²³⁰

Fertilizers

Much like the intervention for seed provision, the PFJ pillar on fertilizers is also founded upon subsidization. Although Ghana had already implemented a national fertilizer subsidy program from 2008, its impact on productivity was limited due to logistical challenges, weak targeting, systemic inefficiencies, low uptake by farmers due to high costs, and the burden on the national budget. The former fertilizer subsidy program was folded into the PFJ and was also streamlined. Eligible farmers are only entitled to cover a maximum of 2 hectares,[¶] thereby ensuring that the program reaches only very small and asset-poor farmers; nevertheless, the rate of subsidy rose from about 26 percent in 2016 to 50 percent in 2017, and the cost to the MoFA rose by 73 percent over the same period. The quantity of subsidized fertilizer thus more than doubled, rising from 134,000 mt in 2016 to 296,000 mt in 2017.²³¹

By 2020, this pillar showed positive outcomes for productivity, total output, downstream activities in the agricultural sector, and overall household welfare. Despite a brief lag at the start of the program, total factor productivity for maize rose by nearly a third in comparison to a business-as-usual scenario. Similarly, total factor productivity for rice and sorghum increased by 24 percent and 15 percent, respectively. The food processing industry also benefitted from

¶ A maximum of six bags of bio-fertilizer for soya bean production, ten bags of NPK, and five bags of urea or sulfate of ammonia for other crops.

forward linkages, with value added in the food industry growing to 15 percent in 2020. This has also supported job creation, particularly among skilled rural labor. Although imports for these crops did not fall significantly, exports did rise, especially for maize. Finally, the subsidized fertilizer pillar led to an increase in household spending for the consumption of maize, rice, sorghum, and food products, indicating an improvement in overall household welfare and nutrition.²³²

Simulations estimate that, if continued, the fertilizer pillar in PFJ will contribute to a rise in productivity and overall production, and to higher employment, especially among skilled rural residents. It is expected that, compared to 2017, average annual productivity in 2024 will be 20 percent, 21 percent, and 13 percent higher for maize, rice, and sorghum, respectively. In addition, average annual production is also set to rise by 15 percent, 14 percent, and 11 percent for rice, maize, and sorghum, respectively. Importantly, the broader food industry will also grow by 14 percent annually until 2024.²³³

Agricultural extension services

To support the uptake of improved seeds and subsidized fertilizers, the PFJ program also included a pillar to boost the country's extension capacity. In addition to an aggressive recruitment plan to hire 2,700 new extension agents—over 800 of whom were recruited within the first year²³⁴—the program has also offered expanded training programs for agents, and support for logistics so that they can visit farmers more frequently. In 2018, 216 new pickup trucks were purchased for the Departments of Agriculture at district level and 3,000 motorbikes were purchased for extension agents.²³⁵ Studies in the Talensi District of Ghana showed that the modernized extension services provided through PFJ were extremely successful. During the 2019 production season, beneficiary rice farmers were able to produce 140 kg/acre (345kg/hectare) more than non-beneficiaries.²³⁶

Marketing

In addition to developing inputs markets as above, the marketing pillar in PFJ aspires to reduce the seasonal volatility of prices by strengthening linkages between farmers and farmer-based organizations, and with aggregators and agribusinesses. The marketing pillar has also been the driving force behind the rehabilitation and construction of new warehouses. By February 2020, as declared by the President of Ghana, 46 warehouses had already been constructed across the country; of these, 35 were funded by the Ministry of Special Development Initiatives and 13 by the Ministry of Agriculture. A further 27 were being

considered by the same ministries, with the goal of adding 80 warehouses, each with a capacity of 1,000 mt, to the national storage capacity.²³⁷

e-Agriculture

The e-agriculture pillar established a database of PFJ beneficiaries to boost the responsiveness, efficiency, transparency, and accountability of all actors involved in the program. Deploying real-time cloud computing services, the database is used to validate the profiles of beneficiaries, record their land use and cropping patterns, and record the extension visits they receive.²³⁸ Although it has been one of the lesser-known pillars among beneficiaries, it plays an important role in long-term sustainability and continuation of the program as resource planning and allocation by the government becomes more targeted, prompt and efficient. Farmers also benefit as they can leverage the information held in their e-agriculture profiles to access financial products and services including savings, credit, and insurance. The e-agriculture pillar draws upon, and builds on, a nationwide e-agriculture program that was implemented in 2011, with support from the World Bank, to enhance the uptake of digital technologies and solutions in Ghana's agricultural sector. Indeed, as shown in the Malabo Montpellier Panel's report, *Byte by Byte: Policy Innovation for Transforming Africa's Food System with Digital Technologies: Ghana*, the country has invested significantly in developing a strong environment for digitalization, particularly for its agrifood sectors.²³⁹

When launched in 2017, it was expected that the total budget allocated to PFJ would amount to GHC 3.3 billion over four years (US\$ 825 million). Rising exponentially from GHC 190 million (US\$ 47.5 million) in 2017, the budget allocation for 2020 was set at GHC 1.6 billion (US\$ 277 million). Considering that the entire budget allocation for MoFA in 2016 was only GHC 501 million (US\$ 125 million), Ghana's ambition concerning the PFJ is clear. Although this budget allocation was not met and, by 2020, the total cost (only) added up to about GHC 2.2 billion (US\$ 550 million), the program remains an extraordinary undertaking.²⁴⁰

In 2020, out of an estimated 2.6 million agricultural households, 1.74 million farmers received inputs. In fact, beneficiary numbers exceeded those planned for 2018, 2019, and 2020. Although fertilizer distribution fell short of budgeted amounts (423,000 mt in 2020, compared to the over 663,000 mt which was expected), the positive impacts on productivity and

total output were strong. Over the four years, total output for maize, rice, sorghum, and soybeans grew at an annual average rate of over 10 percent. Among these, maize output overshadowed the others by growing at nearly 19 percent annually, while growth in sorghum output measured nearly 15 percent per year. Notably, before the COVID-19 pandemic, Ghana saw imports of maize fall by over 89 percent, from 81,708 mt to 8,819 mt between 2018 and 2019.²⁴¹ Growth in PFJ vegetable crops was more muted,** but the later additions showed promise, with groundnut output growing at over 9 percent and cassava at 7.5 percent. An environmental cost is hidden within these output figures, however, as much of this growth is founded on the expansion of farmed land; in other words, although productivity did rise, it did not meet the targets.²⁴² The PFJ has nevertheless proven to be a widely successful program and has demonstrated that clear, well-funded and unwavering support for programmatic interventions can result in significant improvements in food security. The program has also been reported to have been instrumental in keeping down food prices, particularly for maize between 2017 and 2019, thereby improving the accessibility and affordability dimensions of food security.²⁴³

Although the remaining four modules of the wider Planting for Food and Jobs campaign are still relatively young and have undergone few evaluations, the campaign has also shown Ghana's capacity for transforming food systems as it implements interventions beyond crop production.

Agricultural Mechanization Service Centers

In 2007, the MoFA and the Agricultural Engineering Services Directorate embarked on a program to jointly create Agricultural Mechanization Services Centers (AMSECs). The program was designed to boost the use of machinery in agriculture and reduce drudgery. Within the first year, 17 AMSECs were established, while another 72 opened between 2009 and 2011. The centers were designed as private entities to avoid direct government management. The government received the machinery through concessional loan agreements with Brazil, Japan, and other partners.²⁴⁴ Each AMSEC was provided with five to seven selected tractors with implements for land preparation at highly subsidized loans.²⁴⁵ The centers then offered the machinery to private sector players for onward hiring, or directly to farmers. It was expected that each AMSEC would serve about 500 small-scale farmers per season, each with average landholdings of 2 hectares.²⁴⁶

** Tomatoes grew at 3.8 percent, onions at 2.8 percent, and chilies at 3.2 percent per annum.

This first phase of the AMSEC program increased the availability of mechanization services by 8 percent. Further, farmers in AMSEC areas also perceived a significant reduction in drudgery and a rise in yields.²⁴⁷ The government estimated that the area under mechanization increased from about 13 percent per hectare in 2008—the first year of the program—to 19.3 percent per hectare in 2010.²⁴⁸ The original format came under pressure, however, as machines broke down and few options for repairs and maintenance were available. The loan repayment rate was also extremely low, and, without appropriate training, the uptake was lower than expected. The second phase of AMSEC, which resumed in 2016 and is currently being implemented, was therefore modified to accommodate the lessons learned from the first phase.²⁴⁹

In this second phase, the Government of Ghana secured a concessional loan facility through a South-South Cooperation Program to import agricultural machinery from Brazil. The new phase required a full down payment from AMSECs even though the highly subsidized rates were retained, thus reducing the risk and cost burden to the government. The beneficiary categories were also widened to include any would-be buyers whether they were AMSECs or individual farmers, and the requirement to purchase a minimum number of machines was lifted. This single change appeared to have been effective in the short term, as 69 percent of purchases in the first year were undertaken by individuals who bought only one tractor.²⁵⁰ An individual farmer could, in fact, be classified as an AMSEC if they purchased two or more machines which they then hired out. This was also made more attractive as the variety of implements offered was extended beyond land preparation to include shellers, multi-crop threshers, planters, harvesters, seed drills, and boom sprayers. Most importantly, the new phase offered 1,000 hours of maintenance service to anyone who purchased a tractor, in the form of 12 government-subsidized and mobile workshops that were operated by private individuals. The Brazilian suppliers were also contracted to provide spare parts for two years following delivery of the tractor. The new phase also included training for operators, which was mandatory for first-time buyers.^{251,252}

By March 2018, AMSECs had been set up in 89 districts, with further support from various emerging economies such as Brazil, China, and India.²⁵³ In the decade prior, approximately 3,000 tractors were imported by the MoFA.²⁵⁴ Although the Ghanaian mechanization sector is still in its early stages, with comparatively low machinery growth rates,

the government's commitment to mechanization is reflected by its support for the AMSECs and its push toward growing private sector involvement, particularly in the hiring services market. To achieve further progress, and as the Government of Ghana implements its AMSEC program within the context of the broader Planting for Food and Jobs campaign, more targeted interventions on agricultural mechanization will need to be developed and national research capacities further strengthened, for example through dedicated research institutions and courses on agricultural mechanization.²⁵⁵

Ghana School Feeding Program

To address hunger and malnutrition, encourage healthy diets, increase school enrollment, and enhance national food production, in 2005 the GoG introduced the Ghana School Feeding Program (GSFP); it provided free cooked meals to school-age children in state run primary schools and nurseries for 195 days of the school year. The program was coordinated at the national level by the Ministry of Gender, Children and Social Protection, assisted by the Ministry of Local Government and Rural Development, MoFA, Ministry of Education, Ministry of Health, and Ministry of Finance and Economic Planning.²⁵⁶ The program centers on sourcing locally produced nutritious food from smallholder farmers, with 80 percent of the program's allocated food budget committed to securing local food.²⁵⁷



The GSFP school menus are designed with nutrition in mind and contain a broad range of produce. They aim for a balance of 150 grams of cereals, 40 grams of legumes, and 10 grams of vegetable oils, for a total of 760 calories, and they also try for an abundance of local and seasonal produce.²⁵⁸ In Northern Ghana, for example, where tomato farming is strong, GSFP menus commonly include a traditional tomato stew and rice dish which meets 6 grams of the daily protein requirement of children aged 4 to 8 and keeps costs low at US\$ 0.13 per meal.²⁵⁹ The GSFP in that way capitalizes on the local agroecological conditions and benefits from cost-efficient implementation, while

driving diversification in local production in order to achieve the wider objectives of the program.²⁶⁰

The program also seeks to enhance local nutrition knowledge. In 2017, over 5,000 school caterers received training on the importance and application of food safety, hygiene, and nutritional values. In this way, caterers can focus on feeding students nourishing meals while teachers can concentrate on providing quality education, all within a cost-effective framework. A further benefit is the market that smallholder farmers gain for their produce. Between 2008 and 2013, the school feeding program resulted in a 16 percent increase in school enrollment as well as positive health and nutrition outcomes for students, with GSFP beneficiaries showing a 10 percent reduction in the prevalence of anemia and a 6-gram increase in hemoglobin concentrations.^{261,262} In 2019, the program reached over 54.6 percent of school-enrolled pupils across Ghana, and it hopes to reach 74.8 percent by 2023.²⁶³

To sustain these achievements, the GoG is maintaining its commitment to improving school enrollment and child nutrition. In 2018, the budget for the GSFP program was raised by 30 percent, totaling US\$ 61 million.²⁶⁴ Within just one year of this increased funding, it was reported that the program had provided one hot meal a day to over 2.6 million students in 8,683 schools across all the districts of Ghana.²⁶⁵ The program has also shown a marked improvement in the heights of students, particularly for girls aged five to eight years.²⁶⁶ Moreover, reducing hunger in pupils saw improved concentration, understanding, and overall educational performance, and marginal increases in test scores.²⁶⁷

CONCLUSION

Through focused and resolute efforts, Ghana has demonstrated its capacity to reduce poverty and malnutrition. Institutional coordination run through the National Development Planning Commission is critical to promoting a clear mission for a sustainable food system and to facilitating the effective delivery of services and support to the different actors. Together with this, the MoFA's decentralized approach ensures that the process of a food systems transformation is inclusive and impactful. Investments in irrigation have strengthened the country's resilience against climate variability, while the establishment of NAFCO has significantly contributed to stabilizing food prices, ensuring continued food supply, and providing remunerative prices for agricultural produce. In

addition, through the YEA, the government is also undertaking actions to facilitate youth employment in the food system. The extensive long-term nature of GoG's flagship strategies is recognized as being key to ensuring that short- and mid-term, as well as cross-sectoral, interventions achieve a common objective for sustained and inclusive growth. The Planting for Food and Jobs campaign, for instance, which consumes a large share of the agricultural budget, is further evidence that the government is centralizing the agricultural sector to drive both economic growth and progress on health and nutrition. The PFJ's focus on enhancing capacity within the private sector is seen as a key ingredient of its success, one outcome of which has been increased private sector investment in food and agriculture. This in turn ensures the long-term sustainability of the program.

As Ghana moves forward, however, the increasing prevalence of overweight and obesity requires a more holistic approach to the transformation of food systems, in response to an overall deterioration in the health of the nation. Through careful policy-making and programming, greater emphasis must be placed on the production and consumption of more diverse foods, using nutrition information and regulation to drive change among consumers. Despite strong intentions to improve the food environment—including the plan in the NCD policy to ban the advertisement of unhealthy food and drinks to children and the proposed rollout of the GSFP to high school children under the School Feeding Bill—the GoG needs to strengthen implementation. Similarly, as climate impacts become more frequent and costly, it is becoming ever more necessary to enhance social protection schemes and to reduce vulnerability to climate shocks in the food system. While Ghana has seen an impressive transformation in its food systems, which has been coupled with a rise in public sector investments, the country still falls short of meeting its CAADP commitment to allocate 10 percent of national expenditure to the agricultural sector. As it continues its efforts, and particularly in light of the UN Food Systems Summit 2021, the government must consider scaling up school feeding programs and increasing support for agribusiness and storage infrastructure, all of which will truly harness the benefits of the raised productivity resulting from the PFJ campaign.



Agriculture plays a central role in Malawi's economy. Although its contribution to GDP has fallen from over 30 percent in 1995 to 25 percent in 2019, it remains the largest employer in the country, with 76 percent of the population engaged in producing food in 2019.²⁶⁸ The main staple crop is maize, followed by cassava and potatoes. In fact, in 2014, maize provided about 50 percent of the country's daily calories while potatoes and cassava provided 9 and 6 percent, respectively. Food security in Malawi is thus largely defined in terms of the availability and access to maize. Indeed, maize production and consumption is so central to Malawian culture that it penetrates—and, arguably, defines—the nation's politics.²⁶⁹

It is essential to recognize, however, that Malawi's vulnerability to climate shocks and its exposure to other economic shocks such as currency devaluation have diminished the impact of interventions in the agricultural sector. In the last two decades, the country has been hit by at least four severe droughts, one even resulting in famine conditions. Moreover, structural shifts have led to a sharp currency devaluation, which in turn has impacted its ability to bring agricultural inputs into the country and to export food. Over the last 10 years, Malawi's agricultural sector has grown at only about 2.9 percent annually,²⁷⁰ which is significantly below the 6 percent target outlined in the Comprehensive Africa Agriculture Development Programme (CAADP).

Although the country has not made an explicit transition into food systems thinking, its institutional, policy, and programmatic interventions over the last 15 years demonstrate a more comprehensive approach to transforming its food systems. Not only has Malawi (over)committed to agriculture in comparison to the targets set out in the CAADP, it has also been one of the leading countries in terms of meeting these commitments. Between 2006 and 2014, Malawi's annual average share of total public spending dedicated to agriculture was 18.9 percent, which was the highest average among southern African countries and surpassed the CAADP spending target.²⁷¹ It is no surprise, therefore, that the 2018 Biennial Review Report rated Malawi among the top 10 countries that are on course to achieve continental agricultural policy reform and budget allocation targets.²⁷²

Beyond budgetary commitments, the Government of Malawi (GoM) has introduced programs, updated policies, and refined institutional frameworks to strengthen various elements of its food systems. Improvements in agricultural productivity, for example, have been driven by a successful—albeit

controversial—inputs subsidy program. The fact that it was implemented despite the reluctance expressed by development partners is an indication of the willingness of Malawi's government to challenge conventional wisdom and develop homegrown solutions. Moreover, the leadership and ownership of this program at the presidential level indicates that food and agriculture are a national priority. By broadly aligning its social protection programs with food security and input subsidies, the GoM ensures that its financial interventions maximize their impacts. Alongside these interventions, policy-led interventions on nutrition, combined with budgetary support for health interventions, are showing gradual but positive trends in addressing child malnutrition and an overall reduction in mortality caused by malnutrition. Finally, stemming from a general overhaul of its financial sector, particularly the institutional frameworks, Malawi has also made significant advances in making credit and financing more affordable and accessible to rural communities, including those in the agrifood sector.

INSTITUTIONAL INNOVATIONS

Leadership, national priorities, and coordination

Given its importance in Malawi's politics, the strategic direction and policy priorities for agricultural development were, until recently, fittingly developed and designed within the Office of the President and the Ministry of Agriculture, Irrigation and Water Development (MoAIWD). In fact, former President Professor Arthur Peter Mutharika (2014–2020) temporarily took charge of the ministry for five months in 2017 following the dismissal of the then Minister of Agriculture on charges of corruption. Following the 2020 general election, the ministry was renamed the Ministry of Agriculture (MoA). Six technical departments within the ministry oversee agricultural research, irrigation, land management, and crop, livestock, and extension advisory services. In addition, the MoA houses separate parastatal agencies that are responsible for agricultural inputs and produce marketing.

In a reflection of the national-level priority status to which large-scale irrigation has been elevated, the Greenbelt Authority is situated within the Office of the President and Cabinet. The Greenbelt Authority is responsible for large-scale irrigation schemes that are not within the remit of the Ministry of Agriculture's Irrigation Department. It draws, however, on all expertise from the Ministry's Irrigation Services Department. In 2019, the Greenbelt Authority partnered with an Israeli private company to launch a US\$ 5.5 million project for agricultural production.

This public-private partnership (PPP) is expected to deploy the latest technology for intensive vegetable production, a large share of which is currently imported to supply domestic markets.²⁷³

In recognition of the interlinkages of Malawi's food and agricultural sectors to other parts of the economy, several other line ministries have been assigned responsibilities in support of productivity, marketing, processing, and consumption. They include:

- **Ministry of Lands**, which is responsible for sustainable land use management,
- **Ministry of Finance**, which controls the agricultural budget and spending,
- **Ministries of Industry and Trade**, which are responsible for trade and investment, and for information sharing on markets, and
- **Ministry of Energy, Ministry of Mining, and Ministry of Forestry and Natural Resources**, which provide guidance and direction on the management of Malawi's natural resources, energy, and environmental programs, including fisheries.²⁷⁴

In 2014, the Ministry of Health adopted the Department of Nutrition, HIV and AIDS (DNHA) from the Office of the President to oversee policy efforts and to provide technical guidance and high-level advocacy on the national nutrition agenda. Created in 2004, the DNHA is credited for significant improvements in maternal and child health and nutrition, in part due to its accountability to the country's most senior office.²⁷⁵ The DNHA also seconds its staff on a consultancy basis to the Malawi Bureau of Standards in order to contribute to efforts on food safety and standards.

An Executive Management Committee coordinates relevant activities by these ministries within the framework of Malawi's National Agricultural Investment Plan (NAIP); in addition, an Agriculture Sector Working Group (ASWG) convenes meetings of state and non-state actors. State actors include the MoA and other relevant ministries such as the Ministries of Lands, Trade and Finance; non-state actors include representatives of parastatals, the private sector, farmer organizations, NGOs and civil service organizations, academia and research institutions, and agricultural sector development partners. Chaired by the Permanent Secretary at the MoA, and cochaired by a non-state actor from either the private sector or a farmers' organization, the ASWG supports sector-wide planning and cooperation among these stakeholders and monitors progress in achieving goals.

The ASWG, in fact, is one of 16 similar Sector Working

Groups (SWGs) that were formalized in 2008. SWGs were created with a number of goals including enhancing coordination and cooperation between development partners and the government; facilitating planning and monitoring of activities; resolving any inconsistencies; and guiding national dialogues on the development of specific sectors. Not only is the ASWG one of the most active SWGs, it is also where primary coordination of the agricultural and food sectors takes place. There is scope, however, for some of the other SWGs to play a more active role in food systems transformation. These SWGs include those for Health; Education; Trade; Industry and Private Sector Development; Roads, Public works, and Transport; Information and Communications Technology (ICT); Water, Sanitation, and Irrigation; Gender, Youth, and Sports; Environment, Lands and Natural Resources; and Vulnerability and Disaster Risk Management.²⁷⁶ Since not all of these are active or effective, however, the GoM proposed a revamp in 2020.²⁷⁷

Finally, a Donor Committee on Agriculture and Food Security organizes input from a broad range of development partners, including the European Union, World Bank, African Development Bank (AfDB), UK Department of International Development (DfID)[¶], Norwegian Embassy, United Nations Development Programme (UNDP) and the International Fund for Agricultural Development (IFAD), as well as some private sector and non-state actors. The MoA also benefits from input from technical working groups and from beneficiary feedback on implementation, via a District Executive Committee.²⁷⁸

Protecting consumers and supporting producers: The Agricultural Development and Marketing Corporation and the National Food Reserve Agency

The Agricultural Development and Marketing Corporation (ADMARC) is a state-owned company formed in 1971 to expand export markets for Malawi's agricultural produce. Its primary objectives were to purchase, store, process, insure, advertise, transport, and distribute all agricultural products. It also oversaw exports and provided access to financing for agricultural development. For the first decade of its operation, ADMARC played a key role in stabilizing prices and ensuring that food was affordable and that producers were sufficiently reimbursed. Where prices fell below marketing costs, the GoM covered the difference. The company capitalized on an expansive rural infrastructure of depots and warehouses and became a key avenue for supplying inputs to Malawi's

[¶] Renamed to Foreign, Commonwealth and Development Office (FCDO) in September 2020.

farmers. It also, however, leveraged its role as sole purchaser and amassed large profits, until supporting it became unsustainable for the government. Following market liberalization in the late 1980s, ADMARC was unable to compete with private traders and lost its role as the sole marketer for all produce except for maize.²⁷⁹ Since the mid-1990s, ADMARC's role in Malawi's food (maize) security has fluctuated in response to weather- and market-induced changes and shifts in national policy between price bands, outright bans in maize marketing, and export bans.²⁸⁰

These challenges have forced a review of ADMARC's own institutional structure. In December 2003, ADMARC transitioned into a limited liability company. It also reverted to trading beans, cotton, groundnuts, pigeon peas, soybeans, rice, fertilizers, and pesticides, in addition to maize and maize flour. Capitalizing on its large infrastructure base, including 220 warehouses with a storage capacity of about 137,000 metric tons (mt), a network of depots and permanent and seasonal markets, as well as a 43 percent stake in the national commodity exchange (the Auction Holdings Commodity Exchange, or AHCX) (see the section below on warehouse receipts), ADMARC has regained significant influence in Malawi's commodity markets. It also deploys profitability from other commodities to cross-subsidize its commercial and "social" maize market operations.²⁸¹ The company, however, continues to require substantial support from the GoM²⁸² and is now earmarked for further reforms aimed at improving the efficiency of its commercial activities, reducing its operational costs, and strengthening its financial sustainability.²⁸³

Working alongside ADMARC, the National Food Reserve Agency (NFRA) is mandated to maintain adequate buffer stocks of grain to ensure domestic supplies. Established as an independent trust in 1999, the NFRA buys maize from ADMARC and from private traders for Malawi's strategic grain reserves and is also permitted to import maize when necessary.²⁸⁴ At the time of writing, in 2021, the NFRA has six depots across the country which offer at least 217,000 mt of capacity.²⁸⁵

Access to finance: Policy and institutional innovation and leadership

Over the last 15 years, the GoM has wholly revamped its financial sector. This has been underpinned by the need to enhance access to finance for its unbanked, poor, vulnerable, and rural populations. Following two scoping studies conducted by the International Monetary Fund (IMF) and the World Bank (2007),²⁸⁶ and by FinMark Trust (2008), the GoM embarked on a wholesale reform of its financial sector to broaden

the diversity of products and services available, as well as extend their reach. Importantly, interventions have also sought to address demand-side challenges by developing and implementing a financial literacy framework and program that targets both clients and service providers and enhances interoperability among service providers and technologies, in order to enable users to access a broader range of services and products.

The process of transforming Malawi's finance sector that has been underway since 2007 has involved legal, policy, and institutional changes, as well as the upgrading of its financial infrastructure. The GoM has introduced and updated several financial sector laws that address banking, insurance, securities, microfinance, pensions, financial cooperatives, agent banking, credit information, and payment systems. In turn, Malawi's efforts to improve access to finance and credit have been entirely homegrown, nationally owned, and participatory; they have drawn inputs from across a wide range of stakeholders, including relevant ministries (Finance, Economic Planning and Industry, Trade and Private Sector), the Reserve Bank of Malawi; the private sector (banks, microfinance institutions and insurance companies), and the development community.²⁸⁷

These changes have been coordinated and implemented by a newly formed Financial Sector Policy Unit (FSPU) in the then Ministry of Finance, Economic Planning and Development (MoFEPD)**, which works closely with the Reserve Bank of Malawi (RBM) and with development partners that include the World Bank. In 2016, the FSPU was merged with the Pension Division and renamed the Pensions and Financial Sector Policy Division with its own dedicated staff.

In 2010, with these ambitions in mind, the GoM launched two new national strategies: the Financial Sector Development Strategy (FSDS) and the National Strategy for Financial Inclusion (NSFI) 2010-2014. They provided clear and prioritized roadmaps of actions and interventions that were aimed at shaping a sound, efficient, and inclusive financial sector. The NSFI 2010-2014, in particular, recognized the importance of an inclusive financial sector to the expansion of agricultural production, the development of micro and small enterprises, employment creation, and increasing household incomes.²⁸⁸ In order to deliver on the ambitions of the FSDS and the NSFI 2010-2014, in 2011 the World Bank partnered with the GoM to implement a Financial Sector Technical Assistance Project through the issuance of a US\$

** Now the Ministry of Finance and the Ministry of Economic Planning and Development and Public Service Reforms

28.2 million credit line. The seven-year project to improve the enabling environment comprised four key components, including establishing regulations and oversight, expanding financial infrastructure, boosting consumer protection and financial literacy, and enhancing the capacity for policy and governance.²⁸⁹

Private sector

Changes in the sector, however, have not been limited to governance. Private sector financial services providers have also undergone institutional changes in order to be more inclusive of actors in the agrifood sector including agribusinesses in both rural and urban areas, particularly micro, small, and medium-sized enterprises (MSMEs). Although MSMEs employ up to one million Malawians—about 63 percent of whom market agricultural produce—about 98 percent are not officially registered and are located in rural areas. These characteristics push Malawi's MSMEs out of the potential market for commercial banks and force them to turn to informal sources of financing such as village savings and loans associations (VSLAs) or social networks.²⁹⁰ Made up of microcredit agencies, microfinance institutions (MFIs, those that do, and do not, accept deposits) and financial cooperatives (SACCOs), MFIs plug a key gap in access to finance for MSMEs that would otherwise not be able to meet the requirements of commercial banks and other financial institutions.²⁹¹ VSLAs in particular, which operate through solidarity group lending and savings, are successful in tackling collateral shortfalls. They are especially popular

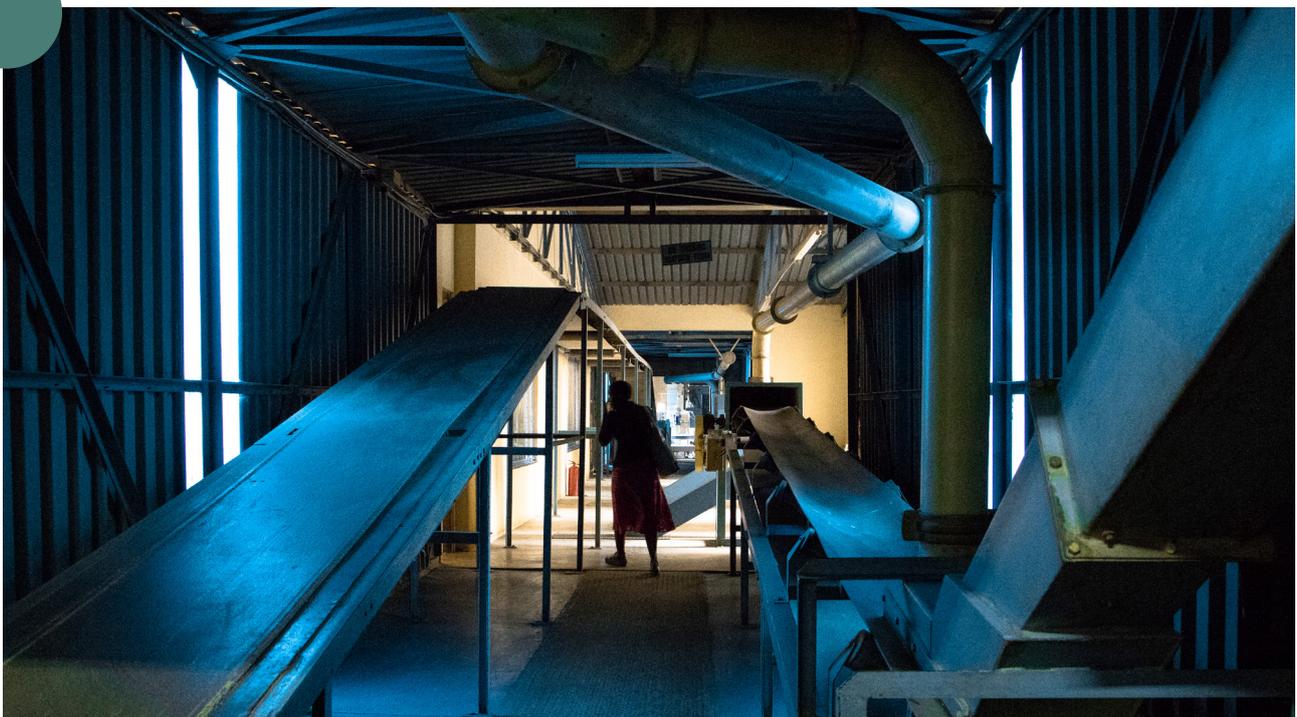
among women, who, in 2014, comprised nearly 72 percent of their members. VSLAs provide an important means for poor women to earn an income and become economically independent.²⁹²

With the establishment of the Malawi Microfinance Network (MAMN) in 2001, MFIs have benefitted from capacity building to ensure improvement in their own financial sustainability. While the RBM regulates and supervises MFIs, the Malawi Union of Savings and Credit Cooperatives (MUSCCO) oversees the SACCOs. New directives that came into force in 2014 have further secured the diversity of products and services offered across MFIs, to the point where, by 2018, the institutional strength across MFIs had improved broadly.²⁹³ The licensing, in 2019, of the farmers' cooperative BNC SACCO further points to dedicated efforts to ease rural community access to finance.²⁹⁴

In a further example of these efforts, the National Bank of Malawi (NBM) and a commercial bank (FDH Bank) have introduced products tailored to both smallholder and large estate farmers. They offer seasonal overdraft facilities to farmers against agreed cash-flow projections in order to support production and marketing activities during leaner periods in the agricultural calendar.^{295,296} The NBM also offers value chain financing options to farmers and MSMEs, while the FDH Bank finances aggregators and agro-processors against stocks and commodities.

Access to markets: Warehouse receipt system

Uniquely, Malawi has two commodity exchanges, the



Agricultural Commodity Exchange (ACE), established in 2006, and the Auction Holdings Commodity Exchange (AHCX) Ltd, which was established in 2013. Besides these, several parallel “systems” provide collateral against warehouse receipts. ACE and AHCX operate different—but potentially complementary—models. ACE uses electronic bulletin boards with certified warehouses (57 certified warehouses across the country and a rural network of 23 certified warehouses owned by partner farmer organizations or private sector partners²⁹⁷) and through forward contracts. It also supports development projects through a nonprofit trust. AHCX, on the other hand, has invested heavily in e-trading infrastructure and exchange-owned warehouses. Although it is partly owned by ADMARC (and has earned significant government support from, among others, former President Mutharika), AHCX operates as a commercial platform.²⁹⁸ Because there were multiple warehouse receipt “systems” operating in parallel, however, Malawi’s overall warehousing system had become cumbersome, outdated, susceptible to fraud, and inefficient; it had thus lost the confidence of buyers and sellers.²⁹⁹ In this context, the Warehouse Receipt Act (WRA) 2017, which was introduced as part of the financial sector reforms, streamlines the rights and obligations of the users of warehouse receipts, including warehouse operators. Not only does the WRA 2017 introduce internal best practice into Malawi’s warehousing system, it also provides more clarity and certainty for all users. WRA 2017 is designed to protect the owner, financier, and buyer of a warehouse receipt and make it easier and less risky to invest in agriculture. In addition, a Commodities Exchange Directive was approved in 2018 and took effect in 2019. The Directive elevates the role of the RBM in licensing and regulating (forbidding) price manipulation and commodity exchanges from trading (directly or indirectly) on their own markets, thereby cementing protection for users and ensuring financial sustainability for the exchanges over the long term.^{300,301}

Strengthening the legal environment around Malawi’s warehousing system has also proven conducive for investments. In 2015, the U.S. Agency for International Development (USAID)’s Southern Africa Trade and Investment Hub convened the European Investment Bank, the NBM, and the Agricultural Commodity Exchange for Africa to develop a first-of-its-kind Agricultural Storage Investment Facility (ASIF). By 2018, through the NBM, the facility had already loaned US\$ 12 million to agribusinesses to build 100,000 mt of new storage in Lilongwe, Blantyre, Kasungu, and Mchinji. A further US\$ 24 million was expected to be utilized over the following 18 months

to construct another 100,000 mt of storage. The new storage facilities will also be supported to integrate into Malawi’s broader warehouse receipt system. Finally, all funding is expected to also leverage local private capital.³⁰²

POLICY INNOVATIONS

Food security remains a top priority for the GoM. This is evident from the country’s Vision 2063 statement, which was launched in 2019 and which places agricultural productivity and commercialization at the very top of three pillars for delivering inclusive wealth creation and self-reliance. In Vision 2020, the previous long-term vision document, which was adopted in 1998, agriculture and food security had also been identified as key priorities for fostering economic growth and development.

These long-term vision statements are further itemized through the Malawi Growth and Development Strategies (I, II and III), which in turn guide a National Agricultural Policy (NAP). Finally, an Agricultural Sector Wide Approach (ASWAp) is a prioritized, results-orientated framework for implementing the NAP and for guiding investments by government and donors.³⁰³ In effect, the ASWAp sets the stage for the National Agricultural Investment Plan (NAIP).

High-impact, high-priority investments in agricultural transformation

In order to coordinate investments in the agricultural sector, the GoM formulated the ASWAp, which was adopted in 2011. The process of its drafting coincided with the signing of the CAADP compact in 2010, thereby helping to streamline national processes. This four-year plan presented a single, comprehensive, results-based program and budget framework for **prioritizing government and donor-led interventions in order of their potential to contribute to food security and agricultural growth in Malawi.** ASWAp presented three broad focus areas: food security and risk management; commercial agriculture, agro-processing and market development; and sustainable management of water and agricultural land.³⁰⁴ Development and implementation was done through an ASWAp secretariat and a technical working group that were situated inside the MoAIWD (then called the Ministry of Agriculture and Food Security, now MoA).^{305,306} Within the broad guidance provided by ASWAp, the development partner community was able to select and implement projects that aligned with their preferences. Their support was channeled through two avenues: the first was a special Support Programme (ASWAp-SP) with its own workplan and components which was, in turn, managed by its own steering structure and

chaired by a Head of ASWAp-SP. The second avenue for support was through a multi-donor trust fund located at the World Bank, which pooled money from the World Bank itself, the European Commission, Irish Aid, USAID, the UK's DfID (now the FCDO), and the Governments of Flanders and Norway. At the same time, state support was channeled via the resources allocated to the ministry. State funds were also under the custody of a steering group made up of a Head and a Deputy Head of ASWAp.

By 2015, when it expired, two major agricultural sector development programs, accounting for 70 percent of the total budget, had benefitted from support through ASWAp funds: the Farm Input Subsidy Programme (FISP) and the Green Belt Initiative (GBI).³⁰⁷ ASWAp is credited with having been successful in improving coordination within the sector and creating a central space for civil society and private sector synchronization.³⁰⁸ While ASWAp organized government-led and donor-led investments, its formulation and implementation cemented the need for an overall coordinated approach to the sector's development.

“Malawi-born” National Agricultural Policy: Inclusive policy-making for stakeholder ownership

The National Agricultural Policy (NAP) provides the broadest presentation of Malawi's direction in transforming its food systems. Malawi adopted its first NAP in 2016, prior to which the agricultural sector was guided by several subsectoral policies^{††} that were outdated, incoherent, and not always compatible with each other. This in turn resulted in a changeable policy and legal environment and inadequate investments.³⁰⁹ In 2009, the MoAIWD began the process of developing an overarching sectoral policy. In 2011, however, when the first draft of the new policy was presented, it was disapproved owing to shortcomings in stakeholder consultations. In 2014, a fresh draft using a new, bottom-up, collaborative, and inclusive process was initiated. This draft was developed using evidence from scientific literature, key policy statements and strategies, and inputs from consultants. The document was prepared by a multistakeholder drafting team that was led by the Department of Agricultural Planning Services (at MoAIWD) and presented at a validation workshop. The refinement and validation of the new

†† Subsectoral policies included, for example, the Malawi Agricultural Sector Investment Plan (1999); Pesticides Act of 2000; Malawi Fertilizer Act (2003); Food and Nutrition Security Policy (2005), which was later divided into the Food Security Policy (2006) and the National Nutrition Policy and Strategic Plan (2007); Agriculture Extension Policy; Crop Production Policy; Agricultural Research Master Plan; HIV and AIDS Agricultural Sector Policy and Strategy; Livestock Development Policy; National Fertiliser Strategy; National Irrigation Policy and Development Strategy; and Land Resource Conservation Policy.

draft involved nationwide consultations at district and national levels; these included over 50 focus groups comprised of farmers, representatives from government, NGOs, civil society and the private sector, youth, development partners, academia and research organizations. Over 20 percent of these were women. Inputs and validation from representatives of the private sector, development partners, and civil society were coordinated by the New Alliance Policy Acceleration Support: Malawi project (NAPAS: Malawi^{‡‡}).³¹⁰ Inputs were also solicited via media, post, and email.³¹¹ The resulting NAP is therefore “Malawi-born” and is reflective of priorities across a wide range of stakeholders. In effect from 2016 for five years, the NAP has defined and guided the vision for transforming the agricultural and food sector in Malawi.³¹²

National Agricultural Investment Plan for cross-sectoral coordination of activities

Not only was the NAP formally endorsed and launched by the President himself, private sector and development partners also feel ownership over it and are using it as the basis for defining their plans and activities. Most importantly, departments within MoA are also using the NAP to design their work plans and budgets.³¹³ The GoM has allocated to its agricultural sector well over the 10 percent of total national expenditure that was the target set by the CAADP. In 2016/2017, following the launch of the NAP, the sector received over US\$ 500 million, half of which came from national resources (about 12 percent of the national budget)³¹⁴, and the remainder was supplemented by donor funds.³¹⁵ The NAP engagement process also provided a strong foundation for the development of the next phase of the ASWAp, which was subsequently renamed the National Agricultural Investment Plan (NAIP).³¹⁶

The NAIP was launched in 2018, having been developed by the MoA using a similarly inclusive approach. This five-year (2018 to 2023) multisectoral document is the implementation plan for the NAP and is a successor to ASWAp. It provides a framework for coordinating and prioritizing investments by government agencies, development partners, and other relevant stakeholders in the sector.³¹⁷ Designed in a matrix structure, the NAIP has four programs: policies, institutions, and coordination; resilient livelihoods and agricultural systems; production and productivity; and markets, value addition, trade, and finance. It also has 16 technical intervention areas whose mandate is to eliminate hunger and food insecurity, make agriculture more productive and

‡‡ The NAPAS: Malawi project was supported by Michigan State University, International Food Policy Research Institute (IFPRI), University of Pretoria, AMG Global, and USAID-Malawi.



sustainable, increase the resilience of livelihoods to disasters, and reduce rural poverty. While the MoA oversees the implementation of the NAIP, the Cabinet Committee on the Economy provides political guidance and facilitates speedy clearance of policies and regulations.³¹⁸

NAP 2016: The first step toward a food systems approach

Although the NAP's policy outcomes and objectives adopt a traditional agriculture-focused approach, six of the policy priorities (PPs) are more comprehensive from a food systems perspective. The NAP orients Malawi's agricultural sector toward commercial farming, with greater specialization of smallholder production systems (both crop and livestock). This is matched against the policy priorities, which include raising productivity (PP1) with a higher uptake of mechanization (PP2) and irrigation (PP3); climate risk reduction (PP4); diversification of production; facilitation of greater agricultural market development, agro-processing, and value addition (PP5), thereby supporting youth, women, and other vulnerable groups to join and thrive in the agricultural sector (PP6). Yet another of the NAP's policy priorities is the entitlement to food and nutrition security (PP7) which takes an important step toward closing the gap between agricultural and health interventions, especially those related to malnutrition. In fact, Malawi has a long history of relatively successful policy-led interventions into nutrition.

Nutrition

Underpinned by commitments at the most senior levels and supported by dedicated nutrition policies and strategies, Malawi is making steady progress in reducing hunger and malnutrition among its citizens. Since 2000, the country's policy-driven efforts have

led to a gradual reduction in the prevalence of stunting, underweight, overweight, and wasting among children under five years of age.³¹⁹ According to the 2020 Global Hunger Index, the overall level of hunger has fallen from a score of 43.2 in 2000 to 22.6 in 2020; this is equivalent to a nearly 48 percent improvement, which places it among the top 20 most rapidly improving countries globally.³²⁰ Malawi is also on track to meet two targets for maternal, infant, and young child nutrition: wasting and overweight among children under five years of age.³²¹

The country has adopted a multipronged, multisectoral approach to reducing malnutrition. Its first National Nutrition Policy and Strategic Plan (NNPSP), which was written under the purview of the Office of the President and Cabinet (OPC) and approved in 2007, emphasized the centrality of nutrition in achieving human capital development and hence economic growth and prosperity. It covered 11 priority areas, including enhanced coordination, research and development, dietary diversification, food safety and quality, as well as education and the interaction with health. Until 2011, the NNPSP guided interventions in a range of nutrition-related areas. These included improving maternal nutrition and care and infant and young child feeding practices; improving intake of essential micronutrients, including via nutritious meals for school children; preventing and treating common infectious diseases; improving food safety and quality; reducing nutrition-related non-communicable diseases (NCDs); and improving management of acute malnutrition.^{322,323} The existence of the NNPSP was also a means to mobilize integrated nutrition funding as well as coordinate and improve the quality of nutrition services delivery.

In order to implement and operationalize the NNPSP,

further detailed plans and guidelines followed. These included the National School Health and Nutrition Strategic Plan (2009 to 2018) and the Infant and Young Child Nutrition Policy and Guidelines (2009). As one of the first countries to sign up to the Scaling Up Nutrition (SUN) movement in 2011, a national Nutrition Education and Communication Strategy (2011 to 2016) was put in place. It focused on the prevention of chronic undernutrition during the first 1,000 days to prevent stunting, as well as education communication on diet diversification and the use of local foods to meet dietary needs.

In addition to creating momentum toward addressing malnutrition in Malawi, the development and implementation of these policies had other salient impacts that provided a strong foundation for future interventions. A 2014 review of food and agriculture policies highlighted that widespread gender mainstreaming and cross-sectoral working were evident across the policies, as were very deliberate efforts to include the vulnerable members of society. The policies also laid very strong groundwork for the diversification of production and consumption, including the production and marketing of livestock products.³²⁴ Most significantly, the early nutrition policy processes demonstrated government stewardship and championship of nutrition interventions, in turn contributing to greater awareness about the issues.

Finally, closing the loop between agriculture and nutrition, the 2016 National Agriculture Policy positioned nutrition as one of its top eight policy priority areas, assigning responsibility for diversification, healthy diets, food safety, private sector participation, biofortification, and nutrition education across a broad range of stakeholders including ministries (agriculture, health, nutrition, HIV and AIDS, education, gender, children, disability and social welfare), NGOs and civil society, media, academia and research institutions, and farmers organizations.³²⁵

In 2018, the GoM renewed its commitment to addressing malnutrition by approving an updated National Multi-Sector Nutrition Policy (NMNP) covering the period 2018 to 2022. Building on progress made until then, and adjusting for evolving concerns, the 2018 NMNP's aims include: advancing adolescent, maternal, and child nutrition outcomes; reducing the prevalence of overweight and nutrition-related NCDs; diminishing nutrition-related mortality among children and in the

general population; improving delivery of nutrition interventions during emergencies; and improving the enabling environment for effective coordination and implementation of interventions. The oversight of the NMNP is shared between a cabinet committee on social development, a parliamentary committee on nutrition, HIV and AIDS, and a principal secretaries' committee on nutrition, HIV and AIDS. The Malawian government is thereby reinstated as steward and coordinator of nutrition interventions, though coordination also takes place through the Department of Nutrition, HIV and AIDS, which was created in 2004.³²⁶

PROGRAMMATIC INTERVENTIONS

Agricultural input subsidies program

One of the more well-known programs initiated by the GoM is the Agricultural Input Subsidies Program (AISP). Although input subsidies were popular in the country until the 1990s, they were scaled down significantly as part of the structural adjustment programs.³²⁷ Instead, from 1998 to 2000, and then again from 2000 to 2005, households were provided with "starter packs" to support their immediate food security needs. Disregarding serious reservations from the donor community and NGOs, however, the government reintroduced the AISP in 2005/2006, following two severe food crises in 2002 and 2005 that were caused by droughts. Targeting approximately 50 percent of Malawian farmers, the AISP program offered vouchers to community-selected households to receive one 50 kg bag of heavily subsidized basal and top-dressing fertilizers each. Compared to their market price of MK 2,000 (about US\$ 14), the fertilizers were sold at MK 950 (US\$ 7.50). Maize farmers were also entitled to 3 kg of open-pollinated varieties (OPVs) of maize at a cost of MK 150 (US\$ 1.20) per 3 kg, compared to a market price of MK 500 (US\$ 4) per kg.^{328,329} The program further selected particularly resource-poor participants who owned, or had access to, 0.4 hectares (ha) of land, had the ability to utilize the inputs, were not employed elsewhere, and were registered with the Ministry of Agriculture.³³⁰

As a signal of its commitment and because of the hesitation of the donor community, the full cost of the program was borne by the GoM, absorbing as much as 70 percent of the government's overall agriculture budget and 16 percent of the entire national budget.³³¹ Implementation of the AISP was done through the Ministry of Agriculture, with inputs being handled through ADMARC and the Smallholder Farmers Fertilizer Revolving Fund

of Malawi (SFFRFM). Through a tender process, private importers, as well as SFFRFM and ADMARC, delivered contracted quantities to specified depots. These were then transferred to local area markets by private transport companies, where they were sold to farmers.³³²

Within the first year alone, maize production was completely upended. Malawi went from a 43 percent deficit in 2005 to a 53 percent food surplus in 2006/2007.³³³ Over the following few years, the country became self-sufficient in its maize production and even began exporting to neighboring countries. Following this success in its first year, donors also joined the program³³⁴ and brought the private sector on board to strengthen the program's efficiency and effectiveness and to support seed subsidies, logistics, monitoring, and evaluation.³³⁵

Despite intensive politicization and some design shortcomings, Malawi's AISP has been considered a resounding success.³³⁶ The AISP is said to have contributed to the overall growth in Malawi's agricultural sector, rising from an average of about 2.4 percent per year between 2000 and 2005, to over 5 percent per annum between 2007 and 2011.³³⁷ The program also led to an increase in the use of fertilizers in the country. In 2012, their use reached 40 kg/ha, as compared to the SSA average for that year of 14.7 kg/ha.³³⁸ While impacts on household income were limited, recipients of the subsidized fertilizer—between 1.4 and 1.7 million households³³⁹—benefitted from a positive and significant impact on their food consumption adequacy (even if only 30 percent of households reported an increase in their consumption of maize) and were more likely to be net sellers than net buyers of maize. There was also an increase in school enrollment and attendance.³⁴⁰

Building on the initial success of the program, its ambitions also escalated. First, having begun as a social protection intervention to improve food security for vulnerable households, its scope eventually broadened to national food production and self-sufficiency. Second, the program's cost grew from about MK 4.5 billion (about US\$ 36 million) in 2005/2006 to nearly MK 23.5 billion (over US\$ 187 million) in 2011/2012. Some of these cost increases coincided with rising fertilizer prices, increases in the levels of subsidy, and a sharp depreciation of the kwacha following the liberalization of its foreign exchange market. The amount of fertilizer supplied, however, also increased from 150,000 mt in 2005/2006 to over 200,000 mt in 2007/2008, before falling to 140,000 mt in 2011/2012. In 2009/2010, the cost to farmers of a 50 kg bag fell from MK 900 (US\$ 5.55) to MK 500 (US\$ 3).³⁴¹

At the same time, the AISP's scale and implementation modalities were also refined to improve performance, respond to changing political and economic conditions, and broaden impact. Following the success in the first year, for instance, the GoM extended these benefits to tobacco, cotton, tea, and coffee inputs, partly due to political pressure. However, support for tobacco and cotton production was withdrawn soon afterward to rein in some costs, while support for legumes was introduced in 2007/2008 to promote diversification, improve soil fertility, and improve nutrition outcomes.^{342,343} In the meantime, the varieties of maize seeds offered began to include hybrids and OPVs, which gradually became the focus. Second, the approach to identifying participating households and issuing vouchers became more flexible and sophisticated, involving the MoA, village development committees, local stakeholders, a household register and



eventually voter registration. Additional criteria such as nonrepetitive selection and productivity were also applied to ensure that the program achieved maximum impact.³⁴⁴ Third, voucher security was gradually upgraded: in 2011/2012, vouchers began to be printed outside Malawi, with support from the UK's (then) DfID, and in 2013/2014 an e-voucher scheme was piloted.³⁴⁵

By 2014, annual maize production had more than doubled to 4 million mt. Hence, in 2015, the GoM reduced the degree of subsidy from 95 percent to 80 percent³⁴⁶ and allowed the private sector to play a larger role in both importing and direct retailing. Between 2015 and 2017, the cost to farmers rose to MK 3,500 (about US\$ 5) per 50 kg, and in 2016/2017, the GoM made one more change by fixing its own contribution per 50 kg bag at MK 15,000 (US\$ 21) and allowing farmers' contributions to vary.³⁴⁷ By 2019/2020, the program's expenditure as a share of the agriculture budget had shrunk to 20 percent. As the overall spending on agriculture increased, however, this amounted to MK 35.5 billion (US\$ 48.5 million), which was still significantly higher than the amount spent at the inception of the program. It also reached only 900,000 farmers,³⁴⁸ far fewer than it did during the earlier years when over 1.4 million households benefitted from the program. In 2020, incredibly, the government proposed a further scaling up of the newly renamed program (the Affordable Inputs Programme) which will cost MK 160.2 billion (about US\$ 214 million). At the same time, the program has now adopted even broader and more ambitious goals; it now aims for the reduction of poverty and the ensuring of food security at the household and national levels.³⁴⁹

Malawi's AISP has continued successfully since its inception, although with several modifications as outlined above. Despite a number of shortcomings in its design and implementation, there is widespread recognition that it has had a significant impact on the country's maize productivity. Importantly, as concluded by Chisinga (2017), *"the subsidy programme is a successful home-grown solution to the intractable hunger problem that was implemented in total disregard of fierce donor resistance"*.³⁵⁰

Social protection: Mtukula Pakhomo

Since the late 1990s, in addition to the input subsidy programs, Malawi has implemented several other social protection programs to improve food security and nutrition outcomes. While the earlier programs directly aimed at raising agricultural production, the later ones experimented with conditional and unconditional cash transfers.³⁵¹ In 2006, the GoM

piloted an unconditional cash transfer program called Mtukula Pakhomo (Lifting up Families). The program targeted ultra-poor, labor-constrained households with school-age children. First implemented in Mchinji District, the program was administered by the Ministry of Gender, Children, and Social Welfare, with additional oversight provided by the Ministry of Economic Planning and Development and technical support from UNICEF.³⁵² The program offered a regular cash transfer that was calculated according to the number of household members. Single-person households received approximately MK 500 per month (US\$ 4), which rose to MK 1,600 per month (US\$ 13) for a four-person household.³⁵³ In addition to poverty alleviation and reducing hunger and malnutrition, the program was initiated to improve school enrollment and attendance among the poorest. Subsequent evaluations have shown several benefits from the program, including an increase in investments in agricultural assets such as tools and implements for crop and livestock production. While adult on-farm labor allocation rose, fewer children were sent to work off-farm, thereby enabling them to join and attend school.³⁵⁴ In addition, 75 percent of the cash transfers were spent on groceries, resulting in an overall reduction in hunger and malnutrition.³⁵⁵ Stunting fell from 55 percent to 46 percent in beneficiary households (while the control group saw no change) and, in comparison to non-beneficiary households, the proportion of children who were wasted fell by an additional 2 percent within one year.³⁵⁶ The program also delivered significant advances in women's empowerment as they shifted a large share of their labor from off-farm activities to selling cash crops such as their own homegrown soybeans and sunflowers. Access to funds from the program facilitated the participation of female beneficiaries in VSLAs, and they went on to use the loans to invest in small businesses. Several women also purchased small livestock, providing a form of resilience to future shocks.³⁵⁷

Its success empowered a rapid scale-up such that, by 2008, the program covered 7 districts and over 18,180 households.³⁵⁸ In 2013/2014, the program was allocated MK 450 million (US\$ 1.3 million), a 300 percent increase from the previous year.³⁵⁹ Additional benefits included a reduction in the number of missed meals, particularly during the lean season, as well as an increase in the quantity and diversity of food consumption. During its expansion, the program has also refined its targeting. By 2015, it was operating across 15 districts, reaching over 100,000

households. Beneficiaries with one adult received payments of MK 500 (US\$ 1.50) every two weeks, but this was also subsequently raised to MK 850 (US\$ 2.50) every two weeks; additional cash was also disbursed based on the number of children enrolled in primary or secondary school.³⁶⁰

By adopting a multifaceted approach to improving food security and nutrition outcomes, Malawi's GoM has demonstrated a nuanced understanding of food systems and their linkages with poverty alleviation and education.

Financial literacy program

The World Bank's Financial Sector Technical Assistance Project, which has been implemented since 2011, included a program to improve financial literacy among potential and existing clients. In this respect, two key parallel activities took place to cover adults, those living in rural areas, and youth and children attending formal and semiformal schools. These activities included the introduction of financial literacy into the curriculum and teaching materials for many secondary schools, and amplified mass media literacy programs. The school element was led and coordinated by the Ministry of Education, Science and Technology. It provided regular teacher training, required the development of appropriate source books, and integrated learning into seven examinable subjects, including agriculture, business, Chichewa, English, life skills, mathematics, and social studies.^{361,362} A rural community financial literacy program was also rolled out in 22 of the 28 districts in order to educate and empower adults.³⁶³

The mass media literacy programs were supported by a new unit created in the Reserve Bank of Malawi (RBM). The programs were guided by a National Strategy on Financial Literacy, which was also developed by the RBM in partnership with financial industry associations, line ministries, academia, consumer watchdogs, national farmer organizations, NGOs, civil society and development partners.³⁶⁴ The RBM has also championed an annual Financial Literacy Week³⁶⁵ and has worked with broadcasters to produce programs on customer rights, responsibilities, and protection.³⁶⁶

These interventions have been exceptionally successful, with the proportion of financially illiterate Malawians—a high share of whom were in rural areas—dropping to half between 2014 and 2018. Financial literacy among women has also increased as a result; by 2018, nearly 40 percent of women were considered financially literate according to the follow-up Malawi Financial Literacy and Consumer Protection Household Survey.³⁶⁷ Studies have shown that higher education and financial

literacy, and hence financial inclusion, increases food security in Malawi as households save more, their creditworthiness improves, they gain access to profit-generating enterprises, and they strengthen their overall resilience to shocks.³⁶⁸

Conclusion

Over the last two decades Malawi has been gradually addressing several challenges facing its food and agricultural sectors. With the input subsidy schemes, the GoM has sought to strengthen the productivity of its agricultural sectors, while reforming its marketing institutions (ADMARC and NFRA) strengthens downstream responses for producers. Dedicated nutrition policies, overseen at the highest levels, have contributed to a marked improvement in the health and well-being of Malawians. Finally, an institutional overhaul of its finance sector, combined with a financial literacy program, raises the amount of liquidity within the food and agricultural sectors and ensures its long-term viability. Most impressively, Malawi's policymakers have chosen to challenge conventional wisdom and develop solutions that fit within their own contexts, and they have opted to do so inclusively. Rather than isolate a large and active development partner community, Malawi has joined forces with them to leverage their capacity and optimize the value of processes and interventions.

These innovations provide a strong foundation for the next level of food systems transformation. As Malawi's policymakers engage with the UN Food Systems Summit and beyond, they have an opportunity to catalyze a more holistic approach. In doing so, they first must adopt the same "Malawi-born" inclusive process as they have used previously; a broad range of stakeholders must be openly consulted, informed, and involved, thereby incorporating "buy in" for the next steps. An inclusive process will also draw greater attention to the need to address diversification in production and consumption in order to enhance both environmental and health-related resilience. Although there are several avenues for institutional coordination, there are still some gaps that need closing—for example, between the ASWG and other sector-wide groups—and some room for streamlining among others. Second, Malawi's policymakers must consider complementary inputs and services that would further support a food systems transformation such as energy and water for production and processing, education and skills development, and stronger research, development and dissemination. No doubt, the signing of the Malawi Agricultural Commercialization Project with the World Bank in 2020 is a step in the right direction and will also connect well with the country's jobs agenda.



Morocco has made significant progress in meeting its food and nutritional demands from domestic production. It has done so by encouraging the development of its agricultural sector and agrifood industries. Recent estimates show that the agricultural sector, including livestock, contributes nearly 15 percent to GDP and accounts for 23 percent of exports, more than one-third of the country's total employment, and about 80 percent of rural income.³⁶⁹ The resilience of the agricultural sector has been strengthened by the promotion and expansion of irrigation, improved water management techniques, and land restoration programs. Nearly 20 percent of Morocco's arable land is currently equipped for irrigation, making its agriculture more resilient to climate shocks and environmental degradation.³⁷⁰ Morocco's overall food security and nutrition have also significantly improved compared to many other African countries.³⁷¹ Between 2000 and 2020, Morocco's score on the Global Hunger Index fell by 43 percent (from 15 to 9), while the proportion of wasted and stunted children decreased from 4 to 3 percent and from 25 to 15 percent, respectively.³⁷² Such achievement is partly due to the government's actions at the institutional, policy, and programmatic levels to transform the country's food systems and to achieve sustainable and healthy diets for all. The Moroccan government has built on a "territorialization approach", in which policies and interventions are tailored to physical, human, financial, institutional, and cultural resources in each locality or territory. The government has promoted and supported better access to inputs and technologies for increased agricultural production and value addition along food value chains, doing so through aggregation, contract programs, and incentives to stimulate private sector investment. Morocco is facilitating access to financing, particularly for smallholders, and is encouraging entrepreneurship along the value chain. It is also promoting the participation of youth and women in agribusiness in order to drive equity and inclusivity, and to that end it has undertaken dedicated measures such as capacity strengthening. As a result, there are more than 2,000 small and medium-sized enterprises in the agribusiness sector.³⁷³

INSTITUTIONAL INNOVATIONS

Several government institutions are working toward transforming Morocco's food systems. While the Ministry of Agriculture and Fisheries holds the primary responsibility for overseeing the development and implementation of national policies on agriculture and rural development, this is done in partnership with Regional Offices of Agricultural Development

(ORMVAs) and the Agricultural Development Fund (FDA). Morocco has also established institutions for attracting private sector investments, easing access to finance for farmers, expanding the provision of extension services, improving food safety, and creating jobs in the agrifood sector, particularly for women and young people.

Providing decentralized and targeted services

Regional Offices of Agricultural Development

Regional Offices of Agricultural Development (ORMVAs) are public institutions that were created in 1966. They have legal status and enjoy financial autonomy under the supervision of the Ministry of Agriculture and Fisheries. They play a significant role in increasing Morocco's agricultural resilience, primarily through irrigation development. They also oversee technical studies, project execution, management of hydro-agricultural equipment, management of water resources for agricultural use, and dissemination of new farming technologies. ORMVAs also oversee the operation of digitalized irrigation systems and have been equipped with clear procedures and guidelines for the planning, programming, operation, and maintenance of irrigation systems. This enhances the technical capacity of engineers to conduct computer-assisted maintenance and to invoice for water used for irrigation.³⁷⁴

Agricultural Development Agency

Guided by the Plan Maroc Vert (PMV) (see Policy Innovations below), the Agricultural Development Agency (ADA) develops action plans and provides solutions that address agricultural needs at the local and national levels. The national agency, created in 2009 and supervised by the Ministry of Agriculture and Fisheries, proposes action plans to support smallholder subsistence agriculture.³⁷⁵ Drawing on financial backing from the Agricultural Development Fund, the ADA implements economically viable projects to raise productivity, such as land restoration and the cultivation of high-value crops. To support more resilient and productive agriculture, the ADA has developed a comprehensive portfolio of projects and programs related to climate change; these include conservation and reforestation programs and agricultural management projects which together are worth approximately US\$ 33 million, an amount which has been financed by bilateral and multilateral organizations.³⁷⁶ The ADA also promotes agricultural value chain development by supporting the adoption of new irrigation systems, mechanization, better packaging, and improved marketing of agricultural products. The ADA also supports investors seeking to join the agricultural sector by providing them

with information, advice, and guidance on project selection.

Reformed and tailored extension services: National Office for Agricultural Advisory Services

The creation of the National Office for Agricultural Advisory Services (ONCA) in 2013 was the culmination of a long reform process whose aim was to reduce the technical assistance gap in the agricultural sector in order to update the quality, planning and delivery of extension services, and to reduce the gender and age disparities within the existing system. The new institution reflects the government's commitment to reviving public agricultural extension services, strengthening links with the research system, and tailoring themes and messages to different audiences, 'especially youth, rural women, and family farms. In addition to information on farming practices, ONCA also shares knowledge on how to access the support structures and financial aid provided by government. It was also mandated to create 10,000 new farmers cooperatives between 2015 and 2020 in order to support national agricultural aggregation ambitions.³⁷⁷

ONCA uses modern practices of extension services and knowledge management; these include farmer field schools, virtual knowledge networks, call centers, and production and distribution of audiovisual materials.³⁷⁸ In 2018, the institution had 300 decentralized support centers and 1,000 extension workers.³⁷⁹ The decentralized operating model of ONCA is in line with the country's territorialization approach in which policy interventions are adapted to each geographic area, its existing asset base, and its development potential. Fifty provincial agricultural advisory services and about 300 local agricultural advisory centers have been created within provincial service provision.³⁸⁰ In 2015, private consultants also gained legal permission to provide extension advice alongside public sector personnel.

Guaranteeing food safety: National Office for Health Security of Food Products

Created in 2009, the National Office for Health Security of Food Products (ONSSA) provides technical assistance on food safety. It regulates food safety across food systems, specifically with regard to animal and plant sanitary and phytosanitary requirements. Although ONSSA is housed within the Ministry of Agriculture and Fisheries and has legal status and fiscal autonomy, it operates through a decentralized model; it has one central office, regional and provincial structures, and inspection services and analysis laboratories.³⁸¹ ONSSA ensures the compliance of agricultural inputs, veterinary drugs,

and animal feed with national quality standards. It also monitors the conditions of production, storage, preparation, processing, transport, and sale of locally produced and imported animal and plant products to ensure that they are safe for human consumption.³⁸² Some of its interventions include the identification of livestock using electronic technology such as radio frequency identity tags.

Financing and Insuring Food Systems

Agricultural Development Fund

The Government of Morocco has supported the development of credit services for smallholder farmers, showing its commitment to ensuring equity and inclusivity within Morocco's food systems. Established in 1986, the Agricultural Development Fund (FDA) aims to promote private investment in the agricultural sector. With direct input from state funds, the FDA offers targeted incentives such as subsidies to support the uptake of irrigation and the intensification of the production of fruits and vegetables such as dates, olives, citrus fruit, and early vegetables. It also works to improve the performance of the livestock sector (including cattle, poultry, and camels) through improved breeding and development of downstream activities.³⁸³ The FDA thus serves as an instrument for the implementation of government policy in the agricultural sector and as a means for leveraging investments; it thereby contributes to economic growth and the improvement of farmers' incomes.³⁸⁴ In 2019, the fund offered incentives worth MDH 8.6 billion (US\$ 898 million), of which 58 percent was taken up by farmers with holdings of less than 10 hectares (ha). The fund's expenditure rose to MDH 9.7 billion (US\$ 1 billion) in 2020 and is expected to exceed MDH 10 billion (US\$ 1.04 billion) in 2021.³⁸⁵



The Morocco Credit Guarantee Corporation

The Morocco Credit Guarantee Corporation (CCG) is a public financial institution that was created in 1949. It helps to boost private initiatives by encouraging the creation, development, and modernization of businesses, including agrifood small and medium-sized enterprises (SMEs); it does so through guaranteeing loans and through financing and cofinancing projects. By lowering the eligibility criteria for opening accounts and accessing credit, the CCG plays an important role in providing access to finance for rural youth. In particular, the CCG provides guarantees for women and young entrepreneurs who are planning to start micro or small enterprises. It shares risks with other institutions in the financial sector in order to facilitate access to finance. Since 2009, it is the sole player in the national institutional guarantee system in which the Moroccan state plays a central role.³⁸⁶

An innovative financing institution for agriculture: Tamwil El Fellah

In 2010, a new innovative financing institution, Tamwil El Fellah (TEF), was developed by the Groupe Credit Agricole du Maroc (GCAM), formerly Morocco's Agricultural Development Bank. GCAM partnered with the Government of Morocco to provide financial services to smallholder farmers without access to collateral. Loan limits were set at 25 percent of the farmer's income or US\$ 10,000, whichever was less. No more than 20 percent (US\$ 2,000) of the amount could be expended on inputs and working capital, and no more than 80 percent (US\$ 8,000) could be spent on other investments. In return, TEF provides a partial guarantee program which is underwritten by a risk coverage of 60 percent by the government. For credit risk assessments, TEF does not require collateral from smallholders; instead, it assesses other performance indicators such as the client's previous credit history and repayment behavior. The duration of loans was also modified to accommodate the longer and seasonal characteristics of agricultural financing. By extending the periods during which a loan could be considered pre-doubtful, doubtful, and compromised, to 12, 24, and 36 months, respectively, GCAM was able to better manage its risk levels and reach a broader range of clients without damaging its liquidity and impacting other bank subsidiaries.³⁸⁷ TEF also promotes productivity-enhancing and low-risk investment in, for example, irrigation and mechanization, through facilitating credit for these investments. The financial services are complemented by technical assistance, including extension services, advice on investment planning, and programs that provide specific subsidies.³⁸⁸ By

2015, TEF operations had broken even. By 2016, more than 67,000 smallholders had received loans, and the loan repayment rate at the end of the term was 98 percent. About 70 percent of the loans had been granted to finance investments in dairy farming, irrigation, farm equipment, and tree planting.³⁸⁹ Particularly popular reasons for borrowing also included crop conversion to higher value production such as olives, almonds, and figs, diversification to off-farm and processing activities, and intensification. By October 2015, interestingly, over 1,800 irrigation projects using solar water pumping systems had also been financed. The model has been so successful that it was also extended to SMEs.³⁹⁰

Agricultural insurance: The Mutual Moroccan Agricultural Insurance Company

The Mutual Moroccan Agricultural Insurance Company (MAMDA) was founded in 1963 to protect the country's farmers against weather-related risks. Holding over 70 percent of market share, MAMDA is one of the most important players in the sector. It offers insurance products covering the entire agricultural sector including the farmer, the farm, crops, livestock, and equipment. It has also set up a multi-risk climate insurance product that protects policyholders against a variety of risks such as drought, hail, frost, strong winds, sandstorms, and flooding. With premiums subsidized by the government by up to 90 percent, these products are extremely attractive to smallholder farmers.³⁹¹ MAMDA has also streamlined the compensation process by investing in a network of over 200 agricultural experts and cutting-edge information systems such as satellite tracking, geolocation, and automated payments. These efforts have made it possible to double the penetration rate of agricultural insurance in Morocco within five years.³⁹²

Employment and Skills Development

Training and education institutions

The Moroccan government is committed to improving employment opportunities for women and young people in agribusinesses. To improve the uptake and efficiency of agribusinesses, it aims to establish a network of 52 institutions with 24 different curricula across the country. Eight secondary schools prepare young people for the baccalaureate degree in agricultural sciences, and 30 middle schools in rural areas are dedicated to training young people in agricultural technology. The training seeks to improve overall understanding of the various employment and business opportunities within the agricultural sector, and it encourages young people to pursue studies or training in this area. All agricultural vocational training

institutions provide apprenticeships to improve the employability of rural youth who are not in school but have basic literacy skills. Since 2015, more than 10,000 young people annually receive training in 20 professions.³⁹³

National Agency for the Promotion of Employment and Skills

The National Agency for the Promotion of Employment and Skills (ANAPEC) is a public institution with fiscal autonomy that was created in 2000. ANAPEC contributes to the design and implementation of skills development and employment promotion programs, including in the agrifood sector. In conjunction with employers and training establishments, it sets up vocational training programs to prepare young people for integration into working life. ANAPEC works with potential employers to define their skill needs, collating job offers and accepting applications. It also matches employees to job openings, provides them with relevant information, and supports their orientation process. ANAPEC also guides young entrepreneurs in realizing their economic projects.³⁹⁴

Social Development Agency

In 1999, the Social Development Agency (ADS) was created under the Ministry of Solidarity, Social Development, Equality and Family. It was set up as a public agency with legal status and fiscal autonomy, and with a mandate to initiate and support programs intended to sustainably improve the living conditions of the most vulnerable populations, including

smallholders. It finances income- and employment-generating activities such as food processing and local restaurants, and it provides financing which encompasses all stages from production to consumption. ADS, for example, financed the "TATMINE" program, which consisted of promoting local production chains for the benefit of small farmers including women.³⁹⁵ ADS seeks to improve the living conditions of the vulnerable by supporting collective and individual projects for the production of goods and services. It also strengthens the institutional capacities of non-governmental organizations that work to support the agency.³⁹⁶

POLICY INNOVATIONS

Transitioning to a territorialization approach: National Human Development Initiative

In order to bring decision-making closer to the population and facilitate a more inclusive policy process, Morocco adopted a territorial approach to food systems governance. This new system of governance is represented in the National Human Development Initiative (INDH), which was launched by the King of Morocco in 2005 to tackle the root causes of poverty and socioeconomic exclusion. The INDH seeks to reduce poverty through the creation of income-generating activities in the form of micro projects such as agricultural processing and value addition, and the promotion of collective entrepreneurial thinking and networking. The INDH is a national coordination body housed within the



Ministry of the Interior. A multilevel governance structure was adopted under the INDH with a central strategic interministerial committee and regional, provincial, and local committees. Agricultural and rural development are key priorities under the INDH, which seeks in particular to improve the living conditions of women and youth.³⁹⁷ Between 2005 and 2014, more than 80 percent of funded activities were in the agricultural sector and mainly included goat breeding, rabbit farming, beekeeping, irrigation, and milk collection. The majority of beneficiaries were young people and women in rural areas.³⁹⁸ Other areas of activity included capacity development and strengthening of the actors involved in implementation of the INDH; the focus was on good governance mechanisms and on the provision of basic services and infrastructure such as education, healthcare, roads, water and sanitation, and environmental protection.³⁹⁹

Building sustainable, prosperous, and nutritious food systems

Plan Maroc Vert (Green Morocco Plan)

Implemented between 2008 and 2020, the Plan Maroc Vert (PMV) remains one of Morocco's defining national strategies. It contributed significantly to building sustainable food systems in Morocco. As reflected in its two pillars, its aim was to enhance the country's food security by increasing food production and income, especially for small-scale and family farmers.⁴⁰⁰ Pillar I of the PMV aimed to develop modern agriculture, supported by investments with high added value by upgrading key value chains including cereal, legumes, citrus fruit, olives, and grapes. Pillar II sought to support vulnerable actors such as smallholder farmers, with the aim of reducing rural poverty by improving their incomes. It aimed to double agricultural value-added, create thousands of jobs and halve rural poverty by 2020.⁴⁰¹ The PMV also adopted the territorialization approach, which is founded on the principle of optimizing the potential of each region. To that end, regional agricultural plans were formulated with the involvement of local and regional actors; after validation by the Ministry of Agriculture and Fisheries, they were used as the main policy documents.⁴⁰² The PMV served to reinforce Morocco's food self-sufficiency such that about 70 percent of the domestic cereal market and all vegetables, meat, and milk are locally produced. Between 2007 and 2018, agricultural value added doubled from US\$ 7.35 billion to US\$ 14 billion and agricultural exports increased by 2.4 times. The plan also created more than 250,000 jobs in the agricultural sector. More than 2.7 million beneficiaries—including small and medium-sized enterprises—benefitted

from interventions such as irrigation and water management, agricultural insurance, aggregation, and animal health and genetic improvement. Each US\$ 1 of publicly funded incentive generated US\$ 2.3 of private investment; this amounted to more than US\$ 7.12 billion of private investment.⁴⁰³

Green Generation Strategy

In 2020, the Government of Morocco adopted a new decadal strategy, the Green Generation 2020–2030 (GGG), led by the Ministry of Agriculture and Fisheries. The GGG builds on the success of the PMV to present a new vision for the agricultural sector, new governance arrangements, and the provision of modern tools for agricultural development. It also aims to serve as an instrument for recovery from the COVID-19 crisis and for rural resilience. The strategy has two pillars, one on human capital development and the other concerning sustainable agricultural development. Pillar I, the human capital development pillar, promotes the creation of an agricultural middle class of some 400,000 households and a new generation of young entrepreneurs. This objective will be achieved through investment in 1 million hectares of collective land for the creation of 350,000 jobs targeting young people, through agricultural organizations that are supported by efficient inter-professions, and through the implementation of updated support mechanisms.⁴⁰⁴ Pillar II will ensure the sustainability of agricultural development by increasing the performance of agricultural value chains. Its goal is to double the 2020 volume of exports and agricultural GDP by 2030 and to ensure that product distribution processes are improved through the modernization of wholesale markets. Pillar II also aims to replant 133,000 ha of forests, create 27,500 additional direct jobs, and increase the annual income of production chains and ecotourism to about US\$ 515,000. To reach these resilience goals, the new strategy seeks to actively involve local communities in forest management and to create forest nurseries, a training and research center, a Water and Forest Agency, and a Nature Conservation Agency. Combined, the two pillars directly contribute to several dimensions of food security. The GGG is being implemented through a territorial approach in order to tap into the comparative advantages of each region; it coordinates with all stakeholders and follows the principles of good governance.⁴⁰⁵

Halieutis Plan

In 2009, the government launched the Halieutis Plan to complement the PMV's focus on crop and livestock production. The plan aimed to promote the conservation of fisheries and marine ecosystems,

boost the productivity and quality of the sector, and enhance its competitiveness in the global economy. In doing so, the Halieutis Plan sought to increase the sector's contribution to GDP and exports and to improve food security and nutrition, while maintaining the long-term sustainability of aquatic resources. The plan aspired specifically to increase domestic consumption of fish from 11 kg per capita per year to 16 kg per capita per year. To this end, three processing zones were constructed for a total of US\$ 1.02 billion, one each in Tangier, Agadir, and Laâyoune-Dakhla. Following from their construction, marine fishery production rose by an average of 2.3 percent per year and by 2017 its total value had increased by 7.2 percent. The marine fishing sector currently offers 108,000 jobs on boats and 97,000 jobs on land. The production increase improved food security and nutrition in Morocco by allowing the per capita consumption of fish to rise from 11 kg in 2009 to 14 kg in 2017. In addition, the sector attracted US\$ 295 million in private investments and by 2019 the annual growth rate of investments in fish processing industries had reached 13 percent.⁴⁰⁶ Yet another plan has been designed for the period 2020 to 2030, one which is also based on the territorialization approach.

National Nutrition Strategy

Over the period 2011 to 2019, Morocco also committed to improving nutrition through the implementation of the National Nutrition Strategy. Nine ministries were overall involved in its design and implementation, including the Ministries of

Health, Agriculture and Fisheries, Education, Youth and Sports, Interior, Communications, and the Ministry of Industry, Trade, Investment and the Digital Economy.⁴⁰⁷ The interdisciplinary nature of the nutrition strategy led to the formation of the Comité intersectoriel de nutrition. This decision-making body was composed of representatives from the public, the private sector, local communities, and civil society. With the aim of food and agricultural transformation, the strategy aimed to improve the availability and affordability of food while ensuring the quality and safety of food products. It included the use of reinforced price regulation mechanisms such as food price subsidies, a productivity increase among small-scale farmers, and an effort to capitalize on local agricultural products. The strategy's approach, however, did not assume a territorial orientation as it was mainly centralized, lacking regional or local dimensions.⁴⁰⁸

National Integrated Youth Policy

The Ministry of Youth and Sports, in partnership with the General-Directorate for Local Communities and international organizations such as the United Nations, has also designed a long-term policy called the National Integrated Youth Policy 2015-2030. It was created with the technical assistance of the World Bank and the support of the Center for Mediterranean Integration in Marseille. The policy aims to address the inefficiency of uncoordinated sectoral policies by adopting a cross-sectoral youth policy. In order to ensure convergence in the





actions dedicated to young people in all domains, sectors such as agriculture, environment, education, employment, health, and culture are involved. The policy emphasizes the economic and social inclusion of all young people and particularly of groups of disadvantaged youth. It has planned to ensure greater inclusion of young people in the conception of public policies to ensure that they receive quality education, have access to formal employment and adequate health services, are able to participate actively in political, social, and cultural life, and that their human rights are respected.⁴⁰⁹

PROGRAMMATIC INTERVENTIONS

Multisectoral interventions

Morocco has implemented several innovative programs to achieve the objectives of its different initiatives, policies, and plans. The INDH has been implemented in three phases. During its first phase (2005–2010), it was structured around four programs that were focused on the fight against poverty in rural areas, social exclusion in urban areas, precariousness, and a cross-cutting human development intervention. The second INDH phase (2011–2018) pursued the same objectives as the first phase but with an increased financial envelope allocated to programs. During this phase, rural communities and poor urban neighborhoods were targeted, as well as one million beneficiaries in 3,300 villages belonging to 22 mountainous and isolated regions. The third INDH phase (2018–2023), launched in September 2018,

consolidates the achievements recorded during the previous phases. It is based on four programs that focus on providing infrastructure and basic services in under-equipped areas, supporting people in vulnerable conditions, improving the income and the economic integration of young people, and supporting human development in favor of future generations through investment in human capital.⁴¹⁰ By 2014, more than 7,400 projects (about 20 percent of the total number) had been implemented in the agricultural sector under the INDH. These include 3,063 projects in the livestock sector with 45,945 beneficiaries, 300 projects in the promotion of local products with 7,407 beneficiaries, 288 projects in the fisheries sector with 4,320 beneficiaries, and more than 723 actions targeting smallholder farmers, which together have 10,845 beneficiaries.⁴¹¹

Agricultural Value Chain Program Contracts and Aggregation Projects

The PMV was implemented through innovative interventions that allowed the achievement of the Plan's objectives. Pillar I was implemented through program contracts and aggregation projects for agricultural value chain development. The program contracts are cosigned by government institutions such as the Ministry of Agriculture and Fisheries and by interbranch organizations pertaining to agricultural value chains (such as formalized groups of farmers, processors, or traders). Contracts set out the responsibilities of each party for improving the organization, production, and productivity of

a particular value chain over 7 to 10 years, whether within farming or processing. Depending on the value chain and the activities, the government offers incentives for the private sector to invest in businesses under the contract program such as agricultural production, processing, or marketing. Aggregation projects were built around large stakeholders in agricultural value chains. For example, private agro-industrial agreements, for example, support and then buy the output of small farmers.⁴¹² The support to farmers includes the provision of technical advice, inputs, and loans to invest in agricultural product processing. The government finances 10 percent of the aggregation project cost and pays a premium per production unit (hectare, head of cattle, or ton). In 2013, in the region of Doukkala-Abda, a project involving the aggregation of 10,766 dairy farmers, representing 24 percent of the region's producers, was set up around the Nestlé Morocco plant. The breeders owned 17,700 cows and were organized into 130 milk collection cooperatives. As part of this project, the company will achieve aggregated annual milk production of 74 million liters against the initial level of 40 million liters that was set in 2013.⁴¹³

Productivity increase, conversion to higher value-added crops, and diversification of activities

Pillar II of the PMV had government subsidies as the main instrument for allowing small farmers to invest in intensification, conversion to higher value-added crops (mainly from cereal crops to rainfed or irrigated fruit trees), and diversification of activities through the valorization of local products to generate additional incomes.⁴¹⁴ In order to stimulate the acquisition of agricultural equipment, for instance, several incentives have been put in place by the government through the FDA. The subsidy for the acquisition of agricultural equipment ranged from 30 to 70 percent, depending on the type of equipment.⁴¹⁵ Under intensification projects, farmers also benefitted from agricultural advice and training provided by the ONCA. The conversion aimed to increase agricultural resilience by replacing cereal crops located in rainfed zones with fruit plantations that are less sensitive to rainfall variations. Eligibility, however, was restricted to farmers cooperatives or associations with the capacity to contribute between 10 and 20 percent to the total project cost, mainly in terms of labor or provision of land to build processing plants. By 2011, more than 325 projects had been approved by the Agricultural Development Agency, for a total cost of US\$ 1.13 billion of public investment. Two-thirds of the projects included fruits and vegetables such as olives, almonds, and dates, with livestock making up the balance.⁴¹⁶ Nearly 12 million trees were planted

annually on 1 million hectares of land that was not suitable for cereal crops.⁴¹⁷ To support the marketing of the increased production, professional agricultural organizations were also created, including cooperatives, the federation of cooperatives, and economic interest groups in charge of ensuring the transformation, certification, labeling, and marketing of agricultural products.⁴¹⁸

Scaling up sustainable irrigation

Morocco also emphasized irrigation development in order to reduce smallholder farmers' vulnerability to climate shocks and create a more resilient and productive food system. A Program of Irrigation Expansion (PEI) was initiated in 2008 to upgrade 1.5 billion cubic meters (m³) of water through hydro-agricultural developments; it aimed to cover an area of 160,000 ha by 2020.⁴¹⁹ In conjunction, the Government of Morocco also implemented the National Irrigation Water Saving Programme (PNEEI) over the period 2008 to 2020 in order to increase water-use efficiency in irrigation for sustainability. The PNEEI aimed to improve and modernize traditional and collective irrigation systems for expanding the use of drip irrigation. To support this program, farmers were able to access financial assistance from the Agricultural Development Fund to help them purchase equipment. In addition, farmers benefitted from advice and guidance on how to increase the return on water used by producing high-value crops and joining aggregation systems. Due to these government efforts, between 2008 and 2014 the amount of land equipped with drip irrigation increased to 450,000 ha; under the PMV, it was intended to reach 550,000 ha by 2020.⁴²⁰

Much emphasis has been placed on forming public-private partnerships (PPPs) by offering long-term leases on land to private investors for developing new irrigation projects.⁴²¹ PPPs in irrigation reduce the financial burden of subsidies for investment in the public sector; they also provide affordable improvements in the sustainability and quality of irrigation and drainage services available to farmers and promote more efficient use of water resources through appropriate incentives such as volumetric billing. The program launched by the Ministry of Agriculture and Fisheries encourages irrigation schemes in zones with high agricultural potential through the desalination of seawater.⁴²² In 2015, the Ministry signed a 30-year contract with a private firm to build, operate, and cofinance the desalination and irrigation infrastructure across 13,600 ha in the Chtouka Plain in the region of Souss-Massa-Drâa.⁴²³ The expansion of land under irrigation and the adoption of modern technologies greatly contributed

to the growth and increased resilience of Morocco's agricultural sector. The 2015/2016 agricultural season, for instance, was marked by rainfall that was over 50 percent below average; the agricultural GDP, however, fell by only 7 percent, which was a tangible indicator that the irrigation program has increased farmers' resilience and protection against climate variations. Before the expansion of irrigation, the fall in GDP might have reached up to 40 percent.⁴²⁴

Promotion of youth and women's employment in agribusiness

The Government of Morocco has implemented programs to increase employment, including several in the agricultural value chains. The Ministry of Labor and Professional Integration and ANAPEC, in cooperation with the German development agency GIZ, developed an integrated approach to promoting employment in rural areas. To assist young people in their job search, this approach combines actions which include the identification of local labor market needs, provincial dialogues, and the expansion of an information network and guidance centers for employment; the program also facilitates job seekers' placement and supports young entrepreneurs. Young people are being offered short training courses that are adapted to rural contexts; these include beekeeping, agricultural mechanics, olive processing, maintenance of orchards, phytosanitary treatment, and livestock fertilization.⁴²⁵ To enhance the sustainability of the model, the project supports key actors who are involved in the promotion of employment at national and regional levels. It works with them to initiate a lasting dialogue on the dissemination of the model and on securing its funding by national and regional partners. During the first phase of the project, from 2015 to 2017, more than 2,500 young women and men aged 15 to 35 benefitted from the project and 47 percent of the young people that were supported found a job or were able to increase their income. The second phase of the project, from 2018 to 2021, focuses on the development and dissemination of the intervention by piloting it in other provinces so as to reach a further 3,000 young people.⁴²⁶

CONCLUSION

Morocco has made remarkable progress in its efforts to build sustainable food systems. Under the overall leadership of the Ministry of Agriculture and Fisheries, food systems transformation is contributed to by several agencies, including the Regional Offices of Agricultural Development, the Agricultural Development Agency, the National Office for Health Security of Food Products, and the National Office of Agricultural Advisory Services. The decentralization process and the adoption of a territorial approach under the various policies and programs have ensured inclusivity and effectiveness in service provision. Morocco has also prioritized the financial inclusion of smallholders, as evidenced by the creation of an innovative financing institution, the Tamwil El Fellah. The Morocco Credit Guarantee Corporation has also supported private investments in the food system. The government is committed to improving the availability of employment opportunities for youth in the agriculture and food sector, as well as women's participation in agribusinesses. Programs have been implemented under the INDH which aim at sustainably improving the living conditions of the most vulnerable populations, including smallholders. Interventions such as incentives for private sector investment, contract programs, and aggregations have contributed to sustainable increases in agricultural production and ensuring well-functioning food value chains. Irrigation development, land restoration programs, and the expansion of agricultural insurance have strengthened the resilience of the food system. Despite the significant progress in building sustainable food systems, however, Morocco should emphasize action coordination by adopting a food systems approach. In this respect, the UN Food Systems Summit offers a unique opportunity for the country to streamline its interventions in order to maximize their impact and create sustainable, inclusive, nutritious, and prosperous food systems. Other countries can, in turn, draw inspiration from Morocco's innovative approaches to providing access to finance, supporting private sector investments, and enhancing access to employment opportunities, especially for youth.



Among African nations, Rwanda is increasingly acknowledged for its achievements in accelerating economic growth. Since 2000, the country has seen over 7.7 percent annual GDP growth.⁴²⁷ Key to this success is Rwanda's agricultural sector, which remains central to poverty reduction, improving livelihoods, and economic growth. The sector accounts for 67.4 percent of the active workforce and, in 2020, contributed 26 percent to the total GDP.^{428,429} Notably, the agricultural sector was estimated to have accounted for a third of overall poverty reduction between 2001 and 2011.^{430,431} Moreover, the agricultural sector has seen significant annual growth of an average of 5 percent since 2007 through land expansion and scaled investments.⁴³²

Nevertheless, there remain challenges that leave communities vulnerable to food insecurity and malnutrition, environmental degradation and climate change, and socio-economic shocks. One such challenge is that crop production remains at only 45 percent of its yield potential.⁴³³ Furthermore, while wasting and stunting rates among children under five have been steadily decreasing since the beginning of the 2000s, undernourishment in the general population has been increasing, going from 22.2 percent in 2012 to 35.6 percent in 2020; in 2018, almost 20 percent of the population was recorded as food insecure.^{434,435} Rural households thus remain exposed to a wide range of shocks that may compromise their access to nutritious food.

Rwanda has, even so, witnessed a significant transformation in the past two decades. The country's performance has been driven by the government's strong commitment to improving livelihoods, economic growth, and food security.⁴³⁶ Being the first nation to sign the Comprehensive Africa Agriculture Development Program (CAADP) in 2007, and receiving global recognition for its alignment with the Sustainable Development Goals, Rwanda has demonstrated its commitment to meeting agricultural transformation targets.⁴³⁷ To reach these goals, the government has articulated the importance of taking a holistic "food systems approach for enhanced nutrition and household food security" and of ensuring that Rwanda's interventions in its food and agricultural sectors are all-inclusive.⁴³⁸ The country has thus prioritized the development of multisectoral strategies, policies, institutions, programs, and funds that focus on transforming its food systems.

Notably, Rwanda has adopted a multisectoral approach to tackling food systems by designing an institutional framework that allows for the collaborative development and coordinated implementation of policies and programs. Cross-sectoral cooperation through multiple institutional structures that engage the state, civil society, and private sector is

making possible the comprehensive and inclusive design and pursuit of national objectives. Rwanda's state cooperation across policies, programs, and institutional activities demonstrates the government's commitment to tackling the multifaceted nature of food systems. Additionally, a strong national agenda for market-led growth, combined with the adoption of institutional structures that attract and manage sustainable investment from the private sector, are assisting in financing interventions to address food systems challenges. As such, Rwanda's progress thus far and its ambitious agenda for change is illustrated by its strength in the CAADP Second Biennial Review Report, where it scored in the top 10 countries that are successfully pursuing actions to improve livelihoods and increase prosperity through an African agricultural transformation. This is discussed in detail below.

INSTITUTIONAL INNOVATIONS

Due to the multifaceted nature of food systems, multiple institutions and initiatives are responsible for the gradual transformation of Rwandan food systems. The Ministry of Agriculture and Animal Resources (MINAGRI) is the main institution responsible for the policies and programs that seek to improve food security, agricultural productivity, diversification, and growth. MINAGRI introduces policies and programs to facilitate a sustainable agricultural transformation through market-led agricultural growth. It operates through two implementing institutions, the Rwanda Agriculture and Animal Resources Development Board (RAB) and the National Agricultural Export Development Board (NAEB). Established in 2017, the RAB's purpose is to ameliorate food insecurity and poverty by transforming agriculture into a smart, resilient, and productive sector, centering research and knowledge sharing, the adoption of innovative technologies, and private sector participation as key components for success.[¶] The RAB is responsible for the implementation of key agricultural policies that are focused on animal husbandry, technology innovation and adoption, training, extension services, and the coordination of stakeholders in programs and policies.⁴³⁹ The NAEB promotes economic prosperity and diversification and aims to strengthen Rwanda's agribusiness and export activities, with a target to reach US\$ 1 billion in export revenues by 2024.^{**440,441}

Multistakeholder financial planning

The Ministry of Finance and Economic Planning (MINECOFIN) coordinates and manages planning

¶ Law No 14/2017 establishing Rwanda Agriculture and Animal Resources Development Board (RAB) and determining its mission, organisation, and functioning.

** The law No. 13/2017 (ratified on 14 April 2017) establishes NAEB as commercial public entity, including a new structure.

and policy-making across all sectors. In order to facilitate national planning activities, MINECOFIN works with all relevant line ministries, discussing priorities, evaluating progress, and monitoring implementation.⁴⁴² To enhance synergies in the implementation and joint sector review processes, sector and subsector working groups bring together multiple stakeholders, including NGOs, development partners, state institutions, farmers, financial organizations, the private sector, and civil society. The Agriculture Sector Working Group (ASWG), for example, is chaired by MINAGRI; in collaboration with MINECOFIN and multiple partners, it assists in the development of agricultural sector strategies, using various approaches including the organization of public and private stakeholder consultations and workshops. MINAGRI's Sub Sector Working Groups on crop and livestock development, agribusiness, markets and export development, and planning, also support MINECOFIN and MINAGRI in developing collaborative programs with other government institutions and the private sector. More recently, the ASWG has been instrumental in ensuring that the Economic Recovery Plan for COVID-19's agricultural pillar provides support to existing agriculture and food security initiatives and strengthens institutional capacity to deal with COVID-19's impacts. As such, the government's post-COVID-19 response in terms of agriculture and social protection includes measures to prevent supply chain disruption and food insecurity; these measures include additional funds for input subsidies, strategic grain reserves, food transfers, and livestock services.^{443,444}

The formation of an Agriculture Development Fund is also underway. This fund offers an opportunity to provide targeted financial support to Rwandan agricultural policies; it will seek to incentivize private actors to invest in agricultural activities through offering fiscal incentives for engagement with public-private partnerships (PPPs), competitive funds, and interest loans.⁴⁴⁵ The funding will filter between four different sections to stimulate research and knowledge sharing; increase sectoral productivity; enhance agribusiness entrepreneurship; and boost financial inclusion through a Credit Guarantee Scheme. More specifically, through the Agribusiness Window there will be direct support for women in accessing finance, inputs, and information. The provision of seed capital to kickstart the engagement of women in the agricultural sector aims to stimulate inclusive economic activity and an agricultural transformation. Although the Agricultural Development Fund is still in its initial stages, MINAGRI has committed over US\$ 20 million to it. The Ministry has also emphasized throughout its national strategies the benefits of establishing the fund and its importance in using investment opportunities to leverage Rwanda's

achievement of national agricultural objectives by supporting the commercialization of agriculture.⁴⁴⁶

Linking agriculture with nutrition, health, education, and gender

MINAGRI cooperates regularly with different ministries on cross-sectoral projects and policies. Given the complexity of food systems and the overlap between sectoral responsibilities, the coordination between multiple ministries has been identified as being key to Rwanda's progress.⁴⁴⁷ In 2013, the Inter-Ministerial Coordination Committee (IMCC) was established as the highest-level convening body under the Prime Minister's Office; its role was to oversee Rwanda's interventions to reduce malnutrition, including the revision and updating of Rwanda's National Food and Nutrition Policy. The IMCC was made up of representatives from the Ministry of Local Government (MINALOC), the Ministry of Health (MoH), MINAGRI, the Ministry of Education (MINEDUC), and the Ministry of Gender and Family Promotion (MIGEPROF). The objective of the IMCC is to ensure that all necessary stakeholders are involved in the design and review of state initiatives. They meet four times a year to identify pressing food and nutrition challenges and to assess the progress of activities.⁴⁴⁸

Furthermore, MINAGRI has largely decentralized to the district level the authority over institutional priorities with regard to the planning, implementation, and monitoring of local agricultural programs. The Joint Action Development Forum (JADF) assists districts in developing their unique District Development Plans, budgets, and implementing activities. Government agents from MINALOC, NGOs, farmers, agricultural groups, and cultural leaders work together under the JADF umbrella to coordinate on local priorities. The process of decentralization seeks to ensure inclusivity and the alignment of national objectives and local needs.

POLICY INNOVATIONS

Through several initiatives that encompass the complexity of production, processing, transport, and consumption, the Rwandan government has committed to strategies, policies, and programs that will positively transform food systems for people, the planet, and the economy. Rwanda's Vision 2050 and the preceding Vision 2020 are the government's flagship national development agendas that aim to accelerate Rwanda's status from a low- to a middle-income country by 2035 and to a high-income low-carbon economy by 2050.^{449,450} Alongside this, the National Strategy for Transformation (NST I) 2017-2024 presents policies that will accelerate a sustainable economic and social transformation to a more prosperous and equitable Rwanda. Vision

2050 and NST I highlight the government's priorities for specific sectors, including agriculture and health; they provide direction for institutional structures and policy instruments that promote inclusive and prosperous growth. **The African Union's Agenda 2063, the United Nations Sustainable Development Goals, and the CAADP indicators have been carefully woven into Rwanda's development agenda and national policies.**⁴⁵¹ Vision 2020, Vision 2050, and the NST I all prioritize agricultural development as being central to wealth creation in Rwanda; as such, they include increasing the productivity of labor and land used for agricultural production, expanding distribution of fertilizers and seeds, increasing the use of irrigation technology, and improving access to key infrastructure and financing.

Vision 2050 and NST I are further detailed through a Strategic Plan for Agricultural Transformation (PSTA), of which Rwanda is currently on its fourth iteration. The three agricultural plans preceding 2018, PSTA I, II, and III, established clear principles for agricultural growth and have developed varying agendas for the central focus and vision for growth. The successful implementation of PSTA II (2009-2012) enhanced agricultural production and productivity; crop yields increased by an average of 400 percent and postharvest losses declined to less than 15 percent of production. PSTA II reportedly also contributed to a 6 percent reduction of poverty over the period of the policy.⁴⁵² PSTA III (2013-2017) saw a 5 percent annual growth in the agricultural sector and a 13 percent reduction in poverty.⁴⁵³

In an effort to provide a comprehensive action plan for addressing the multidimensional aspects of food systems, the fourth Strategic Plan for Agriculture Transformation 2018-2024 (PSTA IV) outlines 4 priority areas that address food security, resilience, economic opportunities, and wealth creation. MINAGRI leads the development and implementation of the new PSTA IV (2018-2024), which **adopts a food systems approach and acknowledges the holistic nature of ensuring food security and nutrition, agricultural growth, environmental protection, and economic prosperity for sustainable growth across Rwanda.** The ambitious US\$ 1.5 billion plan aims to commercialize the agriculture value chain and stimulate increased productivity and improved livelihoods. PSTA IV outlines the government's commitment to providing infrastructure, research, social protection, and the necessary resources and management to build a sustainable and thriving Rwandan agricultural sector. This newest strategic plan centers on market-led growth of the agricultural sector, looking to facilitate a sustainable food systems transformation. National objectives for growth include the creation of an enabling environment for greater private sector

participation and raising agricultural productivity. Enhanced productivity is particularly supported through greater uptake of mechanization and the diversification of production in order to improve nutrition; all of this is aimed at increasing household incomes, contributing to agricultural growth, and ultimately eradicating rural poverty.⁴⁵⁴ PSTA IV incorporates initiatives for women and youth that integrate throughout all priority areas; through its policy initiatives, it also highlights the importance of adopting a "green growth" approach to food systems planning. Specifically, PSTA-IV aims "to strengthen resilience against the impacts of climate change and to transform the dominant subsistence farming sector into a competitive and market-led agriculture sector".⁴⁵⁵

Linking climate action with agriculture

Rwanda's ambition to become a leading climate-resilient economy is demonstrated by the proactive approach that the government has taken in centering adaptation to, and mitigation of, climate change in its national objectives. The Rwandan Green Growth and Climate Resilience Strategy (GGCRS) was adopted in 2011. It implements 14 cross-sectoral programs which recognize environmental protection as a driver of national economic development and guide low-carbon planning and a green approach to national policy-making. More recently, in 2019, the GGCRS influenced the development of the National Environment and Climate Change Policy (NECCP). Formulated in consultation with MINAGRI, the NECCP acknowledges the drastic impacts that climate change, environmental degradation, and pollution of water and soil have on the agricultural sector and on human health. The policy therefore outlines objectives with regard to the conservation and restoration of vital ecosystems and landscapes, sustainable agriculture, and the establishment of biosafety regulations and early warning systems. More recently, the Rwanda Green Fund (FONERWA) was created to mobilize and manage the resources required for the successful implementation of the GGCRS. FONERWA is an investment fund that works to attract contributions from international development partners. It has funded over US\$80 million in Rwandan green growth projects across different sectors.⁴⁵⁶

The GGCRS outlines policy objectives that promote agricultural modernization and intensification among smallholder farmers to drive a green revolution. Mitigation strategies to improve agricultural resilience and prosperity in a challenging climate include the integration of soil fertility management, the use of organic fertilizers, and the adoption of clean energy sources.

Inclusive policy-making

To guide the development of PSTA IV, MINAGRI established a task force coordinated by the RAB and the NAEB whose mandate is ensuring the integration of PSTA IV between stakeholders. The task force engages multiple government institutions, sub-sector working groups, development partners including the EU, IFAD, FAO, World Bank, FCDO and USAID, private sector stakeholders, and agricultural communities to gather information on challenges and overlapping agendas for the food system. This coordinated and inclusive approach to understanding the complexities and interlinkages of food systems has strengthened PSTA IV's ability to provide targeted policy frameworks for different goals. Moreover, District Development Plans support the PSTA IV and other sectoral frameworks in actioning the policy agenda at the local level.⁴⁵⁷

Building on the PSTAs, the National Agricultural Policy (NAP), adopted in 2018, provides a policy agenda outlining actions for agriculture that can deliver “food security, nutritional health and sustainable agricultural growth from a productive, green and market-led agricultural sector”. The NAP is aligned with several other national strategies, including NST I (and its predecessor, the Economic Development and Poverty Reduction Strategy, EDPRS), the Agriculture Gender Strategy, the Poverty Reduction Strategy, and the Green Growth and Climate Resilience Strategy. As such, the NAP centers on enabling the private sector to stimulate desirable economic gains in agricultural production. The pillars of the NAP aim to provide an enabling environment for agriculture, kickstart a technological and skills revolution, induce

a productive and sustainable agricultural sector, and encompass inclusive opportunities.⁴⁵⁸ Specific policy action points provide examples of different initiatives that aim to increase incomes and resilience, improve food security and nutrition, and stimulate jobs and poverty alleviation.

Leveraging the private sector

In order to attain the Government of Rwanda's national targets and strengthen the private sector's role in Rwanda's development into a prosperous and equitable nation, in 2016 the Rwandan government enacted the public private partnership (PPP) law. The law sanctions a framework for inclusive and sustainable PPP investments; it sets the criteria for the procurement process, the selecting of locations, the role of institutions and stakeholders, and it outlines the governance structure for managing PPPs.⁴⁵⁹ The Rwanda Development Board (RDB), MINECOFIN and, at the local level, the Local Administrative Entities Development Agency together hold responsibility for adherence to the 2016 PPP law, prepare guidelines for different stakeholders, lead negotiations for PPP agreements, and monitor the delivery of the terms.⁴⁶⁰ Before a project is legally approved, sectoral ministries, in line with policy and program priorities, must identify PPP projects, conduct feasibility studies, and note preferred organizations. Under the RDB, the Public Investment Committee and the PPP Steering Committee review and approve conditions and shortlist bidders for PPP contracts.

In 2019, the Government of Rwanda established the Leveraging Private Sector Strategy (LPSS) to attract and support private sector investment in the



agricultural sector and to support the implementation of PSTA IV. The LPSS outlines the importance of bridging the national financing gap and accelerating the institutional environment in order to increase investments in agriculture; by prioritizing activities that lower capital risk, reduce contractual arrangement delays, and ensure all deals reinforce national objectives. As such, the LPSS supports PSTA IV objectives; it also encourages an increased engagement with private stakeholders across all agricultural strategies by utilizing the PPP law to stimulate further activities and initiatives. According to the LPSS, over US\$ 10 million in PPP activities and initiatives for the agricultural sector have so far been identified.⁴⁶¹

Agricultural sector digitalization

In 2016, the National Information Communication Technology for Rwandan Agriculture (ICT4RAg) Strategy was launched; it aimed to support agricultural development by facilitating the adoption and development of ICT-based agriculture in Rwanda. A taskforce led by MINAGRI, and the Ministry of Youth and ICT (MYICT) developed the ICT4RAg Strategy to highlight Rwanda's vision for mainstreaming ICT in agriculture. The strategy outlines national priorities and a plan of action for the implementation and evaluation of over \$US 30 million worth of activities and projects.⁴⁶² The strategy emphasizes the importance of integrating youth into the promotion of ICT in farming; it also stresses a commitment to generating employment opportunities for women and youth.⁴⁶³ Projects and activities seek to challenge existing shortfalls in agricultural productivity through the digitalization of knowledge sharing and technical advisory services.⁴⁶⁴

PROGRAMMATIC INTERVENTIONS

Twigire Muhinzi Extension Program

In 2013, the RAB, in collaboration with district institutions, established the Twigire Muhinzi Extension Program. The program supports improving Rwandan farmers' accessibility to up-to-date knowledge, technologies, and advisory services and, in turn, farmers assume a central role in agricultural extension. The Twigire Muhinzi Extension Program operates through a system in which farmers, through farmer field schools (FFS) and farmer promoter (FP) models, are integrated into extension provision, thereby ensuring that agricultural development is driven from the bottom up. In this model, all local farmers are organized into Twigire Groups and one lead farmer from each village is trained to be a farmer promoter by farmer field school facilitators

in a nearby FFS. The program encourages women and youth to take part in local Twigire Groups by engaging with all members of the community. Over 52 percent of members are women and 17 percent of FFS facilitators are under the age of 35.⁴⁶⁵ This inclusive farmer-to-farmer engagement seeks to facilitate the adaptation to and adoption of new agricultural technologies and knowledge sharing for the improvement of Twigire Group farming practices and nutrition. The FPs are responsible for ensuring that agricultural production in the village is resource efficient and improves yields.⁴⁶⁶ Moreover, village demo plots, supervised by farmer facilitators, encourage local Twigire Groups to test new practices and apply innovative technologies firsthand. Radio marketing for increased engagement and learning, community discussions to stimulate interest and accountability in local agriculture, and the additional promotion of the Twigire program encourages the collaboration and development of smallholder agriculture and creates a motivating environment for productivity. FPs and FFS facilitators are rewarded for their participation and input into the program through lump sums and incentives.⁴⁶⁷

In 2016, an assessment of the Twigire Muhinzi Extension Program recorded the training of 2,500 FFS facilitators, 8,500 FFS groups, and 14,200 farmer promoters; it also estimated that over half of the farmers across 1.1 million Rwandan households were members of a Twigire Group.⁴⁶⁸ The success of the program's training and knowledge dissemination is demonstrated by a reported average 44 percent increase in crop yields for beans, cassava, maize, rice, soya, and wheat. This growth, however, was concentrated in a few villages, without which the growth in yield was more restrained. An estimated 70 percent of farmers trained through FFSs also adopted "good agriculture practices" in crop production. Examples of these good practices that were noted since the implementation of the program include improved knowledge and better decision-making on crop diseases and pest identification, the formation of cooperatives to better access finance, the use of better seed storage for an improved next harvest, and improved knowledge on the nutritional value of soybeans. By decentralizing development to local facilitators, the program empowers local communities to improve productivity, increase livelihoods, and ensure food security.⁴⁶⁹

Digital Solutions

In 2010, in collaboration with the World Bank, MINAGRI launched e-Soko, a market information system by which rural farmers are able to access up-to-date prices on over 78 commodities in 61 markets

across Rwanda.⁴⁷⁰ The data on the commodities outlines market trends and seeks to empower rural farmers and market traders to make informed decisions on pricing crops; its ultimate aim is to improve the market's ability to provide a fair price. Mobile phones can be used to receive an SMS or voice call, or the e-Soko portal can be accessed via computer. It provides product and market information on crops such as beans, maize, rice, wheat, potatoes, and cassava.⁴⁷¹ MINAGRI manages the project, and local agents collect daily price information for commodities at local markets which are then recorded on the platform. In 2011, MINAGRI reported over 60,000 users of the SMS service; it also noted e-Soko's contribution to a reduction in costs for producers and consumers as well as the stabilization of prices and the boost to agricultural investment.⁴⁷² An independent study on the usage of e-Soko in Rwanda's Muhanga District also confirmed that farmers' usage of this portal corresponds with increased prices, productivity, and market demand. Among users, 67 percent reported that the platform helped them identify where to market products to obtain higher selling prices, and 14 percent reported that it had increased their productivity. However, it was reported that 43 percent of farmers across the region were not aware of e-Soko and that only 27.5 percent of respondents were utilizing the service. Given the reported success but lack of uptake, the government should increase efforts to raise awareness of the benefits of e-Soko and should seek to address the challenges experienced by farmers.^{473,474}

Since the introduction of the 2016–2021 ICT4RAG Strategy, MINAGRI, in collaboration with the FAO, has released a new information system for agriculture, the Agricultural Services and Digital Inclusion in Africa Program, which develops four apps: Cure and Feed your livestock, e-Nutrifood, Weather and Crop calendar, and AgriMarket Place.⁴⁷⁵ The apps will be available for all Rwandan citizens and are being developed in various local languages. Leveraging the lessons learned in the implementation of e-Soko, the new program promotes the inclusion of smallholder farmers in mobile technology activities—particularly during its development—in order to improve all aspects of agricultural production, processing, and consumption. The program looks to provide various types of services, including: information on climate conditions; information on agricultural services for improved production, such as resilient crop varieties and nutrients; advisory services on livestock diseases and nutritional values; and increased connectivity to markets through accurate price information. This innovative program aims to facilitate MINAGRI'S commitment to improving access to education in agriculture for smallholder farmers and thereby reducing poverty.⁴⁷⁶

Feeder Roads Program

In 2011, the Government of Rwanda introduced the National Feeder Roads Development Program (RFRDP) in order to increase access to rural transport facilities and thus increase farmers' access to the market. Led by MINAGRI and the Ministry of Infrastructure (MININFRA), this program aims to provide farmers across 21 districts with access to classified, resilient, and motorable roads that enhance market access and improve rural socioeconomic development. The program is seen as a fundamental approach to achieving wider national strategies, specifically PSTA IV and Vision 2050; it is also believed to drive agricultural productivity and help achieve a reduction in on-farm employment.

An impact evaluation of the RFRDP's upgrade to 79 km of feeder roads in Rwanda's Rutsiro District showed that the project increased incomes, enhanced employment opportunities and skills transfers, and subsequently reduced travel time for 1,316 households in the area.⁴⁷⁷ The reduction of travel time; reducing transport costs and post-harvest losses; increasing availability of agriculture inputs such as fertilizers and machinery; and increasing access to larger markets for trade, has enhanced the agricultural economy in the Rutsiro District and is noted to have indirectly impacted other food system factors, specifically rural health and nutrition. An additional evaluation by the World Bank indicated that the program's road rehabilitation had the largest beneficial impact on rural communities, where a 20 percent increase in incomes was observed.⁴⁷⁸

Land Tenure Registration Program

Land distribution plays an important role in the development of food systems and is key to sustainable management, agricultural productivity, and security of livelihoods.⁴⁷⁹ The introduction of the Land Tenure Regularization (LTR) program in Rwanda from 2004 sought to issue legal titles to every landholder in the country. The passing of the National Land Policy (NLP) and Organic Land Law (OLL) facilitated the implementation of the LTR program and provided legislation that supported the right to land for all Rwandans. The development of the NLP, OLL, and subsequently the LTR involved different ministries and development partners. The rollout of land registration between 2009 and 2013, at a cost of US\$ 70 million, clarified and documented the rights of existing landholders across all of Rwanda. Certificates were issued which validated titles for over 10 million land plots, offering land security and enabling the use of land as a transactional asset.⁴⁸⁰ The main principle of the program was to improve livelihoods, reduce poverty, and establish social security in the aftermath of the 1994 genocide.⁴⁸¹ Among the cross-cutting



and internationally recognized successes of Rwanda's LTR, land reform is considered central to rural agricultural development and it supports the national agenda for the commercialization of the agricultural sector, by easing agricultural investments. The World Bank considered the land consolidation exercise to be a significant contribution to increased crop yields and to the doubling of growth in the agricultural sector between 2000 to 2016.⁴⁸² Notably, MINAGRI distributes fertilizers based on certified land size data; this data is stored on their Agriculture Land Information System (ALIS). ALIS, an online database, details land size and tenure status to assist public and private stakeholders make informed and responsible investments; it also supports the implementation of initiatives and improves monitoring and management of land.⁴⁸³

Sustainable Intensification of Small-Scale Agricultural Programs

To ensure that food systems significantly reduce their contribution to climate change and to help make agricultural communities more resilient to climate shocks and stresses, the Sustainable Intensification of Small-Scale Agriculture Program, implemented in 2012 under the GGCRS, seeks to institutionalize sustainable farming techniques that maximize food production; it also aims to improve the efficiency of resource use through nutrient recycling and waste and water management, and to improve soil quality through increased use of fertilizers and better pest control techniques. In particular, the sustainable pest management techniques in the program involve the

introduction of napier grass and desmodium legumes to control pests in maize crops, increase yields of current production, and improve the concentration of nitrogen soil levels. Not only do sustainable pest management techniques improve yields of staple crops, increase incomes, and enhance food security; napier grass also provides animal feed and desmodium reduces methane emissions from cattle grazing.⁴⁸⁴ In 2018, an evaluation by MINAGRI of the GGCRS saw 48 percent of participants in the program adopting crop rotation techniques to encourage resilience to climate shocks; it also observed that 197 "plant doctors" had been trained on sustainable pest management techniques that encourage climate-resilient crop production.⁴⁸⁵

Girinka

With support from large NGOs, MINAGRI embarked on the internationally recognized asset transfer program called Girinka. Translated as, "May you have cows", Girinka is anchored in a cultural tradition of gifting a cow to establish unity and respect. It is an important initiative that seeks to transform rural communities' livelihoods and agricultural productivity by granting one cow to every poor family.⁴⁸⁶ Since its implementation, the RAB has distributed more than 340,000 cows across Rwanda.⁴⁸⁷ Vulnerable families are identified as program beneficiaries and receive a cow either directly or after it has been passed from family to family. Before and after families receive their cow transfer, training is given in animal husbandry, artificial insemination, animal fodder production, milk storage, and shed construction; to equip

beneficiaries with the skills necessary to maximize yields, productivity, and livelihoods, and to support household nutrition. A 2012 study that surveyed 885 beneficiaries found that management training administered by the program resulted in daily milk production that was one and a half times more than when livestock transfer occurred without training. In 2017, daily average milk yield stood at 4.2 liters.^{488,489} The increase in milk production was reported to have contributed to a 132 percent increase in national milk production between 2010 and 2020. This demonstrates the importance of the program in supporting wider national, continental and global development goals to promote agriculture as a means for poverty reduction and productivity increase.⁴⁹⁰ Furthermore, an evaluation of Girinka's impact on poverty reduction highlighted a 14 percent increase in food security, a 58 percent decrease in underweight children, and a 129 percent increase in measured income.⁴⁹¹ The program has also expedited Rwanda's progress in reducing wasting, stunting, and underweight among children under five.⁴⁹² MINAGRI aims to continue the success of Girinka from 2018 to 2024 and to distribute a further 189,000 cows across the country. The government will also be extending asset transfer programs to include small-stock animals such as chickens and pigs in order to further increase resilience and the diversity of production.^{493,494}

CONCLUSION

Thanks to forward-thinking institutional frameworks, policies, and programmatic interventions that are seeking to challenge adversity, Rwanda offers exemplary experiences and visionary leadership for the successful transformation of its food systems. Importantly, the government is now explicitly adopting a "food systems approach" across agricultural objectives and is clearly acknowledging the need to facilitate institutional coordination in addressing the multifaceted nature of interventions. The eminent attention on sustaining 'green growth' entwined throughout activities, clearly demonstrates its contribution to combatting the environmental challenges confronted in Rwanda's food systems and the government's commitment to seizing the opportunities arising from green-led investments into agriculture. Most notably, collaboration with a diverse range of cross-sectoral stakeholders in the development and implementation of state initiatives ensures success in achieving inclusive, tailor-made, and context-specific solutions. There is, nevertheless,

a need to strengthen independent evaluations of Rwanda's agricultural transformation in order to draw comprehensive lessons for the scaling up and scaling out of interventions across the continent.

While Rwanda has taken great strides in recognizing the complexity of food systems, several opportunities exist to combat existing challenges and to leverage sustained development. Rwanda can further magnify efforts to eliminate hunger and malnutrition through targeted initiatives that address food systems in the context of both food production and consumption. Demand- and supply-side interventions are essential to addressing the underlying causes of nutrition deficiencies such as lack of dietary diversity. In addition to nutrition education, production diversity with appropriate financial support will contribute significantly to dietary diversity. For the most vulnerable, poor, and food-insecure households in rural areas, social safety nets and alternative livelihood programs offer vital and stable sources of income to support sufficient and healthy diets. Moreover, strengthening downstream activities within value chains—including processing and marketing—would also have a significant "pull" effect on upstream production and productivity. Rural food markets, in particular, offer win-win outcomes as they support both agricultural growth and dietary diversity and hence an overall food systems transformation. They in turn require extensive interventions to improve energy, water, and hard infrastructure, so as to improve sanitary consumption and regulate food safety. Despite the strengths in facilitating private sector investments, more attention needs to be paid to funding the development of Rwanda's agro-processing subsector in order to improve resource utilization in production and the quality of food products for consumption. Importantly, while Rwanda has built a robust institutional framework for inclusive policy-making, the implementation of initiatives must include the clear communication of activities so as to ensure coordination and alignment between stakeholders. In this way, the benefits of a successful food systems transformation will be fully harnessed.

5. CONCLUSION

Africa's food and agricultural sectors are now at an inflection point. COVID-19 has dramatically exposed the interconnectedness and shared vulnerability of different sectors, including food and agriculture, nutrition and health, employment and environment. Business as usual is no longer an option, neither in how we understand the sectors nor in how we recover from this systemic shock. "Building back better" after COVID-19 does not only mean that we need to embrace a food systems approach to policy design and implementation. In fact, food systems thinking needs to be at the heart of any future continental and global strategies for economic growth, food security, climate, and development.

African countries have made significant efforts and progress to transform their agricultural systems to improve food security and provide healthy diets. Although much has been achieved on the continent over the past two decades, more remains to be done, not only to sustain the progress made to date but to elevate the continent's food systems to the next level. Policy-making for food systems transformation will require a more holistic and nuanced approach—one that operates within the interlinkages of policy domains that have been historically dealt with distinctly, such as agriculture, health, education, and the environment.

The complex challenges presented by food systems transformation will require complex solutions involving multiple sectors, industries, and stakeholders, all of whom arrive with varying interests. In other words, policy-making for food security and nutrition must move beyond agriculture and food production where it can better manage trade-offs and leverage synergies.

Moving away from 'business as usual' means that policymakers will be required to innovate and learn simultaneously. Long-term systemic change must be an iterative process. Disruptive innovations will reorient the trajectories of national and regional food security and nutrition outcomes. But these are likely to have both positive and negative outcomes. The need to reduce these imbalances must be placed at the center of new and innovative food systems policies, which will naturally present synergies and trade-offs. Combining these with a strong learning environment and framework will ensure that governments can successfully tailor responses to local, emerging threats and opportunities, and that interventions maximize impact.

While 2021 can mark a turning point and an important milestone in the transformation of Africa's food systems, the momentum must be maintained well beyond the UN Food Systems Summit in order

to ensure follow through on the commitments and targets that are being set and on stakeholders' shared ambitions.

In this sense, the experience of four African countries that have been at the forefront of dedicated and effective actions at the institutional, policy, and programmatic levels, offers a wealth of lessons for replication, and scaling-up and out across the continent.

Ghana is recognized as a leading African country in its efforts to reduce poverty and boost economic growth. A key component of success is the government's forward-thinking long-term policies that have paved the way for short-, mid-term and cross-sectoral interventions to achieve a common objective for sustained and inclusive growth. Supported by a strong and collaborative institutional framework, the government ensures inclusivity and support to all actors in the effective delivery of interventions. Moreover, Ghana's flagship Planting for Food and Jobs campaign has been successful in enhancing the involvement of the private sector in agricultural activities with significant financial support.

Malawi is among the top African countries that are on course to achieve continental agricultural policy reform and budget allocation targets. Recent institutional, policy and programmatic interventions demonstrate a comprehensive approach to transforming its food systems. Improvements in agricultural productivity have been driven by a successful—albeit controversial—inputs subsidy program. Malawi's policymakers chose to develop solutions that fit within their own contexts and have opted to do so inclusively. Rather than isolate a large and active development partner community, Malawi has joined forces with them to leverage their capacity and boost the impact. Dedicated nutrition policies, overseen at the highest levels, have contributed to a marked improvement in the health and well-being of Malawians. Finally, an institutional overhaul of its finance sector, combined with a financial literacy program, raised the amount of liquidity within the food and agricultural sectors and ensures its long-term viability.

Morocco's commitment to sustainably develop its agriculture sector and agri-food industries to meet its food and nutritional demands from domestic production has significantly contributed to building a sustainable food system. Through the Ministry of Agriculture and several specialized agencies, the government has ensured better access to extension services and technologies and has enforced laws and regulations for more inclusive food value chains. In addition, expansion of irrigation, land restoration and

agricultural insurance have significantly increased the resilience of the food system. Morocco is also facilitating access to finance in particular for smallholders, and entrepreneurship along the value chain, while promoting the participation of youth and women in agribusiness through dedicated measures such as capacity strengthening. More importantly, the adoption of the so-called “territorialization approach” –in which policies and interventions are tailored to physical, human, financial, institutional, and cultural resources in each locality or territory—including across agricultural policies and programs, has increased the effectiveness of government interventions in the food system.

Rwanda has developed an extensive institutional framework that supports effective coordination between different stakeholders in the development and implementation of activities and interventions in its food systems. The government’s approach centers on encouraging private sector involvement in all activities along the food value chain. Similarly, the government is encouraging Rwanda’s development to be green-led, to improve resilience and climate-sensitive and-smart approaches. Finally, Rwanda’s land tenure reforms have further strengthened the country’s ability to meet demands for food security, healthy diets, and improved livelihoods.

The Malabo Montpellier Panel has identified a set of actions summarized below that, if brought to scale, could have a significant impact on driving a food systems transformation across the continent:

- 1** Ensure multistakeholder and multisectoral coordination across government departments in order to reflect the interconnectedness of food systems transformation
- 2** Facilitate evidence-based and guided experimentation and innovation of policies and accelerated science capacity for technical solutions supporting broad food systems change
- 3** Institutionalize monitoring, evaluation and learning for impactful planning and implementation
- 4** Integrate food systems transformation into long-term national vision, growth and development agendas
- 5** Enhance CAADP indicators to reflect the complexity of food systems

6. ENDNOTES

- ¹ WFP and FAO. 2020. FAO-WFP early warning analysis of acute food insecurity hotspots: October 2020. Rome. <https://doi.org/10.4060/cb1907en>
- ² OECD, 2021. Making Better Policies for Food Systems. OECD Publishing, Paris. <https://doi.org/10.1787/ddfba4de-en>
- ³ FAO, IFAD, UNICEF, WFP, WHO, 2020. Executive Summary, in: The State of World Food Security and Nutrition in the World 2020: Transforming Food Systems for Affordable Healthy Diets., The State of the World. FAO, Rome. <https://doi.org/10.4060/CA9692EN>
- ⁴ Amankwah, A., Gourlay, S., Zezza, A., 2021. Agriculture as a buffer in COVID-19 crisis: Evidence from five Sub-Saharan African countries World Bank Blogs. <https://blogs.worldbank.org/opendata/agriculture-buffer-covid-19-crisis-evidence-five-sub-saharan-african-countries> (accessed 20.6.21).
- ⁵ FSIN and Global Network Against Food Crises, 2020. Global Report on Food Crises 2020 September update: In times of COVID-19. FSIN, Rome.
- ⁶ HLPE, 2020. Food security and nutrition: building a global narrative towards 2030. HLPE, Rome.
- ⁷ Hendriks, S., Soussana, J.-F., Cole, M., Kambugu, A., Zilberman, D., 2021. Ensuring Access to Safe and Nutritious Food For All Through Transformation of Food Systems: A paper on Action Track 1. Scientific Group of the UN Food Systems Summit.
- ⁸ Ibid.
- ⁹ Op. Cit. OECD, 2021.
- ¹⁰ Tschirley, D.; Haggblade, S.; Reardon, T. Africa's emerging food system transformation. In Global Center for Food Systems Innovation. White Paper. East Lansing, MI: Michigan State University. <https://doi.org/10.1016/j.gfs.2019.04.009>
- ¹¹ Malabo Montpellier Panel, 2017. Nourished: How Africa Can Build a Future Free from Hunger and Malnutrition. IFPRI: Dakar.
- ¹² FAO, IFAD, UNICEF, WFP and WHO, 2017. The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security. FAO, Rome.
- ¹³ Op. Cit. Malabo Montpellier Panel, 2017.
- ¹⁴ FAOSTAT, 2021. Suite of Food Security Indicators, Number of people undernourished (million) (annual value). Data retrieved on 29.1.21.
- ¹⁵ Concern Worldwide, Welthungerhilfe, 2020. Global Hunger Index (GHI) Global, Regional, and National Trends. <https://www.globalhungerindex.org/trends.html> (accessed 17.6.21).
- ¹⁶ Kengne, A.P., Echouffo-Tcheugui, J.-B., Sobngwi, E., Mbanya, J.-C., 2013. New insights on diabetes mellitus and obesity in Africa-Part 1: prevalence, pathogenesis and comorbidities. *Heart* 99, 979-983. <https://doi.org/10.1136/heartjnl-2012-303316>
- ¹⁷ Bigna, J.J., Noubiap, J.J., 2019. The rising burden of non-communicable diseases in sub-Saharan Africa. *The Lancet Global Health* 7, e1295-e1296. [https://doi.org/10.1016/S2214-109X\(19\)30370-5](https://doi.org/10.1016/S2214-109X(19)30370-5)
- ¹⁸ World Health Organization. Regional Office for Africa, 2018. Atlas of African health statistics 2018: Universal health coverage and the sustainable development goals in the WHO African Region. World Health Organization. Regional Office for Africa, Brazzaville.
- ¹⁹ Global Panel on Agriculture and Food Systems for Nutrition, 2016. Economic case for investing in nutrition in Africa: Key messages, based on: Hoddinott, J., 2016. The Economics of Reducing Malnutrition in Sub-Saharan Africa. Cornell University, Ithaca.
- ²⁰ IFPRI, 2015. Global Nutrition report 2015: Actions and accountability to advance nutrition and sustainable development. International Food Policy Research Institute, Washington, DC. <https://doi.org/10.2499/9780896298835>
- ²¹ Op. Cit. Global Panel on Agriculture and Food Systems for Nutrition, 2016.
- ²² Op. Cit. Malabo Montpellier Panel, 2017.
- ²³ Op. Cit. Malabo Montpellier Panel, 2017.
- ²⁴ Development Initiatives, 2018. What people eat and why it matters, in: 2018 Global Nutrition Report: Shining a Light to Spur Action on Nutrition. Development Initiatives, Bristol.
- ²⁵ WHO, 2015. WHO estimates of the global burden of foodborne diseases. World Health Organization, Geneva.
- ²⁶ Global Food Safety Partnership, 2019. Food Safety in Africa: Past Endeavors and Future Directions. Global Food Safety Partnership (GFSP), Washington, DC
- ²⁷ Townsend, R., Jafee, S.M., Hoberg, Y.T., Htenas, A.M., Shekhar, M., Hyder, Z., Gautam, M., Kray, H.A., Ronchi, L., Hussain, S., Elder, L.K., Moses, E., 2016. Future of food : shaping the global food system to deliver improved nutrition and health (Working Paper No. 104757). World Bank Group, Washington D.C.
- ²⁸ Abdychev, A., Alonso, C., Alper, E., Desruelle, D., Kothari, S., Liu, Y., Perinet, M., Rehman, S., Schimmelpfennig, A., Sharma, P., 2018. The Future of Work in Sub-Saharan Africa. International Monetary Fund, African Department, Washington D.C.
- ²⁹ World Bank, 2021. World Development Indicators: Employment in agriculture (% of total employment) (modeled ILO estimate) - Sub-Saharan Africa. <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=ZG> (accessed 17.6.21).
- ³⁰ Allen, T., Heinrigs, P., Heo, I., 2018. Agriculture, Food & Jobs in West Africa (No. 14), West African Papers. OECD Publishing, Paris.
- ³¹ Christiaensen, L., Brooks, K., 2018. In Africa, more not fewer people will work in agriculture. Jobs. <https://blogs.worldbank.org/jobs/africa-more-not-fewer-people-will-work-agriculture> (accessed 17.6.21).
- ³² Ibid.
- ³³ International Labour Office, 2018. Women and men in the informal economy: a statistical picture, Third. ed. International Labour Organization, Geneva.
- ³⁴ Tacoli, C., 2016. Informal food systems and food security in rural and urban East Africa (Briefing). iied, London.
- ³⁵ Barrett, C.B., Reardon, T., Webb, P., 2001. Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. *Food Policy* 26, 315-331. [https://doi.org/10.1016/S0306-9192\(01\)00014-8](https://doi.org/10.1016/S0306-9192(01)00014-8)
- ³⁶ IFPRI, 2017. 2017 Global Food Policy Report. International Food Policy Research Institute, Washington, DC. <https://doi.org/10.2499/9780896292529>

- ³⁷ Wegerif, M.C.A., 2020. "Informal" food traders and food security: experiences from the Covid-19 response in South Africa. *Food Secur.* 12, 797-800. <https://doi.org/10.1007/s12571-020-01078-z>
- ³⁸ Malabo Montpellier Panel, 2020. Trading Up: Policy innovations to expand food and agricultural trade in Africa. AKADEMIYA2063, Dakar.
- ³⁹ Dobson, R., Skinner, C., Nicholson, J., 2009. Working in Warwick: including street traders in urban plans. School of Development Studies, University of KwaZulu-Natal, Durba South Africa.
- ⁴⁰ Townsend, R., Benfica, R.M., Prasann, A., Lee, M., Shah, P., 2017. Future of food : shaping the food system to deliver jobs (Working Paper No. 114394). World Bank Group, Washington D.C.
- ⁴¹ Rapsomanikis, G., 2015. The economic lives of smallholder farmers: An analysis based on household data from nine countries. FAO, Rome.
- ⁴² Ibid.
- ⁴³ IFAD, 2016. Rural Development Report 2016: Fostering inclusive rural transformation. IFAD, Rome.
- ⁴⁴ IFAD, 2019. Chapter 3: Empowering young rural women to pursue productive livelihoods, in: 2019 Rural Development Report: Creating Opportunities for Rural Youth. IFAD, Rome.
- ⁴⁵ Op. Cit. Townsend, R., Benfica, R.M., Prasann, A., Lee, M., Shah, P., 2017.
- ⁴⁶ Christiaensen, L., Rutledge, Z., Taylor, J.E., 2020. Viewpoint: The future of work in agri-food. *Food Policy* 101963. <https://doi.org/10.1016/j.foodpol.2020.101963>
- ⁴⁷ Hearle, C., Baden, S., Kalsi, K., 2019. Promoting economic empowerment for women in the informal economy (WOW Helpdesk Guidance No. 1).
- ⁴⁸ UNSCN, n.d. Food Systems Dialogue on Gender Equality and Women's Empowerment for Food Security and Nutrition Recent News. <https://www.unscn.org/en/news-events/recent-news?idnews=2072> (accessed 17.6.21).
- ⁴⁹ Thornton, P.K., Kruska, R.L., Henninger, N., Kristjanson, P.M., Reid, R.S., Robinson, T.P., 2003. Locating poor livestock keepers at the global level for research and development targeting. *Land Use Policy* 20, 311-322. [https://doi.org/10.1016/S0264-8377\(03\)00034-6](https://doi.org/10.1016/S0264-8377(03)00034-6)
- ⁵⁰ FAO, African Union, 2018. Leaving no one behind: Empowering Africa's Rural Women for Zero Hunger and Shared Prosperity.
- ⁵¹ Op. Cit. UNSCN, n.d.
- ⁵² Dupas, P., Robinson, J., 2013. Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya. *American Economic Journal: Applied Economics* 5, 163-192. <https://doi.org/10.1257/app.5.1.163>
- ⁵³ Meinzen-Dick, R., Johnson, N., Quisumbing, A.R., Njuki, J., Behrman, J.A., Rubin, D., Peterman, A., Waithanji, E., 2014. The Gender Asset Gap and Its Implications for Agricultural and Rural Development, in: Quisumbing, A.R., Meinzen-Dick, R., Raney, T.L., Croppenstedt, A., Behrman, J.A., Peterman, A. (Eds.), *Gender in Agriculture*. Springer Netherlands, Dordrecht, pp. 91-115. https://doi.org/10.1007/978-94-017-8616-4_5
- ⁵⁴ World Bank, 2021. World Development Indicators: Employment in agriculture, female (% of female employment) (modeled ILO estimate) and Employment in agriculture, male (% of male employment) (modeled ILO estimate) – Sub-Sahara Africa. International Labour Organization, ILOSTAT database. Data retrieved on 29.1.21.
- ⁵⁵ Hackman, N.A., 2021. The pandemic has set gender equality back. Its legacy must not. *African Arguments*. <https://africanarguments.org/2021/03/the-pandemic-has-set-gender-equality-back-its-legacy-must-not/> (accessed 17.6.21).
- ⁵⁶ AGRA News Center, 2020. COVID-19 and Women in Agriculture Call to Action Press Release. <https://agra.org/news/press-release-covid-19-and-women-in-agriculture/> (accessed 17.6.21).
- ⁵⁷ Rodgers, Y., Akram-Lodhi, H., n.d. The gender gap in agricultural productivity in sub-Saharan Africa: causes, costs and solutions (Policy Brief No. 11). UN WOMEN, New York.
- ⁵⁸ Njuki, J., Sanginga, P.C. (Eds.), 2013. *Women, livestock ownership, and markets: bridging the gender gap in Eastern and Southern Africa*. Routledge; International Development Research Centre, Abingdon, Oxon; New York: Ottawa.
- ⁵⁹ Evers, B., Opondo, M., Barrientos, S., Krishnan, A., Amoding, F., Ndlovu, L., 2014. Global and regional supermarkets: implications for producers and workers in Kenyan and Ugandan horticulture. *Capturing the Gains*, University of Manchester, Manchester.
- ⁶⁰ Op. Cit. FAO, African Union, 2018.
- ⁶¹ Op. Cit. FAO, African Union, 2018.
- ⁶² Op. Cit. AGRA News Center, 2020.
- ⁶³ Malapit, H., Meinzen-Dick, R.S., Quisumbing, A.R., Zselezcky, L., 2020. Women: Transforming Food Systems for Empowerment and Equity, in: 2020 Global Food Policy Report: Building Inclusive Food Systems. International Food Policy Research Institute, Washington, DC. https://doi.org/10.2499/9780896293670_04
- ⁶⁴ Mechiche-Alami, A., Abdi, A.M., 2020. Agricultural productivity in relation to climate and cropland management in West Africa. *Sci Rep* 10, 3393. <https://doi.org/10.1038/s41598-020-59943-y>
- ⁶⁵ World Meteorological Organization (WMO), 2020. State of the Climate in Africa 2019. WMO, Geneva.
- ⁶⁶ Op. Cit. World Meteorological Organization (WMO), 2020.
- ⁶⁷ Mouhamed, L., Traore, S.B., Alhassane, A., Sarr, B., 2013. Evolution of some observed climate extremes in the West African Sahel. *Weather and Climate Extremes* 1, 19-25. <https://doi.org/10.1016/j.wace.2013.07.005>
- ⁶⁸ CARE, 2021. 2 years since Cyclone Idai and Mozambique has already faced an additional 3 cyclones Press Release. <https://www.care.org/news-and-stories/press-releases/2-years-since-cyclone-idai-and-mozambique-has-already-faced-an-additional-3-cyclones/> (accessed 17.6.21).
- ⁶⁹ IPCC, 2019. Summary for Policymakers. In: *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* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.
- ⁷⁰ Challinor, A.J., Watson, J., Lobell, D.B., Howden, S.M., Smith, D.R., Chhetri, N., 2014. A meta-analysis of crop yield under climate change and adaptation. *Nature Clim Change* 4, 287-291. <https://doi.org/10.1038/nclimate2153>
- ⁷¹ Op. Cit. IPCC, 2019

- ⁷² Jaramillo, J., Muchugu, E., Vega, F.E., Davis, A., Borgemeister, C., Chabi-Olaye, A., 2011. Some Like It Hot: The Influence and Implications of Climate Change on Coffee Berry Borer (*Hypothenemus hampei*) and Coffee Production in East Africa. *PLoS ONE* 6, e24528. <https://doi.org/10.1371/journal.pone.0024528>
- ⁷³ Bett, B., Kiunga, P., Gachohi, J., Sindato, C., Mbotha, D., Robinson, T., Lindahl, J., Grace, D., 2017. Effects of climate change on the occurrence and distribution of livestock diseases. *Preventive Veterinary Medicine* 137, 119-129. <https://doi.org/10.1016/j.prevetmed.2016.11.019>
- ⁷⁴ Ritchie, H., Roser, M., 2013. Land Use Our World in Data. <https://ourworldindata.org/land-use> (accessed 17.6.21).
- ⁷⁵ Ibid.
- ⁷⁶ <https://eros.usgs.gov/westafrica/land-cover/land-use-and-land-cover-trends-west-africa>
- ⁷⁷ Ondiek, R.A., Vuolo, F., Kipkemboi, J., Kitaka, N., Lautsch, E., Hein, T., Schmid, E., 2020. Socio-Economic Determinants of Land Use/Cover Change in Wetlands in East Africa: A Case Study Analysis of the Anyiko Wetland, Kenya. *Front. Environ. Sci.* 7, 207. <https://doi.org/10.3389/fenvs.2019.00207>
- ⁷⁸ Malabo Montpellier Panel, 2020. Meat, Milk and More: Policy innovations to shepherd inclusive and sustainable livestock systems in Africa. International Food Policy Research Institute, Dakar. <https://doi.org/10.2499/9780896293861>
- ⁷⁹ Malabo Montpellier Panel, 2018b. Water-Wise: Smart Irrigation Strategies for Africa: Morocco. IFPRI, Dakar.
- ⁸⁰ Op. Cit. IPCC, 2019
- ⁸¹ Brück, T., d'Errico, M., 2019. Food security and violent conflict: Introduction to the special issue. *World Development* 117, 167-171. <https://doi.org/10.1016/j.worlddev.2019.01.007>
- ⁸² Soffiantini, G., 2020. Food insecurity and political instability during the Arab Spring. *Global Food Security* 26, 100400. <https://doi.org/10.1016/j.gfs.2020.100400>
- ⁸³ Africa Center for Strategic Studies, 2021. Food Insecurity Crisis Mounting in Africa Infographic. <https://africacenter.org/spotlight/food-insecurity-crisis-mounting-africa/> (accessed 17.6.21).
- ⁸⁴ Op. Cit. FSIN and Global Network Against Food Crises, 2020.
- ⁸⁵ Op. Cit. FAO, IFAD, UNICEF, WFP and WHO, 2017.
- ⁸⁶ Ibid.
- ⁸⁷ Bailey, R., 2012. Famine early warning and early action: the cost of delay. Royal Institute of International Affairs (Chatham House), London.
- ⁸⁸ ICRC, n.d. Practice Relating to Rule 53. Starvation as a Method of Warfare Customary IHL. https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_rul_rule53 (accessed 17.6.21).
- ⁸⁹ Messer, E., Cohen, M.J., 2004. Breaking the links between conflict and hunger in Africa (2020 Africa Conference Brief No. 10). IFPRI, Washington D.C.
- ⁹⁰ Benin, S. (Ed.), 2016. Agricultural productivity in Africa: Trends, patterns, and determinants. International Food Policy Research Institute, Washington, DC. <https://doi.org/10.2499/9780896298811>
- ⁹¹ Badiane, O., Collins, J., and Ulimwengu, J. M., 2020. The past, present and future of agriculture policy in Africa. In 2020 Annual trends and outlook report: Sustaining Africa's agrifood system transformation: The role of public policies. Resnick, D., Diao, X., and Tadesse, G. (Eds.), Chapter 2, Pp. 9-25. Washington, DC, and Kigali: International Food Policy Research Institute (IFPRI) and AKADEMIYA2063. https://doi.org/10.2499/9780896293946_02
- ⁹² Tadele, Z., 2017. Raising Crop Productivity in Africa through Intensification. *Agronomy* 7, 22. <https://doi.org/10.3390/agronomy7010022>
- ⁹³ FAO, 2021. FAOSTAT Statistical Database: Crops, Yield. FAO, Rome.
- ⁹⁴ African Development Bank, 2020. Africa's fertilizer sector and the Bank's High 5s News and Events. <https://www.afdb.org/en/news-and-events/africas-fertilizer-sector-and-banks-high-5s-36830> (accessed 17.6.21).
- ⁹⁵ Alemu, D., 2011. The Political Economy of Ethiopian Cereal Seed Systems: State Control, Market Liberalisation and Decentralisation. *IDS Bulletin* 42, 69-77. <https://doi.org/10.1111/j.1759-5436.2011.00237.x>
- ⁹⁶ Pindiriri, C., 2018. Breaking the Traditional Trap: Assessing Drivers of Modern Technology Adoption by Smallholder Farmers in Hurungwe District, Zimbabwe, in: Shimeles, A., Verdier-Chouchane, A., Boly, A. (Eds.), Building a Resilient and Sustainable Agriculture in Sub-Saharan Africa. Springer International Publishing, Cham, pp. 33-53. https://doi.org/10.1007/978-3-319-76222-7_3
- ⁹⁷ Grow Africa, n.d. Fertilizer Subsidy Reform Revives Nigeria's Agriculture: Case Studies on Public-Private Agricultural Investments. Grow Africa, Midrand.
- ⁹⁸ zef Centre for Development Research University of Bonn, Akademiya2063, 2020. Animal Husbandry, in: From Potentials to Reality: Transforming Africa's Food Production. Investment and Policy Priorities for Sufficient, Nutritious and Sustainable Food Supplies. Program of Accompanying Research for Agricultural Innovation, Bonn and Dakar, p. Chapter 4.2. 46-55.
- ⁹⁹ Malabo Montpellier Panel, 2020. Case study: Economic Community of West Africa (ECOWAS), in Trading Up: Policy innovations to expand food and agriculture trade in Africa. AKADEMIYA2063, Dakar.
- ¹⁰⁰ Op. Cit. Malabo Montpellier Panel, 2020.
- ¹⁰¹ Reardon, T., Awokuse, T., Haggblade, S., Kapuya, T., Liverpool-Tasie, S., Meyer, F., Minten, bart, Nyange, D., Rusike, J., Tschirley, D., Vos, R., 2019. Chapter 3: The Quiet Revolution and Emerging Modern Revolution in Agri-food Processing in Sub-Saharan Africa, in: The Hidden Middle: A Quiet Revolution in the Private Sector Driving Agricultural Transformation, Africa Agriculture Status Report. Alliance for a Green Revolution in Africa (AGRA), Nairobi.
- ¹⁰² Malabo Montpellier Panel, 2018a. Mechanized: Transforming Africa's Agriculture Value Chains. IFPRI, Dakar.
- ¹⁰³ Poku, A.-G., Birner, R., Gupta, S., 2018. Is Africa ready to develop a competitive bioeconomy? The case of the cassava value web in Ghana. *Journal of Cleaner Production* 200, 134-147. <https://doi.org/10.1016/j.jclepro.2018.07.290>
- ¹⁰⁴ Mlambo, C., Mukarumbwa, P., Megbowon, E., 2019. An investigation of the contribution of processed and unprocessed agricultural exports to economic growth in South Africa. *Cogent Economics & Finance* 7, 1694234. <https://doi.org/10.1080/23322039.2019.1694234>
- ¹⁰⁵ HLPE, 2014. Food losses and waste in the context of sustainable food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. FAO, Rome.
- ¹⁰⁶ Kaliba, A.R., Mbiha, E.R., Nkuba, J.M., Kingu, P.M., 2008. Economic multipliers for Tanzania: implications on developing poverty reduction programs.

- ¹⁰⁷ Woldemichael, A., Salami, A., Mukasa, A., Simpasa, A., Shimeles, A., 2017. Transforming Africa's Agriculture through Agro-Industrialization. *Africa Economic Brief* 8, 12.
- ¹⁰⁸ Op. Cit. Malabo Montpellier Panel, 2020.
- ¹⁰⁹ Akinola, R., Pereira, L.M., Mabhaudhi, T., de Bruin, F.-M., Rusch, L., 2020. A Review of Indigenous Food Crops in Africa and the Implications for more Sustainable and Healthy Food Systems. *Sustainability* 12, 3493. <https://doi.org/10.3390/su12083493>
- ¹¹⁰ Rampa, F., Lammers, E., Linnemann, A., Schoustra, S., de Winter, D., 2020. Pathways to improved food and nutrition security of the poor: The promise of African indigenous foods and technologies.
- ¹¹¹ Swanevelde, C. J., 1998. Bambara - Food for Africa. National Department of Agriculture ARC, Grain Crops Institute. Pretoria.
- ¹¹² Wallace, H., Carter, J., Austin, J., Poinou, M., Moxon, J., Walton, D., Randall, B., Viji, I., 2012. Processing of *Canarium indicum* nuts: adapting and refining techniques to benefit farmers in the South Pacific. Australian Centre for International Agricultural Research, Canberra.
- ¹¹³ Richard, M., Daniel, K., Srinivasulu, R., Radegunda, K., Monica, K., Damas, M., Silvestra, S., Jacqueline, N., Ngoni, N., Ruth, C., Peter, M., 2017. Development of market opportunities through post-harvest processing of the African indigenous vegetables in Tanzania. *Afr. J. Bus. Manage.* 11, 426-437. <https://doi.org/10.5897/AJBM2017.8286>
- ¹¹⁴ Weinberger, K., 2007. Are Indigenous vegetables underutilized crops? Some evidence from eastern Africa and South East Asia. *Acta Hort.* 29-34. <https://doi.org/10.17660/ActaHortic.2007.752.1>
- ¹¹⁵ Op. Cit. Woldemichael, A., Salami, A., Mukasa, A., Simpasa, A., Shimeles, A., 2017.
- ¹¹⁶ Op. Cit. Woldemichael, A., Salami, A., Mukasa, A., Simpasa, A., Shimeles, A., 2017.
- ¹¹⁷ Op. Cit. Malabo Montpellier Panel, 2018a.
- ¹¹⁸ Op. Cit. Malabo Montpellier Panel, 2018a.
- ¹¹⁹ Malabo Montpellier Panel, 2019. Byte by Byte: Policy innovation for transforming Africa's food system with digital technologies. IFPRI, Dakar. <https://doi.org/10.2499/9780896296848>
- ¹²⁰ Tsan, M., Totapally, S., Hailu, M., Addom, B., 2019. The Digitalisation of African Agriculture Report, 2018-2019. CTA, Brussels.
- ¹²¹ Anidi, O., Mayienga, S.M. and Mpagalile, J., 2020. Use of information and communications technology tools for tractor hire services in Africa - Opportunities and challenges. *Integrated Crop Management* No. 25. FAO, Rome.
- ¹²² APHLIS, 2019. Climate change and postharvest loss <https://www.aphlis.net/en/news/29/climate-change-and-postharvest-loss> (accessed 17.6.21).
- ¹²³ Op. Cit. Malabo Montpellier Panel, 2018a.; Op. Cit. Malabo Montpellier Panel, 2019.
- ¹²⁴ FAO, 2017b. Policy measures for managing quality and reducing post-harvest losses in fresh produce supply chains in South Asian Countries. FAO, Rome.
- ¹²⁵ Jouanjean, M.-A., 2013. Targeting infrastructure development to foster agricultural trade and market integration in developing countries: an analytical review. ODI, London
- ¹²⁶ Berg, C.N., Deichmann, U., Liu, Y., Selod, H., 2017. Transport Policies and Development. *J. Dev. Stud.* 53, 465-480. <https://doi.org/10.1080/00220388.2016.1199857>
- ¹²⁷ Ali, R., Barra, A.F., Berg, C.N., Damania, R., Nash, J.D., Russ, J., 2015. Agricultural Technology Choice and Transport (Policy Research Working Papers No. 7272). Agriculture Global Practice Group, World Bank, Washington D.C
- ¹²⁸ Njenga, P., Willilo, S., Hine, J., 2015. First Mile Transport Challenges for Smallholder Tomato Farmers along Ihimbo Itimbo Road, Kilolo District Tanzania. AfCAP, Nairobi.
- ¹²⁹ Wally, O., 2019. The Gambia River bridge set to end "centuries" of trade chaos with Senegal. BBC News.
- ¹³⁰ Houmy, K., Clarke, L.J., Ashburner, J., Kienzle, J., 2013. Agricultural mechanization in sub-Saharan Africa: guidelines for preparing a strategy, Integrated crop management. Plant Production and Protection Division, FAO, Rome.
- ¹³¹ World Bank, 2020. Global Economic Prospects, June 2020. World Bank, Washington D.C. <https://doi.org/10.1596/978-1-4648-1553-9>
- ¹³² Deloitte, n.d. Addressing Africa's Infrastructure Challenges.
- ¹³³ World Bank, n.d. Why We Need to Close the Infrastructure Gap in Sub-Saharan Africa World Bank. <https://www.worldbank.org/en/region/afr/publication/why-we-need-to-close-the-infrastructure-gap-in-sub-saharan-africa> (accessed 18.6.21).
- ¹³⁴ Lakmeeharan, K., Manji, Q., Nyairo, R., Poeltner, H., 2020. Solving Africa's infrastructure paradox McKinsey & Company. <https://www.mckinsey.com/business-functions/operations/our-insights/solving-africas-infrastructure-paradox> (accessed 18.6.21).
- ¹³⁵ The Infrastructure Consortium of Africa, 2018. Infrastructure Financing Trends in Africa - 2018. African Development Bank, Abidjan
- ¹³⁶ Louis, K.K., Jmal, Y., Lakpa, D., Adidi, I., 2020. The Africa Infrastructure Development Index (AIDI) 2020 (Brief). African Development Bank, Statistics Department, Abidjan.
- ¹³⁷ Op. Cit. The Infrastructure Consortium of Africa, 2018.
- ¹³⁸ Economic Commission for Europe, Committee on Innovation, Competitiveness and Public-Private Partnerships, Working Party on Public-Private Partnerships, 2018. Standard on Public-Private Partnerships in Railways: Implementing the United Nations Agenda for Sustainable Development through effective "People-first Public Private Partnerships," ECE/CECI/WP/PPP/2018/6.
- ¹³⁹ Klagge, B., Nweke-Eze, C., 2020. Financing large-scale renewable-energy projects in Kenya: investor types, international connections, and financialization. *Geografiska Annaler: Series B, Human Geography* 102, 61-83. <https://doi.org/10.1080/04353684.2020.1729662>
- ¹⁴⁰ African Development Bank, 2013. Morocco: Works on World's Largest Solar Plant Financed by AfDB Go Underway African Development Bank. <https://www.afdb.org/en/news-and-events/morocco-works-on-worlds-largest-solar-plant-financed-by-afdb-go-underway-11775> (accessed 18.6.21).
- ¹⁴¹ Op. Cit. The Infrastructure Consortium of Africa, 2018.
- ¹⁴² Op. Cit. Malabo Montpellier Panel, 2020.
- ¹⁴³ UNECA, AU, AfDB, UNCTAD, 2019. Assessing Regional Integration in Africa 9: Next Steps for the African Continental Free Trade Area, Assessing Regional Integration in Africa (ARIA). UN Economic Commission for Africa, African Union, African Development Bank and UN Conference on Trade and Development, Addis Ababa.

- ¹⁴⁴ Bonuedi, I., Kamasa, K., Opoku, E.E.O., 2020. Enabling trade across borders and food security in Africa. *Food Sec.* 12, 1121-1140. <https://doi.org/10.1007/s12571-020-01095-y>
- ¹⁴⁵ Sibindi, N., 2020. Nexus Between Food Security and Trade in the Run-up to the World Food Systems Summit (SAIIA Policy Briefing No. 222). SAIIA, Johannesburg.
- ¹⁴⁶ Pais, G., Jayaram, K., van Wamelen, A., 2020. Safeguarding Africa's food systems through and beyond the crisis. *Featured Insights*. <https://www.mckinsey.com/featured-insights/middle-east-and-africa/safeguarding-africas-food-systems-through-and-beyond-the-crisis> (accessed 18.6.21).
- ¹⁴⁷ Ibid.
- ¹⁴⁸ African Development Bank, 2016. *Feed Africa: Strategy for Agricultural Transformation in Africa 2016-2025*. African Development Bank, Abidjan.
- ¹⁴⁹ UNECA, 2019. *African Continental Free Trade Area - Questions & Answers*. UN Economic Commission of Africa, Addis Ababa.
- ¹⁵⁰ Songwe, V., 2019. Intra-African trade: A path to economic diversification and inclusion. *Brookings*. <https://www.brookings.edu/research/intra-african-trade-a-path-to-economic-diversification-and-inclusion/> (accessed 18.6.21).
- ¹⁵¹ Op. Cit. OECD, 2021.
- ¹⁵² Bouët, A., Odjo, S.P., Zaki, C., 2020. *Africa Agriculture Trade Monitor 2020*. IFPRI, Washington, DC. <https://doi.org/10.2499/9780896293908>
- ¹⁵³ Op. Cit. Malabo Montpellier Panel, 2020.
- ¹⁵⁴ Awokuse, T., Reardon, T., Salami, A.O., Mukasa, N.A., Teclé, T., Lange, F., 2019. Chapter 6: Agricultural Trade in Africa in an era of Food System Transformation: Policy Implications, in: *The Hidden Middle: A Quiet Revolution in the Private Sector Driving Agricultural Transformation, Africa Agriculture Status Report*. Alliance for a Green Revolution in Africa (AGRA), Nairobi.
- ¹⁵⁵ Norton, A., Conway, T., Foster, M., 2001. *Social Protection Concepts and Approaches: Implications for Policy and Practice in International Development (Working Paper No. 143)*. Centre for Aid and Public Expenditure, Overseas Development Institute, London.
- ¹⁵⁶ Hoddinott, J., Devereux, S., White, P., Klasen, S., Woolard, I., Alderman, H., Badiane, O., Ulimwengu, J., Wouterse, F.S., 2012. *Social protection in West Africa: The status quo, lessons from other regions, implications for research (WCAO Thematic Research Note No. 3)*. Washington DC, IFPRI.
- ¹⁵⁷ Ibid.
- ¹⁵⁸ Pellerano, Luca, Marta Moratti, Maja Jakobsen, Matej Bajgar, and Valentina Barca. 2014. "Child Grants Programme Impact Evaluation: Follow-up Report."
- ¹⁵⁹ Daidone, S., Davis, B., Dewbre, J., Covarrubias, K., 2014a. *Lesotho's Child Grant Programme: 24-month impact report on productive activities and labour allocation*. Lesotho country case study report. FAO, Rome.
- ¹⁶⁰ van Ginneken, W., 2005. *Managing Risk and Minimizing Vulnerability: The Role of Social Protection in Pro-Poor Growth (Paper)*. ILO, Geneva.
- ¹⁶¹ Andersson, C., Mekonnen, A., Stage, J., 2011. Impacts of the Productive Safety Net Program in Ethiopia on livestock and tree holdings of rural households. *Journal of Development Economics* 94, 119-126. <https://doi.org/10.1016/j.jdeveco.2009.12.002>
- ¹⁶² Daidone, S., Davis, B., Dewbre, J., González-Flores, M., Handa, S., Seidenfeld, D., Tembo, G., 2014. *Zambia's Child Grant Programme: 24-month impact report on productive activities and labour allocation*. FAO, Rome.
- ¹⁶³ World Bank. 2007. "Safety Nets and Transfers: Overview," available at: <http://go.worldbank.org/RJP1CF2CM0>
- ¹⁶⁴ Coady, D., 2004. *Designing and Evaluating Social Safety Nets: Theory, Evidence, and Policy Conclusions (FCND Discussion Paper No. 172)*. IFPRI, Washington D.C.
- ¹⁶⁵ Hall, A., Dijkman, J., Sulaiman V., R., 2010. *Research into Use: Investigating the Relationship between Agricultural Research and Innovation (UNU-MERIT Working Papers)*. Maastricht Economic and social Research and training centre on Innovation and Technology, UNU-MERIT, Maastricht.
- ¹⁶⁶ Stads, G.-J., 2016. Investment in agricultural research and development: An account of two-speed growth, underinvestment, and volatility, in: *Agricultural Research in Africa: Investing in Future Harvests*. IFPRI, Washington, DC, p. Chapter 4. Pp. 85-108. https://doi.org/10.2499/9780896292123_04
- ¹⁶⁷ CAADP Biennial Review 2015-2018
- ¹⁶⁸ Horton, P., Banwart, S.A., Brockington, D., Brown, G.W., Bruce, R., Cameron, D., Holdsworth, M., Lenny Koh, S.C., Ton, J., Jackson, P., 2017. An agenda for integrated system-wide interdisciplinary agri-food research. *Food Sec.* 9, 195-210. <https://doi.org/10.1007/s12571-017-0648-4>
- ¹⁶⁹ Mbabu, A.N., Ochieng, C., 2006. *Building an Agricultural Research for Development System in Africa (ISNAR Division Discussion Paper No. 8)*. IFPRI, International Service For National Agricultural Research Division (ISNAR), Washington D.C.
- ¹⁷⁰ Schut, M., Klerkx, L., Sartas, M., Lamers, D., Campbell, M.M., Ogbonna, I., Kaushik, P., Atta-Krah, K., Leeuwis, C., 2016. *Innovation Platforms: Experiences With Their Institutional Embedding in Agricultural Research for Development*. *Experimental Agriculture* 52, 537-561. <https://doi.org/10.1017/S001447971500023X>
- ¹⁷¹ Badiane, O., Collins, J., 2020. Strengthening National Institutions for Tangible and Sustainable Impacts at Scale, in: *Islamic Development Bank Group (Ed.), Inclusive Growth: Making Value Chains Work for Smallholder Farmers*. Islamic Development Bank Group, Jeddah, pp. 98-113
- ¹⁷² Op. Cit. Mbabu, A.N., Ochieng, C., 2006.
- ¹⁷³ Benin, S., Nkonya, E., Okecho, G., Pender, J., Mugarura, S., Kato, E., Kayobyo, G., 2007. *Assessing the Impact of the National Agricultural Advisory Services (NAADS) in the Uganda Rural Livelihoods (IFPRI Discussion Paper No. 00724)*. Development Strategy and Governance Division and Environment and Production Technology Division, IFPRI, Washington D.C.
- ¹⁷⁴ Ibid.
- ¹⁷⁵ Ibid.
- ¹⁷⁶ Op. Cit. HLPE, 2020.
- ¹⁷⁷ World Bank, 2021. *Poverty in Ghana 1987 - 2016*. The World Bank Data. <https://data.worldbank.org/topic/poverty?locations=GH> (accessed 21.06.21).
- ¹⁷⁸ UN Ghana, 2021. *United Nations in Ghana. MDG 1: Eradicate extreme poverty & hunger*. <http://gh.one.un.org/content/unct/ghana/en/home/global-agenda-in-ghana/millennium-development-goals/mdg-1-eradicate-extreme-poverty-and-hunger.html> (accessed 21.06.21).

- ¹⁷⁹ World Bank Group, 2018. 3rd Ghana Economic Update: Agriculture as an Engine of Growth and Jobs Creation.
- ¹⁸⁰ Ghana Statistical Service, 2020. Production of Agric Statistics.
- ¹⁸¹ Vigneri, M., Kolavalli, S., 2018. Growth through pricing policy: The case of cocoa in Ghana. FAO, Rome.
- ¹⁸² Kuhlmann, C.K., Zhou, Y., 2016. Seed Policy Harmonization in ECOWAS: The Case of Ghana. Regional Seed Policy Harmonization.
- ¹⁸³ WFP, 2021. Ghana. World Food Programme. <https://www.wfp.org/countries/ghana> (accessed 21.06.21).
- ¹⁸⁴ Ofori-Asenso, R., Agyeman, A.A., Laar, A., Boateng, D., 2016. Overweight and obesity epidemic in Ghana—a systematic review and meta-analysis. *BMC Public Health* 16. <https://doi.org/10.1186/s12889-016-3901-4>
- ¹⁸⁵ World Bank, 2021b. Agricultural irrigated land (% of total agricultural land) - Ghana. World Bank Data. <https://data.worldbank.org/indicator/AG.LND.IRIG.AG.ZS?locations=GH> (accessed 21.06.21).
- ¹⁸⁶ Babu, S.C., Blom, S., 2017. Strengthening and Harmonizing Food Policy Systems to Achieve Food Security, IFPRI Discussion Paper 01607.
- ¹⁸⁷ Aryeetey, R., 2016. Nutrition-sensitive research in Ghana. *Field Exchange* 15. <https://www.enonline.net/fex/51/nutrition-sensitive-researchinghana> (accessed 21.06.21).
- ¹⁸⁸ National Development Planning Commission, 2018. History of NDPC. About us. <https://www.ndpc.gov.gh/about/> (accessed 21.06.21).
- ¹⁸⁹ MoFA, 2007. Food and Agriculture Sector Development Policy (FASDEP II). Ministry of Food and Agriculture, Accra.
- ¹⁹⁰ MoFA, 2021a. Regional Agricultural Development Units. About MoFA. <https://mofa.gov.gh/site/about-us/regional-agricultural-development-units> (accessed 21.06.21).
- ¹⁹¹ MoFA, 2021b. Directorate of Crop Services. Directorates. <https://mofa.gov.gh/site/directorates/technical-directorates/directorate-of-crop-services> (accessed 21.06.21).
- ¹⁹² WAAPP, 2021a. Plant Protection and Regulatory Services. Agencies. <https://waapp.org.gh/agencies/mofa/pprsd> (accessed 21.06.21).
- ¹⁹³ MoFA, 2021c. Animal Production. Directorates. <https://mofa.gov.gh/site/directorates/technical-directorates/animal-production> (accessed 21.06.21).
- ¹⁹⁴ Johnson, R., 2018. Bird flu outbreak in Ghana: Veterinary Services imposes ban on movement of poultry products. *The Poultry Site*. <https://www.thepoultrysite.com/news/2018/07/bird-flu-outbreak-in-ghana-veterinary-services-imposes-ban-on-movement-of-poultry-products> (accessed 21.06.21).
- ¹⁹⁵ WAAPP, 2021b. Veterinary Services Directorate. Agencies. <https://waapp.org.gh/agencies/mofa/vsd> (accessed 21.06.21).
- ¹⁹⁶ WAAPP, 2021c. Women in Agricultural Development. Agencies. <https://waapp.org.gh/agencies/mofa/wiad> (accessed 21.06.21).
- ¹⁹⁷ MoFA, 2021d. Directorate of Agricultural Extension Services. Directorates. <https://mofa.gov.gh/site/directorates/technical-directorates/directorate-of-agricultural-extension-services> (accessed 21.06.21).
- ¹⁹⁸ Namara, R., Horowitz, L., Nyamadi, B., Barry, B., 2011. Irrigation Development in Ghana: Past experiences, emerging opportunities and future directions. IFPRI GSSP Working Paper.
- ¹⁹⁹ MoFA, 2021e. National Food Buffer Stock Company. Directorates. <https://mofa.gov.gh/site/directorates/sub-vented-organization-soes/national-food-buffer-stock-company> (accessed 21.06.21).
- ²⁰⁰ Abokyi, E., Strijker, D., Asiedu, K.F., Daams, M.N., 2020. The impact of output price support on smallholder farmers' income: evidence from maize farmers in Ghana. *Heliyon* 6. <https://doi.org/10.1016/j.heliyon.2020.e05013>
- ²⁰¹ NAFCO, 2021. National Food Buffer Stock Company. <https://nafco.gov.gh/> (accessed 21.06.21).
- ²⁰² Op. Cit. Abokyi et al (2020)
- ²⁰³ Youth Employment Agency, n.d. URL <https://www.yea.gov.gh/> (accessed 6.21.21).
- ²⁰⁴ NDPC, 2016. Long Term National Development Plan for Ghana (2018-2057). National Development Planning Commission, Accra.
- ²⁰⁵ Abubakari, M., Asamoah, P.K.B., Agyemang, F.O., 2018. Ghana and Sustainable Development: The 40-Year National Development Plan in Retrospective. *JHRSS* 06. <https://doi.org/10.4236/jhrss.2018.61024>
- ²⁰⁶ Op. Cit. World Bank Group, 2018
- ²⁰⁷ NDPC, 2019. 2019 Annual Progress Reports. National Development Planning Commission, Accra.
- ²⁰⁸ Ibid.
- ²⁰⁹ Agency, G.N., 2020. NGO advocates inclusion of agroecology in FASDEP III. *News Ghana*. <https://newsghana.com.gh/ngo-advocates-inclusion-of-agroecology-in-fasdep-iii/> (accessed 21.06.21).
- ²¹⁰ Ministry of Environment Science, Technology and Innovation, 2013. Ghana Climate Change Policy.
- ²¹¹ Kwabena Brakopowers, A., 2020. An examination of Ghana's Climate Change Policy in the light of sustainable development.
- ²¹² Ministry of Environment, Science, Technology and Innovation, 2015. Ghana National Climate Change Master Plan Action Programmes for Implementation 2015-2020.
- ²¹³ MoFA, Ghana Irrigation Development Authority, 2011. National Irrigation Policy, Strategies and Regulatory Measures. <http://extwprlegs1.fao.org/docs/pdf/gha149500.pdf> (accessed 21.06.21).
- ²¹⁴ USAID, 2017. Ghana Feed the Future Agriculture Policy Support Project (APSP): Review of the National Irrigation Policy, Strategies and Regulatory Measures for the Irrigation Sub-Sector of Ghana.
- ²¹⁵ Owusu-Sekyere, E., Bibariwah, C., Owusu, V., Donkor, E., 2021. Farming under irrigation management transfer scheme and its impact on yield and net returns in Ghana. *Land Use Policy* 102. <https://doi.org/10.1016/j.landusepol.2020.105266>
- ²¹⁶ MoFA, WAAPP, 2015. Gender and Agricultural Development Strategy (GADS II).
- ²¹⁷ Britwum, A.O., Akorsu, A.D., 2016. Qualitative gender evaluation of agricultural intensification practices in northern Ghana. *International Institute of Tropical Agriculture*.
- ²¹⁸ Op. Cit. MoFa, WAAPP, 2015
- ²¹⁹ USAID, 2018. Final Report Feed the Future Ghana Agriculture Policy Support Project. Chemonics.
- ²²⁰ Government of Ghana, 2012. Public Health Act.
- ²²¹ FDA Ghana, 2020. 2019 Annual Report. Food and Drugs Authority, Accra.

- ²²² Ministry of Health, 2012. National Policy for the Prevention and Control of NCDs in Ghana. Accra.
- ²²³ Laar, A., Barnes, A., Aryeetey, R., Tandoh, A., Bash, K., Mensah, K., Zotor, F., Vandevijvere, S., Holdsworth, M., 2020. Implementation of healthy food environment policies to prevent nutrition-related non-communicable diseases in Ghana: National experts' assessment of government action. *Food Policy* 93. <https://doi.org/10.1016/j.foodpol.2020.101907>
- ²²⁴ Op. Cit. Government of Ghana, 2012
- ²²⁵ MoFA, 2021f. Planting for Food & Jobs. Programmes. <https://mofa.gov.gh/site/programmes/pfj> (accessed 21.06.21).
- ²²⁶ USAID, 2018b. Assessment of Implementation of Planting for Food and Jobs (PFJ Programme: Lessons and Ways Forward. Feed the Future.
- ²²⁷ Pauw, K., 2021. A review of the Ghana Planting for Food and Jobs program: 2017-2020: Implementation, impact, and further analysis. International Food Policy Research Institute, Washington, DC. <https://doi.org/10.2499/p15738coll2.134353>
- ²²⁸ Ibid.
- ²²⁹ Azumah, S., 2020. Assessing the Contribution of Planting for Food and Jobs (PFJ) Programme to Improved Seed Security in Ghana. The National Seed Trade Association of Ghana, Accra.
- ²³⁰ Ibid.
- ²³¹ Iddrisu, A M., Gafa, D W., Abubakari, M., Emini, C A., Beaumais, O., 2020. Implications of the Fertilizer-Subsidy Programme on Income Growth, Productivity, and Employment in Ghana.
- ²³² Ibid.
- ²³³ PEP, 2020. How the fertilizer subsidy program can boost economic growth and employment in Ghana (Policy Brief 205). Partnership for Economic Policy.
- ²³⁴ Ofori-Atta, K., 2018. The Budget Statement and Economic Policy of the Government of Ghana for the 2018 Financial Year. Ministry of Finance, Accra.
- ²³⁵ MoFA, 2019. Medium Term Expenditure Framework for 2019-2022: Programme Based Budget Estimates. Accra.
- ²³⁶ Zoogah, A.T., Nakuja, T., 2020. Modernizing extension services to improve rice productivity: Lessons from Ghana's planting for food and jobs program. *Journal of Agriculture Extension and Rural Development* 12, 6. <https://doi.org/10.5897/JAERD2020.1164>
- ²³⁷ The Presidency Republic of Ghana, 2020. "Planting For Food and Jobs Yielding Spectacular Results" - President Akufo-Addo. URL <https://presidency.gov.gh/index.php/briefing-room/news-style-2/1517-planting-for-food-and-jobs-yielding-spectacular-results-president-akufo-addo> (accessed 21.06.21).
- ²³⁸ Op. Cit. USAID, 2018b.
- ²³⁹ Malabo Montpellier Panel, 2019. Byte by Byte: Policy innovation for transforming Africa's food system with digital technologies. International Food Policy Research Institute, Center for Development Research University of Bonn, Imperial College London, Washington, DC. <https://doi.org/10.2499/9780896296848>
- ²⁴⁰ Op. Cit. USAID, 2018b
- ²⁴¹ FAOSTAT, 2019. Crops and Livestock products. <http://www.fao.org/faostat/en/#data/TP> (accessed 21.06.21).
- ²⁴² Op. Cit. USAID, 2018b
- ²⁴³ Op. Cit. Pauw, 2021
- ²⁴⁴ Daum, T., Birner, R., 2017. The neglected governance challenges of agricultural mechanisation in Africa - insights from Ghana. *Food Sec.* 9. <https://doi.org/10.1007/s12571-017-0716-9>
- ²⁴⁵ Diao, X., Cossar, F., Houssou, N., Kolavalli, S., Jimah, K., Aboagye, P.O., 2012. Mechanization in Ghana: Searching for sustainable service supply models (IFPRI Discussion Paper 1237). IFPRI, Washington D.C.
- ²⁴⁶ Houssou, N., Diao, X., Cossar, F., Kolavalli, S., Jimah, K., Aboagye, P.O., 2013. Agricultural mechanization in Ghana: Is specialization in agricultural mechanization a viable business model? (No. IFPRI Discussion Paper 01255). IFPRI, Washington D.C.
- ²⁴⁷ Benin, S., 2015. Impact of Ghana's agricultural mechanization services center program. *Agricultural Economics* 46, 103-117. <https://doi.org/10.1111/agec.12201>
- ²⁴⁸ MoFA, 2021g. Ministry of Food and Agriculture. Home. <http://mofa.gov.gh/site/?p=10003> (accessed 21.06.21).
- ²⁴⁹ Takeshima, H., Diao, X., Aboagye, P.O., 2020. In search of effective support for agricultural mechanization in Africa. *Policies, Institutions and Markets*. <https://pim.cgjar.org/2020/11/03/in-search-of-effective-support-for-agricultural-mechanization-in-africa/> (accessed 21.06.21).
- ²⁵⁰ Takeshima, H., Diao, X., Aboagye, P.O., 2020b. Policies for competitive and sustainable agricultural production systems: a case study of Ghana's recent mechanization interventions. *Resakss*. https://doi.org/10.2499/9780896293946_05
- ²⁵¹ Diao, X., Agadin, J., Fang, P., Justice, S., Kufoalor, D.S., Takeshima, H., 2018. Agricultural mechanization in Ghana: Insights from a recent field study (IFPRI Discussion Paper 1729). IFPRI, Washington D.C.
- ²⁵² Op. Cit. Takeshima et al, 2020b
- ²⁵³ Diao, X., Cossar, F., Houssou, N., Kolavalli, S., 2014. Mechanization in Ghana: Emerging demand, and the search for alternative supply models. *Food Policy* 48. <https://doi.org/10.1016/j.foodpol.2014.05.013>
- ²⁵⁴ Daum, T., Birner, R., 2017. The neglected governance challenges of agricultural mechanisation in Africa - insights from Ghana. *Food Sec.* 9. <https://doi.org/10.1007/s12571-017-0716-9>
- ²⁵⁵ Aboagye, P.O., Abubakar, A.G., Adama, A.I., Lawal, A., Musa, A.A., Takeshima, H., 2016. Agricultural mechanization and south-south knowledge exchange: What can Ghanaian and Nigerian policymakers learn from Bangladesh's experience? (GSSP Policy Note; NSSP Policy Note No. 6; 36). IFPRI, Washington D.C.
- ²⁵⁶ Ghana School Feeding Programme, 2019a. About Us. http://schoolfeeding.gov.gh/?page_id=1486 (accessed 21.06.21).
- ²⁵⁷ Government of Ghana, 2006. Ghana School Feeding Programme Document 2007-2010. Accra.
- ²⁵⁸ Drake, L., Woolnough, A., Burbano, C., Bundy, D., 2016. *Global School Feeding Sourcebook: Lessons from 14 Countries*. Imperial College Press. <https://doi.org/10.1142/p1070>
- ²⁵⁹ Goldsmith, P., Andrade, J., Cornelius, M., Asigbee, M., Atim, P., Tamimie, C., 2019. National School Lunch Nutrition and Cost Profile: A Case Study of the Ghana School Feeding Programme. *Food Nutr Bull* 40, 41-55. <https://doi.org/10.1177/0379572119825960>

- ²⁶⁰ Singh, S., Fernandes, M., 2018. Home-grown school feeding: promoting local production systems diversification through nutrition sensitive agriculture. *Food Sec.* 10, 111-119. <https://doi.org/10.1007/s12571-017-0760-5>
- ²⁶¹ FAO, 2015. Ghana - Country fact sheet on food and agriculture policy trends. Rome.
- ²⁶² Abizari, A.-R., Buxton, C., Kwara, L., Mensah-Homiah, J., Armar-Klemesu, M., Brouwer, I.D., 2014. School feeding contributes to micronutrient adequacy of Ghanaian schoolchildren. *Br J Nutr* 112. <https://doi.org/10.1017/S0007114514001585>
- ²⁶³ Ministry of Gender, Children and Social Protection, 2020. Medium Term Expenditure Framework for 2020-2023: Programme Based Budget Estimates for 2020. MGCSP, Accra.
- ²⁶⁴ Ibid.
- ²⁶⁵ Ghana School Feeding Programme, 2019b. Programme Coverage. http://schoolfeeding.gov.gh/?page_id=1773 (accessed 21.06.21).
- ²⁶⁶ Gelli, A., Aurino, E., Folsom, G., Arhinful, D., Adamba, C., Osei-Akoto, I., Masset, E., Watkins, K., Fernandes, M., Drake, L., Alderman, H., 2019. A School Meals Program Implemented at Scale in Ghana Increases Height-for-Age during Midchildhood in Girls and in Children from Poor Households: A Cluster Randomized Trial. *The Journal of Nutrition* 149. <https://doi.org/10.1093/jn/nxz079>
- ²⁶⁷ Aurino, E., Gelli, A., Adamba, C., Osei-Akoto, I., Alderman, H., 2018. Food for thought? Experimental evidence on the learning impacts of a large-scale school feeding program in Ghana (IFPRI Discussion Paper No. 1782). IFPRI, Washington D.C.
- ²⁶⁸ World Bank, 2021. World Development Indicators: Employment in agriculture (% of total employment). World Bank, Washington D.C. Data retrieved on January 29, 2021.
- ²⁶⁹ FAO, 2015a. Review of food and agricultural policies in Malawi. (MAFAP Country Report Series). FAO, Rome.
- ²⁷⁰ World Bank, 2021. World Development Indicators: Agriculture, value added (annual % growth). World Bank, Washington D.C. Data retrieved on January 29, 2021.
- ²⁷¹ ReSAKSS, n.d. SA Monitoring Progress Malawi. <https://www.resakss.org/node/40> (accessed 17.6.21).
- ²⁷² Benson, T., Nyirenda, Z., Nankhuni, F., Maredia, M., 2018. The Quality of Agriculture and Food Security Policy Processes at National Level in Malawi: Results From The 2017/18 Malawi Agriculture And Food Security Policy Processes End Line Survey (Research Paper No. 107). Feed the Future Innovation Lab for Food Security Policy, Michigan.
- ²⁷³ Nthenda, G., 2020. Mw's first extensive greenhouse project promises to transform agricultural fortunes. <https://malawi-israel.org/mws-first-extensive-greenhouse-project-promises-to-transform-agricultural-fortunes/> (accessed 16.6.21).
- ²⁷⁴ AGRA, 2017. AGRA Malawi Operational Plan. AGRA, Nairobi.
- ²⁷⁵ Malabo Montpellier Panel, 2017. Nourished: How Africa Can Build a Future Free from Hunger and Malnutrition. Country case study: Malawi (Case study). Dakar.
- ²⁷⁶ Taylor, A.J., 2014. Review of the Functionality of Sector Working Groups in Malawi. Department of Economic Planning and Development, Ministry of Finance Economic Planning and Development, The Government of Malawi, Lilongwe.
- ²⁷⁷ Andsen-Mana, T., 2020. Malawi: Chilima Calls for Revamp of Sector Working Groups allAfrica.com. <https://allafrica.com/stories/202008070116.html> (accessed 16.6.21).
- ²⁷⁸ Op. Cit. AGRA, 2017.
- ²⁷⁹ Msiska, E., 2017. A Review of Food Market Policies that Malawi has Pursued Since Independence and How they have Affected Food Availability and Accessibility.
- ²⁸⁰ FAO, 2015b. Malawi: Country fact sheet on food and agriculture policy trends. FAO, Rome.
- ²⁸¹ Gondwe, A., Baulch, B., 2017. The case for structured markets in Malawi (MaSP Policy Note No. 29). International Food Policy Research Institute, Washington D.C.
- ²⁸² Ngahy, J., 2020. ADMARARC and the Right to Food and Poverty Alleviation for Malawians: Has it Performed Well?
- ²⁸³ Ministry of Agriculture, Irrigation and Water Development, 2016. National Agriculture Policy. Ministry of Agriculture, Irrigation and Water Development, The Government of Malawi, Lilongwe.
- ²⁸⁴ Op. Cit. FAO, 2015a.
- ²⁸⁵ National Food Reserve Agency, 2021. Storage Facilities <https://www.nframw.com/storage-facilities> (accessed 16.6.21).
- ²⁸⁶ World Bank, 2008. Financial Sector Assessment : Malawi. World Bank, Washington D.C.
- ²⁸⁷ UN Capital Development Fund (UNCDF), 2017. Building an Inclusive Financial Sector in Malawi (FIMA) Summary. <https://www.uncdf.org/article/403/building-an-inclusive-financial-sector-in-malawi-fima-project-document> (accessed 17.6.21).
- ²⁸⁸ Ministry of Finance, 2010. Malawi National Strategy for Financial Inclusion (2010-2014). Economic Affairs Division, Financial Sector Development Unit, Ministry of Finance, Government of Malawi, Lilongwe.
- ²⁸⁹ The World Bank, 2019. Malawi Financial Sector Technical Assistance Project: Implementation Completion and Results Report (No. ICR00004184). The World Bank, Washington D.C.
- ²⁹⁰ MFW4A - Making Finance Work for Africa, n.d. Malawi Financial Sector Overview. <https://www.mfw4a.org/country/malawi> (accessed 16.6.21).
- ²⁹¹ Chetama, J.C., Dzanja, J., Gondwe, S., Maliro, D., 2016. The Role of Microfinance on Growth of Small-Scale Agribusinesses in Malawi: A Case of Lilongwe District. *JAS* 8, 84. <https://doi.org/10.5539/jas.v8n6p84>
- ²⁹² Making Access Possible, 2020. Malawi: Financial Inclusion Refresh. Making Access Possible, Lilongwe.
- ²⁹³ MFW4A - Making Finance Work for Africa, n.d. Malawi Financial Sector Overview. <https://www.mfw4a.org/country/malawi> (accessed 16.6.21).
- ²⁹⁴ The Nation Online, 2018. New Sacco challenged to boost financial inclusion. <https://www.mwnation.com/new-sacco-challenged-to-boost-financial-inclusion/> (accessed 16.6.21).
- ²⁹⁵ National Bank of Malawi plc, n.d. Agricultural Loans & Seasonal Overdrafts Corporate. <https://natbank.co.mw/corporate/agricultural-loans-seasonal-overdrafts> (accessed 16.6.21).
- ²⁹⁶ FDH Bank, n.d. Seasonal Financing Facilities Products: Corporate and Investment Banking. <https://www.fdh.co.mw/fdh-bank-home/products/corporate-and-investment-banking/seasonal-financing-facilities/> (accessed 16.6.21).
- ²⁹⁷ Huber, C., 2017. Analysis of GIZ Approaches to Improve Access to Agricultural Finance. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn.

- ²⁹⁸ Baulch, B., Gross, A., Nkhoma, J.C., Mtemwa, C., 2019. Commodity Exchanges and Warehouse Receipts in Malawi: Synopsis (Policy Note No. 33), Strategy Support Program. International Food Policy Research Institute, Washington D.C.
- ²⁹⁹ Jimu, C., 2014. Malawi moves to enact warehouse receipt bill. The Nation Online. <https://www.mwnation.com/malawi-moves-enact-warehouse-receipt-bill/> (accessed 16.6.21).
- ³⁰⁰ Op. Cit. Baulch, B., Gross, A., Nkhoma, J.C., Mtemwa, C., 2019.
- ³⁰¹ UNCITRAL, 2017. Warehouse Receipts: Developing an UNCITRAL Instrument on Warehouse Receipts. UN Commission on International Trade Law, Vienna.
- ³⁰² McCotter, B., 2018. \$36 Million Investment Partnership Finances Warehouses in Malawi to Improve Food Security DAI Global Developments. <https://dai-global-developments.com/articles/36-million-investment-facility-finances-warehouses-in-malawi-to-improve-food-security> (accessed 16.6.21).
- ³⁰³ Chinsinga, B., 2012. The Political Economy of Agricultural Policy Processes in Malawi: A Case Study of the Fertilizer Subsidy Programme (Working Paper No. 039). Future Agricultures Consortium, University of Sussex, Brighton.
- ³⁰⁴ Op. Cit. Ministry of Agriculture, Irrigation and Water Development, 2016.
- ³⁰⁵ Op. Cit. Benson, T., Nyirenda, Z., Nankhuni, F., Maredia, M., 2018.
- ³⁰⁶ Op. Cit. AGRA, 2017.
- ³⁰⁷ Op. Cit. FAO, 2015b.
- ³⁰⁸ Op. Cit. AGRA, 2017.
- ³⁰⁹ Nankhuni, F.J., 2016. Understanding the Policy Framework for Agricultural Transformation in Malawi. National APIS Workshop on ASWAp II Design, October 24-27, 2016, Lilongwe.
- ³¹⁰ IFPRI Malawi, 2017. Malawi's First National Agriculture Policy Picks up Momentum IFPRI Malawi Strategy Support Program. <https://massp.ifpri.info/2017/02/10/malawis-first-national-agriculture-policy-picks-up-momentum/> (accessed 16.6.21).
- ³¹¹ Op. Cit. Nankhuni, F.J., 2016.
- ³¹² Op. Cit. IFPRI Malawi, 2017. 16.6.21
- ³¹³ Ibid.
- ³¹⁴ Nankhuni, F., Mabiso, A., 2017. The National Agriculture Policy in Malawi: Farmers on the Move, from Subsistence to Commercialization, New Alliance Policy Acceleration Support: Malawi Project (NAPAS:Malawi). Feed the Future Innovation Lab for Food Security Policy, Lilongwe.
- ³¹⁵ Ibid.
- ³¹⁶ Op. Cit. Nankhuni, F.J., 2016.
- ³¹⁷ Mpaso, P., 2018. Government of Malawi launches National Agriculture Investment Plan IFPRI Malawi Strategy Support Program. <https://massp.ifpri.info/2018/06/30/government-of-malawi-launches-national-agriculture-investment-plan/> (accessed 16.6.21).
- ³¹⁸ FAO, 2018. Malawi National Agricultural Investment Plan (NAIP) FAOLEX Database. <http://www.fao.org/faolex/results/details/en/c/LEX-FAOC190532/> (accessed 16.6.21).
- ³¹⁹ UNICEF, 2018. Nutrition Statistics in Malawi, Malawi Statistics. UNICEF, New York.
- ³²⁰ von Grebmer, K., Bernstein, J., Alders, R., Dar, O., Kock, R., Rampa, F., Wiemers, M., Acheampong, K., Hanano, A., Higgins, B., Ní Chéilleachair, R., Foley, C., Gitter, S., Ekstrom, K., Fritschel, H., 2020. Annex E: 2000, 2006, 2012, and 2020 Global Hunger Index Scores, in: 2020 Global Hunger Index: One Decade to Zero Hunger - Linking Health and Sustainable Food Systems. Welthungerhilfe: Bonn and Concern Worldwide: Dublin.
- ³²¹ Development Initiatives, 2020. 2020 Global Nutrition Report: Action on equity to end malnutrition Country Nutrition Profiles: Malawi. <https://globalnutritionreport.org/resources/nutrition-profiles/africa/eastern-africa/malawi/> (accessed 17.6.21).
- ³²² USAID, 2014. Malawi: Nutrition Profile. USAID, Washington D.C.
- ³²³ Mayer, A.-M.B., 2014. Country Policy Analysis: Malawi, Nutrition Impact of Agriculture and Food Systems. UN System Standing Committee on Nutrition, Geneva.
- ³²⁴ Ibid.
- ³²⁵ Op. Cit. Ministry of Agriculture, Irrigation and Water Development, 2016.
- ³²⁶ Department of Nutrition, HIV and AIDS, 2018. Malawi National Multi-Sector Nutrition Policy 2018 2022 (Policy). Department of Nutrition, HIV and AIDS, Government of Malawi, Lilongwe.
- ³²⁷ Op. Cit. Chinsinga, B., 2012.
- ³²⁸ Dorward, A., Chirwa, E., Jayne, T.S., 2011. Malawi's Agricultural Input Subsidy Program Experience over 2005-09, in: Chuhan-Pole, P., Angwafo, M. (Eds.), Yes, Africa Can: Success Stories from a Dynamic Continent. The World Bank, Washington D.C.
- ³²⁹ Op. Cit. Chinsinga, B., 2012.
- ³³⁰ Jumbe, C., Kaiyatsa, S., Mason, N., 2018. An Overview of the Malawi and Zambia Input Subsidy Programs. IFDC Workshop on "Developing Private Sector Agro-Input Markets - Lessons Learned and Emerging Perspectives on Subsidy Programs", February 20, 2018, Jinja.
- ³³¹ Lunduka, R., Ricker-Gilbert, J., Fisher, M., 2013. What are the farm-level impacts of Malawi's farm input subsidy program? A critical review. *Agricultural Economics* 44, 563-579.
- ³³² Chirwa, E., Dorward, A., 2013. *Agricultural Input Subsidies: The Recent Malawi Experience*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199683529.001.0001>
- ³³³ Op. Cit. Chinsinga, B., 2012.
- ³³⁴ Ibid.
- ³³⁵ Op. Cit. Chirwa, E., Dorward, A., 2013.
- ³³⁶ Chinsinga, B., 2007. Reclaiming Policy Space: Lessons from Malawi's 2005/2006 Fertilizer Subsidy Programme (Research Paper No. 006). Future Agricultures Consortium, University of Sussex, Brighton.
- ³³⁷ World Bank, 2021. World Development Indicators: Agriculture, value added (annual % growth). World Bank, Washington D.C. Data retrieved on January 29, 2021.
- ³³⁸ Op. Cit. FAO, 2015a.
- ³³⁹ Holden, S., and Tostensen, A., 2011. Appraisal of the Malawi Medium Term Plan for the Farm Inputs Subsidy Programme (FISP-MTP) (2011-2016). Lilongwe.
- ³⁴⁰ Op. Cit. Chirwa, E., Dorward, A., 2013.

- ³⁴¹ Op. Cit. Jumbe, C., Kaiyatsa, S., Mason, N., 2018.
- ³⁴² Dorward, A., and Chirwa, E., 2009. The Agricultural Input Subsidy Programme 2005 to 2008: Achievements and Challenges. SOAS: London.
- ³⁴³ Op. Cit. Chinsinga, B., 2012.
- ³⁴⁴ Op. Cit. Jumbe, C., Kaiyatsa, S., Mason, N., 2018.
- ³⁴⁵ Op. Cit. Chirwa, E., Dorward, A., 2013.
- ³⁴⁶ Daidone, S., Davis, B., Knowles, M., Pickmans, R., Pace, N., Handa, S., 2017. The Social Cash Transfer Programme and the Farm Input Subsidy Programme in Malawi: Complementary instruments for supporting agricultural transformation and increasing consumption and productive activities? FAO, Rome.
- ³⁴⁷ Op. Cit. Jumbe, C., Kaiyatsa, S., Mason, N., 2018.
- ³⁴⁸ Malawi Nyasa Times, 2019. Mwanamvekha unveils K1.7 trillion 2019/20 Malawi budget: Key points at-a-glance Malawi Nyasa Times. <https://www.nyasatimes.com/mwanamveka-unveils-k1-7-trillion-2019-20-malawi-budget-key-points-at-a-glance/> (accessed 16.6.21).
- ³⁴⁹ Kenamu, E., Thunde, J., 2020. Op-Ed: How to make the AIP more cost-effective IFPRI Malawi Strategy Support Program. <https://massp.ifpri.info/2020/09/14/op-ed-how-to-make-the-aip-more-cost-effective/> (accessed 16.6.21).
- ³⁵⁰ Op. Cit. Chinsinga, B., 2012.
- ³⁵¹ Op. Cit. Mayer, A.-M.B., 2014.
- ³⁵² Op. Cit. Daidone, S., Davis, B., Knowles, M., Pickmans, R., Pace, N., Handa, S., 2017.
- ³⁵³ Niño-Zarazúa, M., Barrientos, A., Hickey, S., Hulme, D., 2012. Social Protection in Sub-Saharan Africa: Getting the Politics Right. *World Development* 40, 163-176. <https://doi.org/10.1016/j.worlddev.2011.04.004>
- ³⁵⁴ FAO, WFP and IFAD. 2012. The State of Food Insecurity in the World 2012. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition. FAO, Rome.
- ³⁵⁵ Covarrubias, K., Davis, B., Winters, P., 2012. From protection to production: productive impacts of the Malawi Social Cash Transfer scheme. *Journal of Development Effectiveness* 4, 50-77. <https://doi.org/10.1080/19439342.2011.641995>
- ³⁵⁶ Miller, C.M., Tsoka, M., Reichert, K., 2011. The impact of the Social Cash Transfer Scheme on food security in Malawi. *Food Policy* 36, 230-238.
- ³⁵⁷ Nesbitt-Ahmed, Z., Pozarny, P., de la O Campos, A.P., 2017. Qualitative research on the impacts of social protection on rural women's economic empowerment: The Malawi Social Cash Transfer Programme. Country Case Study Report. FAO, Rome.
- ³⁵⁸ Huijbregts, M. (2009). Social cash transfers and their impact on food security, health and nutrition. 10th EDF Conceptualisation workshop. Lilongwe.
- ³⁵⁹ Op. Cit. FAO, 2015b.
- ³⁶⁰ Op. Cit. Daidone, S., Davis, B., Knowles, M., Pickmans, R., Pace, N., Handa, S., 2017.
- ³⁶¹ Op. Cit. The World Bank, 2019.
- ³⁶² Op. Cit. Making Access Possible, 2020.
- ³⁶³ Ibid.
- ³⁶⁴ OECD, 2015. National Strategies for Financial Education: OECD/INFE Policy Handbook. Comparative Tables. OECD/INFE, Paris.
- ³⁶⁵ Umali, R., 2020. RBM launches financial education week. Malawi 24. <https://malawi24.com/2020/12/07/rbm-launches-financial-literacy-training/> (accessed 16.6.21).
- ³⁶⁶ Financial Literacy: for an informed financial decision - RBM [WWW Document], n.d. . mbc. <https://www.mbc.mw/q-a/item/5209-financial-literacy-for-an-informed-financial-decision-rbm> (accessed 16.6.21).
- ³⁶⁷ Op. Cit. The World Bank, 2019.
- ³⁶⁸ Damiyano, D., Musapatika, C., Dorasamy, N., 2020. The Impact of Financial Inclusion on Food Security: A Comparative Approach of Malawi and Zimbabwe. *Journal of Critical Reviews* 7, 12.
- ³⁶⁹ World Bank, 2021. Climate Risk Profile: Morocco (2021). The World Bank Group, Washington DC.
- ³⁷⁰ FAO, 2018. FAOSTAT. Land use indicators. <http://www.fao.org/faostat/en/#data/EL>
- ³⁷¹ Op. Cit. World Bank, 2021.
- ³⁷² von Grebmer, K., Bernstein, J., Alders, R., Dar, O., Kock, R., Rampa, F., Wiemers, M., Acheampong, K., Hanano, A., Higgins, B., Ni Chéilleachair, R., Foley, C., Gitter, S., Ekstrom, K., Fritschel, H., 2020. Annex E: 2000, 2006, 2012, and 2020 Global Hunger Index Scores, in: 2020 Global Hunger Index: One Decade to Zero Hunger - Linking Health and Sustainable Food Systems. Welthungerhilfe: Bonn and Concern Worldwide: Dublin.
- ³⁷³ Op. Cit. World Bank, 2021.
- ³⁷⁴ Arrifi, E.M., 2009. L'économie et la valorisation de l'eau en irrigation au Maroc : un défi pour la durabilité de l'agriculture irriguée. Symposium international « Agriculture durable en région Méditerranéenne (AGDUMED) », Rabat, Maroc, 14-16 mai 2009.
- ³⁷⁵ Agence pour le Développement Agricole. Missions. <https://www.ada.gov.ma/fr/missions> (accessed 22.6.21)
- ³⁷⁶ Verner, D., Tréguer, D., Redwood, J., Christensen, J., McDonnell, R., Elbert, C., Konishi, Y., Belghazi, S., 2018. Climate variability, drought, and drought management in Morocco's agricultural sector. World Bank, Washington, DC.
- ³⁷⁷ FAO, 2018. Morocco. Investing in collective action: opportunities in agrifood cooperatives (report number 34). FAO, Rome Italy.
- ³⁷⁸ Op. Cit. Verner, D., Tréguer, D., Redwood, J., Christensen, J., McDonnell, R., Elbert, C., Konishi, Y., Belghazi, S., 2018.
- ³⁷⁹ Op. Cit. FAO, 2018. Morocco. Investing in collective action.
- ³⁸⁰ Office National du Conseil Agricole. Organes de gouvernance. <http://www.onca.gov.ma/fr/onca/organes-de-gouvernance>. (Accessed 22.06.21)
- ³⁸¹ Office Nationale de Sécurité Sanitaire des Produits Alimentaires. www.onssa.gov.ma. (Accessed 22.6.21).
- ³⁸² Ibid
- ³⁸³ Agence pour le Développement Agricole, 2018. Guide de l'Investisseur dans le secteur agricole au Maroc. Rabat, Agence Pour le Développement Agricole. https://www.ada.gov.ma/sites/default/files/Guide-Investisseur-ADA/Guide_Investisseur%20FR.pdf

- ³⁸⁴ Fond de Développement Agricole, 2019. Les Aides Financières de l'État pour la promotion des investissements agricoles. Ministère de l'Agriculture, de la Pêche Maritime, du Développement Rural et des Eaux et Forêts, Royaume du Maroc, Rabat.
- ³⁸⁵ EcoActu, 2021. Fond de Développement Agricole <https://www.ecoactu.ma/fonds-de-developpement-agricole-2021/> (accessed 22.6.21).
- ³⁸⁶ Credit Capital Garantie, n.d. Présentation de la CCG. https://www.ccg.ma/fr/la-ccg/presentation-de-la-ccg_ (accessed 22.6.21)
- ³⁸⁷ FAO, ADA, 2016. Innovations for inclusive agricultural finance and risk mitigation mechanisms, the case of Tamwil El Fellah in Morocco. FAO, Rome.
- ³⁸⁸ FAO, AFRACA, 2020. Agricultural value chain finance innovations and lessons: Case studies in Africa. FAO, Rome.
- ³⁸⁹ Groupe Crédit Agricole du Maroc. Modèle économique marocain au service du monde agricole et rural. Groupe Crédit Agricole du Maroc, Rabat.
- ³⁹⁰ FAO, ADA, 2016. Innovations for inclusive agricultural finance and risk mitigation mechanisms. The case of Tamwil El Fellah in Morocco. FAO, Rome.
- ³⁹¹ MAMDA. Multirisque Climatique Céréales et Légumineuses. <https://www.mamda-mcma.ma/fr/nos-produits/multirisque-climatique/multirisque-climatique-cereales-et-legumineuses-0> (accessed 22.6.21).
- ³⁹² Credit Agricole du Maroc, 2019. Document de référence relatif à l'exercices 2018 et au 1^{er} semestre 2019. Rabat.
- ³⁹³ Agency for Agricultural Development, 2015. Investor's Guide in the Agricultural Sector in Morocco. Ministry of Agriculture, Fisheries, Rural Development, Water and Forests of Morocco. Rabat.
- ³⁹⁴ ANAPEC, 2015. Présentation Agence Nationale de Promotion de l'Emploi et des Compétences ANAPEC, 17 & 18 Septembre 2015, Dakar.
- ³⁹⁵ Agence de Développement social. Présentation. <https://ads.ma/archives/programme/90> (accessed 06.22.21).
- ³⁹⁶ Ibid
- ³⁹⁷ IFAD, ILO, n.a. Morocco Young women's employment and empowerment in the rural economy. (Country Brief). International Labor Organization, Geneva.
- ³⁹⁸ Toumi, L., 2010. INDH au Maroc : Analyse critique de la composante formation du programme de lutte contre la pauvreté en milieu rural.
- ³⁹⁹ OECD, FAO, UNCDF, 2016. Adopting a Territorial Approach to Food Security and Nutrition Policy, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264257108-en>
- ⁴⁰⁰ Agence Pour le Développement Agricole. <https://www.ada.gov.ma/fr> (accessed 22.06.21).
- ⁴⁰¹ Verner, D., Treguer, D., Redwood, J., Christensen, J., McDonnell, R., Elbert, C., Konishi, Y., Belghazi, S., 2018. Climate Variability, Drought, and Drought Management in Morocco's Agricultural Sector. World Bank Group, Washington, D.C. <https://doi.org/10.1596/30603>
- ⁴⁰² Op. Cit. OECD, FAO, UNCDF, 2016.
- ⁴⁰³ Ministère de l'Agriculture, Ministère de la Pêche Maritime, Ministère du Développement Rural, Ministère des Eaux et Forêts, 2018. Nouvelle stratégie agricole. Rabat.
- ⁴⁰⁴ Germany Trade and Invest, 2021. Morocco Green Generation Program-for-Results: Funding approval. World Bank Group (IBRD) / International Development Organization / International Development Association (IDA), Bonn. <https://www.gtai.de/gtai-de/trade/entwicklungsprojekte/marokko/verbesserung-des-agrarsektors-596710> (Accessed 06.22.2021).
- ⁴⁰⁵ Mouahidi, K.A., 2020. Morocco launches "Green Generation 2020-2030", a new farming development strategy - Medafrica Times. <https://medafricatimes.com/19464-morocco-launches-green-generation-2020-2030-a-new-farming-development-strategy.html> (accessed 22.6.21).
- ⁴⁰⁶ Al-Awsat, A., 2019. Morocco Achieves 83% of its Sea Fishing Development Plan. <https://english.aawsat.com//home/article/1603271/morocco-achieves-83-its-sea-fishing-development-plan>
- ⁴⁰⁷ Ministère de la Santé, UNICEF, 2011. La Stratégie Nationale de la Nutrition 2011-2019. Ministère de la Santé, Royaume du Maroc, Rabat.
- ⁴⁰⁸ Op. Cit. OECD et al, 2016
- ⁴⁰⁹ Ministère de la Jeunesse et Sports, 2014. Strategies Nationale Intégrée de la Jeunesse 2015-2030. Ministère de la Jeunesse et Sports, Rabat.
- ⁴¹⁰ Initiative Nationale pour le Développement Humain (INDH) <https://www.maroc.ma/fr/content/indh>. (accessed 22.6.21).
- ⁴¹¹ Op. Cit. OECD et al, 2016
- ⁴¹² Inter-réseaux, 2016. The Green Morocco Plan: The Major Principles and Advances of Morocco's Agricultural Strategy (Food Sovereignty Brief No. 20). Inter-Réseaux Développement Rural and SOS Faim Belgium, Bruxelles.
- ⁴¹³ L'Economiste, 2013. Plan Maroc Vert: Comment la région a valorisé ses filières agricoles. <https://www.leconomiste.com/article/913655-plan-maroc-vert-comment-la-r-gion-valoris-ses-fili-res-agricoles> (accessed 22.06.21).
- ⁴¹⁴ Op. Cit. Inter-réseaux, 2016.
- ⁴¹⁵ Agence Pour le Développement Agricole. <http://www.ada.gov.ma/page/accompagnement-dans-la-mise-en-oeuvre-des-projets-agricoles> (accessed 06.22.2021)
- ⁴¹⁶ Op. Cit. Inter-réseaux, 2016.
- ⁴¹⁷ FAO, 2017. Vers une agriculture et une alimentation durables au Maroc dans le cadre du Programme de développement durable à l'horizon 2030 - Diagnostic Rapide De La Durabilité de l'Agriculture au Maroc. Rome.
- ⁴¹⁸ Ibid.
- ⁴¹⁹ Ministère de l'Agriculture et de la Pêche Maritime. 2016. Projet de loi de finance au titre de l'exercice budgétaire 2016. Projet Ministériel de Performance Du Département de l'Agriculture.
- ⁴²⁰ Challenge, 2016. Mécanisation agricole : Le PMV tracte la mécanisation agricole ! <http://www.challenge.ma/mecanisation-agricole-le-pmv-tracte-la-mecanisation-agricole-67747/> (accessed 22.06.21)
- ⁴²¹ Op. Cit. Ministère de l'Agriculture et de la Pêche Maritime. 2016.
- ⁴²² Ibid
- ⁴²³ Agency for Agricultural Development. 2016. Investor's guide in the agricultural sector in Morocco. Ministry of Agriculture, Fisheries, Rural Development, Water and Forests of Morocco, Rabat.

- ⁴²⁴ Sadiki, P.M., 2017. La Rareté de L'eau: Defis et Opportunités, Cas du Secteur Agricole au Maroc. Séminaire de haut-niveau, « rareté de l'eau : défis et opportunités », 17 Novembre 2017. Rome.
- ⁴²⁵ Dispositif de Promotion de l'Emploi en Milieu Rural, Promotion de l'Emploi des Jeunes en Milieu Rural (PEJ), Unités Mobiles pour l'Employabilité en Milieu Rural (UMER) Casablanca, le 03 février 2020.
- ⁴²⁶ GIZ, Promotion de l'emploi des jeunes en milieu rural (PEJ II). <https://www.giz.de/en/worldwide/33958.html> (accessed 22.06.21)
- ⁴²⁷ World Bank Data, 2021. GDP growth (annual %) - Rwanda. <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=RW> (accessed 17.06.21).
- ⁴²⁸ National Institute of Statistics Rwanda, 2021, Labour Force Survey Trends-February 2021(Q1).
- ⁴²⁹ National Institute of Statistics Rwanda, 2020. GDP National Accounts.
- ⁴³⁰ World Bank, 2018. Transformation of Agriculture Sector Program 4 PforR. Washington D.C.
- ⁴³¹ MINAGRI, 2020. Annual Report 2019-2020. Kigali, Rwanda.
- ⁴³² Ibid.
- ⁴³³ Op. Cit. World Bank 2018
- ⁴³⁴ WFP, 2018. Comprehensive Food Security & Vulnerability Analysis: Rwanda. Rome
- ⁴³⁵ Global Hunger Index, 2021. Rwanda. <https://www.globalhungerindex.org/rwanda.html> (accessed 17.06.21).
- ⁴³⁶ MINAGRI, 2018. Strategic Plan for Agriculture Transformation 2018-24. MINAGRI, Kigali, Rwanda.
- ⁴³⁷ World Bank, 2018b. Sustainable Agricultural Intensification and Food Security Project. The World Bank. <https://doi.org/10.1596/978-1-4648-0484-7>
- ⁴³⁸ Op. Cit. MINAGRI, 2018
- ⁴³⁹ RAB, 2021. Rwanda Agriculture and Animal Resources Development Board. Overview of the Rwanda Agriculture Board. <http://rab.gov.rw/index.php?id=158> (accessed 17.06.21).
- ⁴⁴⁰ NAEB, 2019. National Agricultural Export Development Board. About us. <https://naeb.gov.rw/index.php?id=1> (accessed 17.06.21).
- ⁴⁴¹ NAEB, 2019b. Strategy 2019-2024.
- ⁴⁴² MINECOFIN, n.d. Ministry of Finance and Economic Planning. About MINECOFIN. <https://www.minecofin.gov.rw/about> (accessed 18.06.21).
- ⁴⁴³ AGRA, 2020. Policy Response for Rwanda. Nairobi.
- ⁴⁴⁴ IFPRI, 2021. European Union gives €1 million to support the agriculture pillar of the National Economic Recovery Plan for COVID-19 in Rwanda.
- ⁴⁴⁵ Op. Cit. MINAGRI, 2018
- ⁴⁴⁶ Republic of Rwanda, 2020. Vision 2050. Kigali, Rwanda.
- ⁴⁴⁷ Op. Cit. MINAGRI, 2018
- ⁴⁴⁸ Republic of Rwanda, 2014. Rwanda National Food and Nutrition Policy. Kigali, Rwanda
- ⁴⁴⁹ Republic of Rwanda, 2000. Rwanda Vision 2020. Ministry of Finance and Economic Planning, Kigali, Rwanda.
- ⁴⁵⁰ Op. Cit. Republic of Rwanda, 2020
- ⁴⁵¹ UN Sustainable Development Goals, 2019. Rwanda. Knowledge Platform. <https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=1662&menu=3170> (accessed 18.06.21).
- ⁴⁵² World Bank, 2014. Promoting Agricultural Growth in Rwanda: Recent Performance, Challenges and Opportunities. Washington D.C.
- ⁴⁵³ MINAGRI, n.d. Experts in agriculture discuss on 4th 'Strategic Plan for Agric Transformation' formulation.
- ⁴⁵⁴ Republic of Rwanda, 2019. 2019 Rwanda Voluntary National Review Report. UN Sustainable Development, Kigali, Rwanda.
- ⁴⁵⁵ Op. Cit. MINAGRI, 2018
- ⁴⁵⁶ FONERWA, 2019. The Rwanda Green Fund. About. <http://www.fonerwa.org/about> (accessed 17.06.21).
- ⁴⁵⁷ Op. Cit. MINAGRI Strategic Plan for Agriculture 2018
- ⁴⁵⁸ Yongabo, P., Göktepe-Hultén, D., 2021. Emergence of an agriculture innovation system in Rwanda: Stakeholders and policies as points of departure. Industry and Higher Education 095042222199861. <https://doi.org/10.1177/0950422221998610>
- ⁴⁵⁹ Republic of Rwanda, 2016. Law No.14-2016 of February 5th, 2016, Governing Public Private Partnerships.
- ⁴⁶⁰ MINECOFIN, 2017b. National Investment Policy. Kigali, Rwanda.
- ⁴⁶¹ Republic of Rwanda, 2019b. Leveraging Private Sector Strategy. Kigali, Rwanda.
- ⁴⁶² MINAGRI, 2016. National ICT4RAg Strategy 2016-2020. Kigali, Rwanda.
- ⁴⁶³ Op. Cit. World Bank, 2018
- ⁴⁶⁴ FAO, 2020. Rural youth employment and agri-food systems in Rwanda: A rapid Context Analysis. Rural Employment 18.
- ⁴⁶⁵ Wennink, B., Mur, R., 2016. Capitalization of the Experiences with and the Results of the Twigire Muhinzi Agricultural Extension Model in Rwanda. Royal Tropical Institute 37
- ⁴⁶⁶ Ibid.
- ⁴⁶⁷ Republic of Rwanda, 2016b. Twigire Muhinzi Reflection Paper. RAB, Kigali, Rwanda.
- ⁴⁶⁸ Izamuhaye, J.C., 2021. The Twigire Muhinzi Extension Model, in: RAB. Presented at the Eastern Africa Field Schools Webinar.
- ⁴⁶⁹ Rwanda Agriculture Board, 2015. Twigire Muhinzi National Extension System.
- ⁴⁷⁰ Op. Cit. MINAGRI, 2018
- ⁴⁷¹ e-Soko, 2010. About e-Soko. e-Rwanda Project. <http://www.esoko.gov.rw/esoko/Dashboard/Login.aspx?DashboardId=4&dash=true&Login=true> (accessed 18.06.21).
- ⁴⁷² Ibid.
- ⁴⁷³ Ildephonse, Y., 2015. E-Government Initiative and Market Information Delivery Among Rural Farmers In Rwanda: A Case Study Of E-Soko Usage In Muhanga District. Mount Kenya University.

- ⁴⁷⁴ Kamande, M., Nafula, N., 2016. The Welfare Effects of ICTs in Agricultural Markets: AGRODEP Working Paper 0035, 46.
- ⁴⁷⁵ FAO, 2021. Digital Services in Africa. Food and Agriculture Organization of the United Nations. <http://www.fao.org/in-action/africa-digital-services-portfolio/en/> (accessed 18.06..21).
- ⁴⁷⁶ FAO, 2018. Agricultural services and digital inclusion. FAO, Rome.
- ⁴⁷⁷ Rwanda Transport Development Agency, 2020. Updated Environmental and Social Impact Assessment for Rehabilitation, Upgrading and Multi-Year Maintenance works of Indicative Feeder Roads. Rutsiro.
- ⁴⁷⁸ World Bank, 2019. Estimating the Impact of Rural Feeder Roads in Rwanda. Washington D.C.
- ⁴⁷⁹ The Right to Food, 2011. Land Tenure, Investments and the Right to food. Coherent Food Security Responses: Incorporating Right to Food into Global and Regional Food Security Initiatives.
- ⁴⁸⁰ Ngoga, T.H., 2019. A quick, cost-effective approach to land tenure regularization: the case of Rwanda. IGC: Cities that Work 20.
- ⁴⁸¹ AfDB, 2016. Land Tenure Regularization in Rwanda: Good practices in land reform | African Development Bank - Building today, a better Africa tomorrow, Build Today, a Better Africa Tomorrow.
- ⁴⁸² Op. Cit. World Bank, 2018
- ⁴⁸³ Lesnick, K., McGill, K., 2018. Enabling Responsible Private Investment in Rwanda. AgriLinks: Feed the Future.
- ⁴⁸⁴ REMA, 2021. Sustainable Intensification of Agriculture | Rwanda Climate Change Portal [WWW Document]. Climate Portal. <http://climateportal.rema.gov.rw/node/26#> (accessed 18.06.21).
- ⁴⁸⁵ Rugege, D., 2018. Evaluation of the Green Growth and Climate Resilience Strategy (GGCRS) Implementation. Ministry of Environment: Evaluation Report 62.
- ⁴⁸⁶ RAB, n.d. The ONE COW PER POOR FAMILY Program (Girinka) IN RWANDA (Pamphlet). Kigali, Rwanda.
- ⁴⁸⁷ Argent, J., Augsburg, B., Rasul, I., 2014. Livestock asset transfers with and without training: Evidence from Rwanda. *Journal of Economic Behavior & Organization* 108, 19-39. <https://doi.org/10.1016/j.jebo.2014.07.008>
- ⁴⁸⁸ Argent, J., Augsburg, B., Rasul, I., 2013. Livestock asset transfers with and without training: evidence from Rwanda. Institute for Fiscal Studies.
- ⁴⁸⁹ Josaphat, M.R., Jean de Dieu, N., Jacqueline, T., Dusengemungu, L., Peter, B., Concilie, N., Methode, N., 2019. Girinka Program as part of poverty reduction strategy in Rwanda: Ten Years Socioeconomic Impacts. RAB.
- ⁴⁹⁰ Op. Cit. Annual Report 2018
- ⁴⁹¹ Op Cit. Josaphat et al, 2019
- ⁴⁹² Malabo Montpellier Forum, 2019. Nourished: How Africa Can Build a Future Free from Hunger and Malnutrition: Case Study Rwanda.
- ⁴⁹³ Op. Cit. MINAGRI, 2018
- ⁴⁹⁴ Op. Cit. MINAGRI, 2018

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