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SELECTIVE REVIEW OF FOOD SECURITY POLICY WORLDWIDE: WHAT CAN BE LEARNED FROM INTERNATIONAL EXPERIENCES IN ORDER TO SHAPE FOOD SECURITY POLICY IN AFRICA? PART II

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Executive Summary

Food security for all requires (i) sustained productivity growth and competitiveness, not only of agriculture but of the entire economy; (ii) a social safety net; and (iii) resilience in the face of periodic shocks. This is the central message of this review.

Two popular concepts in food security for all are food self-sufficiency (FSS) and food sovereignty (FSY). While countries have pursued different policies to achieve FSS, the common element in their approaches is the misguided belief that domestically producing all of a country's consumption of basic food makes that country food secure. In addition, FSY is concerned with retaining control over policy; that is a country's agri-food should not be subjugated to foreign corporate interests. Though popular, implementation of these concepts has not delivered "food security which exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"– (1996 World Food Summit). We label this holistic concept of food security: FSH. FSH rests on four pillars: availability, access, utilization, and stability. FSH in fact corresponds to the food security most people want. More often than not, achievement of FSS or FSY is not FSH. Instead, their implementation has raised serious questions regarding the sustainability, inclusiveness, and resilience¹ of food systems.

If there were any a time to rebuild our agri-food systems, it is now in the dark days of the COVID-19 pandemic and strenuous socio-economic recovery efforts. The widespread dislocation of globally integrated agri-food value chains inflicted by the pandemic may lead policymakers to conclude that, contrary to experience, the higher the level of FSS, the more solid the guarantee of food security. Far from it. If the pandemic has taught us anything, it is that the countries that fared best are those where the leadership recognized the magnitude of the public health threat, and responded swiftly and decisively to detect, isolate, contact trace, treat, and contain the virus. They learned from their past experiences with contagious diseases, used science and technology, and enjoyed public trust throughout.

The same qualities of leadership and governance apply to achieving food security for all. The leaders that have done best have recognized that the food security

1. <http://www.fao.org/3/al936e/al936e00.pdf>.

challenge requires transformation not only of their agricultures but of their entire economies as well. They put in place investments, incentives, and institutions that made use of science and technology, and improved access to expanding markets to fuel their decades-long transformations. They monitored the impacts of their interventions and adjusted their policies along the way.

Our review of food security policy in 16 countries (five in and 11 outside Africa) includes high, middle and low-income countries with very different historical legacies and structural characteristics, and at very different stages of development (see Annexes 2, 3 (a) and (b) and 4). This great diversity shows that countries whose leadership promoted sustained agricultural productivity growth in the earlier decades of their development within a macro and trade framework of expanding markets (domestic and foreign), succeeded best in achieving FSH. They recognized the complex short- and long-term challenges of achieving FSH and did not reduce them to only domestic production of more basic staples.

Herein lies a basic point for policymakers in developing countries with significant (5%-10% of GDP or more) agricultural sectors: invest, invest, invest in your agri-food sector and not only for food staples but also to increase value added at primary and processing levels, to diversify and to integrate into the broader macro and world economy. Too many developing countries have followed industry-first import-substituting strategies. Like China under Mao (although they did not share the same ideology), many countries wanted to ‘leap’ into industry and ‘squeeze’ agriculture. Largely as a result, they have neither a strong industrial sector nor a strong agricultural sector. Timmer (2015) put it best: “No country has succeeded in its industrial revolution without a prior (or at least a simultaneous) agricultural revolution. Neglecting agriculture in the early stages of development is neglecting development”. Worldwide experience amply shows that it is essential not only to promote agriculture but to transform it; not just to increase output but to sustain its productivity growth, transforming it into a diversified and high value added sector that progressively integrates into the broader domestic and world economy.

To achieve FSH, an agricultural revolution is necessary but not sufficient. Persistent poverty in many Asian countries that have successfully promoted the Green Revolution illustrates this. A social safety net is required even in high-income countries, for everyone is vulnerable to economic downturns, personal misfortunes, and periodic disasters. Just as individuals need insurance, so do societies as a whole for resilience and longevity. Unless an economy is resilient, successful agricultural and economic transformation is virtually impossible, because transformation is ‘slow magic’ that stretches over several decades at least. For any country during this long period, the likelihood of being plunged into a crisis beyond its control is very high. The COVID-19 pandemic is an example.

The COVID-19 pandemic has laid bare one key food security vulnerability: weaknesses in public health systems. Public health systems at all levels—from local to global—are being severely tested. It is increasingly clear that global public health is an essential public good for food security. Our highly integrated global economy, our warming climate, and high rates of urbanization are key structural features that heighten our vulnerability to the rapid spread of infectious diseases. Snowden (2019) argued that the old wisdom that saved societies in the past must be

brought front and center of government: “salus populi, suprema les esto” according to the ancients (Adams, 2020). In other words, public health must be the highest law. All else follows from it. Therefore, in a post-pandemic era, governments must invest in strengthening their public health infrastructures to achieve domestic food security, and should do so with global partners.

In rebuilding their economies after the COVID-19 pandemic, African leaders should not forget this centuries-old lesson regarding the fundamental importance of public health as they prioritize continental trade. Such trade can rightly be viewed as the prime mover in the agricultural and economic transformation of the continent, necessary to eliminate extreme poverty, and achieve food security for all in Africa. The Africa Continental Free Trade Area (AfCFTA) promises to be a vast continental market of increasing agri-food demand from an urbanizing and industrializing Africa. Realizing this great potential will require African leaders committed to a vision of an integrated, peaceful, and prosperous Africa that is capable of drawing on the substantial assets Africa has, including regional and global alliances, a diaspora of well trained and well financed Africans, and institutions of agricultural research, development and higher learning. Leaders should also be fully aware of the pitfalls and promises in global experiences of food security policy.

Introduction

There are three main concepts of food security. First is food self-sufficiency (FSS) which means meeting all domestic food needs only from domestic production. Second is food sovereignty (FSY) which prioritizes the right of countries to adopt their own agricultural policies that are best suited to the countries’ ecological and cultural contexts. Third is the holistic concept of food security which is multidimensional (FSH, H for holistic). FSH specifies four fundamental conditions which must be present for satisfactorily meeting everyone’s food needs: availability, accessibility, utilization, and stability (see Annex 1: Food Security: Concepts, Pillars, Goals, and Policies, which sets out the main similarities and differences relevant to this paper).

Today, industrialized, high-income countries have been able to ensure food security for most of their populations. At the same time, many low- to middle-income countries are still struggling to ensure food security for vast segments of their populations. These populations suffer from chronic hunger or undernourishment, which is the major global food problem.

After recording a downward trend in global hunger, the prevalence of undernourishment stabilized in 2014. But the numbers have increased since 2015. In 2019, more than 820 million people, or 1 in every 9 persons, are chronically hungry. The combined estimate of severe and moderate undernourishment however is much higher: about 2 billion people or 26.4 % of global population (FAO, 2019). Africa is home to 30% of the world’s undernourished people, a figure that remains high despite progress made by African countries.

Therefore, the basic question addressed here is: why are African countries, especially those in sub-Saharan Africa, unable to ensure food security for the vast majority of their

populations², and what can and should be done to achieve food security for all (FSH)?

Specifically, this policy paper is organized thus:

- I. Why is Africa as a continent not food secure?
- II. Country cases in Africa on the status of food security and policy:
 - a. North of the Sahara: Morocco, Egypt
 - b. South of the Sahara: South Africa, Rwanda, Ethiopia
- III. What have we learnt from international experiences on food security policy outside Africa (in Part I) of relevance to food security policy in Africa, in the wake of the COVID-19 pandemic?

For our analysis of Africa, this policy paper builds on the country experiences and policy insights from Part I, which selectively reviewed the implementation of food security policy (FSP)³. The COVID-19 pandemic is certainly severely testing governments around the world, in terms of their ability to best contain a public health crisis and moderate its disruptive impact, and in terms of their ability to use this trauma as a unique opportunity to rebuild stronger, more resilient, and more inclusive economies. In view of the need to address public health as a key factor impacting on food security, lessons learnt from effective responses to the pandemic will also be drawn on.

I. Why is Africa as a continent not food secure?

Africa is rich in natural resources. It has diverse agro-climatic zones, abundant land and mineral resources, major water reserves consisting of surface and underground water (WRI, 2003), and substantial human resources. In particular, it has a 'youth bulge', though this has different consequences: the swelling labor force that can actively participate in the creation of wealth, or constitute a major source of social discontent if not gainfully employed. In 2019, Africa's total population is estimated at some 1.30 billion (UN, 2019), with people aged 15-24 making up 20%, and those aged 15-34 making up a staggering 75% of the total (2015)⁴.

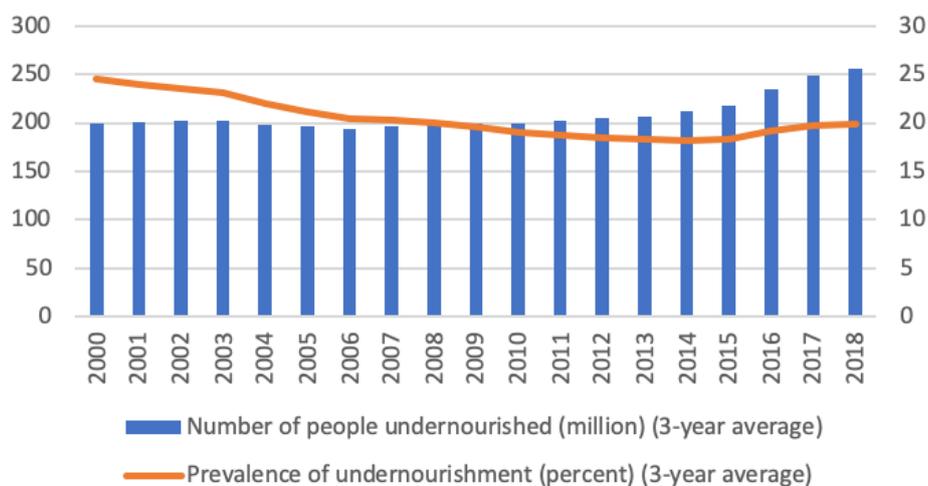
In spite of all these structural advantages, Africa continues to experience high rates of food insecurity. While the absolute number of undernourished people in Africa increased from 200 million in 2000 to 250 million in 2018, the share of undernourished people in the total population has declined (although the numbers have been rising slowly since 2015). For example, the share of undernourished people in the total population declined from 25% to 20% over the same period.

2. FAO. Out of an estimated total African population of 1288 million, 676 million suffered from moderate food insecurity, 277 million from severe food insecurity. Total: $676+277=953/1288=0.7399$ or rounded 74%. (2018 data).

3. The regions and countries reviewed span high, middle, and low-income countries; thus: the United States of America, the Common Agricultural Policy of the European Union (28); Japan; the Republic of Korea; China, India, Bangladesh; Malaysia; Indonesia; Chile; and Peru.

4. United Nations. Office of Special Adviser to Africa. Youth Empowerment. <https://www.un.org/en/africa/osaa/peace/youth.shtml>.

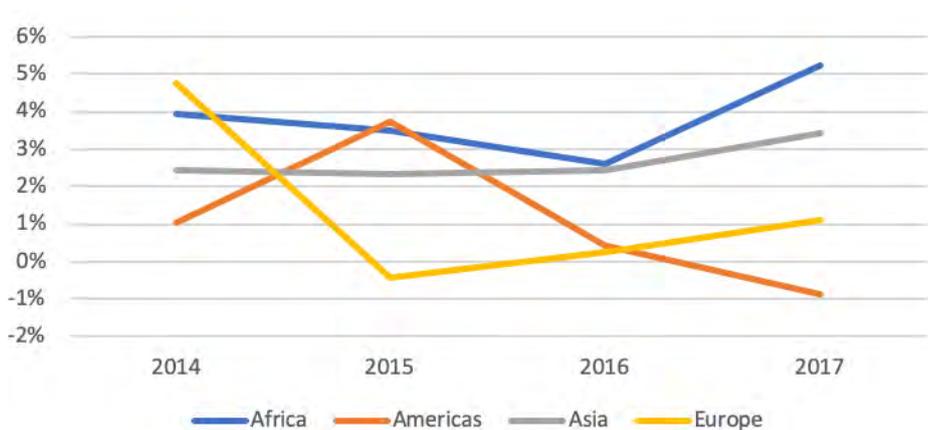
Figure 1: Extent of Undernourishment in Africa between 2000-20



Source: FAO, 2020

The improvement in performance on a continental scale can be explained by three main factors. First, there has been a continuous improvement in agricultural production in volume terms. Second, compared to the performance of other continents, Africa recorded the highest agricultural growth rate in the world over the same period, i.e. about 3.3% compared to 2.3% on average. Moreover, the agricultural growth rate even exceeded the population growth rate of 2.4%.

Figure 2 : Agricultural Growth rate by Continent (2014-17)



Source: FAO, 2020

The third factor is the use of imports to meet the food needs of the population. Imported food combined with locally produced food converted to energy shows that the availability of agricultural food products can be estimated at 2600 food calories (Kcal) per day. Knowing that the daily needs of an average healthy adult are about 2500 Kcal for men and 2000 Kcal for women, the estimated energy supplies in Africa are able to meet the needs of the population. Thus, at the aggregate level, the evolution of agricultural

production in the African continent combined with imports in terms of food products make it largely possible to satisfy the totality of the food needs of the population.

Why does Africa today have such a high number of undernourished people? To shed light on this basic question, we analyze some specific country situations. Though these cases do not exhaust the totality of the African experience since Africa is a very diverse continent, they do highlight key policy issues with an impact on the food security of millions.

II. Food security policy in selected African countries

Morocco and Egypt, both water-stressed countries, are examples of countries where the long-term goal of FSS must strike a difficult balance between the need for water security in an environment of climate change, and the need to strengthen the public health infrastructure during the COVID-19 pandemic. South Africa and Rwanda share histories in which race and ethnicity threatened their very existence, but are contrasts in resource endowment, leadership styles, and food security outcomes. Like South Africa and Rwanda, Ethiopia has restored peace and stability after decades of national trauma from famines and armed conflicts. Like Rwanda, Ethiopia shows what a mission-oriented government can do to improve the food security of its people. All five countries espouse FSS as their food security goal, but the extent to which their pursuit of FSS translates into gains in food security for all (FSH) depends largely on the extent to which they succeed in raising and sustaining broad-based productivity growth not only in agri-food but also in the wider non-agricultural economy. Annexes 2 through 4 present the key structural features relevant to food security policy of all economies reviewed.

The Kingdom of Morocco (USD GNI/CAP 3, 190)⁵

Brief Background

Dualism in agriculture—a legacy left by the French: In the aftermath of independence (1956), the Moroccan government chose to capitalize on actions carried out by the French settlers in terms of agricultural development. During the period 1912-1956, under the French protectorate, French settlers built several dams in order to manage water and mitigate climate risks. They also invested in research to enhance agricultural productivity and improve crop yields (Pérennès, 1993). Modern agriculture was mainly practiced by French settlers on the most fertile soils. At the same time, the local population conducted subsistence farming in the mountainous regions where soils are less fertile and living conditions precarious (Swearingen, 1987). By focusing on market-oriented agriculture in the areas controlled by the protectorate, the development of smallholder Moroccan agriculture was marginalized. Thus, on the eve of independence, there was a dualistic agricultural system: a minority of modern commercial farmers co-existed with the majority engaged in small-scale subsistence agriculture.

Agricultural sector—relative decline but continuing economy-wide importance: From 1980 to 2018, the Moroccan agricultural sector generated on average 13% of GDP. However, its contribution to GDP varied from 11% to 18%, depending mainly on the amount of rainfall. But its importance is much greater as economy-wide growth is highly

5. WDI (2019). Latest estimates published July 1, 2020.

correlated with agricultural growth. Thus, from 1980 to 2018, the correlation coefficient between GDP and agricultural production was about 96%. In addition, agriculture remains the country's main provider of employment: it employs approximately 34.4% of the total employed population (HCP, 2019).

Agricultural policies and FSS achievements since independence

Achieving food self-sufficiency (FSS) a priority goal since independence: The day after independence (1956), Morocco inherited a fragile, dualistic agricultural sector. In the 1960s-1970s, the Government of Morocco (GOM) implemented a highly interventionist policy to enhance agricultural productivity and ensure food self-sufficiency mainly for sugar, milk, cereals, and vegetable oil: the so-called strategic crops. This policy was based on massive public investment programs in irrigation and agro-industry, high levels of customs protection, and rigorous price and marketing control. The government controlled entire agricultural value chains: from tillage to the distribution of the final food product. In addition, the Agricultural Investment Code published in 1969 required mandatory farm standards (crop rotation plans and cultivation techniques), which were laid down by order of the Minister of Agriculture and Agrarian Reform to guide the development of large irrigation schemes in accordance with the GOM's objectives. The policy of dams was to ensure a large part of sugar, milk, and fruit and vegetables production from the irrigated perimeters. Thus, agricultural production in irrigated perimeters covered most of the population's food needs and even exceeded them for a few products, such as pulses, vegetables, and fruit (Table 1).

Table 1. rate of coverage of food needs by national production

Cereals	83%	Meat	100%
Sugar	56%	Pulses	275%
Cooking Oils	36%	Vegetables	131%
Milk	66%	Fruits	400%

Source: A. Benhadi, 1976.

Pursuing FSS at substantial costs and despite trade liberalization in the 1980s: For the GOM, food security was to be achieved through coverage of the totality of basic needs, at affordable prices, from the country's domestic supply, relegating external markets to a marginal role as complementary sources of supply. The cost of this policy was enormous and it weighed heavily on the public budget. Investments dedicated to irrigated development alone accounted for 40% of the total investment budget in agriculture between 1968 and 1972. The cost of equipment per hectare could reach up to 50,000 dirhams, which was well above the highest price for agricultural land in the country (Bouderbala, 1999). Besides investments and operating expenditures, which were high, other indirect costs should be taken into consideration, such as costs of market distortions. In response to this situation, during the 1980s, significant waves of liberalization were undertaken in Morocco, reflecting the withdrawal of the public sector. Despite the change in the government's mode of intervention, the authorities have retained the same objectives in terms of food policy, i.e. to guarantee the country's food sufficiency. The government implemented several incentives such as remunerative

pricing for producers, and subsidies for agricultural inputs, e.g. fertilizers, irrigation water (Sayout & al., 2015). These measures were intended to greatly improve production and enable the country to meet the needs of its population and be less dependent on world markets. As a result, in the mid-1980s, Morocco reached high levels of self-sufficiency, notably 40% to 60% for cereals, almost 100% for meat and milk, 60% for sugar, and 20% for edible oils. It is true, however, that the self-sufficiency rate for oil seeds has remained low (almost 5%, with olive oil satisfying internal demand for edible oils at 14-15%) (Berdai, 2016).

A rebalancing between domestic production and imports? However, pursuing food self-sufficiency has been confronted with the following reality: (i) climate challenges (rainfall scarcity and variability); (ii) technical issues (low productivity); and (iii) financial costs (heavy subsidies and investments). Taking into consideration these difficulties and given international agricultural trade expansion since the mid-1980s, the GOM has recognized the opportunities offered by recourse to the external market to cover the food needs of the population at lower cost, and has espoused the concept of FSH (FAO, 2003). However, the adoption of the holistic concept of food security has not altered the role attributed to domestic agricultural production as the most effective provider of food security at national and household levels:

“Food security is an imperative that is immediately part of agricultural policy, it is a prerogative of the public authorities and falls under the attributes of national sovereignty. The international market should therefore not be seen as an end in itself, but as an instrument for achieving the objectives of economic growth, employment, social development and political stability” (MADREF, 2000).

Unfortunately, between 1990 and 2001, the cost of food imports increased significantly. Thus, the food balance deficit tripled from \$333,767 to \$1,010,491, with an annual average of \$726,488. From 1990 to 2001, the relative cost of food imports in total exports averaged 21%, placing Morocco among the countries that require trade earnings to meet their food needs (FAO, 2003).

Dualism maintained in the Plan Maroc Vert (Green Morocco Plan): In light of this, the Moroccan government adopted a new strategy in 2008 called the Plan Maroc Vert (2008-2019, PMV). It rests on two pillars. The first is an agriculture that aims to be high value added/high productivity, efficient and competitive, organized around mobilizing aggregation projects. The second pillar is rather that of an ‘agriculture of solidarity’, focused on the fight against poverty, increasing the income of small-scale and medium-scale farmers, particularly in peripheral or marginal regions. In total, some 1,500 projects were scheduled in a little over a decade, mobilizing a budget of nearly 150 billion dirhams, which marked a considerable investment effort⁶. In terms of food self-sufficiency, the PMV aimed to increase the self-sufficiency rate to 60% for cereals, 62% for sugar, 19% for oilseeds and 100% for meats and milk (Akesbi, 2012). The current agricultural policy “Green Generation” aims at consolidating the achievements of the last ten years (during the Morocco Green Plan), while giving priority to the human capital, in order to create an agricultural middle class capable of playing an important role in the socio-economic balance of the rural environment.

6. To date, there is however no official evaluation of the GMP.

Major forces impacting on food security: climate change, water scarcity, poverty, vulnerability, and COVID-19 pandemic

Pivotal importance of increasing water use efficiency and higher value crops to effectively mitigate negative impacts of climate change: Morocco already shifted towards warmer and drier climates in the twentieth century. Temperature is projected to continue to rise and rainfall to decrease. Competition for water use will also increase with urbanization and industrialization. Higher temperature with less rainfall reduces crop yields of rainfed agriculture but can increase yields of irrigated crops. Ouraich (2010) projected that rainfall will drop by 20% by 2050 and then decrease by more than 40%. He also estimated that yields for rainfed crops will decline by 15% by 2050, but yields for irrigated crops will increase by 5% on average (Ouraich, 2010). Using a CGE⁷ model (GTAP-BIO-W), under different scenarios of temperature rise, rainfall decline, and changes in crop yields, GDP will fall and unemployment will rise in both agriculture and non-agriculture. For example, with a 20% reduction in water supply (relative to the base year 2016), and with crop yield changes, GDP could fall by 5.5% without an increase in water use efficiency (WUE); but by 4.7% with increase in WUE (Taheripour & al, 2020). Thus, an increase in WUE can mitigate these negative impacts by increasing production of higher value crops at the expense of lower value, more water-intensive crops, such as wheat. These lower value crops occupied 81.7% of harvested area and contributed to 49.5% of total production but to only 32.7% of total value of production at producer prices (2016). The corresponding percentages for higher value crops were: 18.3%, 50.5%, and 67.3%⁸. The decrease in the economy-wide demand for unskilled and skilled labor could also be quite significant: under the same scenarios as above, the estimated decrease is 5.1% and 4.6% respectively. These are scenarios not predictions. However, these scenarios emphasize the key importance of mitigating/countering the negative impacts of climate change by focusing public policy on increasing WUE, which GOM is now addressing through its National Irrigation Water Saving Program (PNEEI); and on promoting higher value crops rather than strategic crops, which runs counter to the long-standing FSS priority.

Poverty and vulnerability substantially reduced: Poverty and vulnerability rates have declined significantly since the early 2000s. The prevalence of poverty⁹ fell from 15.3% to 8.9% between 2000-2001 and 2006-2007 and to 4.2% in 2014. Vulnerability¹⁰ decreased from 22.8% in 2000-2001 to 17.5% in 2006-2007, and then to 11.5% in 2014. The Gini index, which is an indicator of inequality, remained stable between 2001 and 2007 at around 0.407, and then declined to 0.388 (2014). The poorest households have little access to basic social infrastructure and services, including health, sanitation and education services, leading to higher risks of malnutrition, higher mortality and morbidity, and other health problems. Poorer households also show a higher school dropout rate compared to the better-off income categories. Although the rate of poverty is higher in rural areas (8.9% compared to 1.1% in urban areas in 2014), pockets of poverty also persist in urban areas. In 2012, 5.9% of the population lived in slums and rough settlements, characterized by the low availability of services and by food insecurity (MCAGG, 2018).

7. Computable General Equilibrium model

8. Lower value crops are: wheat, coarse grains, oilseeds, and sugar. Higher value crops are: fruits, vegetables and others. See Taheripour et al (2020), Tab 3.1.

9. Poverty headcount ratio at national poverty lines (Taheripour et al, 2020: Tab 6.3-6.4).

10. Vulnerability is defined as a high degree of exposure of a person to the risks of losing or failing to achieve a state of well-being. These risks can be covariant shocks affecting the whole community or country, such as climate shocks, food crises or economic crises. For this study: Vulnerability = risk/capacity.

An extensive social safety net since the 1940s: About 30% of the state budget is allocated to the social safety net and social assistance. Total safety net expenditures breakdown shows that the largest part is assigned to subsidy systems, followed by health assistance and then the government's contributions to employer pension and health insurance schemes. The compensation system was created in the 1940s to protect the purchasing power of the population and to enable them to have access to basic necessities. The compensation fund played a major role in ensuring food security by financing subsidies from its own resources to all groups of population. However, since it is universal and non-targeted to vulnerable people, it weighs heavily on the public budget. In 2018, the compensation charge for wheat and flour amounted to 1.5 billion dirhams while that of sugar averaged 3.4 billion dirhams (MEFRA, 2019). In 2015 a reform of the compensation system was implemented that should make it possible to free up resources to finance a social protection system targeted at the populations most in need. Currently, only sugar and national soft wheat flour are highly protected and subsidized. In terms of health assistance, the most important program is named RAMED (Régime d'Assistance Médicale aux économiquement Démunis), set up in 2011. It provides basic medical coverage based on free medical care and services available in public hospitals, health centers, and state-run health services both in emergencies and during hospitalization. The initial RAMED's budget was estimated at 3 billion dirhams, 75% of which is borne by the government, 19% by beneficiaries in case of people in vulnerability, and 6% by territorial and regional authorities in case of poverty (MCAGG, 2018).

GOM response under the pandemic: A Special Fund for COVID-19 Pandemic Management was established as soon as infectious cases were reported in Morocco. With an initial envelope of 10 billion dirhams from the public budget and subsequently funded by private and corporate donations, it aims at mitigating the economic and social consequences resulting from COVID-19 propagation and to rehabilitate and mobilize the health system to cope with the spread of the pandemic (EU, 2020). By the end of April 2020, the Fund had recorded an income of 32.2 billion dirhams (TGR, 2020). The fund is also used to save jobs and to smooth the social impact of the crisis through targeted transfers (Ait Ali & al., 2020). In addition to financial assistance, the GOM closed its borders to travelers to and from France, Spain, and Algeria¹¹.

The Arab Republic of Egypt (GNI/CAP \$2,690)

Brief Background:

Evolution of agricultural and food policy for decades: Egypt has a long tradition of universal food subsidies that dates back to the Second World War. In fact, food subsidies are a key component of the social contract between the Government of Egypt (GOE) and the Egyptian people, contributing to social and political stability. Food rationing started in 1941 as a way of coping with the scarcity and inflation during the war. Some key developments have been:

11. <https://english.alarabiya.net/en/News/world/2020/03/13/Morocco-suspends-travel-links-with-Spain-France-to-prevent-coronavirus>.

- Under President Nasser's 'July Revolution' (1952), agrarian reforms were accompanied by other extensive government intervention into production, marketing and distribution of most agricultural products, until the liberalization policies of 1987.
- Under Nasser, the primary role of subsidies was to ensure the supply of essential food items, and they remained a modest portion of the government's budget (Ahmed & al, 2001).
- Under President Anwar Sadat (Oct. 1970-Oct. 1981), the food subsidy system grew enormously in scope and cost. At its peak, the food subsidy system included 18 foods. Inevitably, the budgetary cost grew: from LE3 million or 0.2% (1970/71) of total government expenditure to LE1.4 billion or 14% (1980/81) of total government expenditure (Ahmed & al, 2001).
- President Hosni Mubarak reduced the scope and improved the targeting of the subsidies in the 1990s. However, government increased them again in the 2000s in response to repeated socio-political crises that undermined the incomes and purchasing power of Egyptians. By 2011/12, the subsidy costs reached 2% of GDP (Ecker & al., 2016)¹².

The ups and downs of FSS: In the 1960s, Egypt was self-sufficient in various staple foods, with the exception of wheat, for which the country was about 70% self-sufficient. However, the self-sufficiency rate declined sharply for most food products during the 1970s and 1980s. The self-sufficiency rate dropped to 20% for wheat, lentils, and edible oil. Rice was the only food product for which internal demand was entirely satisfied by domestic production (Chapin Metz, 1990). In the second half of the 1970s, Egypt imported more than 40% of its food consumption of which about 78% was for wheat only (Ansari, 1986). Food shortages were reported in 1988 and 1989, particularly for tea, sugar, and oil. The GOE even struggled to find creditors to finance food imports; and the rising world food prices in 2007-2008 made the situation much worse. The decline in food self-sufficiency was mainly attributed to increased demand caused by high population growth rates, increased household purchasing power in the 1970s, and the expansion food subsidies (World Bank, 2015)¹³.

Food subsidies promote social peace but undermine good nutrition: Egypt is infamous for the food riots which exploded in 1977 when the Sadat government announced sharp increases in the prices of some widely used consumer goods: 50% on the price of fino bread and 67% on fino flour; rice up by 20%; gas by 46% (Ahmed & al, 2001). Violent clashes, mainly in Cairo and Alexandria, ended when the government backed down. From then on, food subsidies were reduced only very gradually and quietly (without publicity) under President Hosni Mubarak¹⁴. By 1995, the government had removed all food subsidies except for four items: baladi bread and wheat flour, sugar, and edible oil. Baladi bread and wheat flour subsidies are available to all Egyptians without any restrictions, while sugar, edible oil, rice, and tea are distributed monthly to consumers through ration cards. The fiscal cost of these subsidies amounted to 2% of GDP

12. Egypt's successive economic crises included the terrorist attacks at Luxor (Nov 1997), the European recession (2000-01), and the Sept 11, 2001 attack against the World Trade Center. All these hurt export earnings and tourism. In 2006, avian influenza hurt small-scale poultry producers as mass culling of poultry had to be undertaken. Then came the global Food-Fuel-Financial crisis (2008-09), followed by the Egyptian revolution of Jan 25-Feb 11, 2011, which brought down the Mubarak government amidst widespread social upheaval.

13. Annual population growth rates were 3.6 % (1980), 2.5 % (2012), and 1.7 % (2017).

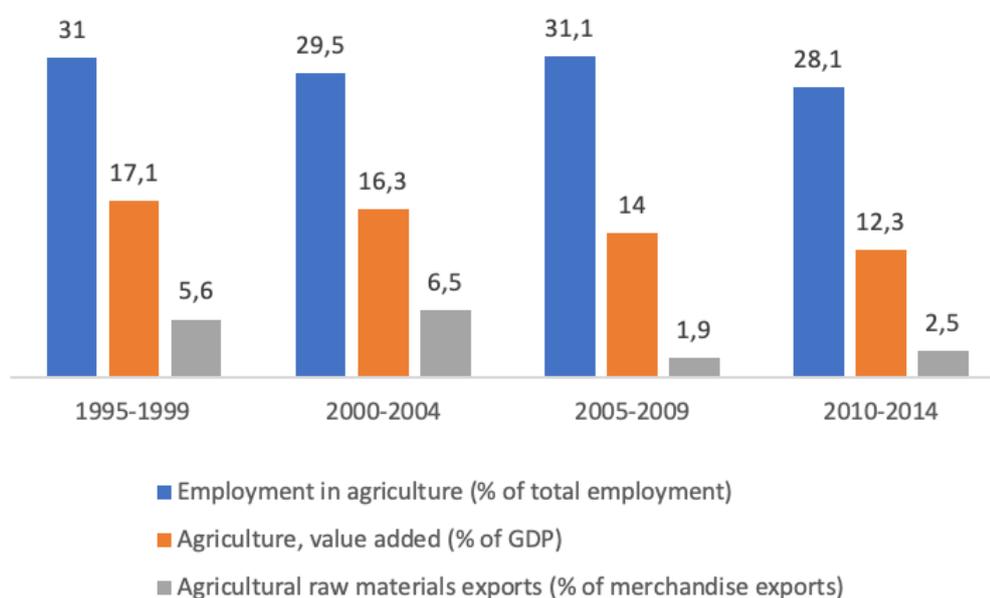
14. After the assassination of Sadat, Hosni Mubarak became president on Oct 14, 1981. He stepped down during the Egyptian Revolution (Jan 25 -Feb 11, 2011). He died Feb 25, 2020, age 91 (born May 4, 1928).

in 2008-2009 or LE21.1 billion or \$3.8 billion (World Bank, 2010). In addition to high financial costs, the food subsidy programs have been criticized for leakage, wastage, and for contributing to unbalanced diets. By subsidizing calorie-rich but micro-nutrient poor foods, the subsidies have contributed to major nutrition problems including high prevalence of stunting and excess weight among children, excess weight and obesity among women (in particular women of reproductive age), and anemia (Ecker & al, 2016).

Agriculture –Structure, performance, and policies for food self-sufficiency

Continuing importance despite relative decline in GDP contribution: Although the relative contribution of agriculture (99.8% irrigated) to GDP in Egypt has declined over the past decades, from 17% in the 1990s to 14% in the 2000s and 12% in 2010-2015, the sector still plays a major role, producing food for a growing population, providing raw materials to some domestic industries and increasing export revenues (Figure 3). Moreover, if agro-processing and marketing are included, the contribution of agriculture increases and could reach up to 20% of Egypt's GDP (IFAD, 2015). The sector is the largest employer, covering about 30% of the total labor force, and providing livelihoods for 53% of the rural population (Shalaby & al., 2011). From 1994 to 2004, agricultural trade deficits increased significantly because of the increase in food demand and the slowdown in agricultural exports.

Figure 3 : Selected indicators of agricultural performance in Egypt



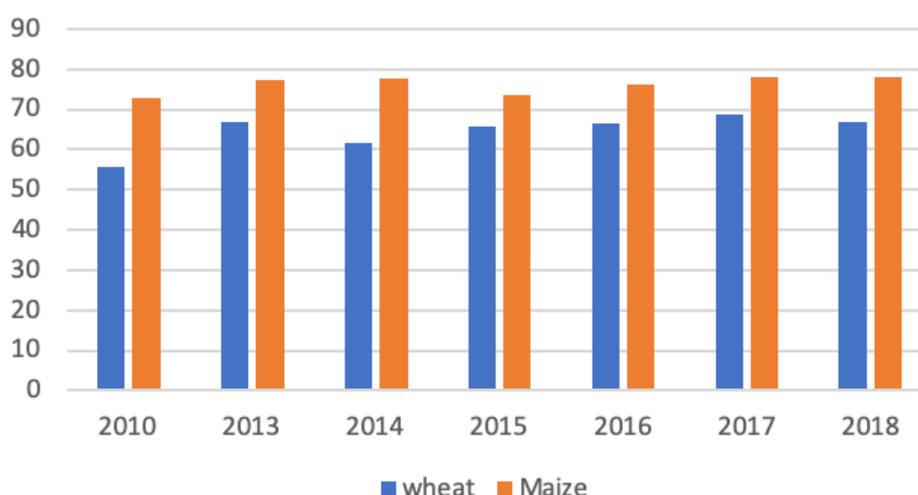
Source: FAO, 2020

Low labor productivity amid land scarcity: Agriculture in Egypt is labor-intensive, characterized by labor productivity which has increased on average by only 1% over the last decade (FAO, Agricultural Policies, Trade and Sustainable Development in Egypt, 2017). In addition, although Egypt occupies a very large area, agricultural land is very scarce. Arable land represents only 3% of total surface in Egypt (FAOSTAT 2020). Egyptian agriculture is also characterized by small land holdings. About 80% of farmers own agricultural land of five

feddans¹⁵ or less. In rural Upper Egypt, the percentage of such tiny farms is 60% versus 40% in rural Lower Egypt. To be commercially viable, farmers must produce and successfully market high-value horticultural crops. But instead they are mainly devoted to traditional crops including wheat, maize, sugar cane, and rice, which the GOE considers 'strategic' and which it subsidizes and provides procurement guarantees. These strategic crops are low value and water intensive. Poor farmers also have less access to irrigation water (which is subsidized), which is not available on demand but follows a schedule of stops and starts suitable for traditional field crops. Although cooperatives are widespread, they only penetrate about 70% of the communities. Besides, they focus on handling subsidized inputs, e.g. fertilizers and credit, and do not link smallholders to value chains. Upper Egypt is also poorly served by transport infrastructure, in particular refrigerated trucks essential for horticulture. It is estimated that up to 20% of fruit and up to 40% of vegetables spoil between farm and market (World Bank, 2015). Despite input subsidies, the agriculture sector was heavily taxed until the mid-1980s, after which the tax was reduced, although exportable outputs like cotton were implicitly taxed (Cassing & al., 2007).

Pursuing the elusive goal of FSS: Achieving food self-sufficiency has always been a priority goal for the GOE. For the 2012-2017 strategic development plan, the GOE's goal was to increase wheat production to reach a level of self-sufficiency of 74% by 2017. Actually, Egypt produces half of the 20 million tons of wheat consumed annually, which means a wheat self-sufficiency rate of 50% (Senthold, 2018). Egypt imported in 2017 about 10.1 million tons of wheat, making the country the world's second largest wheat importer after Indonesia (FAO, 2020). Despite having not achieved its self-sufficiency goal for wheat, the government has started to implement a new plan for 2015-2030. In the revised plan, the government set a new target of 81% wheat self-sufficiency by 2030. Moreover, the GOE has also set self-sufficiency goals for maize at 78% and 92%, for 2017 and 2030 respectively. According to Asseng et al, (2018), Egypt will continue to rely on wheat imports in the near future even if it expands agricultural land and wheat cropping intensification. The critical challenge will be meeting the increasing demand for irrigation water.

Figure 4 : Egypt: Wheat and Maize yields in Qx/ha



Source: FAO, 2020.

15. 1 feddan=1.04 acres or 0.42 ha.

Climate change and water scarcity—two major forces impacting on food security

Climate change is already here: Egypt is already feeling the effects of climate change with sea-level rise leading to submergence and salt-water intrusion in the northern fringe of the delta; as well as heat waves in summer and higher minimum winter temperatures. Farmers have already been adapting their strategies, including using more irrigation (increasing frequency or quantity), adjusting cultural practices, and using varieties with high water-use efficiency. Scenario analyses show that climate change can decrease production significantly by 2050, e.g. by 11% for rice; soybeans by 28%; maize by 19%. By 2050, water needs for summer crops may go up by 16% but decrease by 2% for winter crops. Under the scenario of a 1.5°C global temperature rise by 2050, farm net revenue per hectare would be greatly reduced (Eid & al., 2007). To help farmers better cope with the adverse impacts of climate change, these results emphasize the key importance of more efficient use of water, including crop, land, and water management, the revamping of the entire system of water delivery and control, and the ensuring of effective monitoring and regulation to avoid water losses. Through an Enhanced Resources Management Project, Egypt has begun to address these interwoven challenges rendered acute by climate change: water scarcity and quality, drainage, pollution, and institutional capacity (World Bank, 2017).

Poverty, vulnerability, and inequality in Egypt

Continued growth performance inadequate: Economic growth during the past three decades or so has been moderate and volatile, not sufficient to drastically reduce poverty and high unemployment, especially among young people and women. From 2005 to 2010, the economy grew by about 6% per year, but poverty increased. The poverty rate—based on the national poverty line—increased from 27.8% in 2015 to 32.5% in 2017-2018 (or from 16% to 26.1% using the World Bank's international poverty line of \$3.20/person/day at 2011 PPP). Another 28.7% of the population (2015) is categorized as vulnerable, vulnerability being measured as those whose consumption is above the poverty line but is lower than 133% above the poverty line (World Bank, 2019). The Gini coefficient of consumption distribution increased slightly from 0.28 (FY 2012-2013) to 0.308 (2015). Though relatively low, there are significant disparities in consumption: the consumption of the top decile is 6.7 times greater than the level of the poorest decile; the top one percent is close to 17 times greater than the poorest decile (World Bank Group, JN 2019: 15-16). There are also major regional disparities in poverty incidence: nearly 58% in rural Upper Egypt versus around 12% in urban Lower Egypt. Income mobility (or gains in income across generations) in Egypt is among the lowest in 75 countries studied (Narayan & al., 2018). The poor and the vulnerable—around 60% of the population, or 59 million (2018) Egyptians—are chronically food insecure¹⁶.

A complex social safety net program including early assistance for the pandemic: To assist the poor and vulnerable, the GOE's social protection system is extensive. It includes employment services, social services (e.g. health, education, pension, insurance), social assistance (e.g., cash transfers), and energy and food subsidies. With the recent onslaught of the COVID-19 pandemic, the government has taken

16. Estimated total population: 98.42 million (2018) Sources: Eurostat; World Bank.

several measures including: (i) a travel ban on all incoming flights; (ii) introducing a one-time payment to irregular workers impacted by the virus outbreak of LE500/month for three consecutive months starting April 13, 2020; (iii) targeting 1.5 million workers; (iv) introducing exceptional wage and pension increases of 14% starting in the next fiscal year; (v) revising tax exemption thresholds; and (vi) raising the minimum wage. However, Egypt has an enormous informal economy that is difficult to reach through these means—the informal economy is estimated at 50% of non-agricultural employment or 30%-40% of Egypt's economy (Mabrouk, 2020). The LE500 /month stipend is only half of the average salary of these workers. The response so far is just the beginning as the virus is far from contained and hospitals overwhelmed, with more than 1000 of infections per day reported by late May (Raghavan & S., 2020).

The Republic of South Africa (GNI/CAP \$6,040)¹⁷

Brief Background

A dual agricultural economy, a problematic legacy from South Africa's Apartheid past: After the Union of South Africa was proclaimed under British rule in 1910, racial segregation and white supremacy were the rule. The Land Act (1913) segregated Africans and Europeans on a territorial basis. By the early twentieth century, the African majority was confined to the Native Reserves (called African Homelands or the Bantustans), covering 13% of the land. The remaining land, including the best agricultural land was reserved for the whites. By the end of Apartheid in 1994, the white minority—10.9% of the population—owned 86% of farmland. So, 82 million acres was concentrated in the hands of some 60,000 white owners, while 13 million black farmers were crowded into 14% of farmland, where their land rights were unclear or contested (Lahiff and Li, 2012)¹⁸. In addition to land, government assistance to white farmers was extensive. At the same time, every avenue via which black farmers could use to improve their incomes—access to land, input, including credit, and output markets—was closed. The white government channeled Africans to become laborers on European farms, in mines, and manufacturing. Draconian measures controlled where Africans could live and work; e.g. those who worked in urban areas could only live in townships. White farmers were not only favored with land, but also by a whole structure of policies and institutions that subsidized their inputs and guaranteed markets for their outputs at remunerative prices. Thus:

- From 1910-47, white farmers were supported in practically every way imaginable including loans from the Land Bank (1912)¹⁹, through the creation of cooperative societies (1922), marketing schemes and control boards (1937), investment in infrastructure, in agricultural research and extension services, and export subsidies (World Bank, 1994)²⁰.

17. WDI. Year: 2019 (Atlas Method).

18. As farms consolidated, the number of white commercial farmers decreased to around 43,000 (2018).

19. The Agricultural and Land Bank of South Africa was established in 1912.

20. This report estimates that the total number of white large-scale farmers was around 67,000 in the 1990s (p iv).

- After the end of the Second World War, under the National Party Government, white farming continued to be heavily subsidized and highly protected within an overall inward looking macro approach of an import-substitution industrialization strategy. High tariffs and quotas were pervasive. Subsidies on capital increased capital intensity in agriculture. The bulk of agricultural products were marketed through the Agricultural Marketing Act of 1968, which was a continuation and expansion of the 1937 Act.
- In the 1980s, many of the farm subsidies were reduced; marketing policies were partially liberalized resulting in lower producer prices and higher capital costs as interest rate subsidies were reduced.

During these decades, smallholder African farming received no government support. Crowded onto the worst agricultural land, African subsistence farmers of the Homelands could not even meet the subsistence needs of their inhabitants. The Homelands were net food importers (World Bank, 1994: i). The Homelands were and still are poverty-stricken: the subsistence-oriented farmers earn less than less than 5% of the national wage rate. By the mid-1980s, agriculture in the Homelands was estimated to meet only 16% of food requirements of the Africans living there, and only 10%-20% at most of their incomes. Most of their incomes came from repatriated migrant earnings and pensions (World Bank, Feb. 1994). African agricultural laborers on white farms earned a third of the national wage rate (Hérault & al., 2009).

Agriculture—socio-economic importance far surpasses its declining relative importance in a mining-driven GDP: South Africa's economy was primarily driven by mining and quarrying in the early years. From 1911 to 1960, the share of mining and quarrying in GDP declined from 27.7% to 10.4%²¹. During the same period, agriculture, forestry, and fishing contributed 21% of GDP, declining to 12% by 1960, 4.7% by 1991, and 2.4% by 2013²². Agro-processing contributed another 4.8% of GDP (2013). Around 2018, the relative share of mining was reduced to 7% of GDP but contributed 28% of total exports. South Africa has remained a top producer of several minerals including gold, diamonds, platinum-group metals, coal, and iron ore. In the earlier decades, mining promoted the development of finance, energy, and transport. Its multiplier was estimated to be around 2 in the 2000s (World Bank, 2019). During Apartheid, Africans were allowed to work only as unskilled labor for white South Africans, because skilled and semi-skilled jobs were reserved for whites by the Job Reservation and Colour Bar Acts, along with the first iteration of the Mines and Works Acts of 1911. In agricultural and rural areas, the post-Apartheid governments have not been able to redress and reverse 350 years of race-based colonization and dispossession, through their land reform program which has three prongs:

1. Land restitution for victims of dispossession;
2. Tenure reform for victims of past discriminatory practices;
3. Redistribution through purchases on the open market.

21. Between 1870 and 1886, diamonds and gold were discovered in Kimberly and Witwatersrand respectively. Diamond digging became corporate mining monopolized by De Beers Consolidated Mines controlled by Cecil Rhodes.

22. Republic of South Africa. Department of Agriculture, Fisheries and Forestry. 2015. "Briefing Note on Agro-Processing in South Africa". The contribution of AG GDP /GDP was 2.4 % (2013) is from this source. <http://pmgassets.s3-website-eu-west-1.amazonaws.com/151027brief.pdf>

After over 25 years of land reform, the post-Apartheid governments still need to radically equalize the asset base, give tenure security, and increase the incomes and opportunities of the black farming population (Lahiff & al., 2012). Calls for land expropriation without compensation are now a major source of fragility in the South African social contract (World Bank, 2018). The experience of Zimbabwe's Fast Track Land Reform (2002) is a powerful reminder of the turbulence land grievances can unleash. The target of transferring 30% of land to black farmers by 2014 was not achieved; only around 8% was transferred. The new target date for delivering on land reform is 2025 (World Bank, 2018).

Performance of white agriculture under and post-Apartheid—production, productivity, and food self-sufficiency: By the mid-1990s, white agriculture produced some 90% of agriculture value added. However, it was neither efficient nor equitable, though South Africa exported basic commodities and was considered food self-sufficient. South African white agriculture thus achieved food self-sufficiency, a major goal of the Apartheid government. Agriculture, like the overall economy, was capital intensive and was protected by high tariffs and quotas as the Apartheid government adopted an inward-looking import-substituting industrial strategy. By the late 1980s, South African white agriculture already produced more of basic food commodities than all the countries of the Southern African Development Community (SADC)²³ combined, e.g. maize, wheat, sunflower, and sugar (World Bank, 1994). Under Apartheid, agriculture TFP (percent per year) grew by 1.26 from 1947-1991—low by international standards and masking much variation among subsectors. The labor-intensive horticultural sector grew at 2.42, and livestock and field crops at 0.77 only. Low total factor productivity growth of the entire economy characterized most of the post Second World War years under Apartheid, especially when compared to the high-growth economies of South Korea, Taiwan, and Japan during that period. Thus from 1950-1973, TFP growth (percent, per year) was 0.2; -0.5 from 1973-1984 and -1.1 from 1981-1988 (World Bank, 1994)²⁴. Since the end of Apartheid, with increased market- and export-orientation, growth in agricultural production and exports has been sluggish. The African National Congress government adopted an export-oriented strategy, removing many distortions, but it was still complex and favored some subsectors. The favored key food-processing subsectors were sugar refining, dairy products, and grain milling: all were protected with tariffs averaging nearly 17%. Overall annual GDP growth rates declined from around 3.5% during 1971-1975 to around 1% during 1986-1992 (World Bank, 1994).

A food self-sufficient economy with widespread food insecurity: South Africa is a striking case of food self-sufficiency coexisting with widespread food insecurity, in the sense of poor FSH. Overall growth since the end of Apartheid in 1994 has been relatively jobless. Growth picked up in the early 2000s—reaching 5% by 2005—only to stall again after the 2007-2008 global food-fuel-financial crisis. As a result, unemployment peaked at nearly 28% in 2017. Young people (15-24) have been hit particularly hard—nearly 53% unemployed in 2012. With high inequality and low growth, poverty is extensive. The top 10% of wealthy South Africans own 70.9% of total net household wealth (much held abroad), while the poorest 50% own only 4.2%. The Gini coefficient of income inequality was estimated at 0.7 (2008) and the consumption Gini at 0.63 (2014). Thus the top decile of the population accounts for 58% of the national income, while the bottom decile has

23. SADC has 16 member countries. It was formed on Aug 17, 1992.

24. Thus TFP growth in South Korea, Taiwan, and Japan during 1950-73 was 2.8, 3.5, 5.5 respectively; for the 1973-84 period, they were 1.4, 1.3, 2.0 respectively.

only 0.5% and the bottom 50% less than 8%. Poverty has been substantially reduced under the ANC governments but it is still high for a middle-income country. From 1996 to 2008, poverty was nearly halved, but since then, poverty reduction has stalled (World Bank, 2013). In 2015, 18% of South Africans lived on less than \$1.90/day. At the national poverty level, 55.5% could not meet their minimum nutritional requirements (the upper poverty line). At this upper poverty line, poverty incidence is highest among blacks: in 2015, poverty incidence (in percent) was 64.2% among blacks versus 41.3% among coloreds, 5.9% among Indians, and 1.0% among whites. In rural areas, in particular the former Homelands, poverty incidence was 81.3% versus 40.6% in urban areas (World Bank, 2018). Life expectancy at birth is only 64 (2017), one of the lowest for a middle-income country.

Global warming—a threat to the livelihoods and food security of millions, including labor in mines and on small farms: South Africa faces twin daunting challenges due to climate change.

1. South Africa's energy sector is heavily dependent on coal and it is one of five top major coal exporting countries. However, it will need to transition to a low-carbon economy, within a decade or so; a short time for this transition. The global community has been urged to cut global carbon emissions by 45% compared to 2010 levels by 2030. IPCC scientists tell us if global warming above the 1850s levels (which has already reached 1.0°C), climbs to 2°C by 2050, adaptation will increasingly tax ecosystems and our food systems and health. The global challenge is to mitigate the rise and limit it to 1.5°C by 2050. Achieving this would require us to use all the tools we have to “sequester the carbon emissions and steer the future of the Earth in a direction we can live with” (IPCC, 2018).
2. Climate change is predicted to inflict increased frequency and severity of droughts and heat waves in a country that is already semi-arid with an annual average rainfall of 495 mm, ranging from less than 100 mm/year in the western deserts to 1,200 mm/year in the eastern part of the country. Some 65% of the country does not receive enough rainfall for successful rainfed crop production. It is therefore mainly used as grazing land. The east is predicted to have more rainfall. Nearly 13%²⁵ of cultivated area is irrigated (2012); mostly occupied by large-scale commercial farms owned by whites, and allocated to high value crops such as fruit (e.g. grapes) and vegetables, tobacco, and industrial crops such as sugar and cotton (FAO, 2016: 3, 9-10, Tab 6)²⁶. Lower rainfall threatens to amplify already existing water insecurities. With increasing urbanization, Cape Town and other cities are already experiencing severe rationing of their water services.

Even without these looming problems, millions—at least 50% of South Africa's population—cannot meet their daily minimum daily nutritional requirements. The transition to a low-carbon economy threatens their employment and hence the livelihoods and food security of workers in coal-intensive activities, at least in the short run before alternative

25. Another source puts the percent of irrigated to total arable land at less than 10% (p 5). Source: Republic of South Africa. Schulze, R. E. (edi.) 2016. 'Irrigation and Climate Change in South Africa' Thematic Booklet # 13. Department of Agriculture, Forestry, and Fisheries. University of Kwazulu-Natal. Center for Water Resources Research. <https://www.nda.agric.za/doiDev/sideMenu/forestry/docs/Booklet%2013%20Irrigation.pdf>.

26. FAO Aquastat. 2016. Country profile: South Africa. <http://www.fao.org/3/i9821en/i9821EN.pdf>.

sources of energy are developed. Furthermore, those threatened in this dual agricultural economy are not the large-scale white farmers, estimated at around 43,000, who produce the bulk of the agricultural value added. The majority threatened are smallholders who fall into three broad categories: (i) smallholders numbering roughly 11,000-15,000; (ii) emerging commercial farmers, 350,000-700,000; and (iii) subsistence farmers, 2.5-3.5 million. These smallholders are poorly served in terms of rural infrastructure, land access, secure land tenure, and property rights, and credit and agricultural services, for both crops and livestock (World Bank Group, April 2018). In its Vision 2030, enshrined in the National Development Plan (2012-2025), the government has started to emphasize integrating smallholders into value chains in rural areas and making agriculture more climate-resilient.²⁷ Improved food security of these millions will depend heavily on the government's ability to respond effectively to these twin challenges.

Social safety network since 1994 has improved the food security of the poor: The ANC governments have doubled social expenditures and vastly increased the number of beneficiaries. Social insurance programs including old-age pensions, child support grants, conditional grants for school feeding and early childhood development programs, and disability grants cover about 16 million people in total (World Bank, 2013). The programs are well targeted to provide income relief to the poor. For example, more than 60% of the households benefiting from the child support grants belong to the two poorest quintiles of the national consumption distribution (Beegle & al., 2018). With continued low growth, the high current deficit inevitably limits financial resources for expanding the social safety net.

Addressing the challenge of recovering from the COVID-19 pandemic: In response to the pandemic, President Cyril Ramaphosa imposed a lockdown in mid-March 2020 and injected into the economy a 500 billion Rand stimulus on April 21. Furthermore, on March 23, Ramaphosa and his cabinet built a Solidarity Fund (SF) with a third of their salaries. By early April, South African businesses had contributed, increasing the SF to around \$117 million (Schneidman & al., 2020). The government has also put in place several financial and regulatory measures to inject liquidity into the economy, including topping up welfare grants as a pandemic relief measure. Significant as these are, they are only the beginning as the Reserve Bank is predicting a 6.1% economic contraction. Recovery will be an even greater challenge. In mid-March, the government imposed stricter sanitary controls, allowing freight to pass under stricter controls, but not travelers across its borders. (Bouët & al., 2020).

Rwanda: GNI/CAP \$820 (2019, Atlas Method)²⁸

Brief background:

Key structural and political economy features: Rwanda is a poor, densely-populated, small and hilly country—population of 12.5 million (2018)—with major constraints which include low productivity, high energy costs, a small domestic market hampered by cross-border tensions, a small and weak private sector, and inadequate infrastructure.

27. New Agriculturalist. 2013. Country profile: South Africa. <http://www.new-ag.info/en/country/profile.php?a=3071>.

28. Rwanda's GNI/Cap : \$150 in 1994, the year of the genocide.

However, it is famous for its remarkable recovery and development, under the leadership of President Paul Kagame, since the devastating genocide (1994). Rwanda's recovery path is a striking contrast to South Africa, for which 1994 was also a watershed year. Rwanda in 1994 experienced 100 days of terror as Hutus attacked Tutsis, the minority ethnic group; South Africa witnessed the end of over 300 years of white colonialism and oppression against the majority, the Africans²⁹.

Recent socio-economic performance and policy

Rwanda's recent stellar economic performance: Strong growth since the early 2000s has resulted in a fall in poverty from 59% to 45% in 2011 and to 39% in 2014. During this period, the Gini coefficient was reduced from 0.52 to 0.49 and then to 0.43 (2017). Agricultural production more than doubled, contributing to 35% of this poverty reduction (World Bank, 2014). Between 2000 and 2012, GDP growth averaged 8.1% per year. This strong macroeconomic growth performance was accompanied by substantial improvements in living standards, as witnessed by a two-thirds decline in child mortality, and the attainment of near-universal primary school enrollment. There was commendable progress in the provision of health services (World Bank, 2014). Rwanda's leadership is also committed to women's empowerment. Its Strategic Plan for Agricultural Transformation (2018-2024) includes interventions to build women's entrepreneurial skills, through training in leadership, management, and farming as a business, while providing business development support to enable women to access to suitable financial products (IFPRI, 2020). Rwanda is one of the few countries that has managed to have high growth accompanied by a reduction in inequality and poverty. This achievement has been referred to as the 'Triple Crown' (World Bank, 2014).

Key features of Rwanda's agriculture and policy: Food self-sufficiency has largely motivated its agricultural policy, an emphasis reinforced after the 2008-2009 global food crisis (World Bank, 2019). Agriculture is the dominant sector: it contributes to 1/3 of GDP, half of export earnings, and 80% of employment. Agricultural land plots are very small—80% are less than one ha. Over 70% of land is on hills and hillsides. Less than 5% of all land used for production is irrigated. More land that is irrigable is on hillsides where irrigation can be very expensive. If it were to be developed, irrigation plans must be linked with market development for higher-value products such as horticultural products, most likely for regional markets (World Bank, 2019). Rwanda has also launched institutional reforms and policies to transform its smallholder, largely subsistence and rainfed agriculture. Key programs were the Crop Intensification Program (2007), of which Land Use Consolidation (LUC) was an integral component. These two programs built on the prior land regularization and titling measures (1999), culminating in the Organic Land Law (OLL, 2005), which outlined procedures for land and titling. From 2009-2013, the Land Tenure Regularization Program (LTRP) successfully registered 98% of land parcels in the country—11.3 million parcels.³⁰ Land tenure security increased for both men and women, including women in de-facto unions. Increased irrigation was also an important component of the CIP. Furthermore, farmers were organized into cooperatives which helped improve market access. These several programs have jointly contributed to improving agricultural practices, resulting in

29. The first Dutch settlers (Boers) arrived in Cape Town area in 1652.

30. Rwanda's land consolidation and titling programs are discussed in greater detail in a Policy Paper by Tsakok, Isabelle and Tharcisse Guedegbe, Sept 2019. 'From Asian Green Revolution 1.0 to Sustainable Green Revolution 2.0: Towards a Fertilizer Policy for Smallholder Agriculture in Sub-Saharan Africa'. (p 23-25 in particular), see https://www.policycenter.ma/sites/default/files/PP%20-%202019-16%20%28TSAKOK%29_0.pdf.

aggregate agricultural production almost doubling between 2000 and 2011, with significant yield increases in maize, wheat, cassava, and potatoes (World Bank, 2014). Agricultural annual growth between 2016 and 2019 was maintained but varied from 3.9% (2016) to 6.6% (2018) (World Bank, 2020).

Climate change—potentially a major threat to food security

Hotter and more catastrophic weather events predicted: Rwanda's primarily rainfed agriculture is vulnerable to climate change, which is predicted to lead to shorter rainy seasons,³¹ but with higher intensity—more floods and droughts. Climate models disagree on the amount of rainfall predicted. With Rwanda's steep hills, more frequent and more severe torrential rainfall occurrences are a threat in terms of landslides and soil loss. The forecast increase in maximum temperatures varies between 1.5 °C and 2.5 °C. With these higher temperatures, crops that need cooler temperatures, such as beans and Irish potatoes, are threatened; at the same time the prevalence of pests and diseases will increase (World Bank, 2015).

Potentially extensive agricultural losses due to climate change: The economic losses due to climate change could add up to over 1% of GDP per year by 2030, and more thereafter without even factoring in losses due to floods. All aspects of the agricultural value chain, from irrigation, crop production, and land management, to processing, are sensitive to climate variability. Since 90% of cultivation is on slopes, these slopes are particularly susceptible to landslides, soil erosion, and degradation. Erratic rainfall in 2008 caused maize losses of 37% in the eastern provinces, and of 26% in the southern provinces. Heavy rains in the northern and western provinces inflict enormous costs, as exemplified by the flooding of 2012 which cost about 1.4% of GDP (World Bank, 2019).

Vulnerability of energy supply and its economy-wide linkages: Climate change poses other risks. Rwanda's energy supply is vulnerable to climate-related disasters, especially flooding. About half of Rwanda's electricity is generated by hydropower and 80% of the population depends on fuel wood to meet their energy needs. The implications of climate change for water, energy, and food are interwoven. Water is required for generating electricity. And energy is required for water treatment and distribution. Interruptions in water and energy supply put food security at risk. For example, severe droughts and fluctuations in energy prices affect the availability, affordability, and accessibility of food. Given these interacting impacts, a cross-sectoral approach to climate change across these highly exposed sectors is crucial (World Bank, 2019).

Rwanda's COVID-19 pandemic response and social safety net

Swift response to the pandemic: Rwanda was in the midst of an economic boom—growing at 10 percent in 2019—implementing the first of its series of seven-year National Strategies for Transformation (NST1), when COVID-19 struck. The impact in terms of travel, tourism, international trade, and exports has been negative.³² Rwanda is particularly vulnerable to these downturns as it is an open economy (trade/GDP around 50%). It was vulnerable to the Ebola virus from the Democratic Republic of Congo (DRC). Faced with COVID-19, the

31. Rwanda has two rainy seasons: Sept-Nov; March-May; and two dry seasons: Dec-Feb; and Jun-Aug. Average temperatures range from 16°C to 20°C.

32. Rwanda: Overview. World Bank. Dated April 22, 2020. <https://www.worldbank.org/en/country/rwanda/overview>.

authorities responded swiftly and effectively, having learnt how to protect Rwanda from the Ebola threat in 2018 (Tasamba, 2020). Consistent with its coordinated approach in launching and implementing its socio-economic transformation programs, the government of Rwanda (GOR) set up a COVID-19 command post in Kigali bringing together 400 professionals from different sectors to coordinate the country's approach and to contain this virus³³. In late March 2020, Rwanda closed its borders to travelers and imposed stricter (including sanitary) controls for freight, as did an increasing number of SSA countries (IFPRI, May 2020).

In addition to economic growth, Rwanda has several social programs to assist the poor. Its flagship program is:

- Vision 2020 Umurenge Program (VUP launched in 2008) is the GOR's chief program for identifying the poor and extreme poor, and assisting them in exiting poverty. It has four components: (i) cash transfers to labor-constrained families; (ii) public works for wage-based temporary employment for poor households; (iii) financial services for the poor; and (iv) community sensitization and capacity building. As of 2014, this program served 89,000 households, and had public works in 43% of sectors (World Bank, 2014).

In addition :

- The Genocide Survivors' Fund (FARG), the Rwanda Demobilization and Reintegration Program, and one-stop shop assistance to victims of domestic violence.

The GOR has been reforming the social protection network to include assistance to poor households for childhood development (e.g. reduce malnutrition, improve intellectual stimulation), and to improve coordination among services and the quality of delivery of the services themselves. For the May 2020-December 2021 period, the GOR launched a Social Protection Relief and Recovery Plan as a response to the COVID-19 crisis, estimated at about billion 130 Rwf³⁴ (around 1.4 % of GDP) to assist the most vulnerable and affected households, with accompanying measures to ensure access to basic services. (World Bank Group, Oct 2020)

Federal Democratic Republic of Ethiopia: GNI/CAP \$850 (2019, Atlas Method)

Brief Background

Repeated droughts, armed conflicts, and regime changes during the twentieth century: The twentieth century was tumultuous for Ethiopia after it defeated Italy twice, once in 1896, and then again fascist Italy in 1935-1936. Well into the 2000s, it had to endure famines following repeated droughts (15 between 1963-2013 alone!), one of the worst being the most recent in 2015-2016 (World Bank, 2016). Ethiopia is landlocked, surrounded by fragile and conflict-afflicted states. It is the second (after Uganda) largest

33. As of April 22, 2020, according to Johns Hopkins University, Rwanda has reported 147 cases, 80 of which had recovered, and no related deaths.

34. 1 US dollar=953.72 Rwandan Franc (May 31, 2020)

host of refugees in Africa. Political stability is relatively recent (since 2004). First, there was the deposing of Emperor Haile Selassie by Mengistu of the Derg regime in 1974. The Marxist-Leninist Derg regime was itself overthrown in 1991 by the Ethiopian People's Revolutionary Democratic Front (EPRDF). Ethiopia (under Derg) and Eritrea fought a war from 1961-1991. After EPRDF was victorious against the Derg regime, border tensions continued between Ethiopia and Eritrea which broke out in open warfare in 1998, and were not peacefully resolved until 2018. Table 2 shows the main phases and issues since 1950.

Table 2. Ethiopia: Developmental Phases & Regime Changes: Strategies and Issues (1950-present)

Period	1950-74: The Monarchy	1974-91: The Derg	1991 to present: EPRDF
National development strategies	Industrial development through import substitution and industrialization	Centrally planned, industry-led development	Home-grown, agricultural-led, export-oriented development policies
Selected policies	<ul style="list-style-type: none"> • Land was mainly owned by the state and the church • Establishment of large commercial farms producing coffee, as means of earning foreign currency • Prioritized the development of non-agricultural industries 	<ul style="list-style-type: none"> • Nationalization of land and other productive assets • Collectivization of farms and promotion of villagization programs • Mixed economic policies (1988-89). Distortion of markets through price controls, and overvaluation of the Ethiopian birr 	<ul style="list-style-type: none"> • Land remains state owned • Changed national development priority to agricultural development • Adoption of SAPs and export-oriented open economy
Key rural development issues	<ul style="list-style-type: none"> • Food shortages • Neglect of cereal production despite accounting for 80% of the cultivated area 	<ul style="list-style-type: none"> • Severe droughts and famine in 1983-84 and severe food shortages • Civil conflicts 	<ul style="list-style-type: none"> • Persistent food shortages • Rise in rural population • Environmental degradation and climate change-related shocks

Source: OECD, 2020.

Key features of Ethiopia's agriculture and resource base

High-risk smallholder agriculture—crop and livestock: Ethiopia is a vast mountainous country surrounded by arid zones with a very diverse climate. The agricultural uplands of the central-western part of the country enjoy relatively favorable rainfall conditions, with however, significant variations according to altitude and exposure. Rainfall varies between 250mm and 2,000mm per year (Fazzini & al, 2016). Ethiopia is relatively abundant in agricultural land: 34% of total area is considered agricultural land, of which 47% is occupied by permanent and annual crops and the remainder is for livestock (FAO, 2020). Agriculture contributes 31% of GDP (FAOSTAT, 2020) and provides employment to 71% of the workforce (ILOSTAT, 2020). Ethiopia has the largest ruminant livestock herds in Africa, and livestock plays a major role in both food supply and incomes, accounting for 40% of agricultural GDP (Behnke, R., & al, 2011). The majority of farmers are small producers (around 12.7 million total) who contribute 96% of total agricultural production. All land belongs to the state (as in China and Vietnam) and user rights have been distributed fairly equally with the average farm size 1 ha.³⁵ Agriculture is very vulnerable to the vagaries of weather fluctuations as it is mainly rainfed with only 2 million ha under irrigation, less than 1% of total cultivated land.

Low productivity of crop and livestock despite recent increases: Agriculture is characterized by low productivity with limited use of inputs and improved seeds. In addition, it is experiencing a pronounced degradation of its natural resources (especially soil) (Gashaw & al, 2014). Crop yields remain very low and well below the world average (Table 3), although there was increased labor productivity between 2000 and 2010 (World Bank, 2016). The improvement in production is also explained by cultivation of new agricultural land.

Table 3: Ethiopia: Selected Yield Comparisons (Tons / Ha)

Yields	Ethiopia		World	
	2010	2018	2010	2018
Cereals	1.8	2.4	3.6	4.1
Citrus Fruit	8.9	5.6	14.3	13.7
Oil crops	0.9	1.0	2.7	2.9
Pulses	1.4	1.9	0.9	1.0
Roots and Tubers	7.3	8.3	13.9	13.4

Source: FAOSTAT, 2020.

Despite the importance of livestock farming in Ethiopia, the sector is characterized by low productivity. Ethiopia has a dairy herd of around 12 million head and produces only 2 million tons of milk, whereas in Egypt and Morocco, for example, the dairy herd is made up of 6 million and 4 million head and produces around 4 million and 2 million tons of milk respectively (FAOSTAT, 2020).

35. <https://agriculture.gouv.fr/ethiopie>.

Recent agricultural growth driven by public investment, tenure security, high export prices and good weather: Agricultural growth from 2004 to 2014 was a major driver of poverty reduction: yield growth increased by 7% per year, and area increased by 2.7% per year (World Bank Group, March 2016). The EPRDF government invested in the agricultural extension system, resulting in one of the highest extension agent to farmer ratios, and in education, leading to a significant decrease in rural illiteracy. It also invested in roads, greatly improving farmer access to markets. Nearly all households—92%—benefit from tenure security due to the certification of usufruct rights, contributing to increased agricultural investment, and improving the functioning of land rental markets, in particular for women. High international prices for Ethiopia's exports (main exports include coffee, sesame seeds, flowers, and hides and skins) and good weather were also important factors.

Climate change and a deteriorating natural resource base—additional sources of vulnerability: Climate models predict an increase in rainfall variability with more frequent droughts and floods due to global warming. For example, under the Dry2 scenario, reductions in annual rainfall from 2045 to 2055 period could range from 10% to 25% in the central highlands; 0-10% in the south; and more than 25% in the north. If the Wet2 scenario materializes, increases in rainfall can range from 10-25% in the south and central highlands, and more than 25% in the rest of the country. Under the Dry2 scenario, losses are large: 6-10% of GDP and regularly distributed over the 2045-2055 period. Under the Wet2 scenario, GDP loss is also substantial in the 2040-2049 period. In both cases, climate variability will be translated into large swings in agricultural GDP; and losses will include reductions in crop yields and negative impact on livestock. In the Dry2 scenario, if priority is given to agriculture, then there will be a substantial loss in hydropower generation capacity—a drop of a 100% of the capacity installed in 2000! (World Bank et al, 2010). In addition to these daunting climate change scenarios, Ethiopia's extensive agricultural growth has eroded its natural resource base. FAO estimates that 40% of Ethiopia's crop and pastureland is degraded and another 20% is in the process of degradation. Forests have been depleted at the rate of 1% per year during the last twenty years or so as a result of increased demand for fuel. If this rate continues, another 9 million ha (out of 15 million ha total) will be deforested between 2010 and 2030 (World Bank, 2016).

Recent growth performance, poverty reduction, food security and social safety net

Much progress but still a long way to go: Ethiopia views itself as a developmental state with an ambitious goal: to attain lower-middle income country status by 2025.³⁶ Over the period 2000 to 2019, Ethiopia's population grew exponentially, with a growth rate of around 2.7%, increasing from some 66 million in 2000 to more than 112 million in 2019, making Ethiopia the second most populous nation in sub-Saharan Africa. The government has invested heavily since the mid-1990s, e.g. in public infrastructure, in education and health, and in agriculture. Growth has been rapid, 10.9% per year from 2004 to 2014. This high growth rate continued under Ethiopia's Growth and Transformation Plans, GTP I (2010-15) and GTP II (2015-20). GDP grew at 9.9% per year between 2007 and 2018, and inequality remains low despite this high growth. The post-tax Gini coefficient is 0.30.

36. Income grouping (July 01, 2020): Lower middle income group: USD 1,036-4,045
<https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021>.

Extreme poverty was reduced from 55% in 2000 to 33% in 2011 (World Bank, 2016). At the national poverty line, poverty was reduced from 30% in 2011 to 24% in 2016. Socioeconomic indicators also improved. For example, life expectancy rose from 52 to 63 years, child mortality and fertility rates fell, rates of stunting, wasting and underweight among children under 5 years of age have decreased, net attendance at primary school has increased, and immunization rates have increased. Despite such impressive progress, poverty is still extensive as 70% of the population lives on less than \$3.10 /day (at 2011 prices). An estimated 22 million people are undernourished—the prevalence of undernourishment was about 21% of total (FAOSTAT, 2020). Direct transfers from the Productive Safety Net Program (PSNP) to rural households reduced poverty by 2% (World Bank, 2016).

Achieving cereal self-sufficiency through sustained yield increases improve food security: Extensive poverty in Ethiopia makes it clear that food security cannot be equated to the level of cereal self-sufficiency. However, cereals contribute 2/3 of all calories consumed for an average Ethiopian household, absorbing 40% of its food basket (Benson & al., 2014). So, cereals or grains are very important for food security in Ethiopia. In 2010, Ethiopia was 95% cereal self-sufficient (Tesfaye & al., 2018). Cereal³⁷ yields are currently still low but increased between 1991 and 2014. There are still substantial yield gaps; e.g. for maize, yield potential ranges from 6.2 t/ha in Eastern Ethiopia to 12.5 t/ha in Western Ethiopia (Tesfaye & al., 2018). Scenario analyses (e.g. at different population growth rates, yield levels) show that if Ethiopia can achieve 80% of the yield potential, and can do so in a climate-smart and sustainable manner, and at a lower population growth rate, then it can achieve nearly full cereal self-sufficiency by 2050, releasing land for other income-increasing uses. Then it would be able to significantly reduce poverty and improve food security. This positive scenario will however require substantial investment in research and development by both public and private sectors, use of improved cultivars, and hybrids, and good agronomy, among other things.

The Productive Safety Net Program widely considered a flagship response to food insecurity: It is clear that rapid growth (productivity and output) is necessary but not sufficient to assist the millions of food insecure, many being casualties of repeated droughts, famines, and armed conflicts. Until 2005, the government response to the repeated famines was primarily through emergency food aid. The PSNP was created at first to assist the chronically food insecure on a sustained instead of an ad-hoc basis. In setting it up, donors made pledges of multiyear assistance in addition to emergency assistance. This predictability in resource availability has been essential in its effectiveness (Reach Project, Feb 2019: 10)³⁸. Its mission is summarized in the three Ps: protection, prevention, and promotion. It is able to give protection from hunger on a predictable basis. The predictability of assistance protects households from liquidating their meager productive assets when shocks occur. This protection prevents poor households from

37. The five main cereals considered for these analyses are: maize, sorghum, wheat, millet, rice. These five crops make up 40% of total arable crop area. Ethiopia is the largest teff producing country. Some 24.02% of total cereal crops area is devoted to teff (2014-15 survey). See Eyob Bezabeh. "Trends, Growth and Instability of Teff Production in Ethiopia". *International Journal of Recent Research in Life Sciences*. Vol. 3, Issue 4, pp (10-13), Oct-Dec 2016. https://www.researchgate.net/publication/318707284_Trends_Growth_and_Instability_of_Teff_Production_in_Ethiopia.

38. Reach Project. 21 Feb, 2019. "Ethiopia's Productive Safety Net Programme: Addressing Food Insecurity with Food and Cash Transfers". Munk School of Global Affairs and Public Policy at the University of Toronto. <https://static1.squarespace.com/static/5769a0b5f7e0ab7b91a3362b/t/5c6cb5369140b752b9660ab6/1550628156528/ReachProject+Ethiopia+Final.pdf>.

falling further into a poverty trap. The PSNP also promotes household productivity and wellbeing by giving them opportunities to earn income by building community assets (e.g. public works), and increasing their (on-farm or off farm) productivity. The program combines food and cash transfers as well as employment opportunities for the able-bodied. The sick or elderly receive direct transfers. In its 15 years of operation, the program has benefited nearly 8 million people (Tadesse, 2018). Empirical evidence shows its impact on productivity and household asset building has been limited. But it has helped to smooth consumption, reduce food insecurity and minimize productive disincentives. Unlike many social protection programs in sub-Saharan Africa, which did not last beyond the pilot phase, the PSNP has been running for 15 years. This continuity has itself been important for improving welfare and food security. Recently, it has even been extended to urban areas where poverty rates are also high, especially because of high youth unemployment rates.

Early response to COVID-19 pandemic and other disasters: To achieve its goal of achieving lower-middle income country status by 2025 and substantially improve food security for all, Ethiopia's resilience is being severely tested during these unprecedented times. It is now faced with the global COVID-19 pandemic, a locust swarm blanketing the horn of Africa, and a worldwide recession. Increased donor aid has been forthcoming, like the recently (May 1, 2020) agreed debt suspension of International Development Association (IDA)³⁹ countries. It has also received \$250 million in Development Policy Financing to assist its response to the pandemic while implementing reforms under its Second Growth and Competitiveness operation.⁴⁰

III. Conclusion: What have we learnt from international experience on food security policy outside Africa (reviewed in Part I), that would help shape food security policy in Africa after the COVID-19 pandemic ?

Pre-COVID 19 pandemic: what worked, what did not work, and why

Country after country has equated achieving food self-sufficiency (FSS) or food sovereignty (FSY) with food security and national security (Annex 1: Food Security: Concepts, Pillars, Goals, & Policies). The country cases reviewed (e.g., high income EU, Japan; middle and low income Asia: South Korea; China; India; Indonesia; Africa: Morocco, Egypt, South Africa; Ethiopia, Rwanda) show that FSS is considered a political imperative because needing to import basic food is viewed as a national security risk. Countries have thus tried to achieve FSS only to find that that it is no guarantee of control over one's basic food supplies and social stability. In addition, no country has found that FSS (in the sense of meeting basic food needs exclusively from domestic production) is food security which only "... exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs

39. World Bank. What is IDA?

<https://ida.worldbank.org/about/what-is-ida>

40. Ethiopia COVID-19 Supplemental Financing to the Second Ethiopia Growth and Competitiveness Programmatic Development Policy Financing. June 17, 2020.

<https://www.worldbank.org/en/news/loans-credits/2020/06/17/ethiopia-covid-19-supplemental-financing-to-the-second-ethiopia-growth-and-competitiveness-programmatic-development-policy-financing>.

and food preferences for an active and healthy life”— (1996 World Food Summit, FAO)⁴¹. This holistic concept is demanding in that availability, access, utilization, and stability of food must all be simultaneously satisfied for all consumers to be food secure. We label this holistic concept FSH. FSH in fact corresponds to laypeople’s understanding of the highest level of FS they desire.

What worked and why:

How the goal of FSS was operationalized made the critical difference in the cost-benefit ratio of the approach. The experiences of the EU and China illustrate the same point but in different ways. Thus:

- The European Community of six member countries in the 1950s (became the European Union (EU) in 1993, with 27 members in 2020) pursued FSS at great cost (mainly paid by consumers. But unlike in many developing countries, the Common Agricultural Policy (CAP) was an integral component of a broader agenda of regional peace, economy-wide transformation, and integration of adjoining countries that enlarged markets and succeeded in transforming the European Community into a high-income, industrialized region by the early 1980s. The CAP was never a narrowly sectoral program within the confines of single economies. Not only was the CAP an integral component of a holistic approach, it was also adjusted in response to problems that emerged over the decades. The CAP has been reformed several times under mounting pressure from various quarters, including (i) budgetary cost; (ii) the dumping of costly surpluses undermining the markets of poorer farmers in developing countries; (iii) regressive distribution in favor of larger and richer farmers; (iv) environmental degradation; and (v) the reality of climate change.⁴²
- The goal of FSS has been paramount in China under two radically different visions: of Mao (1949-76) and later of Deng Xiaoping (1977-2000s). Under the socialist agriculture of Mao, and despite high levels of fertilizer and other input use, agriculture was highly taxed, the economy was closed, and the entire economy was organized on a war footing for national security reasons. Achieving FSS was treated even as a provincial security issue. During Mao’s tumultuous leadership, agriculture kept pace with population growth, but barely, and poverty remained extensive. Deng’s vision of socialism with Chinese characteristics radically re-oriented China’s agriculture and economy. His reforms were wide-ranging, including the restoration of private material incentives, land tenure security with respect to usufruct rights,⁴³ and capitalistic domestic markets progressively integrated in the world economy, all of which were anathema in Maoist ideology. Extreme poverty was substantially reduced—by over 500 million between 1981 and 2004 (World Bank, 2009), and food security vastly improved. Deng succeeded where many other post-1911 national Chinese leaders failed: the transformation of China.⁴⁴

41. <http://www.fao.org/3/al936e/al936e00.pdf>.

42. European Union. How will we be affected? https://ec.europa.eu/clima/policies/adaptation/how_en.

43. Since the 1980s, the central government has been extending the period during which rural households have land tenure security regarding their usufruct rights. The tenure has been extended for another 30 years starting January 2020.

44. On the transformation of China, see Vogel, Ezra F. 2011. *Deng Xiaoping and the Transformation of China*. The Belknap Press of Harvard University Press. For more discussion of China’s agricultural and fertilizer policy and performance since the 1950s, see the Policy Paper 19/16, Sept 2019, by Isabelle Tsakok and Tharcisse Guèdègbé,

Both the EU and China benefitted from their emphasis on the expansion of markets beyond national borders. For the EU, the CAP was an integral component of a long-term vision of a peaceful, economy-wide transformation, and market integration of an entire region. As the European Union has expanded, so have the markets. Under Deng Xiaoping's vision, China gradually strengthened market economy institutions (in particular, the official acceptance of material incentives in the Household Responsibility System and land tenure security for farm households) as it expanded agricultural markets and diversified agriculture, opened its economy, and joined the World Trade Organization (2001) to integrate its domestic economy in global markets.

Openness to trade, strengthening resilience, and promoting diversified, export-oriented agriculture were hallmarks of other high-performing economies. A good example is Malaysia, for which achieving food security via FSS was also a priority goal. The trade/GDP ratio for Malaysia was 130.5% (2018).⁴⁵ However, Malaysia's FSS policy was not the policy which (i) transformed its agriculture and agro-processing sector; (ii) substantially reduced extreme poverty from some 50% to virtually non-existent by the 2000s; and (iii) raised per capita incomes to \$11,200 (2019). Quite the contrary. Since independence (1957), Malaysia has equated FSS with national security and promoted FSS at enormous financial and opportunity cost. What made the food-security difference were Malaysia's substantial and sustained investments in agriculture and the rural areas from the 1950s on, with systematic diversification of agriculture away from rubber into tree crops, in particular oil palm and its downstream processing and exports. The government of Malaysia successfully promoted value chain development and the integration of smallholders into such value chains (World Bank, 2019). Its successful value chain development required export orientation as the domestic market was too small for its output of palm oil and its many processed forms. By prioritizing its access to expanding foreign markets, it also diversified its agriculture and agro-processing sectors. It is Malaysia's successful diversification into high value added activities that played a critical role in strengthening its resilience against shocks time and again, the two most recent being the 1997-98 Asian financial crisis, and the global 2007-2008 food, fuel, and financial crises. Unless an economy is resilient, successful agricultural and economy-wide transformation is virtually impossible, because transformation takes at least several decades. For any country, the likelihood of being plunged into a crisis outside one's control within this long period is very high, the sudden global onslaught of COVID-19 since late January 2020 being a prime example.

What did not work and why

Many developing countries that followed a sectoral and closed economy approach in their pursuit of FSS found that even when they achieved FSS, they still had: (i) millions still suffering from abject poverty and chronic hunger; (ii) that the achievement remains fragile even while incurring (iii) huge financial costs, thus calling into question their ability to sustain the approach. This is true not only for the Part I countries but also for the Part II African countries selected (For a full list, see Annexes 2, 3 (a) and (b) and 4). By a sectoral and closed economy approach, we mean a narrow focus on promoting primary

entitled "From Asian Green Revolution 1:0 to Sustainable Green Revolution 2.0: Towards a Fertilizer Policy for Smallholder Agriculture in Sub-Saharan Africa".

45. WDI. Trade as % of GDP. Respective years. Trade = (Exports + Imports)
<https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS>.

agricultural production of staples within high tariff walls. India is a good example.⁴⁶ FSS did have some success. Independent India successfully eliminated famines so recurrent in British India. India can also boast of becoming a major rice exporter by the 1990s. However, its FSS approach was maintained at enormous financial cost, for governments at both federal and state levels. In fact, the approach was so popular politically that the governments became locked into a subsidy trap—they found it politically impossible to reduce or eliminate the subsidies. Thus, the funds spent on the subsidies crowded out needed expenditures on a range of public goods and services that could have promoted the sustainable transformation of Indian agriculture into a high productivity and diversified agri-food system, as Malaysia was able to do. The high opportunity cost of these vast sums is clear when one factors in the environmental degradation from overuse of chemicals, the slowing down of agricultural growth itself, and even the reversal of yield growth⁴⁷. Unfortunately, India is not the only country where the achievement of FSS has not meant achieving FSH. Indonesia achieved FSS in the mid-1980s, lost it in 1997-98 crisis, plunging millions back into poverty,⁴⁸ and regained it in 2008 (the year of the global food-financial-fuel crisis). However, in the early 2000s the bottom 40% (some 100 million people in 2015) still suffered from chronic poverty and food insecurity. Growth and poverty reduction has continued but growth has been highly unequal, with some 25 million living under the poverty line and 55 million (2019) categorized as vulnerable (World Bank, April 2020)⁴⁹.

Another case is Morocco, which pursued FSS for over five decades, intervening extensively in the agri-food system, and incurring major costs through input and food subsidies. The allocation of enormous resources has reduced poverty and helped maintain social peace in a politically volatile region. However, whatever level of FSS it achieved, food security for all—the achievement of FSH—has remained elusive. And it will remain elusive so long as FSS policies distort incentives which undermine sustained, broad-based agricultural productivity growth, generating high value added from a diversified agri-food sector. Despite the \$2.37 billion (2008-19) invested (75% by the state) under the Plan Maroc Vert (PMV) to reform and integrate the sector in world markets, it has not succeeded in transforming this dualistic sector. The distorted incentives created to achieve FSS run counter to the reform agenda of the PMV. The dualistic structure has not changed. Less than one percent of farmers on 14% of cultivated land are highly profitable, export-oriented farm enterprises of high value products, while the majority, which cultivate small (70% own less than 5 ha each) semi-subsistence farms, are poorly connected to markets and grow mainly low value crops of wheat and barley, which the government protects and subsidizes in its pursuit of food self-sufficiency. Nearly 50% of the heads of these farming households are over 55 years of age, and 81% of them are illiterate and lack

46. India's Trade/GDP ratio (a measure of openness of the economy) averaged 20% in the 1980s but gradually rose to average 40% in 2016. Ahmad, Junaid Kamal, Florian Blum, Poonam Gupta, Dhruv Jain. Oct 2018. India's Growth Story. Policy Research Working Paper. WPS # 8599. World Bank Group. (Ahmad et al, 2018: Fig 7A) <http://documents.worldbank.org/curated/en/941201538406933607/pdf/WPS8599.pdf>.

47. The various problems of India's policy promoting fertilizer use are discussed at length in "From Asian Green Revolution 1:0 to Sustainable Green Revolution 2.0: Towards a Fertilizer Policy for Smallholder Agriculture in Sub-Saharan Africa" by Isabelle Tsakok and Tharcisse Guèdègbé, PCNS, PP 19/16, Sept. 2019.

48. The Asian Financial Crisis coincided with other disasters. Rice production dropped from around 51 million metric tons (mmt) (1996) to 49 mmt in 1997 and to 48 mmt (1998) following forest fires commonly used to clear the land in Kalimantan, Sumatra, Sulawesi, and Irian Jaya. They burned longer than usual due to abnormally dry conditions triggered by the El Niño drought. These fires blazed out of control and smoke from the fires blanketed the greater part of Sumatra, Kalimantan, Singapore and Malaysia.

49. World Bank. Indonesia: Overview. (April 2020) <https://www.worldbank.org/en/country/indonesia/overview>.

technical knowhow and rarely use modern technologies (World Bank, 2018). The one percent of farmers produces 50% of agricultural GDP, provides 50% of rural jobs, and contributes 75% of agricultural exports. Despite Morocco's many trade agreements, agricultural trade remains highly protected by quotas and high tariffs, mainly because of the FSS goal (World Bank Group, Jn. 2018). The narrow base of growth of this dualistic agricultural system and the largely underdeveloped nature of the agri-food sector have slowed the transformation of the agri-food sector and undermined its contribution to the transformation of the entire economy. This agricultural growth model is characterized by high levels of public investment/expenditure, with slow structural transformation and TFP growth and persistent dualism (World Bank Group, Jn. 2018). The financial sustainability of this model will be challenged given the pressing demands for government to invest more in mitigation, adaptation and smallholders' resilience to more frequent and more severe droughts predicted by climate change scientists.

Egypt like Morocco pursued FSS for decades at substantial financial cost, but the goal of food security has become more elusive over the years. Egypt has become the world's second largest (by dollar value) wheat importer after Turkey.⁵⁰ Its substantial poverty and vulnerability incidence rose to nearly 33% (2017-2018) and 28% (2015) respectively, despite a higher growth rate of 6% per year from 2005 to 2010. With such widespread food insecurity, and the memory of the 1977 food riots, it is no wonder that the costly food subsidy system is considered critical for maintaining social peace. Although Egypt's agriculture is virtually 100% irrigated, labor productivity growth remains low. Much of this precious water and scarce cultivable land are still devoted to 'strategic' crops by the majority of smallholders, especially in poorer rural Upper Egypt. Smallholders prefer the protection afforded to strategic but low-value and water-intensive crops, rather than to take the risk of entering the high-value but riskier horticulture market. They are also constrained by poor marketing infrastructure, inadequate credit, and an inflexible irrigation regime. Despite meager results from its pursuit of FSS, Egypt still sets higher goals for achieving FSS. As in Morocco, the financial sustainability of this model will be challenged as the government manages the difficult balance among competing financial demands to address: (i) climate change by building a more resilient Egypt; (ii) widespread poverty, and food insecurity exacerbated by continuing high unemployment (especially among young people), and by the COVID-19 pandemic; (iii) a weak public health infrastructure in the face of contagious diseases; and (iv) insufficient productivity growth sustained enough to transform its agri-food sector and overall economy, and escape the middle-income trap.

Challenges of achieving food security after the COVID-19 pandemic: Implications for Africa from global experiences with food security policy⁵¹

Food security policy in Africa will inevitably be shaped by its response to the world environment in the wake of the COVID-19 pandemic, and by competing visions of how

50. Daniel Workman. Aug 1, 2020. Wheat Imports by Country. <http://www.worldstopexports.com/wheat-imports-by-country/>

51. Part I of this Policy Paper discusses the experiences of several countries, from rich and industrialized to poor and agriculture-based. The countries/regions are: the United States of America, the European Union, Japan, the Republic of Korea, China, India, Bangladesh, Indonesia, Malaysia, Chile and Peru. In this paper, Part II, the countries discussed are: in North Africa, Morocco, and Egypt; in Sub-Saharan Africa, Rwanda, Ethiopia, and South Africa. We have selected a range of countries to illustrate the food security issues in a diversity of agri-ecological contexts, policy regimes, and challenges. See Annexes 2 through 4 for quantitative structural features of major relevance to food security.

recovery should proceed. These visions will inevitably vary country by country in the coming years, thus requiring country-level analysis to develop specific recommendations.

Public health is now widely recognized as an essential public good for global food security. At country level, COVID-19 has laid bare key factors impacting on food security which may not have been so obvious before. These are:

- The state of the public health infrastructure;
- The connectivity of the population to systems of information including digitalization;
- The vulnerability of supply chains from farm to final consumers to disruptions due to public health concerns;
- Access for all to medicines in emergencies and to tele-healthcare;
- Existence of early warning systems credible to a public previously sensitized to the dos and don'ts in case of a public health emergency.

At country, regional and global levels, the importance of investing in science and technology, and in the containment of infectious diseases, is being increasingly recognized. The proper functioning of our globalized world economy hinges on containing contagious diseases and protecting global public health.

Food security challenges prevalent prior to COVID-19 remain but need reassessment:

Decisions on how best to achieve FSH focus on three sets of issues. The main question is: How best to balance competing considerations and thrive despite dislocations inflicted by the pandemic and other disasters? The major issues are:

1. What balance to strike between protecting domestic production and relying on regional/global trade and value chains? For Africa, on the eve of implementing the Africa Continental Free Trade Agreement (AfCFTA, signed in 2019), the policy decision is whether the goal of food security (FSS) should still be pursued through FSS or FSU and, if so, how.
2. What balance to strike in allocating funds between increasing productivity growth and developing a social safety network of income and/or food assistance? This issue of balance is sharpened by competing budgetary demands for urgent, shorter-term humanitarian assistance and investing in sustained longer term productivity growth.
3. What is the best way to prevent food panics altogether, and how to address high price volatility and price spikes of basic staples, when shocks are rapidly transmitted? This issue is much easier to address if (1) and (2) are effectively resolved. If not, in the short term, it becomes the dominant issue. The situation is rendered more challenging as the structure of entire economies are changing including consumers' incomes, and their preferences on what constitutes "basic food "; women entering formal employment; and urbanization.

These are recurrent issues which must be addressed, at times singly, but more often in combination, by all countries which want to achieve FSH. Given the COVID-19 pandemic, and the realization that public health must be a priority, it is clear achieving food security has become even more urgent and demanding.

What have we learnt from selected country experiences on food security policy in Part I about how Africa should address these recurrent food policy issues?

As pursued by most governments, FSS and FSY has had very limited success in terms of food security for all. Even countries that have achieved FSS still have millions who are poor, vulnerable, and food insecure. Many governments have been unable to strike the right balance in protecting their domestic agriculture in a way that promotes its sustained productivity growth, diversification, and income growth so that over time the funds needed for shorter-term social safety-net programs could be reduced.

However, despite these limited achievements, the nationalistic appeal of FSS and FSY is strong because of the belief that it guarantees national security, social stability, and national sovereignty. Past experience casts serious doubt on these beliefs. Suharto's downfall in 1997-1998 clearly showed that achieving FSS was far from enough to preserve the regime and social stability when the entire economy was battered by multiple crises: the Asian Financial Crisis, the plummeting of rice production, and widespread wildfires linked to a severe El Niño drought (ODI, 1998). Of course, prolonged food shortages are destabilizing, as is evident in Venezuela since the collapse of oil prices in 2014-2015. However, FSS by itself is no guarantee of social peace or national security. Moreover, as shown by the numerous country case studies, FSS has often been pursued in ways that have not generated widespread access to food.

Despite this limited success, it is tempting to think FSS is the answer to Africa's growing import food bill. So far, the development of the agri-food sector has not been able to prevent Africa from becoming increasingly dependent on food imports. The annual aggregate food import bill is currently about \$35 billion and is projected to rise to \$110 billion by 2025 (AGRA, 2017). The major factor in this increase is continued low productivity of much of smallholder agriculture. The relatively high agricultural growth rate of 7 % after 2005 was driven more by commodity price booms and area expansion rather than productivity increases.⁵² Africa's cereal yields are low compared to other regions and the gaps are widening. Africa never had a Green Revolution like the one that swept through Asia (1965-1990), lifting millions out of poverty, thus averting a full blown Malthusian catastrophe.⁵³ Many Asian governments espoused FSS as a central goal. Despite substantial poverty reduction, severe poverty still afflicts millions in Asia: from around 663 million (2005) to 476 million (2018) (FAO & al., 2019). Asia's experience clearly shows that a Green Revolution is necessary but far from enough to eliminate hunger and achieve FSH

The global environment today is very different from that which prevailed when Asia embarked on its Green Revolution in the mid-1960s. Trade and global value chains have deepened the integration of the world economy. Countries in Asia that are becoming economic powerhouses have all used international trade to expand their markets, raise their incomes, and strengthen their food security. This labor-intensive, trade-led

52. There is a dispute regarding this high growth rate. Nin-Pratt, Johnson and Yu (2012) estimate that African agriculture grew by 3.6% per year from 2001 to 2010. Nin-Pratt, A., Johnson, M., & Yu, B. (2012). "Improved performance of agriculture in Africa south of the Sahara: Taking off or bouncing back " (IFPRI Discussion Paper 01224). Washington, DC: International Food Policy Research Institute (IFPRI).

53. The Green Revolution in Asia is discussed on more detail in the Policy Paper 19/16, Sept 2019, by Isabelle Tsakok and Tharcisse Guèdègbé, entitled "From Asian Green Revolution 1:0 to Sustainable Green Revolution 2.0: Towards a Fertilizer Policy for Smallholder Agriculture in Sub-Saharan Africa".

model of growth however has come under increased pressure from several quarters including trade conflicts between large countries and increased trade protectionism, disenchantment with liberalized trade because of the unequal sharing of benefits, and the rise of labor-saving technologies such as automation and 3D printing, which make producing at home more attractive (World Bank, 2020). To these policy and structural changes can be added the onslaught of the global COVID-19 pandemic since early 2020.

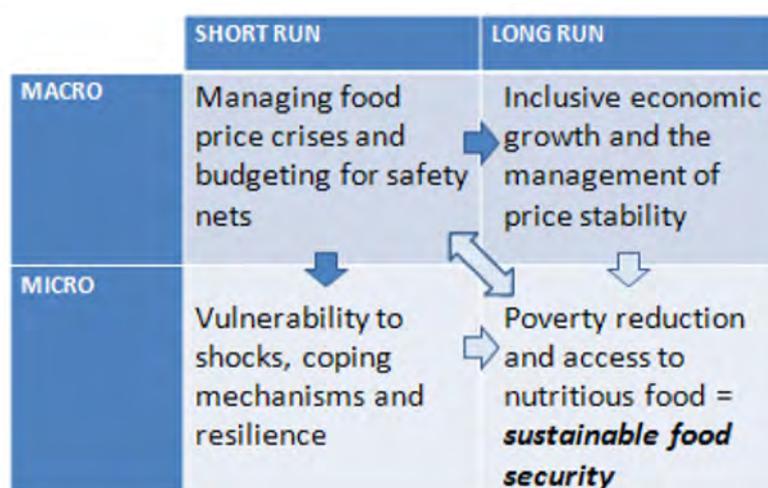
What does this challenging world environment mean for the pursuit of food security in Africa? In view of the experiences with popular approaches such as FSS and FSY, there are three sets of fundamental factors for African governments to consider in their pursuit of FSH. These are:

1. Access to growing markets matters: The goal of FSS prioritizes the protection of domestic markets for staples, even though such protection has undermined sustained agricultural productivity growth, and inevitably food security for millions. The evidence is that access to growing markets, including foreign, has been essential for sustained agricultural productivity and production growth as well as diversification into higher value added at farm and processing levels. However, the growth of global value chains (GVCs), a powerful engine of global income growth, has moderated under rising protectionism since the financial crisis of 2008. Now with the COVID-19 pandemic, dislocations of GVCs is widespread. Many countries are rethinking their vulnerability through GVCs. African governments however do not necessarily have to choose between expanding market access and the fear of losing control over their agri-food supplies if they are able to structure mutually beneficial trade agreements within the continent. Thus, at this unique moment in history, Africa has a golden opportunity to enlarge its domestic agri-food markets that are so essential for millions of its smallholders by dismantling border controls that hold back cross-country trade and by vigorously implementing AfCFTA. Furthermore, African governments should promote not just the productivity growth of primary agriculture but of the entire agribusiness (food and non-food) sector, so that smallholders can integrate into expanding value chains (domestic and continent-wide) and prosper (AGRA, 2017). Of course, in opening borders, wide adherence to sound public health measures to contain the virus must be scrupulously enforced. By March 25, 2020, 23 African countries had closed their borders to travelers and limited freight trade. The African Union Commission has postponed the launching of AfCFTA until January 2021.⁵⁴ Hopefully, these closings will be temporary. For Africa to structure its agriculture to achieve the goals of FSS or FSY at this critical juncture would be tantamount to throwing away this golden opportunity.
2. Going beyond isolated success cases to sustained agri-food and economy-wide productivity growth and transformation: Africa has had several isolated cases of agricultural success, e.g. cassava, maize, cotton, horticulture, and dairy (Haggblade & al, 2010). But the bulk of smallholder agriculture remains mired in low productivity and extensive poverty. Transformative, poverty-reducing growth, as in Europe after the Second World War and in China under Deng Xiaoping, requires holistic (entire

54. IFPRI. May 22, 2020. "COVID-19 border policies create problems for African trade and economic pain for communities." By Antoine Bouët and David Laborde. <https://www.ifpri.org/blog/covid-19-border-policies-create-problems-african-trade-and-economic-pain-communities>.

economies not just agriculture) and long-term approaches, under visionary leadership. In Africa, the leadership of Paul Kagame has transformed Rwanda devastated by the genocide (1994) into a high-growth, poverty-reducing economy. Ethiopia under the leadership of the EPDRF has invested heavily in agriculture, promoting yield increases and high growth of agriculture and the wider economy, thus reversing decades of fragility and conflict. In all cases of success, agri-food development was central, but not just agri-food. Agricultural and economy-wide transformation requires substantial public investments in agriculture and non-agriculture. And these public investments need to be sustained over several decades at least, and should be complemented by private investment. The dire predictions of climate change and the demands of the ongoing pandemic add to an already long list of 'musts' for achieving food security: e.g. infrastructure for public health, water security, and resilience against periodic shocks and weather disasters. Time and again, experience shows that to effectively address this complex task of achieving food security, there is no single magic bullet. Timmer (2015) set out a holistic and long-term approach for addressing the multiple challenges of achieving food security. In Table 3, each quadrant can be disaggregated further to incorporate the specific features of any given country. Decisions between competing and complementary demands for resources for the short and long-term are best anchored within a holistic and long-term framework.

Table 3: Basic framework for understanding food security issues



Source: Timmer (2015).

- Institutions, institutions, institutions: Africa has suffered from a succession of major natural disasters, e.g. long-term drought into the 2000s, with the latest in 2019 in Southern Africa.⁵⁵ There have also been floods in Mozambique and Somalia, and, in 2020, floods and landslides in western Uganda, drought in Morocco, and the locust plague in East Africa. In addition, there has been the unexpected and brutal onslaught of the global COVID-19 pandemic on Africa, where nearly 20% of the

55. NASA. "Long term drought in Africa."

<https://earthobservatory.nasa.gov/images/event/88589/long-term-drought-in-africa>.

population is undernourished (FAO et al, 2019). The pandemic has exacerbated an already difficult food security situation, undermining the survival of millions. On the positive side, it has also shown the ability of many African governments to respond speedily and reduce the spread of the virus. One silver lining in this difficult situation is that it makes evident the crucial dependence of food security on the quality of the public health infrastructure, the connectivity of the public through digitalization, and their access to timely and credible public health information. Building institutions to deliver these services must be now added to the already substantive agenda for governments committed to building a food secure future for their people.

Trying to achieve food security for all was a daunting challenge even before COVID-19 pandemic. In these turbulent times, as the entire world plunges into a recession, the challenge can seem insurmountable. But it is a challenge that all governments must address successfully if they want peace and prosperity for their people. Furthermore, historians remind us that responses to pandemics have given rise to much of what we cherish most in the modern world. Thus, great leaders formulate their visions for a better world to reshape reality. Likewise, the challenge to Africa's leadership is to formulate its vision of a food-secure Africa and determine how best to translate its vision into action.

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Annex 1: Food Security: Main Concepts, Pillars, Goals and Policies

PILLARS:	AVAILABILITY	ACCESS	UTILIZATION	STABILITY
Concepts & Goals:				
Holistic Concept of Food Security (FSH)	✓	✓	✓	✓
Goal: Food Self-Sufficiency (FSS)	✓	✓	?	✓
Policies	Domestic production, Import protection	Food assistance, Social safety net	?	Food stocks, Risk management tools, Disaster management
Goal: Food Sovereignty (FSY)	✓	✓	?	✓
Policies	Domestic production, Control over ag policies, Import Protection	Food assistance, Social safety net	?	Food stocks, Risk management tools, Disaster management

Annex 2. Key structural features with impact on food security in selected high income countries

	High income					
	United States	Japan	European Union	Republic of Korea	Chile	
1	GNI per capita (USD. Atlas Method) (2019)	65,760	41,690	35,721	33,720	15,010
2	Unemployment rate (%) (2019)	3.6	2.3	6.7	4.1	6.7
3	Human Development Index (HDI) (2019)	0.92	0.915	--	0.906	0.847
4	Gini index	41.4	32.9	--	31.6	44.4
		2016	2013		2012	2017
5	Poverty headcount ratio at 5.50\$ a day (2011 PPP) (% of total population)	2	1.2	--	1.2	3.7
	Poverty headcount ratio at 3.20\$ a day (2011 PPP) (% of total population)	1.5	0.9	--	0.5	0.7
	Poverty headcount ratio at 1.90 a day (2011 PPP) (% of total population)	1.2	0.7	--	0.2	0.3
		2016	2013		2012	2018
6	Trade (% GDP) (2018)	27.5	36.6	90.7	83.0	55.7
7	Agricultural value added to GDP (%) (2018)	0.9	1.2	1.7	2.0	3.6
8	Labor employed in agriculture (2019)	1.3	3.4	4.4	4.9	9.0
9	Cereal import dependency ratio (%) (2012)	-19.1	75.8	--	77.3	39.8
10	Average agricultural gross production annual growth rate (%) (2010-2017)	1.6	-0.6	--	0.8	0.5
11	Percent of arable land equipped for irrigation (percent) (2015)	17.5	58.2	--	50.8	86
12	Average dietary energy supply adequacy (%) (2016-2018)	148	114	--	135	126
13	Protein supply quantity (g/capita/day) (2012)	108.7	87.3	--	96	85.7
14	Prevalence of undernourishment (%) (2016-2018)	<2.5	<2.5	<2.5	<2.5	2.7
15	Number of people undernourished (million) (2016-2018)	--	--	--	--	0.5
16	Coverage of social safety net programs (% of population)	--	--	--	--	71.6 2015

Annex 3 (A). Key structural features with impact on food security in selected middle income countries

		Middle income				
		Malaysia	China	Perú	South Africa	Indonesia
1	GNI per capita (USD. Atlas Method) (2019)	11,200	10,410	6,740	6,040	4,050
2	Unemployment rate (%) (2019)	3.3	4.3	3.2	28.2	4.8
3	Human Development Index (HDI) (2019)	0.804	0.758	0.759	0.705	0.707
4	Gini index	41 2015	38.5 2016	42.8 2018	63 2014	39 2018
5	Poverty headcount ratio at 5.50\$ a day (2011 PPP) (% of total population)	2.7	23.9	22.1	57.1	56
	Poverty headcount ratio at 3.20\$ a day (2011 PPP) (% of total population)	0.2	5.4	8.3	37.6	24.2
	Poverty headcount ratio at 1.90 a day (2011 PPP) (% of total population)	0 2015	0.5 2016	2.6 2018	18.4 2014	4.6 2018
6	Trade (% GDP) (2018)	130.5	38.2	48.9	59.0	43.0
7	Agricultural value added to GDP (%) (2018)	7.5	7.2	6.9	2.2	12.8
8	Labor employed in agriculture (2019)	10.4	25.4	27.4	5.1	28.6
9	Cereal import dependency ratio (%) (2012)	72.6	3.4	49.7	3.9	15.4
10	Average agricultural gross production annual growth rate (%) (2010-2017)	1.3	2.3	2.6	0.5	2.5
11	Percent of arable land equipped for irrigation (percent) (2015)	52.8	62.3	76	13.4	28.6
12	Average dietary energy supply adequacy (%) (2016-2018)	125	132	117	125	126
13	Protein supply quantity (g/capita/day) (2012)	80	96.7	73.3	83.4	61.3
14	Prevalence of undernourishment (%) (2016-2018)	2.5	8.5	9.7	6.2	8.3
15	Number of people undernourished (million) (2016-2018)	0.8	122.4	3.1	3.5	22
16	Coverage of social safety net programs (% of population)	--	43.8 2013	56.1 2014	78.6 2014	48.7 2015

Annex 3 (B). Key structural features with impact on food security in selected middle income countries

		Middle income			
		Morocco	Egypt	India	Bangladesh
1	GNI per capita (USD. Atlas Method) (2019)	3,190	2,690	2,130	1,940
2	Unemployment rate (%) (2019)	9.0	11.5	5.4	4.2
3	Human Development Index (HDI) (2019)	0.676	0.7	0.647	0.614
4	Gini index	39.5 2013	31.5 2017	37.8 2011	32.4 2016
	Poverty headcount ratio at 5.50\$ a day (2011 PPP) (% of total population)	31.3	70.4	86.8	84.5
5	Poverty headcount ratio at 3.20\$ a day (2011 PPP) (% of total population)	7.7	26.1	60.4	52.9
	Poverty headcount ratio at 1.90 a day (2011 PPP) (% of total population)	1 2013	3.2 2017	21.2 2011	14.8 2016
6	Trade (% GDP) (2018)	87.0	48.0	43.4	38.2
7	Agricultural value added to GDP (%) (2018)	12.0	11.0	14.6	13.1
8	Labor employed in agriculture (2019)	34.5	23.8	42.4	39.5
9	Cereal import dependency ratio (%) (2012)	42.1	42.1	-8.6	10.3
10	Average agricultural gross production annual growth rate (%) (2010-2017)	5.3	1.9	2.4	1.9
11	Percent of arable land equipped for irrigation (percent) (2015)	18.8	100	45	71.2
12	Average dietary energy supply adequacy (%) (2016-2018)	150	153	109	110
13	Protein supply quantity (g/capita/day) (2012)	96.3	102.7	59.7	54.3
14	Prevalence of undernourishment (%) (2016-2018)	3.4	4.5	14.5	14.7
15	Number of people undernourished (million) (2016-2018)	1.2	4.4	194.4	24.2
16	Coverage of social safety net programs (% of population)	36.6 2009	44.9 2008	93.2 2011	13.1 2010

Annex 4. Key structural features with impact on food security in selected low income countries

		Low income	
		Ethiopia	Rwanda
1	GNI per capita (USD. Atlas Method) (2019)	850	850
2	Unemployment rate (%) (2019)	2.1	1.0
3	Human Development Index (HDI) (2019)	0.47	0.536
4	Gini index	35 2015	43.7 2016
5	Poverty headcount ratio at 5.50\$ a day (2011 PPP) (% of total population)	90.2	91.6
	Poverty headcount ratio at 3.20\$ a day (2011 PPP) (% of total population)	68.9	79.7
	Poverty headcount ratio at 1.90 a day (2011 PPP) (% of total population)	30.8 2015	55.5 2016
6	Trade (% GDP) (2018)	31.0	51.0
7	Agricultural value added to GDP (%) (2018)	31.2	29.0
8	Labor employed in agriculture (2019)	71.0	62.0
9	Cereal import dependency ratio (%) (2012)	7	32.5
10	Average agricultural gross production annual growth rate (%) (2010-2017)	3.5	5.5
11	Percent of arable land equipped for irrigation (percent) (2015)	5.3	0.8
12	Average dietary energy supply adequacy (%) (2016-2018)	105	99
13	Protein supply quantity (g/capita/day) (2012)	60.7	56
14	Prevalence of undernourishment (%) (2016-2018)	20.6	36.8
15	Number of people undernourished (million) (2016-2018)	21.6	4.5
16	Coverage of social safety net programs (% of population)	13.2 2010	20.1 2013

Annex 5. Sources and definitions

- 1. GNI per capita:** GNI per capita (formerly GNP per capita) is the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Source: World Bank national accounts data.
- 2. Unemployment rate:** Unemployment refers to the share of the labor force that is without work but available for and seeking employment. Source: International Labor Organization, ILOSTAT database, 2020

- 3. Human development index:** is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The values of this indicator are between 0 and 1. Four categories can be distinguished:
- Very high human development 0.800 and above
 - High human development 0.700–0.799
 - Medium human development 0.550–0.699
 - Low human development Below 0.550

Source: Human Development Report, 2019. United Nations Development Program.

- 4. Gini Index:** it measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. Source: World Bank, Development Research Group.
- 5. Poverty headcount ratio at \$1.90, \$3.20 and \$5.50 a day (2011 PPP):** it is the percentage of the population living on less than \$1.90, \$3.20 and \$5.50 a day at 2011 international prices. The three levels were taken into consideration because the standard of living in this sample differs from one country to another depending on the level of income and purchasing power. Poverty is therefore both absolute and relative. Source: World Bank, Development Research Group.
- 6. Trade (% of GDP):** is the sum of exports and imports of goods and services measured as a share of gross domestic product. Source: World Bank, Development Research Group.
- 7. Agricultural value added to GDP (%):** Agriculture corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The indicator shows the share of agriculture in total GDP. Source: World Bank national accounts data, 2020.
- 8. Labor in agriculture:** this indicator expresses the share of active working population in the agricultural sector. Source: ILOSTAT, 2020.
- 9. Cereal import dependency ratio (%):** It tells how much of the available domestic food supply of cereals has been imported and how much comes from the country's own production. It is computed as $(\text{cereal imports} - \text{cereal exports}) / (\text{cereal production} + \text{cereal imports} - \text{cereal exports}) * 100$. Given this formula the indicator assumes only values ≤ 100 . Negative values indicate that the country is a net exporter of cereals. Source: FAOSTAT, 2020.

- 10. Average agricultural annual growth rate:** it calculates the growth of agricultural gross production from 2010 to 2017. Data for Rwanda from World Bank, June 2019. Source: Data are taken from FAOSTAT.
- 11. Percentage of arable land equipped for irrigation:** The area equipped for irrigation covers areas equipped for fully controlled irrigation by any of the methods of surface, sprinkler or localized irrigation. It also includes areas under partially controlled irrigation methods of spate irrigation (controlling flood waters to water crops), equipped wetlands and inland valley bottoms and equipped flood recession. It excludes manual watering of plants using buckets, watering cans or other devices. Source: FAOSTAT: 2020.
- 12. Average dietary energy supply adequacy (%) (2016-2018):** The indicator expresses the Dietary Energy Supply (DES) as a percentage of the Average Dietary Energy Requirement (ADER). Each country's or region's average supply of calories for food consumption is normalized by the average dietary energy requirement estimated for its population to provide an index of adequacy of the food supply in terms of calories. Source: FAOSTAT, 2020
- 13. Protein supply quantity (g/capita/day):** National average protein supply (expressed in grams per caput per day). Source: FAOSTAT 2020. The international Recommended Dietary Allowance (RDA) for protein is 0.8 g per kg of body weight (bw) (Wu, 2016). An Adult of 80 kg needs in average 64 g of protein per day.
- 14. Prevalence of undernourishment (%) (2016-2018):** It expresses the probability that a randomly selected individual from the population consumes an amount of calories that is insufficient to cover her/his energy requirement for an active and healthy life. The indicator is computed by comparing a probability distribution of habitual daily dietary energy consumption with a threshold level called the minimum dietary energy Requirement. Both are based on the notion of an average individual in the reference population. Source: FAOSTAT, 2020.
- 15. Number of people undernourished (million) (3-year average):** Estimated number of people at risk of undernourishment. It is calculated by applying the estimated prevalence of undernourishment to total population in each period. Source: FAOSTAT, 2020.
- 16. Coverage of social safety net programs (% of population):** It shows the percentage of population participating in cash transfers and last resort programs, noncontributory social pensions, other cash transfers programs (child, family and orphan allowances, birth and death grants, disability benefits, and other allowances), conditional cash transfers, in-kind food transfers (food stamps and vouchers, food rations, supplementary feeding, and emergency food distribution), school feeding, other social assistance programs (housing allowances, scholarships, fee waivers, health subsidies, and other social assistance) and public works programs (cash for work and food for work). Estimates include both direct and indirect beneficiaries. Source: The Atlas of Social Protection - Indicators of Resilience and Equity, The World Bank.

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