

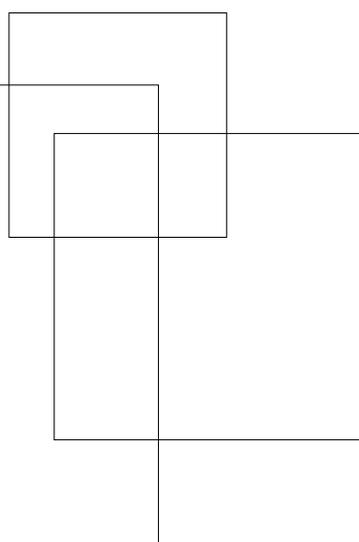


International
Labour
Office

RESEARCH DEPARTMENT ||||| WORKING PAPER NO. 25 |||||

The future of work in African agriculture: Trends and drivers of change

THOMAS JAYNE,
FELIX KWAME YEBOAH
AND CARLA HENRY



DECEMBER 2017

Research Department Working Paper No. 25

The future of work in African agriculture: Trends and drivers of change

*Thomas S. Jayne, Felix Kwame Yeboah and Carla Henry**

December 2017
International Labour Office

* Thomas S. Jayne is University Foundation Professor at Michigan State University. Felix Kwame Yeboah is an Assistant Professor of International Development at Michigan State University. Carla Henry is a Senior Specialist in the ILO Research Department. The authors acknowledge support for this study from the International Labour Organization as well as from the USAID Bureau for Food Security via the Food Security Policy Innovation Lab. The authors wish to thank ILO colleagues Bernd Mueller and Ken Shawa for their technical comments and Sarah Whitehouse for her fine editing.

Abstract

Rapidly rising demand for food, fuelled by population and income growth, will provide major opportunities for agri-food systems to accelerate employment creation and transform African economies. Seizing these opportunities will require African agriculture to become more inclusive and profitable. Greater profits in farming will generate greater expenditures by millions of people in rural areas that fuel the transition to a more diversified and robust economy. Higher incomes for millions of households engaged in agriculture will expand the demand for goods and services – and therefore employment – in the non-farm economy, while also opening up new employment opportunities across all stages of agri-food systems. Making agriculture more profitable and inclusive will require public actions to reduce costs in farm production and agri-food systems, and address soil degradation, climate change, land scarcity and concentrated land ownership. The future of work in Africa will, therefore, depend on how well the enabling environment created through policies and programmes can enhance agricultural productivity growth and enable agriculture to contribute to more broad-based employment generation and the overall agenda for economic transformation.

Executive summary

Sub-Saharan Africa has the world's youngest and fastest growing population. By 2050, the number of people living in the region is expected to double and the subcontinent's share of the global population is projected to rise to about 23 per cent (from 12 per cent in 2015). Sub-Saharan Africa's labour force is also expanding at a rate of 3 per cent per year and an additional 375 million young people are expected to reach working age by 2035. If they can be engaged in productive employment, this growing cohort of young people will offer an important opportunity for economic transformation. Yet, employment creation in the formal economy has not kept pace. Even under the most favourable projections, only about a quarter of the people newly entering the labour force will find wage employment in the formal economy. Agriculture and the informal economy (most of which has important forward and backward linkages with agriculture) will need to absorb a large share of these new workers into remunerative work otherwise the region will experience escalating economic, social and political challenges associated with youth unemployment.

At the same time, rapid population and income growth are expanding the demand for food and agricultural products in the region, opening up substantial opportunities for employment not only in agricultural production but also across agri-food systems. Africa's agricultural production systems, however, have not kept up; an increasing share of the food being consumed in Africa is supplied through imports. Between 2001 and 2014, the sub-continent's food import bill rose from US\$ 6 billion to US\$ 45 billion. Africa's rapid population and labour force growth combined with its import parity pricing conditions for many food products offer enormous potential for economic growth and employment creation in agri-food systems if competitive domestic agricultural production can be expanded.

There are other factors at play, however, that may slow the rate of employment creation, unless steps are taken proactively to address them. Climate change and rapid population growth portend increasingly acute water scarcity, outbreaks of new pests and diseases, and greater variability of temperatures and rainfall. The continent also faces growing land scarcity and degradation resulting from population pressures. Median farm sizes are shrinking to levels that generate little or no surplus production in many countries due to inter-generational subdivision of land and greater competition for unutilized arable land. Many smallholders are left with small plots that are degrading due to continuous cultivation without sufficient integrated soil fertility management. Population pressures are also driving up land prices in the region, restricting access to land for young people. To effectively harness the emerging opportunities for economic transformation and associated work opportunities, policy-makers will need to anticipate the trends affecting African agriculture and proactively formulate and implement strategies to respond to them.

Over the past 15 years, African governments that have effectively promoted farm productivity growth (Ethiopia, Rwanda) have enjoyed faster poverty reduction, higher labour productivity in non-farm segments of the economy, and a more rapid diversification of the labour force from farming into the broader economy. Since most African workers remain engaged in agricultural work, agriculture will continue to influence employment and livelihood opportunities both in agri-food systems and broader non-farm sectors. A comprehensive agricultural growth strategy that promotes competitive and efficient production and marketing systems may therefore be the foundation of an effective employment expansion strategy for most African governments.

There is an important balance to be struck while transforming agriculture in the region. In the long term, a successful economic transformation in Africa is likely to shift low-productivity workers progressively out of agriculture and into higher-productivity jobs in the non-farm sector, as has been the case in most other regions of the world. Inclusive agricultural growth will support a stable and effective economic transition. Since a large proportion of the workforce in most African countries remain engaged in agriculture, agricultural development strategies that enable millions of smallholder households to participate in and benefit from these strategies will result in stronger multiplier and growth linkage effects that will expand job opportunities in the rest of the economy. Evidence from Asia shows that broad-based agricultural growth tends to generate stronger income and employment multiplier effects that pull labour out of agriculture into more attractive non-farm jobs, and do so more effectively than when agricultural growth is concentrated among a small number of large farms (Johnston and Kilby, 1975; Lipton, 2006). It may be easier to promote agricultural growth by focusing public resources on commercialized medium- and large-scale farms, and emerging trends suggest that many African governments favour this approach. The challenge, however, will be how to generate the broader economic growth processes and expenditures in local rural economies that expand off-farm work opportunities. It is not just the rate at which agricultural productivity grows but also how inclusive it is that will influence the strength of growth multipliers in the non-farm economy, the rate at which work opportunities in the non-farm economy are created, and the returns to labour from those opportunities. Agricultural productivity growth is therefore crucial not only to improve the livelihoods of people who remain fully or partially engaged in agriculture but also to expand the pace of employment and income growth in the off-farm segments of the economy, including at various other stages in agri-food systems, and promote economic transformation.

The future of work in Africa will hinge on the enabling environment created and the quality of public spending by African governments and their development partners in the agricultural sector. African governments currently spend on average around six times more on agriculture and related rural development than all of their international development partners combined. Their role is therefore decisive.

Evidence points to four strategic priority areas. First, governments must implement inclusive smallholder development policies that increase the incomes of millions of rural people engaged in agriculture and thereby generate the multiplier effects that expand employment opportunities in the rest of the economy. Government actions that have the most significant impacts on agricultural productivity growth and poverty reduction are: agricultural research and development; physical infrastructure (rural electrification, road, rail and port infrastructure); policies that reduce the costs of private sector investment and promote competition, and agricultural service delivery and extension systems that facilitate farmers' access to productivity-enhancing technologies.

Second, in coming years, innovative forms of public investment will be necessary to promote resilient and sustainable growth in agricultural productivity in the face of climate change. Soil amendments that hold moisture for longer periods and provide greater crop response to synthetic fertilizer are likely to be at the centre of climate-smart agricultural strategies. Most farmers, however, lack access to the materials needed to enhance the organic composition of their soil. Integrating community resilience and climate-smart agriculture into broader employment strategies would afford opportunities for African governments to achieve sustainable agricultural intensification and employment objectives.

Third, owing to continued population growth, increasing demand for land, and rising land prices, median farm sizes are declining and driving many households to seek work outside their own farms, as agricultural wage workers and in non-agricultural informal businesses. This is especially true for young people between the ages of 15 and 34 years, who account for almost 60 per cent of the labour force in sub-Saharan Africa. In the context of increasing land subdivision, fragmentation, and concentration, programmes to promote access to land for young people will become ever more important. In many parts of rural Africa, young people are increasingly unable to inherit enough land to make farming a viable business. This is a new reality in most areas; 30 to 50 years ago, most young people inherited land, which meant that land access did not pose a constraint to engagement in farming. African governments have been slow to respond to these changing circumstances in rural Africa, which has hastened youth migration. Although harnessing young people's potential to contribute to agricultural productivity growth is desirable, possible and necessary, particularly as 60 per cent of the labour force is aged between 15 and 35 years, it will require recognition of how constraints on engagement in agriculture are changing, and support to help governments develop policies and programmes to overcome those constraints. A more comprehensive assessment is needed that synthesizes the available evidence about what has worked, what has not worked, and why.

Governments could promote long-term employment and livelihood objectives by mobilizing more resources for education and skills development in agriculture and related agri-food systems. Contrary to popular perceptions, the average age of people engaged in farming is not rising, and more than 30 per cent of the agricultural work force is under 35 years of age. Successful agricultural production is increasingly knowledge-intensive. Well-functioning agricultural training colleges can enhance workers' productivity and enable young "agripreneurs" to take advantage of emerging opportunities and promote inclusive forms of agricultural productivity growth.

Table of contents

Abstract	v
Executive summary	vi
Table of contents	ix
List of figures and tables	x
1. Introduction	1
2. "Megatrends" affecting African economies	3
2.1 Africa's population explosion.....	3
2.1.1 Rural population growth and migration.....	3
2.1.2 Urbanization, income growth, diet transformation and increasing reliance on imported food.....	
2.2 Rapid changes in land distribution, ownership and control.....	7
2.2.1 Changing farmland structure, ownership and land scarcity.....	
2.2.2 Rising land prices and development of land markets in areas of favourable market access.....	
2.2.3 Widespread soil degradation in densely populated rural areas.....	
2.3 High global food prices.....	10
2.4 Climate change and water scarcity.....	10
3. Africa's evolving labour force: A declining role for agriculture?	11
3.1 Employment shifts in Africa's future working population.....	11
3.2 Changes in age structure in agriculture.....	16
4. Agricultural productivity growth and labour force diversification	19
4.1 Agricultural productivity growth: employment and income multiplier effects on non-farm sectors.....	19
4.2 Trends and prospects for agricultural productivity growth.....	21
5. Policy implications: the role of sustainable agricultural productivity growth in a comprehensive employment strategy	23
5.1 Promoting broad-based agricultural labour productivity growth.....	23
5.2 Upgrading the skills of labour force.....	24
5.3 Enabling agricultural workers to cope with vulnerability and develop resilience for structural transition.....	25
5.4 Encouraging value addition to agricultural products and investment in employment-intensive ventures.....	26
5.5 Speeding up demographic transition.....	26
References	27

List of figures

Figure 1: Population projections for sub-Saharan Africa and the rest of the world	3
Figure 2: Trends in rural population in selected developing regions	4
Figure 3: Value of food imports as a percentage of the value of domestic agricultural production... 6	
Figure 4: Mean age of individuals 15 years or older, who are engaged at least 50 per cent of a full-time work equivalent in farming.....	18
Figure 5: Relationship between total factor productivity growth and change in share of labour force engaged in farming	20
Figure 6: Relationship between total factor productivity growth and labour productivity in non-agricultural sector.....	20

List of tables

Table 1: Proportion of the labour force between the ages of 15 and 64 years in self-employed farming, agricultural wage employment, off-farm stages of agri-food systems, and non-farm activities.....	13
Table 2: Types of employment over time	15
Table 3: Mean age of individuals engaged in agriculture (self-employed and wage-employed).....	17

1. Introduction

Of all the regions of the world, sub-Saharan Africa has the fastest growing population. By 2050, the number of people living in Sub-Saharan Africa will double and the region's share of the global population is projected to rise to about 23 per cent (from 12 per cent in 2015) (United Nations, 2017). This demographic trend will have a profound effect on land, labour and food markets in Africa and the world. Africa's rapid population growth and growing import demand for grains and oilseeds means that it may exert significant upward pressure on world food prices in coming decades. The region's growing food import dependence could also create major opportunities for employment expansion in import-substituting local production and marketing if African governments can effectively encourage agricultural productivity growth. The size of Africa's food and agribusiness is estimated to be US\$ one trillion by 2030 (World Bank, 2013), opening up huge employment opportunities all along the value chains of growing agri-food systems. Almost 60 per cent of Africa's labour force is aged between 15 and 35 years. Inclusive types of agricultural productivity growth with strong economy-wide multiplier effects could therefore be the key to an effective youth livelihoods strategy in Africa that expands job opportunities both in the agri-food and non-farm sectors.

At the same time, the continent faces a huge employment challenge. Africa's workforce is growing at a rate of about 3 per cent per year, with at least 10 million young people entering the work force annually (Filmer and Fox, 2014; Losch 2016). Yet formal employment in Africa's growing economies has not kept pace (Page and Shimeles, 2015). While there is great variation in economic performance across countries, evidence suggests that even under the most favourable projections, only about a quarter of new workers in sub-Saharan Africa will find wage employment in the formal economy (Filmer and Fox, 2014). Agriculture and the informal economy (much of which is related to agriculture) will need to absorb a large share of these new workers into gainful employment otherwise the region will experience an escalation in the challenges associated with youth under-employment and unemployment. What are the prospects for remunerative employment and income growth in Africa's agricultural sector? Who will remain in agriculture? What kind of agriculture will they engage in?

In countries that are largely agrarian, structural transformation has long been considered a fundamental driver of rising labour productivity and living standards (Timmer, 2009; Barrett, Carter and Timmer, 2010; Duarte and Restuccia, 2010). Both in theory and according to the actual experiences of currently developed countries, labour flows from low productivity semi-subsistence agriculture to more productive manufacturing and service sectors have been associated with overall increases in productivity, living standards and poverty reduction. In countries where a large share of the labour force remains in agriculture, successful economic transformation is likely to require inclusive forms of growth in agricultural productivity, which through its powerful income and employment multipliers will expand the demand for work in the rural non-farm economy. Historically, productivity growth in agriculture accumulates additional purchasing power among millions of rural families, which generates powerful multiplier effects for the rest of the economy, expanding off-farm employment opportunities and thereby releasing labour to non-agricultural sectors. While the structural transformation processes that are well under way in much of Africa are unfolding similarly to those in other regions, this report highlights how African transformations appear to be unique in some respects, and speculates on how that could affect the future of work in sub-Saharan Africa.

Recent cross-country analysis suggests that parts of Africa are making steady progress towards agricultural transformation. At the regional level, agriculture's value added grew by 5.2 per cent between 2000 and 2014 compared to less than 3 per cent in the previous decade (World Bank, 2015; Fuglie, 2015), although this growth is very uneven across countries. Due to macro and sectoral policy reforms undertaken in the 1990s, and fuelled by the subsequent rise in world food prices since 2006, public and private sector actors alike are increasingly investing in Africa's agricultural value chains. This is resulting in a rise in the number of medium- and large-scale farms, and growth in labour-intensive small and medium-sized agribusiness firms, even as farming's employment shares declines (Jayne et al. 2016; Tschirley et al. 2015; Yeboah and Jayne, 2017). Although this recent evidence points to a new dynamism in much of Africa, the uneven pattern of growth and poverty reduction has been uneven across countries, raising questions about the nature and inclusivity of the growth.

African economic transformation is being affected by several key "megatrends", including rapidly rising population growth (United Nations, 2017), urbanization (Richards et al., 2016), rising land scarcity (Jayne et al., 2014), massive human-induced land degradation (Tittonell and Giller, 2013; Lal, 2011; Drechsel et al., 2001), and climate change (Lipper et al, 2017). These trends are driving major demographic and employment changes that pose additional challenges to improving productivity and competitiveness of agriculture in the region. The future of work in Sub-Saharan Africa will depend on how governments respond to these key patterns of change in the economic landscape. While strong job growth will depend on the rate of new private investment in the region, the public sector's role is decisive as it determines whether the enabling environment unleashes new private investment or constrains it.

This report synthesises available evidence regarding how salient demographic and economic trends in sub-Saharan Africa are influencing the future of work in agriculture. It also identifies some of the major policy challenges that African governments are facing, which may influence future work in agriculture. Specifically, the report seeks to:

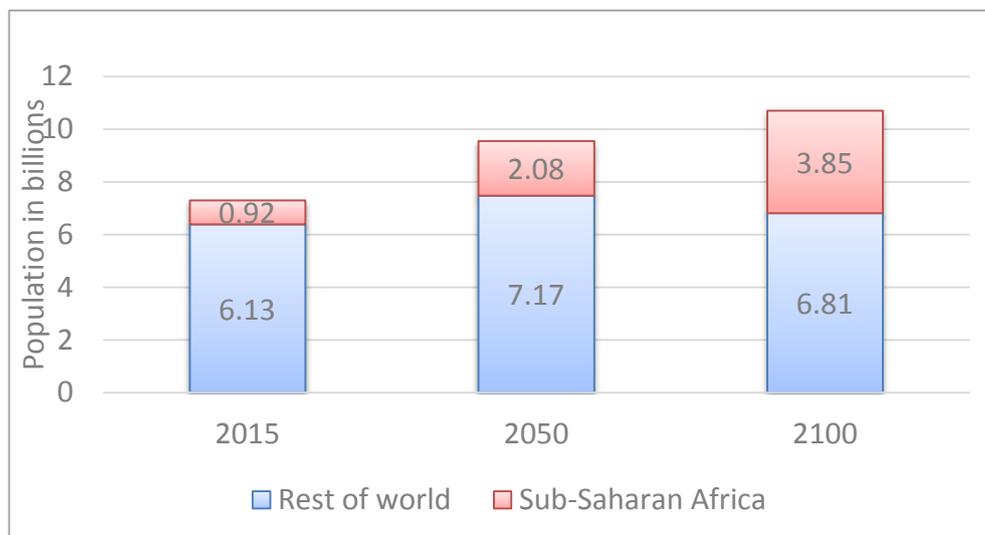
- document major social, economic, demographic and environmental changes in Africa's economic landscape and examine their potential effects on agricultural growth and the livelihoods of agricultural workers;
- consider the relevance and feasibility of smallholder-led agricultural development in Africa in light of emerging changes in the economic landscape;
- examine the evolving role of agriculture in Africa's on-going economic transformation; and
- discuss key entry points for policy and investments towards inclusive, competitive and productive agriculture that will improve livelihoods for agricultural workers.

2. "Megatrends" affecting African economies

2.1 Africa's population explosion

In 2015, about 12 per cent of the world's population resided in sub-Saharan Africa. This share will nearly double to 23 per cent by 2050 and increase further to 36 per cent by the end of this century, with region's population projected to quadruple to roughly 4 billion people (Figure 1). This rapid population growth is driven by rising life expectancy and declining mortality rates, particularly among children, and incorporates the effects of expected lower fertility rates, especially among educated urban women. Compared to other regions of the world that have largely completed a demographic transition, Africa is experiencing a relatively slow decline in fertility. Between 2005 and 2010, fertility rates in sub-Saharan Africa were estimated at 5.4 children per woman, down from 6.5 children per woman in the 1950s. By contrast, fertility rates declined from 5.6 to 1.6 over the same period in East Asia (Canning, Raja, Yazbeck, 2015). Africa's rapid population growth and slow demographic transition has translated into a youth bulge, which will have a significant influence on the region's economic transformation.

Figure 1: Population projections for sub-Saharan Africa and the rest of the world



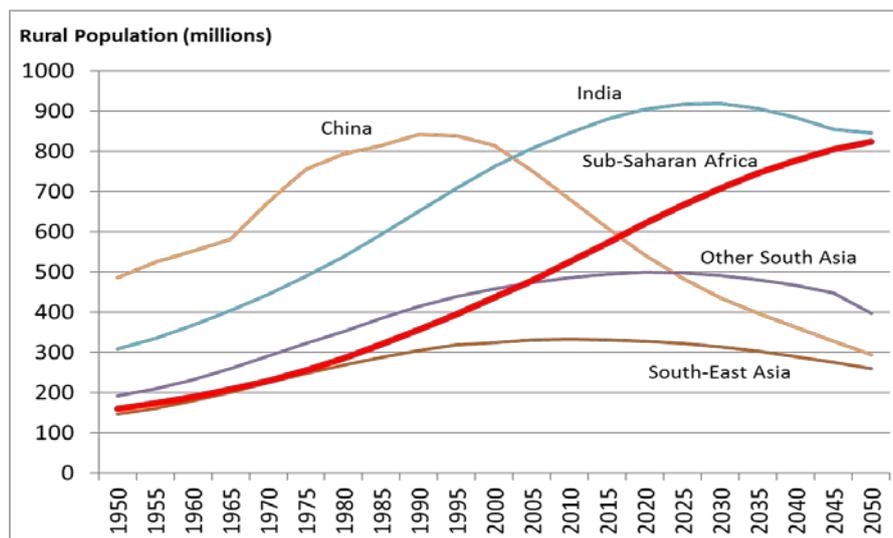
Source: United Nations (2016, mid-year projections, as at the 2014 Revision).

2.1.1 Rural population growth and migration

Sub-Saharan Africa is the only region of the world where the rural population and rural youth in particular, will continue to grow past 2050 (Figure 2). Rural Africa is projected to have about 53 per cent more people in 2050 than it did in 2015, with annual population growth of around 1.7 per cent over the coming decade (United Nations, 2016). Rural population growth is largely fuelled by the African "youth bulge" and the under-estimated importance of rural-to-rural migration (and in some cases urban-to-rural reverse migration) in response to dwindling economic opportunities in African cities (Bilsborrow 2002; Potts 2012; Lucas 2015). Between 2009 and 2013, for example, of all young Tanzanians aged 15–25 years who migrated away from their rural home, 68 per cent migrated to another rural area and searching for wage employment was cited as the primary reason for migration (Wineman and Jayne 2016). Evidence from Nigeria and Zambia also indicates that some young

people who had been pushed out of resource-based urban employment due to falling mineral commodity prices are returning to rural areas.

Figure 2: Trends in rural population in selected developing regions



Source: Prepared using data from United Nations, 2016.

Rural population growth will affect the agricultural sector and employment prospects in many significant ways. It will increase the number of people per hectare of arable land and cause median farm sizes to continue to shrink as they have been over the past several decades (Headey and Jayne, 2014). Increasing demand for land is causing a rise in land values and the rapid development of land markets, a phenomenon already well under way in areas with favourable market access (Wineman and Jayne, 2017; Deininger et al., 2017). These developments will limit the options for own account agriculture for many rural young people, who can no longer expect to inherit land. The numbers of wage workers on others' farms may increase and migration will likely accelerate. Evidence from Ethiopia and Tanzania indicates that the likelihood of young people migrating away from their rural homes is inversely related to the size and productivity of their parents' farms and agricultural assets, and is positively related to the number of siblings in the household (Bezu and Holden 2014; Kosec et al., 2016; Mdoe et al. forthcoming). Similarly, rural migration away from densely populated and land-constrained areas of Kenya has been four times higher than in relatively sparsely populated rural areas (Jayne and Muyanga 2012). Future employment prospects in own account agriculture will therefore be partially influenced by the extent to which policy makes land accessible to rural young people, who currently constitute 60 per cent of the rural labour force.

2.1.2 Urbanization, income growth, diet transformation and increasing reliance on imported food

Africa's urban population is projected to expand around three-fold from 360 million in 2015 to 1,137 million by 2050. Around 55 per cent of the continent's population will live in urban areas by the middle of the century (Cleland and Machiyama, 2016). It is worth noting, however, that most Africa countries' urban population growth over the past 10 years has not been caused by rural to urban migration, which has slowed over the past two decades. Africa's urban population growth is instead now driven by two

factors: natural population growth (birth rates minus death rates of people residing in urban areas); and formerly rural areas reaching a threshold number of people or population density and thereby being reclassified as urban (Bocquier, 2005; Moriconi-Ebrard, Harre, Heinrigs, 2016; Potts, 2012; United Nations, 2016). This is consistent with findings that a large share of Africa's urban population is now residing in secondary and tertiary towns, which tend to have close links with economic activity in surrounding rural areas. Farming and agri-food systems¹ are therefore likely to play a significant role in employment growth in these urban areas.

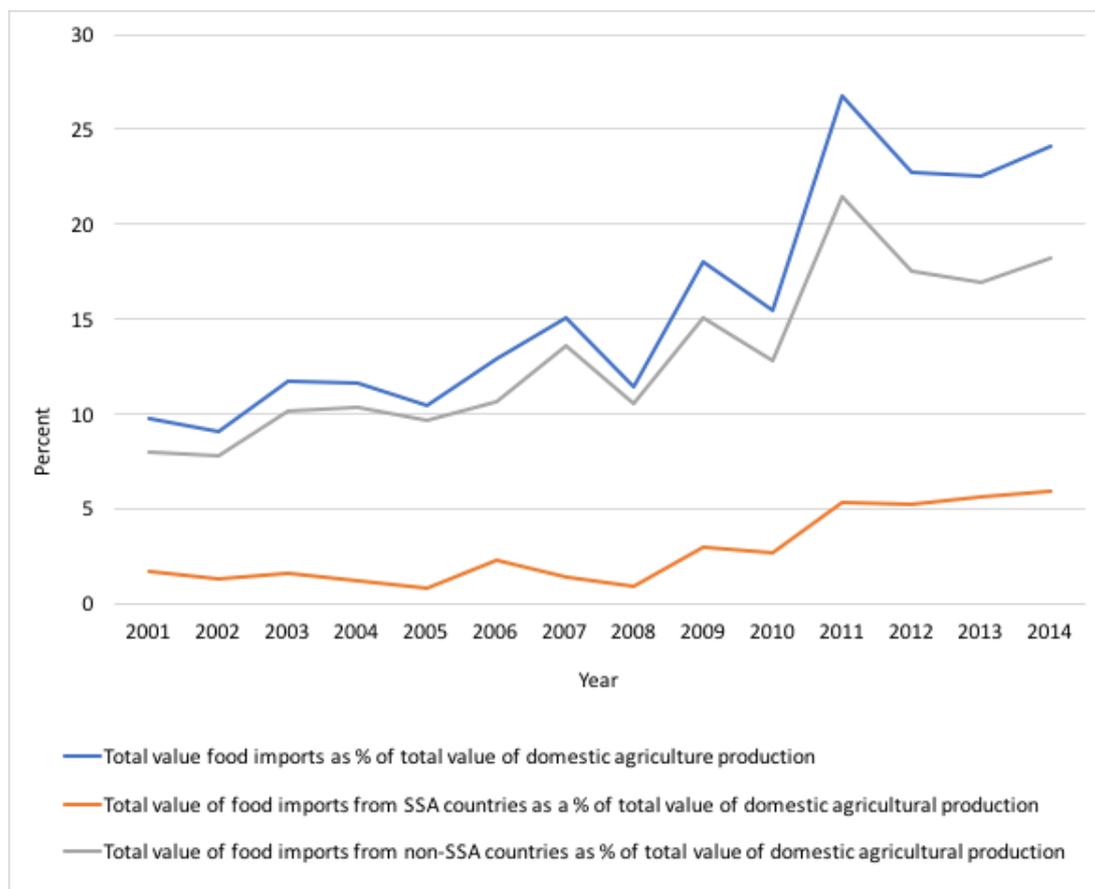
Sub-Saharan Africa has also experienced major increases in per capita income, which rose by more than 30 per cent in real terms between 2000 and 2014, according to Barrett et al. (2017). Some studies point to a rising middle class in Africa, which is envisioned to promote dietary transformation and modernization of Africa's food systems with major employment multiplier effects (AfDB, 2011; Tschirley et al., 2015). The size of Africa's celebrated middle class remains questionable, however, as it depends on how "middle class" is defined (Melber, 2016).² Some scholars argue that the urban population has experienced significant income gains since 2000 in only a small fraction of African countries (Gollin, Jedwab, & Vollrath, 2013; Jedwab, 2013; Potts, 2013). In fact, recent analysis show that the income share of the "middle class" in Nigeria and Zambia has actually declined over the past 25 and 17 years respectively (Ulimwengu et al. 2016). So, while sub-Saharan Africa's overall income growth has been impressive, there appears to be considerable variation both across and within countries.

As population and per capita income grow, the demand for food and agricultural products is rising rapidly. Food demand in the region is projected to increase by 55 per cent by 2030 (World Bank, 2015). Scholars are also pointing to rapid changes in dietary patterns across the region, featuring more diversified and processed diets among urban and rural consumers alike (Tschirley et al. 2015). Africa's agricultural production systems, however, have not evolved to keep up with this growing demand. An increasing share of the food consumed in Africa is being supplied through imports (Rakotoarisoa et al., 2011), with sub-Saharan Africa's food import bill rising from US\$ 6 billion in 2001 to US\$ 45 billion in 2014 – a seven-fold increase over 13 years (RENAPRI, 2017). The value ratio of food imports to agricultural output for the region has also been steadily rising since 2000, from 9.2 per cent in 2001 to 24.1 per cent in 2014 (Figure 3). The greatest share of sub-Saharan Africa's total food imports is coming from countries outside the region. Food grain and oilseed imports are driving rising food deficits, accounting for roughly 60 per cent of the region's total food import bill (FAOSTAT, 2017). These patterns reflect the region's inability to increase local food production fast enough over the past three decades to keep up with its rapidly growing population and the rising income-related growth in food demand.

¹ Agri-food systems refer to the set of activities, processes, people, and institutions involved in supplying a population with food and agricultural products. The agri-food system encompasses the provision of farming inputs and services, production at farm level, post-farm marketing, processing, packaging, distribution, and retail, and the policy, regulatory, environmental, and broader economic environment in which these activities take place (Allen et al., 2016).

² Africa's middle class has been defined as people living on US\$ 2–US\$ 10 per day. According to the United Nations Development Programme's 2013 Human Development Report, only 2 per cent of the world's population of middle class will be in sub-Saharan Africa despite a projected 80 per cent of them expected to come from the global South.

Figure 3: Value of food imports as a percentage of the value of domestic agricultural production



Source: TradeMap, 2017 and FAOSTAT, 2017.

Rising population and income growth in urban areas will likely increase urban-based demand for processed food that will incentivize private investment in food supply chains (Tschirley et al., 2015; Allen et al., 2016). The potential for employment creation from such urbanization and income growth patterns will, however, depend on their inclusivity and whether the food demand will be filled by local production or imports. If the income growth is broad-based, stronger growth and employment multipliers effects could be expected than if income growth was concentrated among a small proportion of the population.

Similarly, to the extent that local production can successfully meet most of the rising demand, significant employment growth will be realized all along the food value chains: input distribution, farming, farm finance, insurance, extension services, transport, marketing, processing, and retailing (Yeboah and Jayne, 2016). If imports are used to meet most of the increased food demand, however, the upstream stages in the food system, such as agro-input supply, services for farmers, crop assembling and wholesale trading, and the informal processing of domestically-produced agricultural products, will not grow nearly as fast, thereby impeding employment growth in the agri-food system (except at the downstream end, particularly food retail, which will still grow rapidly in connection with the distribution of imported food). Among the six sub-Saharan African countries for which agri-food system employment data is available, we note a strong correlation between the proportion of food consumed that is produced domestically and the shares of the labour force in agri-food systems.

Potential new employment will depend on the extent to which policies and public expenditure promote efficient private investment in food production and marketing systems to outcompete imports on the rapidly growing African consumer market. Governments therefore play a decisive role in the future of work in agriculture, through their policies and programmes on agriculture, public expenditure patterns, and macroeconomic policy management.

2.2 Rapid changes in land distribution, ownership and control

While, over recent years many African countries have experienced rapid economic transformation, some have not. Regardless, most African economies remain largely agrarian, and access to land remains an important source of livelihood for the majority of the rural population. Over the past decade, increasing scarcity of land and the rise in its value has had a profound influence on farm structure, land distribution and land access, with important implications for the future of work in agriculture. Some of these dynamics and their consequences are described below.

2.2.1 Changing farmland structure, ownership and land scarcity

Farm structure and farmland ownership patterns in sub-Saharan Africa are changing rapidly. Driven partly by population pressure, increased world food prices and the somewhat erroneous perception of land abundance in Africa, the continent has experienced rising demand for agricultural land from international and national companies (Otsuka & Place, 2014; Deininger and Byerlee, 2011) and urban-based African investor farmers (Jayne et al., 2016; Sitko and Chamberlin., 2015). Rural population growth has also contributed to increasing subdivision of land and fragmentation into tiny plots. Although farms of fewer than five hectares still account for about 90 percent of all farms in sub-Saharan Africa, the number of these farms is increasing only gradually in most African countries owing to land pressures, the economic unviability of further sub-dividing very small farms, and youth migration (Jayne et al., 2016). Conversely, the number of farms of 5–100 hectares (medium-scale farms) is rising rapidly. An increasing proportion of agricultural land is controlled by medium- and large-scale farms owned by urban-based Africans, who have acquired farmland using income earned from non-farm sources. These investor farmers obtain land predominantly through negotiations with customary authorities (often involving monetary exchange) and through more transparent purchases of land in areas where land can be purchased legally (Sitko and Jayne, 2014; Jayne et al., 2016). Recent analysis indicates that medium-scale farms of between 5 and 100 hectares control between 30 and 50 per cent of total farmland in Ghana, Kenya, Malawi and Zambia (Jayne et al., 2016). Estimates from demographic and health surveys for the six African countries for which data is available show that urban households control between 25 and 35 per cent of total agricultural land, and that these shares have risen rapidly in a short period (Jayne *et al.*, 2016). A survey of medium-scale farmers Ghana, Kenya and Zambia also revealed that only about 5 per cent were previous smallholder farmers who had successfully graduated into medium-scale farming through farm expansion. A larger proportion of medium-scale farmers (60 per cent) were urban people who had begun farming over the past decade. The remaining 35 per cent were relatively privileged rural people (Jayne et al., 2014).

While the impacts of evolving farm structure on employment are not yet fully known, if current trends continue, we anticipate that over time, the proportion of rural people engaged in own account farming will decline and the proportion of those who are wage workers on others' farms will grow. We also expect to see young people in rural areas face progressively more acute challenges in accessing land,

especially in areas of favourable access to markets. Medium- and large-scale farms also have the potential to expand off-farm employment opportunities through the forward and backward linkages arising from agricultural productivity growth. The productive and profitable nature of medium- and large-scale farming means that the associated wages and work conditions are better than those for most small-scale farmers, especially in policy environments that are supportive of agricultural workers' rights. Medium- and large-scale farms could therefore be a good source of decent wage employment. Since they typically use more mechanized and capital-intensive forms of agriculture, however, they are often associated with lower ratios of persons to cultivated land, compared with labour-intensive smallholder farms.

It is well recognized that egalitarian land distribution patterns tend to generate greater poverty reducing effects than unequal land distribution patterns (Deninger and Squire 1998; Gugerty and Timmer 1999; Ravallion and Datt 2002). Egalitarian land distribution promotes broad-based growth by allowing more people to earn and spend money in the cash economy, which generates greater second-round expenditures in support of local non-tradable goods and services both in rural areas and towns. These multiplier effects tend to be much weaker when the source of agricultural growth is concentrated in relatively few hands, as exemplified in *latifundia* farming systems in Latin America; very low rural household incomes could not generate strong multiplier effects in such areas. Although there is little evidence from Africa, a recent study from Tanzania indicates that regions with more equal land distribution patterns tend to have higher mean per capita farm and non-farm incomes than regions with more concentrated land distribution patterns (Chamberlin and Jayne, 2017). More evidence is needed on the net impacts of changes in farm structure to develop a better understanding of the evolving nature of work in African agriculture.

2.2.2 Rising land prices and development of land markets in areas of favourable market access

Contrary to widespread perceptions of land abundance in Africa, evidence points to growing land scarcity across much of the continent. About 91 per cent of Africa's remaining arable land is concentrated in nine countries (including Angola, Democratic Republic of the Congo and Sudan), most of which are politically fragile States. The remaining 45 countries are either land constrained or approaching the full extent of their arable land area (Chamberlin, Jayne, and Headey 2014). In many Africa countries, land sales and rental markets are growing rapidly, particularly in relatively densely populated areas with favourable access to markets (Holden, Otsuka, and Place 2009). Land markets offer an important avenue for land-poor and labour-rich households to access land, and hold great potential for increasing agricultural productivity (Jin and Jayne, 2013; Deininger et al., 2016; Chamberlin and Ricker-Gilbert, 2016). Most recent studies indicate that renters tend to be in better economic standing than those renting the land, that many of the latter do so out of distress, and that the longer-term impacts of increasing land market activity in the absence of strong and equitable local institutions for dispute resolution may include increased agricultural land productivity, along with the land dispossession of many local people and a growing class of landless labourers.

Owing to the risks associated with renting out land (especially when land tenure is insecure), emerging evidence suggests the demand for rented land greatly exceeds the willingness of individuals to rent their land out, thus resulting in an unmet demand for rented land (Chamberlin and Ricker-Gilbert, 2016). Consequently, the limited supply of land for sales and renting is driving up land prices and rental rates in the region and putting pressure on traditional leaders to convert customary land into statutory land to

facilitate land access through market transaction. The implications of these developments for rural employment and income distribution need to be better understood to guide future employment policies.

2.2.3 Widespread soil degradation in densely populated rural areas

The average farm size in sub-Saharan Africa is shrinking primarily due to rising rural population density and the intergenerational subdivision of land. According to Heady and Jayne (2014), since the 1970s, the average smallholder farm size has declined by 30–40 per cent in over 40 sub-Saharan countries that are considered to be land constrained. In Kenya, Malawi, Mozambique and Zambia, at least 25 per cent of smallholder farms control less than half a hectare and are approaching landlessness (Jayne et al., 2010). The situation is even direr in Ethiopia and Rwanda. Very small farm sizes restrict farmers' ability to produce surplus for sale and reduce the income earning potential from agriculture. In fact, a study of East and Southern African countries revealed that 40–60 per cent of smallholder farmers remain either absolute buyers of staple foods or buy more than they sell over the course of the year (Jayne, Mather, and Mghenyi, 2010). Many small farms have exceeded their carrying capacity and reached levels where negative threshold effects are occurring in farm income and asset wealth. Small farm sizes also limit opportunities for economies of scale that could be achieved through mechanization. The continual subdivision of land will therefore constrain the profitability of agricultural self-employment.

There are also important questions about how shrinking farm sizes associated with subdivision and fragmentation drive rural labour into informal wage labour, both in agricultural wage employment and beyond (Mueller and Chan, 2015). Rural wage labour, typically low-paid manual labour in agriculture and beyond, is the most important form of employment for many poor households, is becoming more important over time, and is contributing to widening socio-economic differentiation in rural Africa (Mueller and Chan, 2015). Specialized labour market studies typically show high rates of wage labour market participation, not just for the poorest respondents. In Tanzania, 60 per cent of all surveyed households were reliant on income from wage labour (Mueller, 2012), and in Ethiopia and Uganda, even though the survey only counted work in coffee, tea or flower production, a study of nearly 12,000 rural people found that around 50 per cent confirmed their engagement in such wage work (Cramer et al., 2014a).

As farm sizes shrink, smallholder farmers are responding by continuously cropping their fields every year, without crop rotation or any sustainable practice to maintain or improve soil quality. The consequences are widespread soil degradation in much of the region. A report by the Montpellier Panel published in 2014, indicates that around 65 per cent of arable land in sub-Saharan Africa is already degraded, which is costing more than 180 million smallholder farmers around US\$ 68 million in lost income annually (Montpellier Panel, 2014). Loss of micronutrients and soil organic matter pose particular problems, both because they cannot be ameliorated by the application of conventional inorganic fertilizers and because they tend to depress the efficiency of inorganic fertilizer in contributing to crop output (Lal, 2011; Marenya and Barrett, 2009; Vanlauwe et al., 2011). Consequently, smallholder farmers cultivating these depleted soils that are unresponsive to inorganic fertilizer are unable to benefit from the yield gains offered by plant genetic improvements (Giller et al., 2006; Tittonell et al., 2007). As most arable land is already under cultivation, future output growth must come from productivity gains. The future of work in agriculture for these farmers will depend on the extent to which policy-makers can successfully implement a more holistic approach to sustainable agricultural intensification (Powlson et al., 2011) to reverse the trend of soil degradation and create a potential for

productivity growth.

2.3 High global food prices

Food prices have increased sharply and become quite volatile since the global food surge of 2007–08. The prices of major staples such as maize, rice and wheat over the period 2006–2015 are 68, 66 and 55 per cent higher respectively than their inflation-adjusted 1995–2005 averages. Rapid population growth in sub-Saharan Africa and Asia are projected to increase the global demand for these food crops by 70–100 per cent between 2010 and 2050.

As a net importer of staple food commodities since the 1970s, food prices in Africa have reached and are likely to remain for the foreseeable future at very high import parity levels.³ Most African countries have limited capacity to affect global food prices or insulate their economies against global food price swings. A continued rise in global food prices may also accelerate the pace of large-scale land acquisition in rural areas by agribusiness firms and African investor farmers with associated changes in farm structure towards more unequal land distribution patterns.⁴ This will further limit access to land for rural youth, reduce options for agricultural employment in rural areas and potentially encourage emigration. Conversely, high world food prices could be a catalyst for economic transformation. Recent evidence indicates that the sustained high food prices of 2007–2013 had a favourable effect on employment and per capita income growth in Africa (Headey and Martin, 2016).

2.4 Climate change and water scarcity

The fourth megatrend affecting the future of agricultural work is climate change. Africa will suffer greater effects of climate change than other regions of the world, with several projections indicating increasing drought conditions and high temperatures, particularly in arid regions (Niang et al., 2014). In West Africa, for instance, Benin, Burkina Faso, Ghana, Mauritania, Niger and Nigeria may face water scarcity by 2025. Some of these effects are already becoming apparent: Lake Chad, an important water source, which sustains agriculture for more than 30 million people in Cameroon, Chad, Niger and Nigeria, has shrunk to about one fifth of its original size. Increased incidences of pest, weed and diseases of crops and livestock are also expected.

Projected climatic changes will have serious effects on agriculture, particularly on smallholder farmers and pastoralists whose activities are generally subject to the vagaries of the weather. While the precise impacts of climate change on Africa's agriculture are uncertain and are likely to vary spatially, there are two general predictions: greater variability in agricultural production and possibly a decline in crop productivity arising from more erratic and extreme weather patterns (Schlenker and Lobell, 2010; ADB climate change risk report). Despite these predicted negative effects, African agriculture still has great potential for growth if effective resilience policies are adopted. Unlike the developed world, where yields for major cereals have already plateaued, Africa's low yield levels have the potential for great increases before reaching the region's biophysical limits (Grassini, Eskridge, and Cassman, 2013). Realizing this potential for increased agricultural growth and food security would, however, require some investment in integrated approaches to enable smallholder farmers to adapt to and rapidly respond

³ Import parity prices are defined as the world price plus international and local marketing costs to a particular destination.

⁴ For example, the Gini coefficients of landholdings increased in Zambia from 0.42 in 2001 to 0.49 in 2012, and in Ghana from 0.54 in 1992 to 0.65 in 2005 (Jayne et al., 2014a).

to the negative impacts of a changing climate in the agricultural environment. Given the rising competition for water, for example, policy-makers may need to focus on developing irrigation technology that improves water use efficiency and enhances farmers' ability to adapt to climate change (Cassman, Grassini, and van Wart, 2010).

3. Africa's evolving labour force: A declining role for agriculture?

Africa's employment structure is transforming rapidly. Over the next two decades, will agriculture continue to be a major source of work and livelihoods, and who is likely to remain in agriculture?

3.1 Employment shifts in Africa's future working population

A micro-level analysis of nationally representative survey data exploring the extent to which sectoral employment has shifted over time in nine African countries offers some insights into the continent's evolving employment structure (Yeboah and Jayne 2016). The study distinguished between four employment categories:

- (i) agricultural self-employment, which comprised all activities related to growing crops or raising livestock on one's own farm, self-employed aquaculture and hunting;
- (ii) agricultural wage-employment, meaning work performed on someone else's farm;
- (iii) off-farm segments of the agri-food system, which comprised all pre- and post-farm value-addition activities in agricultural value chains including assembly trading, wholesaling, storage, processing, retailing, preparation of food for selling to others outside the home, beverage manufacturing, farmer input distribution and irrigation equipment operators, among others, which may take the form of self-employment or work being performed for someone else's business; and
- (iv) non-farm sector, which included all other types of self-employment and wage-employment not counted above.

Based on comparisons of employment structures over time, the results demonstrate that economic transformation is under way in the region. Most countries are experiencing rapid rates of labour exit from agricultural self- and wage-employment to off-farm sectors. Although the number of working-age individuals (and young people) engaged in agriculture either in own account work or wage employment is still increasing in absolute terms, agricultural employment shares are declining in most countries (Table 1). In the nine countries surveyed, the time that elapsed between the first and second survey ranged from 5 to 10 years. During that time, the proportion of the labour force in self-employed and wage-employed farming fell in eight of the countries, in five of which it fell by more than 10 percentage points (Malawi, Mali, Tanzania, Rwanda and Zambia). Nigeria is the outlier, where the share of the employment in farming rose (as full-time equivalent) from 21.8 per cent in 2003–04 to 33.7 per cent in 2012–13. The declining employment share in agriculture is consistent with the findings of many previous studies using different datasets (Proctor and Lucchesi 2012; de Vries, Timmer, and de Vries, 2015; McMillan et al., 2014).

When examining the relative importance of agricultural self-employment in comparison with agricultural wage employment, the results in Table 1 show that the majority of agricultural work is self-employment on one's own farm. There is, however, growing concern that many otherwise representative surveys under-estimate the extent of agricultural wage employment; the few that do not take that approach tend to report considerably higher participation in agricultural wage work (Mueller and Chan, 2015).

The decline in the proportion of agricultural employment is particularly pronounced when the amount of time allocated to each type of employment is accounted for in full-time equivalent terms. This approach calculates the share of individuals' work time that can be allocated to various work activities, many of which are seasonal. Given that different types of employment occupy differing amounts of a person's time, the full-time equivalent approach provides a more accurate (yet still somewhat crude) estimate of various sectors' employment shares and trends. As Table 1 shows, the rate of decline in agricultural employment shares is at least one percentage point per year more in full-time equivalent terms than when measured as total employment counts or primary employment. Agricultural employment shares as full-time equivalents are also consistently lower than when shares are calculated on the basis of primary employment category or on the total number of work activities specified by respondents. Lower agricultural employment shares using the full-time equivalent approach reflects both the seasonal nature of farming in these economies and the extent to which self-employed and wage-employed farming is becoming a part-time activity for many Africans, owing to increasing opportunities for non-farm work.⁵

⁵ Due to the dominance of rain-fed agriculture in the region, most people do not work in farming year-round. In fact, farming is estimated to take up about 500–1,000 hours per year, while most employment in the off-farm sectors entails more than 2,000 hours per year (McCullough 2015). Hence, in any given year the share of farming employment declines when weighted by the amount of time allocated to it during the year. Correspondingly, employment shares based on full-time equivalents are relatively high in off-farm sectors.

Table 1: Proportion of the labour force between the ages of 15 and 64 years in self-employed farming, agricultural wage employment, off-farm stages of agri-food systems, and non-farm activities.

Country	Survey years	Total # of jobs in	Farming				Off-farm within AFS				Non-farm outside AFS	
			Own farming		Wage farming		Agro-processing		Downstream commerce		% of jobs	% of FTE jobs
			% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs	% of jobs	% of FTE jobs		
Nigeria	2003/04	34.6	26.1	21.3	0.5	0.5	1.3	1.4	2.6	3.3	69.5	73.5
	2012/13	69.7	39.9	32.0	2.1	1.7	4.8	4.6	16.2	18.6	36.9	43.1
Rwanda	2005/06	6.1	60.2	56.4	15.0	9.2	0.4	0.4	6.5	7.4	18.0	26.6
	2010/11	9.1	48.9	41.9	18.5	12.2	1.1	1.2	5.7	7.7	25.9	37.0
Tanzania	2008/09	18.2	50.3	45.2	20.2	15.6	1.4	1.7	3.6	4.5	24.7	32.9
	2014/15	21.4	41.1	40.1	18.7	7.0	0.9	1.2	11.8	14.1	27.5	37.6
Uganda	2005/06	10.8	61.2	45.7	11.3	11.3	2.1	2.8	5.7	10.2	19.6	30.0
	2011/12	15.9	62.6	43.9	4.5	4.2	2.8	3.3	6.6	12.3	23.5	36.3

~ IPUMS data do not have time use information so full-time equivalent could not be calculated, nor could this data permit disaggregation into off-farm employment within and outside the agri-food system (AFS represents the agri-food system).

Source: Author's estimates from Ghana Living Standard Survey 5 and 6; Nigeria Living Standard Survey (2004) and General Household Survey (2013); Rwanda Integrated Household Living Survey (EICV 2 and 3); Tanzania National Panel Survey (2009 and 2015); Uganda National Panel Survey (2006 and 2012); Zambia Labour Force Surveys (2005 and 2012). Microdata of population and housing census data in Integrated Public Use Microdata Series (IPUMS).

Despite declining as a share of employment, self-employed farming remains the single largest source of employment. It accounts for over 50 per cent of all employment in most countries, although only 35–54 per cent of full-time equivalent-based employment. Employment in off-farm sectors both in and outside the agri-food system is expanding rapidly. In most countries, the number of working age individuals in those sectors grew about three times faster than overall growth in the working age population. Off-farm segments of the agri-food system, particularly agro-processing, are, however, growing from a low base. For countries where it was possible to measure employment in those segments, they accounted for less than 20 per cent of total employment and between 9 per cent and 23 per cent in full-time equivalent terms. Comparatively, 24–39 per cent of total employment and 35–47 per cent of all full-time equivalent employment came from the non-farm sector (Table 1).

Off-farm employment in the agri-food system and the non-farm sector is generally growing more rapidly in rural areas than in urban areas, although from a low base. This may suggest rural dynamism and growth linkages between farming and off-farm activities. It may also indicate that the region has been, at least for the past decade or two, considerably more economically diverse than conventional estimates have suggested.

This paper further explores employment type by disaggregating employment by self-employment or unpaid family labour, and wage or salary work. In this analysis, the self-employment or unpaid family labour category comprises three types of worker: own account workers (persons operating their own economic enterprises without employees); employers (persons operating their own economic enterprises with employees); and unpaid family workers (persons working without pay in an economic enterprise operated by a household member). We combined these three types as most available data did not permit disaggregation at that level. The wage employment category includes persons working for a non-household member or firm and receiving remuneration in wages, salary or in kind, and includes both formal (where the employee has a contract and may be entitled to social security) and informal wage employment. Those two types of wage employment are grouped together here, as most datasets do not allow consistent disaggregation of wage employment at this level. Estimates, however, indicate that about half of all wage workers in Sub-Saharan Africa are in non-contract jobs, which are often referred to as informal employment (Fox and Thomas, 2016).

Table 2, shows that self-employment, including unpaid family labour, accounts for more than 75 per cent of total employment for the countries examined, highlighting the level of informality of the labour market. Farming is the largest source of self-employment, accounting for between 46 per cent (Nigeria) and 65 per cent (Rwanda) of all self-employment jobs, followed by the non-farm sectors (30–35 per cent). For those countries where it was possible to distinguish unpaid family labour from self-employment, we found that unpaid or family labour constitutes about 25–40 per cent of total employment and about 33–47 per cent of all self-employment jobs. Nearly 90 per cent of all unpaid family labour jobs are in farming, and young people aged between 15 and 24 years are more likely to engage in unpaid family labour. Once again, the same caveats raised by Mueller and Chan (2015) apply here.

Table 2: Types of employment over time

Countries	% of employment		
	Wage/salary		Self-employed/ unpaid family labor
	Public	Private	
Ghana			
2005/06	5.7	11.9	82.4
2012/13	5.9	16.6	77.5
Nigeria			
2003/04	6.57	3.28	90.2
2012/13	4.41	6.99	88.6
Rwanda			
2005/06	3.2	20.4	86.6
2010/11	3.6	28.4	77.8
Tanzania			
2008/09	2.5	17.4	80.1
2014/15	3.4	31.8	64.8
Uganda			
2005/06	2.7	17.4	79.9
2011/12	3.9	14.8	81.3
Zambia			
2005/06	3.3	3.5	93.3
2011/12	5.3	6.5	88.2
Malawi			
1998	14.1		85.9
2008	21.6		78.4
Mali			
1998	5.7		84.2
2009	4.5		85.9

Source: Author's estimates from Ghana Living Standard Survey 5 and 6; Nigeria's Living Standard Survey (2004) and General Household Survey (2013); Rwanda Integrated Household Living Survey (EICV 2 and 3); Tanzania National Panel Survey (2009 and 2015); Uganda National Panel Survey (2006 and 2012); Zambia Labour Force Surveys (2005 and 2012). Microdata of population and housing census data in IPUMS.

There is also rapid percentage growth in wage employment, particularly in the private sector, which is now the dominant supplier of wage employment. Indeed, in Ghana, Rwanda, Zambia and Malawi, wage employment is growing at nearly three times the rate of self-employment and is expected to become an important source of employment, particularly for the poorest households with limited productive assets (such as land) as the economy transforms (Table 2). Growth in wage employment in both the private and public sectors is, however, starting from low initial bases and thus translates into a relatively small number of jobs. The share of wage jobs in total employment remains low in most countries, typically less than 30 percent. Even in the most optimistic growth scenario, it is unlikely to generate enough employment opportunities for more than a small fraction of the rapidly expanding labour force. In fact, a recent analysis suggests that wage or salary employment as a share of total employment in sub-Saharan Africa grew only slightly from 25 to 28 per cent between 2000 and 2014 despite the overall number of wage or salaried jobs increasing by roughly 70 per cent during that period (Ulimwengu et al., 2016). The non-farm sector is the main source of wage employment, accounting for more than 85 and 60 per cent of public and private sector wage jobs respectively. As mentioned above, some scholars contend that estimates of wage labour shares, particularly in agriculture, are systematically under-reported as existing survey questions and methodologies are ill-suited to adequately capture them

(Mueller and Chan, 2015; Oya and Pontara, 2015). We tend to agree and the results reported here may therefore be interpreted as underestimates of full-time equivalent employment shares in farming (due to under-reporting of agricultural wage employment) and overestimates of employment shares outside agriculture. Our assessment, however, is that these omissions do not fundamentally alter the main findings (see Table 2) that self and wage employment in off-farm informal enterprises are likely to provide the greatest growth of new off-farm employment for most new entrants to the labour market over the next decade.

3.2 Changes in age structure in agriculture

The aging agriculture workforce resulting from young people's disinterest in agriculture, is commonly cited as a reason for promoting greater youth engagement in agriculture (Vos, 2015, Gorman, 2013). Some analysts consider that global food production may be in jeopardy if this current trend continues (Johr 2012). A study of the age distribution of individuals engaged in farming in some African countries, however, revealed a very different picture. Unlike in other regions, evidence from cross-country analysis shows that average age of farmers in most sub-Saharan countries has either reduced slightly or remained stable (Table 3). Of the nine countries studied, only three had experienced a slight increase in the mean age of farmers over 15 years of age. Even when restricting the sample to individuals over 25 years of age who spend at least half of a full-time equivalence in farming, the picture is mixed, with two countries showing a slight increase over time in mean age and the other four unchanged. For this sub-population, the mean age of farmers from the most recently available survey ranges from 41 years in Uganda to 48 years in Nigeria (Table 3). Ironically, the upward pressure on the average age of the farmer population is coming from urban areas, which is also the demographic group experiencing the most rapid growth in farm-based employment. In most of the countries examined, the mean age of farmers is at least several years older in urban areas than in rural areas (Figure 4), which possibly reflects the rising number of urban-based retirees who invest in self-employed farming after retirement (Jayne et al., 2016).

Table 3: Mean age of individuals engaged in agriculture (self-employed and wage-employed)

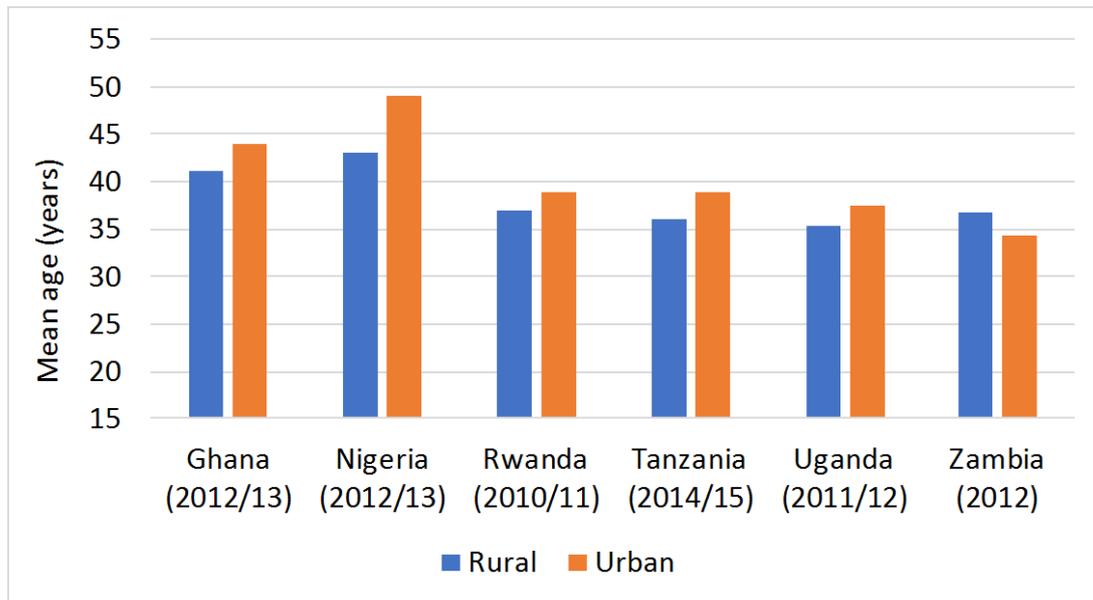
Country	Survey years	Individuals aged 15 years or more engaged in farming			Individuals aged 15 years or more with at least 50% FTE in farming			Individuals aged 25 years or more with at least 50% FTE in farming		
		Total	Males	Females	Total	Males	Females	Total	Males	Females
Ghana	2005/06	40	40	40	40	40	40	44	44	43
	2012/13	39	38	39	42	42	41	45	46	44
Nigeria	2003/04	43	44	41	43	44	42	46	47	45
	2012/13	42	42	42	43	44	42	48	49	46
Rwanda	2005/06	35	35	35	35	35	35	42	42	42
	2010/11	37	36	38	37	37	38	42	42	42
Tanzania	2008/09	39	39	38	39	39	39	44	44	44
	2014/15	36	35	36	36	36	37	44	45	44
Uganda	2005/06	34	34	34	34	35	34	41	41	40
	2011/12	34	34	35	35	34	36	41	41	42
Zambia	2005	33	33	34	34	34	33	42	42	41
	2012	35	37	34	36	38	35	42	42	41
Kenya~	1999	35	35	35	-	-	-	-	-	-
	2009	37	38	37	-	-	-	-	-	-
Malawi~	1998	37	38	36	-	-	-	-	-	-
	2008	37	37	37	-	-	-	-	-	-
Mali~	1998	35	36	33	-	-	-	-	-	-
	2009	35	36	33	-	-	-	-	-	-

These data do not include time-use information. Full-time equivalent could therefore not be calculated.

Source: Author's estimates from Ghana Living Standard Survey 5 and 6; Nigeria's Living Standard Survey (2004) and General Household Survey (2013); Rwanda Integrated Household Living Survey (EICV 2 and 3); Tanzania National Panel Survey (2009 and 2015); Uganda National Panel Survey (2006 and 2012); Zambia Labour Force Surveys (2005 and 2012). ~Microdata of population and housing census data in IPUMS

When accounting for the working-age population (15–64 years of age) engaged in farming for at least half of their work time, the average age ranges from 36 years to 42 years. This is not surprising considering that farming is the single largest employer of the young people in Africa, accounting for 40–63 per cent of full-time equivalent-based employment of young people. Although a large number of young people in rural areas are leaving farming, a significant proportion of the rapidly growing youth population remains engaged in agriculture, which is putting downward pressure on the average age of the agrarian population. Sub-Saharan Africa may therefore not yet be at risk of problems arising from an aging farmer population. The age distribution of individuals in non-farm employment is, however, younger than those in farming. The extent to which young people remain in farming will depend on the future return to labour from farming, which will in turn depend on agricultural policies and programmes influencing adoption of new technologies and access to markets. Youth access to finance and land, especially in increasingly densely populated rural areas, may be particularly important future determinants of youth engagement in farming, and hence the age distribution of farmers (Allen et al., 2016).

Figure 4: Mean age of individuals 15 years or older, who are engaged at least 50 per cent of a full-time work equivalent in farming.



Source: calculated by authors using nationally representative survey data.
See sources listed under Table 1.

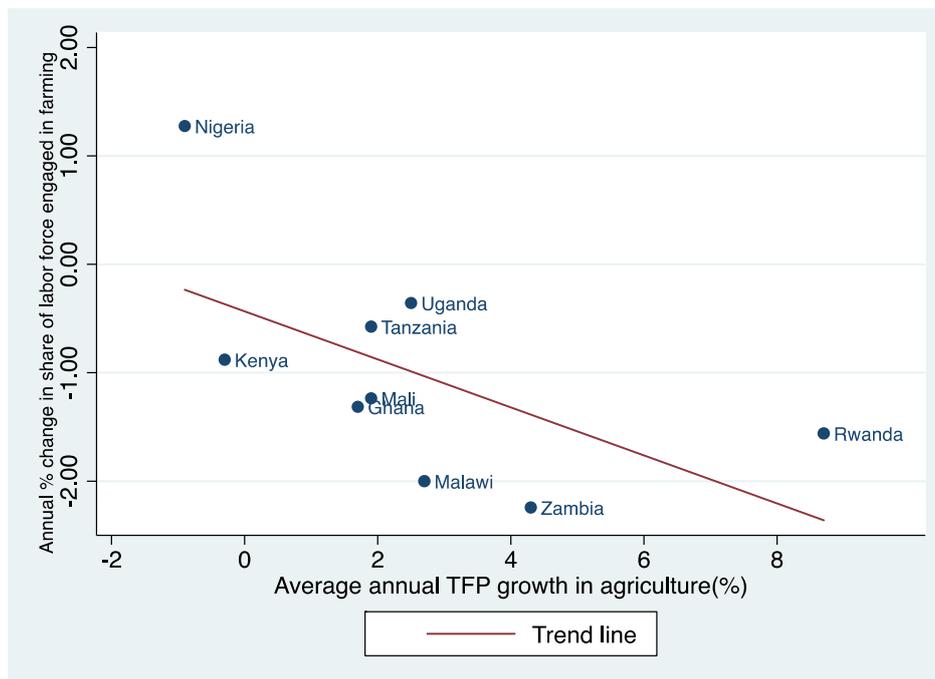
4. Agricultural productivity growth and labour force diversification

Agricultural productivity growth is widely accepted as an important catalyst for economic transformation. In fact, sustained agricultural productivity growth arising from green revolution technologies and supportive government policies is credited for increasing the purchasing power of millions of rural families, which has stimulated demand for off-farm goods and services, created new employment in the off-farm economy, and pulled millions of people from the farm into more productive off-farm employment. As this process has continued, income has risen relative to the cost of food, resulting in major improvements in food security and living standards (Johnson and Mellor, 1961; Mellor, 1976; Lipton, 2005). These patterns are also confirmed by statistical evidence (Johnston and Kilby, 1975; Timmer, 2009). Based on this evidence and Asia's economic transformation, many analysts regard fostering agricultural productivity and accelerating agricultural growth as an important vehicle for transforming Africa's economies. As we consider the evolving role of agriculture in Africa's transformation, we will therefore examine the extent to which growth in agricultural productivity has been an important driver of economic transformation in the region, and explore the prospects for future growth.

4.1 Agricultural productivity growth: employment and income multiplier effects on non-farm sectors

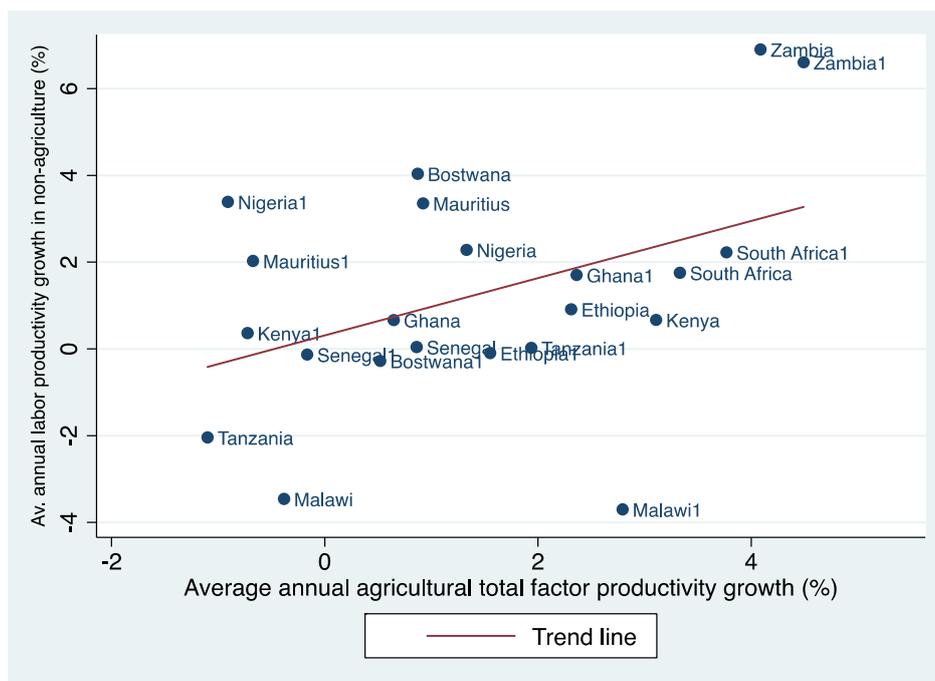
Recent evidence indicates that improvements in agricultural performance in Africa has played a critical role in the continent's ongoing economic transformation. Cross-country bivariate analysis shows that African countries experiencing the most rapid rates of agricultural productivity growth over the past 15 years have also enjoyed the greatest rates of non-farm labour productivity growth and the most rapid exit of the work force out of farming (Yeboah and Jayne 2016, see also Figures 5 and 6). Furthermore, analysis using an expanded dataset and controlling for factors that could plausibly influence agricultural employment shares, including population density, country-level governance indicators, market access conditions, and country fixed effects, also identified lagged labour productivity in agriculture as a significant major driver of sectoral shifts in Africa's labour force over the past decade. The results show that a 20 per cent increase in average agricultural labour productivity over a five-year period leads to an annual decline in the share of the labour force engaged in agriculture by 0.4–6.2 per cent, holding other factors constant (See Yeboah and Jayne 2017). Evidence from Ethiopia also revealed that US\$ 1 of output generated in agriculture stimulated a further \$1.23 in economic activity in other parts of the economy. Around 40 per cent of increased economic activity arises from higher demand for inputs in agriculture and use of agriculture outputs in other industries, while the remaining 60 per cent arises from consumption linkages caused by the increased demand for goods and services that results from higher agricultural incomes and associated spending effects (Diao et. al., 2016). These findings, which are also consistent with Asia's economic transformation, suggest that the rate of off-farm employment creation and labour exit from agriculture will depend greatly on government policies and programmes that affect the inclusivity of productivity growth in agriculture.

Figure 5: Relationship between total factor productivity growth and change in share of labour force engaged in farming



Source: Authors. Mean annual agricultural TFP growth rates for 2003-2012 from USDA TFP dataset (Fuglie, 2015); Spearman Correlation coefficient = -0.6862, prob > |t| = 0.0412

Figure 6: Relationship between total factor productivity growth and labour productivity in non-agricultural sector



Source: Author's agricultural total factor productivity growth rates derived from USDA TFP dataset (Fuglie, 2015) and calculated as mean annual rates over 2001-2005 and 2006-2011 periods; labour productivity growth

rates (mean annual rates over 2001-2005 and 2006-2011 period) derived from Groningen Global Development Centre employment. NB: two points are shown for each country; the latter period (2006-2011) for each country is denoted with “1” (e.g. Malawi1 represents Malawi 2006-2011).

Spearman Correlation coefficient = 0.3721, $\text{rob} > |t| = 0.0881$.

Agricultural productivity growth, especially if broad-based, will generate strong multiplier effects that expand employment opportunities in the downstream stages of the agri-food system and the broader non-farm economy. This is the case in Burkina Faso. High yield cereal crop varieties developed by the nation’s agricultural research system were made available to millions of farmers through an integrated agricultural development programme. These new varieties, combined with successful efforts to promote the adoption of integrated soil fertility management practices including planting basins and tree planting, allowed the country to double its average cereal yield between the periods 1990–1995 and 2010–2014 (FAOSTAT 2016; Reij et al., 2003). The ability of self-employed farmers to meet their household food needs from less land also helped to make more land and labour available for fodder production, which eventually enabled many households to switch from the traditional transhumance system of livestock production to a more intensive year-long system of raising livestock locally. This further facilitated the development of an integrated cereal-legume-livestock production system, using methods that promote sustainability and resilience, improve nutritional outcomes and incomes of farmers and expanded employment opportunities in the rest of the economy (IFAD 2016).

4.2 Trends and prospects for agricultural productivity growth

Agriculture in Africa has shown remarkable improvement over the past 15 years relative to its precarious state in the 1980s. Average total factor productivity growth stagnated until the mid-1980s when it started to rise steadily with annual growth rates, averaging 0.5 per cent between 1981 and 1990 and 1.1 between 1991 and 2000. The continent experienced its strongest growth in total factor productivity in the post-2000 era, where annual growth rates averaged around 2 per cent between 2000 and 2012, driven largely by technical change (Benin and Nin-Pratt, 2016). These aggregate trends, however, mask important differences across sub-regions and countries. Between 2008 and 2014 for instance, the agricultural sector grew at a rate of 2.6 per cent annually. During that period, however, some 15 countries (including Ethiopia, Kenya, Lesotho, Rwanda, Sierra Leone and Tanzania) experienced agricultural growth rates higher than 6 per cent, while others (such as Guinea, Nigeria and South Africa) experienced negative growth rates (Badiane et al., 2016).

There has also been tremendous improvement in land (agricultural value added per hectare of arable land) and labour productivity (agricultural value added per agricultural worker) over the past two decades. Land productivity has improved much faster than labour productivity in the region but both remain much lower than in other regions (Benin and Nin-Pratt, 2016). The continent therefore has the potential to increase existing productivity levels significantly.

Regarding the prospects of future productivity growth, as in the past, growth will likely be uneven across countries and will depend on how well governments invest in key strategies that promote agricultural productivity. Such strategies are well documented and include investing in physical infrastructure and agricultural research, and facilitating access to land, financial instruments, productivity-enhancing inputs (such as fertilizer and improved seeds), optimizing farm management, and marketing know-how through effective extension support appropriate to local conditions. There is evidence that the African countries that have invested in some of these strategies in their agricultural

sectors are already reaping the benefits - stronger economic growth, declining poverty rates and better nutritional status (Badiane et al., 2016). Ethiopia is one such example. In the mid-2000s, the Government adopted an agricultural transformation approach to address key bottlenecks in the economy and revitalize the country's agriculture sector. As part of these efforts, the Government implemented land reforms to promote tenure security, particularly for women farmers, instituted a robust extension system to facilitate service delivery and technology adoption, and established the Agricultural Transformation Agency to promote intragovernmental cooperation and reform in the agricultural sector. Consequently, total national cereal production increased more than 70 per cent between 2005 and 2014, with an average annual increase of 7 per cent. At the same time, the country experienced 10 per cent annual GDP growth with significant poverty reduction effects, putting Ethiopia on track to achieve a middle-income status over the next decade (Ethiopian Agricultural Transformation Agency 2015).

For the region as a whole, there is reason to be optimistic about future growth in agricultural productivity. The past decade has shown a renewed interest in agriculture among African governments and policy-makers. Under the Comprehensive African Agricultural Development Programme, established in 2003, many African governments have already committed to invest 10 per cent of their national budget in their agricultural sectors to achieve a 6 per cent annual growth rate of agricultural productivity. To the extent that this renewed commitment to agriculture can promote investment in productivity enhancing strategies, the region should experience overall growth in agricultural productivity with significant income and employment multiplier effects on the rest of the economy.

5. Policy implications: the role of sustainable agricultural productivity growth in a comprehensive employment strategy

African economies are transforming rapidly. Although agriculture's share of total employment and household income is declining as off-farm opportunities expand, the absolute number of people dependent on agriculture as a source of livelihood continues to grow. Yet, the rate of employment expansion has not kept pace with labour force growth. Rapidly rising demand for food, fuelled by population and income growth, will afford important opportunities for agri-food systems to accelerate employment creation and economic transformation. Africa's agriculture faces several key "megatrends" (including rising soil degradation, climate change, and land scarcity) which present additional challenges and incentives for improving productivity and capacity. The future of work in Africa will therefore depend on how well the enabling environment, created through policies and programmes, responds to these key patterns of change in the economic landscape that will likely affect agriculture's growth prospects, and consequently its contribution to employment and the overall economic transformation agenda. Below we offer some suggestions, based on the evidence presented in this paper, for government action to assure the future of work in agriculture and the rest of the economy.

5.1 Promoting broad-based agricultural labour productivity growth

Emerging employment trends suggest that Africa is likely to follow a transformation pattern similar to those witnessed in the rest of the world, whereby the share of the work force in farming declines gradually as the economy grows and diversifies. Declining employment shares in agriculture, however, do not necessarily mean that the role of agriculture in the region's economic transformation process is diminishing. Over the past 15 years, African governments that have effectively promoted farm productivity growth have enjoyed faster rates of poverty reduction, higher rates of labour productivity in non-farm segments of the economy, and a more rapid exit of the labour force out of farming than countries with slower agricultural productivity growth (Benin and Yu, 2013; Badiane et al., 2016; Yeboah and Jayne, 2017). As most African economies are still agriculture-based, the performance of agriculture will continue to play a decisive role in influencing employment and livelihood opportunities both in the agri-food system and the broader non-farm economies. Public investment in support of agricultural productivity growth will therefore remain a crucial component of an effective employment strategy. As most of Africa's workforce is engaged in smallholder semi-subsistence agriculture, it is essential that strategies promoting agricultural productivity growth are designed to allow the millions of smallholder farmers to participate in and contribute to the region's economic transition to assure broad-based and inclusive agricultural growth with greater multiplier effects on the rest of the economy. Specific public actions to support smallholder inclusion in agricultural development may vary between countries but should at least address climate change-induced risks and vulnerabilities, secured land rights, and agricultural finance, which consistently emerge as the primary constraints impeding profitability of smallholder farming. Recognition of a large and potentially growing class of informal wage workers in rural Africa raises the need to promote and uphold worker protection rights.

To increase and sustain productivity growth, avenues must be created to ensure efficient use of existing resources and technologies, and develop new and improved technologies that are adaptable to Africa's specific context. Despite rising public expenditure on agriculture due to the commitments made under Comprehensive Africa Agriculture Development Programme and the Maputo Declaration, agricultural budgetary allocations to research and development and extension remain small and have decreased over

the past 15 years (Ulimwengu et al., 2016). Research and development will also need to be complemented with effective extension systems that facilitate access to productivity-enhancing technologies (fertilizer, improved seeds, and agronomic practices), financial instruments, farm management, and marketing know-how. A broad-based agricultural productivity growth strategy must also include improvement in coverage and quality of physical infrastructure (roads accessible to motor vehicles, reliable and low-cost energy, communication) to reduce the cost of doing business, facilitate market access, strengthen rural-urban linkages, and enhance competitiveness (Kormawa and Jerome, 2015).

Over the coming years, innovative input programmes may become increasingly necessary to promote resilient and sustainable agricultural productivity growth in the face of climate change. Soil amendments that hold moisture for longer periods and provide greater crop response to synthetic fertilizer are likely to be key to climate-smart agricultural strategies, yet most farmers lack access to the materials needed to enhance the organic composition of their soils.

Continued population growth, increasing demand for land, and rising land prices, are leading median farm sizes to decrease over time and are driving many households to seek work outside their own farms, either as agricultural wage workers or in non-agricultural informal businesses. This is especially true for young people aged 15–34 years, who constitute almost 60 per cent of the labour force in sub-Saharan Africa. In the context of increasing land subdivision, fragmentation, and concentration, programmes to promote youth access to land will become ever more important. Young people in many parts of rural Africa are increasingly unable to inherit land or enough land to make farming a viable business. This is a new reality in most areas; 30–50 years ago, most young people inherited land, which meant that land access did not pose a constraint to engagement in farming. African governments have been slow to respond to these changing circumstances in rural Africa, and this has hastened youth migration. Although harnessing young people's potential to contribute to agricultural productivity growth is desirable, possible and necessary, particularly as 60 per cent of the labour force is aged between 15 and 35 years, it will require recognition of how the constraints on engagement in agriculture are changing, and support to help governments develop policies and programmes to overcome those constraints. A more comprehensive assessment is needed that synthesizes the available evidence about what has worked, what has not worked, and why.

Governments can promote long-term employment and livelihood objectives by mobilizing more resources for education and skills development in agriculture and related agri-food systems. Contrary to popular perceptions, the average age of people engaged in farming is not rising, and more than 30 per cent of the agricultural work force is under 35 years of age. Many do not know what best practices are for the management of their farms. Successful agricultural production is increasingly knowledge-intensive. Well-functioning agricultural training colleges can enhance the productivity of the agricultural workforce and enable young "agripreneurs" to take advantage of emerging opportunities and promote inclusive forms of agricultural productivity growth.

5.2 Upgrading the skills of labour force

There is growing consensus that the productive agriculture of the future will be knowledge and technology intensive, and will require a greater range of technical, business and soft behavioural skills (such as problem solving, organizing and planning, working in teams) than African education and training systems are currently producing (Making Cents 2017; Plan International 2016). Compared with

previous generations, Africa's current workforce has a relatively high number of years in schooling. In Ethiopia, for example, the number of university students completing undergraduate degrees has risen from roughly 3,000 per year in the 1990s to over 100,000 since 2010 (Ministry of Education, 2017). Yet educational attainment for the average individual in Africa's labour force is below secondary school level and most agricultural workers have not completed primary education. Government efforts to accommodate rising demand for education have often been accompanied by deteriorating teacher quality, larger class sizes as enrolments increase, and inadequate rural school facilities, as well as a failure to upgrade curricula to reflect Twenty-first Century needs (Filmer and Fox 2014). Such low educational and skill levels cannot assure the productivity improvements required to fuel future economic transformation.

African governments will therefore need to invest in education and skills development to enhance the productivity of the workforce and prepare workers to effectively take advantage of emerging opportunities. This will require intensification of public investment in basic, secondary and tertiary education, vocational and technical training to impart the numeracy, literacy, technical and soft skills needed to succeed along the agricultural value chain. The skill sets required for successful farmers, entrepreneurs, employees, and professionals in Africa's agriculture and non-farm sectors are likely to shift rapidly and differ between countries, owing to differences in economic conditions. On-going research will therefore be needed into the content and educational approach that would yield the greatest pay-off for each country. This should be complemented by regular consultations with potential private sector employers to solicit input into curriculum reforms, and by internships and practical training opportunities for students. These and other effective strategies to anticipate the nature of shifts and strengthening local "educational supply chains" to provide the requisite skills will be crucial.

5.3 Enabling agricultural workers to cope with vulnerability and develop resilience for structural transition

Although the recent economic recovery in sub-Saharan Africa has resulted in significant reductions in the proportion of the population living in poverty, poverty levels remain stubbornly high. The absolute number of people living below the poverty line rose from 280 million in 1994 to about 330 million in 2013 (World Bank 2016). Most of the poor are smallholder farmers whose livelihoods could be further adversely affected by climate change-related extreme weather conditions and other economic forces in the region. Some may have to abandon agriculture entirely as climate change adaptation strategies would not be sufficient to cope with its negative effects. Moreover, informal agricultural wage workers and rural landless people appear to comprise a large and potentially growing proportion of workers in rural Africa. For all of the above reasons, social protection programmes will take on greater importance for assisting those who may be adversely impacted by climate change, rising land scarcity, and weak labour protection provisions. Such measures should include regulations that protect agricultural workers from exploitation and improve their conditions of service, yet they must not be based on entitlement alone. Rather they should be complementary to the productive investments required for long-term economic growth and poverty alleviation. For instance, similarly to conditional cash transfer schemes, assistance from these social programmes could be conditional on the use of improved agricultural technologies and management practices by farmers for whom farming remains a viable option, and the provision of vocational and technical training to help prepare marginal farmers for alternative routes out of poverty.

5.4 Encouraging value addition to agricultural products and investment in employment-intensive ventures

Most African economies still rely on the export of raw agricultural commodities, which is often associated with low returns and is vulnerable to global price fluctuations. To promote a successful structural transformation with increased income for agricultural workers, value must be added to Africa's raw materials. Value addition will expand opportunities for employment creation in the off-farm sector to absorb displaced agricultural workers. This will not, however, happen organically without strategic investment. In addition to improving the business environment, governments could collaborate with the private sector to seek innovative and labour-intensive value addition activities, identify the barriers to their development and formulate policies to incentive private investment in them. Such new activities could be incentivized with subsidies, trade protection or venture capital, and governments could also assist by playing a coordinating role. Since not all new activities have the potential to be profitable, performance requirements and phase-out plans should be built into all incentives.

5.5 Speeding up demographic transition

Africa's demographic transition can be accelerated by taking measures to reduce the region's high birth rate. Persistently high birth rates increase youth dependency, depress private and public savings, and reduce fiscal space for investment in human capital (education, social and behavioural skills) required for productive employment. It will also continue to expand the numbers of new people seeking employment each year in an already overstretched labour market. Therefore, policies to support Africa's demographic transition remain an essential component of strategies aimed at providing a better future of work in agriculture and the rest of the economy. Reviews show that policy actions that promote girls' education, empower women to have greater control over their fertility decisions, and make reproductive health information and contraceptive methods more accessible are effective strategies to reduce fertility rates (Canning, Raja, and Yazbeck, 2015; Upadhyay et al, 2014).

The details of labour policy reforms must be based on a comprehensive understanding of the labour dynamics in each country and the needs of the various demographics represented in the labour force. There is, however, a paucity of reliable data on labour conditions, which limits our understanding of employment challenges and undermines the evidence-informed approach to labour policy. Improvements in data collection and dissemination of information in areas such as labour market trends, conditions of work, and examples of proven strategies that reduce informality and address particular vulnerabilities in the workforce are essential.

The productivity of agricultural workers will also need to be improved to build inclusive economic growth. The agricultural workforce and rural communities are not, however, homogenous groups of people. They may differ in livelihood sources, employment relations, resource endowment, access to inputs, market and financial services, and type of production. Developing a comprehensive framework to study and understand the realities of different kinds of agricultural worker and the challenges they face is essential for targeting employment support to those who need it most.

References

- African Center for Economic Transformation (ACET). 2014. *Growth with depth: 2014 African transformation report* (Accra, Ghana). Available at: <http://africantransformation.org/wp-content/uploads/2014/02/2014-african-transformation-report.pdf> [12 Dec. 2017].
- African Development Bank, Organisation for Economic Co-operation and Development and United Nations Development Programme. 2014. *African Economic Outlook 2014: Global value Chains and Africa's Industrialisation* (Paris, OECD). Available at <http://www.oecd-ilibrary.org/content/book/aeo-2014-en> [12 Dec. 2017].
- . 2011. The middle of the pyramid: Dynamics of the middle class in Africa (Market brief). Available at: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/The_Middle_of_the_Pyramid_The_Middle_of_the_Pyramid.pdf [12 Dec. 2017].
- Allen, A.; Howard, J.; Kondo, M.; Jamison, A.; Jayne T.; Snyder, J.; Tschirley, D.; Yeboah, F. K. 2016. Agrifood Youth Employment and Engagement Study (AgYees) (East Lansing, Michigan State University).
- Badiane, O.; Ulimwengu, J.; Badibanga, T. 2012. "Structural Transformation among African Economies: Patterns and Performance." *Development* 55 (4) 463–76.
- . S. Benin; T. Makombe. 2016. Strengthening the Continental Agricultural Agenda and Accountability Framework: The Road from Maputo to Malabo. In *Alliance for a Green Revolution in Africa (AGRA). 2016 Africa Agriculture Status Report: Progress towards an Agriculture Transformation in Sub-Saharan* (Nairobi, Kenya).
- Barrett, C. B.; Carter, M. R.; Timmer, C. P. 2010. A Century-Long Perspective on Agricultural Development in *American Journal of Agricultural Economics* 92. 2: 447–68. doi:10.1093/ajae/aaq005.
- . Christiaensen, L.; Sheahan, M.; Shimeles, A. 2017. "On the Structural Transformation of Rural Africa" in *Journal of African Economies*, 26, AERC Supplement 1, i11–i35.
- Benin, S.; Yu, B. 2013. Complying with the Maputo Declaration Targets: Trends in public agricultural Expenditures and implications for pursuit of optimal allocation of public agricultural spending. *ReSAKSS Africa Wide Annual Trends and Outlook Report 2012*. (International Food Policy Research Institute).
- Bezu, S; Holden S. 2014. Are Rural Youth in Ethiopia Abandoning Agriculture? *World Development* 64: 259–72.
- Bocquier, P. 2005. World Urbanization Prospects: "An Alternative to the UN Model of Projection Compatible with Urban Transition Theory" in *Demographic Research* 12.9: 197–236.
- Bilsborrow, R.E. 2002. "Migration, Population Change, and the Rural Environment" in *Environmental Change and Security Project Report No. 8*. Ann Arbor (University of Michigan). Available at: http://www.wilsoncenter.org/sites/default/files/Report_8_Bilsborrow_article.pdf [12 Dec. 2017].
- Canning, D.; Raja S.; Yazbeck, A. S. 2015. *Africa's Demographic Transition: Dividend or Disaster?* Africa Development Forum. (Washington, World Bank and Agence Française de Développement).

- Available at: <https://openknowledge.worldbank.org/handle/10986/22036> (License: CC BY 3.0 IGO) [12 Dec. 2017].
- Cassman, K.G.; Grassini, P.; van Wart, J. 2010. Crop yield potential, yield trends, and global food security in a changing climate. In C. Rosenzweig, D. Hillel (eds): *Handbook of Climate Change and Agroecosystems* (London, Imperial College Press), pp. 37–51.
- Chamberlin, J.; Jayne, T. S.; Headey, D. 2014. "Scarcity amidst abundance? Reassessing the potential for cropland expansion in Africa" in *Food Policy*, 48, pp. 51–65.
- Christiaensen, L.; Demery, L.; Kuhl, J. 2011. "The (evolving) role of agriculture in poverty reduction – an empirical perspective" in *Journal of Development Economics*, 96, pp. 239–254.
- Cleland, J.; Machiyama, K. 2016. The Challenges Posed by Demographic Change in sub-Saharan Africa: A Concise Overview in *Population and Development Review*, October 2016, 23 pages.
- de Vries, G.I Timmer, M.; de Vries, K. 2015. *Structural transformation in Africa: Static gains, dynamic losses*. The Journal of Development Studies, 51(6), 674–688. doi:10.1080/00220388.2014.997222.
- Dürr, J. 2016. "The Political Economy of Agriculture for Development Today: The ‘Small versus Large’ Scale Debate Revisited", in *Agricultural Economics* 47 (6), 671–81. doi:10.1111/agec.12264.
- Deininger, K.; Savastano, S., and Fang Xia. 2017. "Smallholders’ Land Access in Sub-Saharan Africa: A New Landscape?" in *Food Policy, Agriculture in Africa – Telling Myths from Facts*, 67 (Feb.): 78–92. doi:10.1016/j.foodpol.2016.09.012.
- Drechsel, P; Gyiele, L.; Kunze, D.; Cofie, O. 2001. "Population density, soil nutrient depletion, and economic growth in sub-Saharan Africa" in *Ecological Economics*, 38, pp. 251–258.
- FAOSTAT. 2016. Food and Agriculture Organization of the United Nations (Rome). Available at: <http://faostat.fao.org/> [12 Dec. 2017].
- Filmer, D.; Fox, L. 2014. Youth Employment in Sub-Saharan Africa. (Washington, World Bank). doi:10.1596/978-1-4648-0107. Available at: <https://openknowledge.worldbank.org/bitstream/handle/10986/16608/9781464801075.pdf> [12 Dec. 2017].
- Fuglie, K.O. 2015. *Agricultural Total Factor Productivity Growth Indices for Individual Countries 1961-2012*, (Washington, USDA Economic Research Services). Available at: <http://www.ers.usda.gov/data-products/international-agricultural-productivity.aspx> [12 Dec.2017].
- . Rada, N. 2013. Resources, policies, and agricultural productivity in sub-Saharan Africa. Report 145, United States Department of Agriculture, Economic Research Service (Washington).
- Giller, K. E.; Rowe, E. C.; de Ridder, N.; van Keulen, H. 2006. "Resource use dynamics and interactions in the tropics: Scaling up in space and time", in *Agricultural Systems*, 88(1), 8–27.
- Gollin, D.; Jedwab, R.; Vollrath, D. 2013. *Urbanization with and without industrialization*, Working paper 2013-290-26 (University of Houston). Available at: <http://www.uh.edu/econpapers/RePEc/hou/wpaper/2013-290-26.pdf> [12 Dec. 2017].

- Grassini, P.; Eskridge, K. M.; Cassman, K. G. 2013. "Distinguishing between yield advances and yield plateaus in historical crop production trends", in *Nature Communications*, 4.
doi: 10.1038/ncomms3918.
- Headey, D.; Jayne, T. S. 2014. "Adaptation to land constraints: Is Africa different?" *Food Policy*, 48, 18–33.
- . Martin, W. 2016. "The Impact of Food Prices on Poverty and Food Security", in *Annual Review of Resource Economics*, (8), 329-351.
- Holden, S., K. Otsuka, and F. Place (eds). 2009. *The Emergence of Land Markets in Africa*. (Washington, Resources for the Future).
- Gugerty, M. K.; Timmer, C.P. 1999. Growth, Inequality and Poverty Alleviation: Implications for Development Assistance (Mimeo).
- International Fund for Agricultural Development. 2016. *Foster Inclusive Rural Transformation* (Rome).
- Jayne, T.S.; Mather, T.; Mghenyi., E. 2010. "Principal challenges confronting smallholder agriculture in sub-Saharan Africa", in *World Development* 38: 1384–1398.
- . and Muyanga, M. 2012. "Land constraints in Kenya's densely populated rural areas: Implications for food policy and institutional reform", in *Food Security*, 4(3), 399–421.
- . Chamberlin, J, et al. 2016. "Africa's Changing Farm Size Distribution Patterns: The Rise of Medium-Scale Farms." *Agricultural Economics* 47, no. S1 (Nov.): 197–214. doi:10.1111/agec.12308.
- . Headey, D. D. 2014. "Land pressures, the evolution of farming systems, and development strategies in Africa: A synthesis", in *Food Policy*, 48, 1-17.
- Jöhr, H. 2012. "Where Are the Future Farmers to Grow Our Food?" in *International Food and Agribusiness Management Review*, vol. 15, Special Issue A. Available at: http://ageconsearch.umn.edu/record/129168/files/_2_%20Johr.pdf?version=1 [12 Dec. 2017].
- Kormawa, P.; Afeikhen, J. 2014. "Renewing Industrialization Strategies in Africa." In Badiane, O. and Tsitsi, M. (eds): *Beyond a Middle Income Africa: Transforming African Economies for Sustained Growth with Rising Employment and Incomes*. ReSAKSS Annual Trends and Outlook Report. (International Food Policy Research Institute –IFPRI).
- Kosec, K.; Hagos, H.G.; Holtemeyer B. et al. 2016. *Land Inheritance and Youth Employment and Migration Decisions: Evidence from Rural Ethiopia*. Paper prepared for presentation at the 2016 World Bank Conference on Land and Poverty (Washington).
- Lal, R. 2011. "Managing the soils of sub-Saharan Africa" in *Science*, 236 (4805), 1069–1076.
- La Porta R.; Shleifer A. 2014. "Informality and Development" in *Journal of Economic Perspectives*, 28 (3): 109–26.

- Leenstra, M. 2015. *Medium-sized, mixed family farms to feed the future: A vision for farming in Africa*. Food and business knowledge platform. Available at: <http://knowledge4food.net/medium-sized-mixed-family-farms-to-feed-the-future-a-vision-for-farming-in-africa/> [12 Dec. 2017].
- Lipton, M. 2005. *Crop Science, Poverty, and the Family Farm in a Globalizing World*. 2020 IFPRI Discussion Paper No. 40. (Washington, IFPRI).
- Losch, B. 2012. *Agriculture: The Key to the Employment Challenge*. Perspective No. 19. (Montpellier, Agricultural Research for Development -CIRAD).
- . 2016. *Structural transformation to boost youth labour demand in sub-Saharan Africa: The role of agriculture, rural areas and territorial development*. Employment Working Paper No. 204. ILO, Employment Policy Department. Available at: http://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_533993.pdf [12 Dec. 2017].
- Lucas, R. 2015. *Internal Migration in Developing Economies: An Overview*. KNOMAD Working Paper No. 6. (Washington, Global Knowledge Partnership on Migration and Development).
- Making Cents. 2017. Increasing Impact through Youth Engagement in Agriculture. Available at: <http://www.youtheconomicopportunities.org/> [12 Dec. 2017] (This website was created for a USAID/BFS Project and has numerous reports, toolkits, presentations and blog postings).
- McArthur, J. W.; McCord, G. C. 2017. "Fertilizing Growth: Agricultural Inputs and Their Effects in Economic Development" in *Journal of Development Economics* 127: 133–52. doi:10.1016/j.jdeveco.2017.02.007.
- McCullough E. B. 2015. *Labour Productivity and Employment Gaps in Sub-Saharan Africa*, Policy Research Working Paper No. WPS 7234 (World Bank).
- McMillan, M.; Harttgen, K. 2014. *The Changing Structure of Africa's Economies*. National Bureau of Economic Research Working Paper No. 20077. (Cambridge, MA, National Bureau of Economic Research).
- . Rodrik, D; Verduzco-Gallo, I. 2014. "Globalization, Structural Change and Productivity Growth with an Update on Africa", in *World Development* 63: 11–32.
- Mdoe, N.; Muyanga, M; Jayne, T.S.; Minde, I. Forthcoming. *Access to Agricultural Land, Youth Migration, and Livelihoods in Tanzania*. Presentation at the 5th International Conference of African Association of Agricultural Economics, 23–26 September 2016, Addis Ababa, Ethiopia.
- Mellor, J.W. 1976. *The New Economics of Growth* (Ithaca, NY, Cornell University Press).
- Merber, H. 2016. *Africa's rising middle class: time to sort out fact from fiction*. The Conversation. Available at: <http://theconversation.com/africas-rising-middle-class-time-to-sort-out-fact-from-fiction-59797> [12 Dec. 2017].
- Ministry of Education of Ethiopia, 2017. Higher education information available at: <http://www.moe.gov.et/higher-education-admission> [12 Dec. 2017].
- Minnesota Population Center. 2014. Integrated Public Use Microdata Series, Version 6.3 [Machine-readable database] (Minneapolis, University of Minnesota). Available at: <https://international.ipums.org/international/> [12 Dec. 2017].

- Moriconi-Ebrard, F.; Harre, D.; Heinriks, P. 2016. *Urbanisation dynamics in West Africa 1950-2010: Africapolis I, 2015 update* (Paris, OECD). Available At: <http://dx.doi.org/10.1787/9789264252233-en> [12 Dec. 2017]
- Mueller, B.; Man-Kwun Chan. 2015. Wage Labor, Agriculture-Based Economies, and Pathways out of Poverty: Taking Stock of the Evidence. Leveraging Economic Opportunities Report #15 (ACDI/VOCA).
- Niang, I.; Ruppel, O.C.; Abdrabo, M.A.; Essel, A.; Lennard, C.; Padgham, J.; Urquhart, P. 2014: "Africa" in V. R. Barros, C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds): *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, United Kingdom and New York, Cambridge University Press) pp. 1199–1265.
- Otsuka, K.; Place, F. 2014. Changes in land tenure and agricultural intensification in Sub-Saharan Africa (WIDER Working Paper No. 2014/051). Available at: <https://www.wider.unu.edu/sites/default/files/wp2014-051.pdf>
- Page, J.; Shimeles, A. 2015. "Aid, Employment and Poverty Reduction in Africa" in *African Development Review* 27, no. S1: 17–30. doi:10.1111/1467-8268.12136.
- Plan International. 2016. A Working Future Case Study: A New Era of Collaboration. (Woking, United Kingdom) Sep. Available at: <https://plan-international.org/publications/working-future-and-new-era-collaboration> [12 Dec.2017].
- Potts, D. 2012. "Whatever Happened to Africa's Rapid Urbanisation?" in *World Economics* 13.2: 1729.
- . 2013. *Urban livelihoods and urbanization trends in Africa: Winners and losers?* Environment, Politics and Development Working Paper Series Paper No. 57 (London, King's College). Available at: <https://www.kcl.ac.uk/sspp/departments/geography/research/Research-Domains/Contested-Development/PottsWP57.pdf>
- Proctor, F. J.; Lucchesi, V. 2012. *Small-Scale Farming and Youth in an Era of Rapid Rural Change* (London, International Institute for Environment and Development).
- Rakotoarisoa, M.; Iafrate, M.; Paschali M. 2011. *Why has Africa Become a Net Food Importer? Explaining Africa agricultural and food trade deficits* (Rome, Food and Agriculture Organization of the United Nations).
- Richards, P.; Reardon, T.; Tschirley, D.; Jayne, T.S.; Oehmke, J.; Atwood. D. 2016. "Cities and the Future of Agriculture and Food Security: A Policy and Programmatic Roundtable" in *Food Security* 8.4: 871-877. DOI 10.1007/s12571-016-0597-3.
- Sitko, N. J.; Chamberlin, J. 2015. "The Anatomy of Medium-Scale Farm Growth in Zambia: What Are the Implications for the Future of Smallholder Agriculture?" in *Land* 2015 4.3: 869-887. doi:[10.3390/land4030869](https://doi.org/10.3390/land4030869) [12 Dec. 2017].
- Timmer, P. 2009. *A World without Agriculture: The Structural Transformation Process in Historical Perspective* (Washington, American Enterprise Institute Press).

- Tittonell, P.; Giller K. 2013. "When yield gaps are poverty traps: The paradigm of ecological intensification in African smallholder agriculture" in *Field Crops Research*, 143(1), 76–90.
- Tschirley, D.; Snyder, J.; Dolislager, D.; Reardon, T.; Haggblade, S.; Goeb, J.; Traub, L.; Meyer, F. 2015. "Africa's Unfolding Diet Transformation: Implications for Agri-food System Employment" in *Journal of Agribusiness in Developing and Emerging Economies* 5(2), 102-136.
- Ulimwengu, J.; Collins, J.; Yeboah, F. K., Traub, L. N. 2016. "Driving economic transformation. In Alliance for a Green Revolution in Africa (AGRA)". *Africa Agriculture Status Report: Progress towards an Agriculture Transformation in Sub-Saharan* (Nairobi, Kenya).
- Upadhyay, U.D.; Gipson, J.D.; Withers, M.; et al. 2014. "Women's Empowerment and Fertility: A Review of the Literature" in *Social Science and Medicine* 115: 111-20.
- United Nations. 2016. *World Urbanization Prospects, 2014 Revision*. (New York, United Nations). Available at: <https://esa.un.org/unpd/wup/DataQuery/> [12 Dec. 2017].
- . 2017. *World Population Prospects, 2017 Revision* (New York, United Nations).
- Vos, R. 2015. *Thought for Food: Strengthening Global Governance of Food Security*, Committee for Development Policy Background Paper No. 29. (New York, United Nations). Available at: http://www.un.org/en/development/desa/policy/cdp/cdp_background_papers/bp2015_29.pdf [12 Dec. 2017].
- Wineman, A. and Jayne, T.S. 2016. *Intra-rural Migration and Pathways to Greater Well-being: Evidence from Tanzania*. Staff Paper (East Lansing, Michigan State University).
- . 2017. Land Prices Heading Skyward? *Applied Economic Perspectives and Policy*, in press.
- World Bank. 2012. *World Development Report 2013: Jobs* (Washington).
- . 2013. *Growing Africa: Unlocking the Potential of Agribusiness*, AFTFP/AFTAI Report (Washington).
- . 2015. *Ending Poverty and Hunger by 2030: An Agenda for the Global Food System* (Washington).
- Yeboah, K.; Jayne, T. S. 2016. *Africa's Evolving Employment Structure*. MSU International Development Working Paper No. 147 (East Lansing, Michigan State University).
- . 2017. "Africa's Evolving Employment Trends: Implications for Economic Transformation" in *Africa Growth Agenda Journal*, 14(1); 18-22.