

Agricultural Productivity and Food Security in Sub-Saharan Africa

Washington Muzari

Senior Lecturer, Department of Agricultural Engineering, Chinhoyi University of Technology, P. Bag 7724, Chinhoyi, Zimbabwe

Abstract: *In sub-Saharan Africa, agriculture is the principal source of wealth and poverty reduction. In sub-Saharan African countries, agriculture is essential for economic growth, which is in turn necessary to reduce poverty and food insecurity. Unfortunately, the performance of agriculture in sub-Saharan Africa has not been up to expectations and has been characterized over the decades by ups and downs. The rural population has been unable to move out of poverty and food insecurity principally because they have not been able to transform their basic economic activity which is agriculture. Notably, productivity is still way below the region's yield potentials, agricultural mechanization is weak and declining, and the size of the agri-business industry is still nascent. Because the agricultural sector (taken in its widest sense to include crops, livestock, fisheries and forest products) is the only source of food, food security is dependent on the performance of the agricultural sector. For this reason, interventions to increase food security are primarily directed to the agricultural sector. Under the right conditions, agricultural growth underpinned by productivity gains can reduce poverty and food insecurity far more effectively than can growth in the rest of the economy. Expansion of cultivated land in many sub-Saharan African countries has been constrained by physical access, insecure land tenure, limited access to animal and mechanical power, and reduced availability of labour because of migration, competition from off-farm activities, and communicable diseases such as HIV/AIDS. Productivity has remained low because of under-utilization of water resources, limited fertilizer use, limited use of soil fertility management practices, and weak services (research, extension, finance). Recurrent droughts, plagues and related increased risks have discouraged investment in agriculture that is indispensable for raising agricultural productivity. Malfunctioning and inefficient markets (largely due to a frail private sector in most countries), insufficient investment in infrastructure, high transportation costs, weak information systems and a poor regulatory framework have hampered poor remuneration of producers and deterred and incapacitated them from investing and specializing in high-value products. Producer prices have remained low and highly volatile, and there are no mechanisms that can help minimize or share the risks borne by producers. Sufficient efforts should be made in linking production with markets. Strengthening linkages between production and input and output markets cuts the transactions costs of producers, thus improving the profitability of their enterprises and the competitiveness of sub-Saharan Africa's agricultural products in international markets. It also provides producers with additional resources to invest in sustainable intensification. Stabilization of prices is an important factor for encouraging private investment and for making agriculture an engine for growth and a basis for a solid and diversified economic growth.*

Keywords: agriculture, productivity, food security, sub-Saharan Africa

1. Introduction

Sub-Saharan Africa is the poorest region in the world. Average real per capita income in 2010 was US\$688 (in constant 2000 figures) compared to US\$1717 in the rest of the developing world (including Latin America and South Asia) (Chauvin et al., 2012). Over the past 30 years, GDP per capita growth rate has averaged 0.16% per year. This failure of growth over the long term has resulted in high levels of poverty in the region.

Today, almost 33% of the total population of sub-Saharan Africa, or close to 200 million people, are undernourished (FAO, 2005). The region as a whole remains susceptible to frequent crises and famines which are easily triggered even by the slightest of droughts, or floods, pests, economic downturns or conflicts (FAO, 2005). Sub-Saharan Africa is the only region of the world where hunger is projected to worsen over the next two decades unless some drastic measures are taken to ensure peace, improve governance and achieve the economic development required to reverse the current trend (FAO, 2005).

In sub-Saharan Africa, agriculture is the principal source of wealth and poverty reduction. Agriculture has a strong presence in the region, accounting for 64% of its employment, 34% of its GDP, and its growth explains one-third of economic growth (World Bank, 2008). Facing the

most serious starvation in the world with a 27% starvation rate (FAO/WFP, 2012), tackling agricultural development for African food production is an immediate challenge. The cultivated land per agricultural worker has steadily decreased by 59% from 1960 to 2009 (Makino, 2012). Its per capita food production has been declining for the past three decades, and cereal yields are only a quarter of the global average (Jones, 2008). Less suitable land is being cultivated and fallow periods have been shortened, causing negative impacts on land productivity since soil fertility is not being restored over time.

Thus, sub-Saharan Africa will need to swiftly improve its agricultural productivity in order to expand its agricultural production in the years ahead (Makino, 2012). In sub-Saharan African countries, agriculture is essential for economic growth, which is in turn necessary to reduce poverty and food insecurity (Jones, 2008). Indeed, the slow economic growth experienced by countries the region is to a large extent traceable to the low economic performance of agriculture (Jones, 2008).

2. The Concept of Food Security

Food security was defined in the 1996 Rome Declaration as follows: „Food security, at the individual, household, national, regional and global levels exists when all people, at all times, have physical and economic access to sufficient,

safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (Hilderink et al., 2012).

Three aspects are commonly addressed in food security studies, namely availability, access, and utilization. Availability addresses the supply side of food security and is determined by the level of domestic food production, stock levels and net food trade. Access to food is ensured when all households and all individuals within those households have sufficient resources for acquiring the appropriate foods that make up a nutritious diet. Whether this can be achieved depends on the level of household resources (capital, labour and knowledge), food prices and the presence of a social safety net. And most important under access to food is the ability of households to generate sufficient income which, together with own production, can be used for meeting their nutritional needs. Utilization of food has a socio-economic and biological aspect. If sufficient and nutritious food is available and accessible, households must decide which foods to consume and in which proportions. Appropriate food intake (balanced and nutrient-rich food) for young children and mothers is very important for nutritional status. This requires not only an adequate diet, but also a healthy physical environment, including safe drinking water and adequate sanitary facilities, as well as an understanding of proper health care, food preparation and storage processes. In addition, health care capacity, behaviours and practices are equally important (Hilderink et al., 2012).

3. Refocusing on food security and agricultural development in sub-Saharan Africa

Agricultural and food issues, which had for some time until recently, lost their appeal among the development and donor community, have once again begun to attract attention on the international arena (Makino, 2012). The reason is primarily the record-breaking rise in international food prices leading to food riots in recent years. The steep rise in world food prices could have been caused by short-term factors and structural factors (Makino, 2012).

The short-term or shock factors include crop damage caused by poor weather and natural disasters such as droughts, flooding and typhoons; and increases in energy costs, such as rising costs of transportation and input goods, such as fertilizer. Structural factors include "thin" and volatile international market structures (lower export rates compared to mineral or industrial products, and the concentration of exporting countries and regions); demand increase in emerging countries (cereal import volumes and consumption of cereals rising astronomically in countries like China and India); medium and long term constraints on the supply side (e.g. constraints on the area of arable land and water resources, slowing down in agricultural productivity growth rates); effects of climate change; and the pressure of demand increase due to expansion of bio-fuel production (Makino, 2012).

High food prices in recent years have caused the attention of African governments, donors, and international organizations to "return" to or refocus on agriculture and food security. This has led them to attempt to reform

agricultural policies. This has also motivated domestic and foreign farmers and firms to increase their production. In some respects this has been regarded as an opportunity; in others it is considered quite a timely and appropriate chance for the international community to re-strengthen their efforts to increase food production in sub-Saharan African agriculture (Makino, 2012).

Other authors add a fourth dimension to food security, namely "stability" (Townsend, 2013; HLPE, 2014). This dimension stipulates that to be food secure, a population, household or individual must have access to food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity).

4. The performance of the agricultural sector in sub-Saharan Africa

Unfortunately, the performance of agriculture in sub-Saharan Africa has not been up to expectations and has been characterized over the decades by ups and downs (FAO, 2005). Agriculture in sub-Saharan Africa is marked by low productivity with little application of science and technology (Chauvin et al., 2012). For the majority of the sub-Saharan African countries, the agricultural sector still provides a relatively large share of GDP but productivity in the sector has lagged considerably behind that of other continents and the potential of the region in that sector (Chauvin et al., 2012). While on average agriculture employs 65% of Africa's labour force, it accounts for about 32% of GDP, reflecting the relatively low productivity in sub-Saharan Africa's agricultural sector (Chauvin et al., 2012). The rural population has been unable to move out of poverty and food insecurity principally because they have not been able to transform their basic economic activity which is agriculture. Despite the fact that sub-Saharan Africa has experienced an encouraging economic growth averaging about 4.5% over the past decade or so, agricultural transformation has been slow and the growth of the sector rather sluggish. Notably, productivity is still way below the region's yield potentials, agricultural mechanization is weak and declining, and the size of the agri-business industry is still nascent (Chauvin et al., 2012). Although there have been pockets of success stories in a few countries, it is fair to say that economic growth did not spill over to the agricultural sector. The recent record economic growth experienced by many sub-Saharan African countries will be ephemeral unless it is accompanied by effective agricultural transformation (Chauvin et al., 2012).

Contrary to the widespread perception that agriculture has performed worse after the implementation of structural adjustment programmes, evidence suggests that sub-Saharan Africa's agriculture grew more than 1% faster since the mid-1980s than during the period between independence and the launching of the adjustment programmes. However, it is not yet clear who has benefited most from this additional growth; what is abundantly clear, however, is that this growth has not translated into a commensurate improvement of food security in the region (FAO, 2005). The point is that while growth did take place, it did not really lead to improved food security and reduced poverty.

However, encouraging results have been registered over the last decade in the production of cassava, exports of fruits and vegetables, tea production and exports, and fishing and aquaculture (FAO, 2005). Total food production (primary crops and meat) in sub-Saharan Africa has been growing but at a very slow rate of less than 1% per year (Chauvin et al., 2012).

5. Agricultural productivity, poverty and food security

Because the agricultural sector (taken in its widest sense to include crops, livestock, fisheries and forest products) is the only source of food, food security is dependent on the performance of the agricultural sector. For this reason, interventions to increase food security are primarily directed to the agricultural sector (Jones, 2008).

Sub-Saharan Africa's food security and human development depend enormously on agriculture. Agriculture determines food availability, the first link in the food security chain. It is the main source of income and employment for a majority of Africans, especially the poor (UNDP, 2012). Completing the circle, income and employment strengthen food security by enabling people to purchase or produce food. Agriculture also shapes the sustainability of land and water utilization in sub-Saharan Africa (UNDP, 2012).

Estimates of the extent to which poverty and food insecurity fall as agricultural productivity rises show a consistently positive relationship. For example, Thirtle et al. (2003) estimate that a 1% increase in crop yields reduces the number of poor people by 0.72% in sub-Saharan Africa. Analysis by Sachs (2005) shows a positive correlation between cereal yields in poor countries and average annual growth of GDP per capita from 1980 to 2000. Other studies have shown that productivity increases have a strong, positive impact on the rural economy, leading to increased food availability at the household level (FAO, 2004).

Sub-Saharan African agriculture involves a diverse range of crops and livestock, but productivity is particularly important for cereals and starchy roots, which provides two-thirds of total energy intake on average, and three-quarters for the poor (UNDP, 2012). More than 75% of cereals and almost all root crops come from domestic agriculture rather than imports. Farm incomes remain the main means of survival of 70% of the extremely poor who live in rural areas, and rural non-farm activity tends to prosper when farm incomes are rising (UNDP, 2012).

On average, sub-Saharan African countries have two-thirds of their economically active population involved in agriculture, and among young workers the share is even higher in some countries (UNDP, 2012). The share of women in agriculture is nearly 50% in the region, higher than almost anywhere else in the developing world; so agriculture strongly influences the condition of women.

Under the right conditions, agricultural growth underpinned by productivity gains can reduce poverty and food insecurity far more effectively than can growth in the rest of the economy. Where rural poverty is widespread and much of

the labour force lives in rural areas, increasing farm productivity has the potential to drive greater income growth and poverty reduction, accelerating food security and human development (UNDP, 2012). For a large number of Africans, especially the poorest, agricultural growth driven by productivity increases remains the best route to the equitable production of food, income and jobs. Agriculture can continue to make headway against poverty as long as smallholder and poor farmers can be integrated into new, more demanding supply chains driven by conditions set by supermarkets and by consumers in international markets (UNDP, 2012). Agriculture has the potential to generate jobs and income and expand food entitlements. In countries with low incomes, high poverty rates and a large rural labour force, accelerating agricultural growth is the most critical factor for reducing mass poverty and enhancing food security.

Rapid increases in yields can unlock the potential of agriculture. If agriculture is to advance sub-Saharan Africa's food security and human development, yields must rise, and rise fast. To offset rapid population increases and resource depletion, sharp gains in crop yields, especially for staples, must drive growth in farm output (UNDP, 2012). Higher yields will produce more food, generate more income and support good environmental management. While crop yields are not the only determinants of food security in sub-Saharan Africa, they are essential for ensuring food availability and access for a majority of Africans (UNDP, 2012).

Agriculture is by far the most dominant economic activity in sub-Saharan Africa (Jones, 2008). It employs 62% of the population in the region and generates 27% of the GDP of the countries in the region (FAO, 2006). The large share of agriculture in these economies suggests that strong growth in this sector is critical for fostering overall economic growth. The large gap between the shares of agriculture in employment and GDP suggests that poverty is concentrated in agriculture and in rural areas, and that as non-agricultural growth accelerates, many of the rural poor will remain poor (Jones, 2008).

6. Food consumption in sub-Saharan Africa

Average per capita food consumption in sub-Saharan Africa ranges between 0.7 and 0.8 tonnes of food per year (Chauvin et al., 2012). Recently, it decreased to less than 0.7 tonnes, the main reason being that population has been growing at a faster rate as compared to food production (Chauvin et al., 2012; Makino, 2012). Cereals (and roots and tubers) play a central role in food supply in sub-Saharan Africa but their production has generally lagged behind the rate of population growth (FAO, 2005). Those countries that have been able to increase their cereal production and export agricultural products have generally been those in which food security has improved (FAO, 2005).

To satisfy consumption requirements or demand for food, sub-Saharan African countries have had to rely increasingly on imports (Chauvin 2012; FAO, 2005; Makino, 2012): 25% of cereal consumption in the region is currently imported, compared to 5% in the late 1960s (FAO, 2005). This

proportion is much higher in poor countries which have a negative trade balance and high debt, for which these imports are not sustainable (FAO, 2005). The average growth rate of imported food is 5%, while the average growth rate in food production is 2%, that of cereal consumption is 2%, and that of exports is 1% per year (Chauvin et al., 2012). Dependence on imported wheat stands at 74% and imported rice stands at 41% (Makino, 2012; OECD-FAO, 2011). In some countries, food aid has become a regular source of food supply and its proportion in the cereals consumed can be 20% or more, making these countries dependent on foreign handouts (FAO, 2005).

Calories supplied by meat consumption in the region have been increasing by an average of more than 1% per decade (Chauvin et al., 2012). This increase is mostly associated with the higher income levels that allowed consumers to afford income-elastic commodities such as meat. Fish constitutes the lowest source of calories in sub-Saharan Africa. It contributes to less than 1% of total calories consumed in the region. Ghana is one of the largest fish consumers in sub-Saharan Africa because of its proximity to both the ocean and freshwater resources and the lack of animal protein substitutes due to its fledging cattle industry (Chauvin et al., 2012).

Access to food by sub-Saharan African households has been undermined by the inability of countries to generate the resources required to import food, a high and increasing level of poverty (50% or more) resulting from overdependence on subsistence agriculture, limited access to off-farm employment, sluggish development in urban areas and skewed income distribution (FAO, 2005). As a result of poor transport and market infrastructure, food either does not reach those who need it most or reaches them at excessively high prices. In some countries of the sub-Saharan African region, conflicts have constrained the flow of food and, in some cases, it is claimed that food has even been used to drum up political support or as a tool to ensure political loyalty of the populations (FAO, 2005).

Undernourishment and malnourishment are two main consequences of food scarcity. These two unfortunate situations are prevalent in sub-Saharan Africa (Chauvin et al., 2012). Both situations can be alleviated through consumption of a balanced diet and increased micronutrient intake through protein consumption. Protein supply has been increasing more rapidly since 2000 (Chauvin et al., 2012). In fact, annual protein supply growth rate between 2000 and 2007 has been 0.83% per year, compared to 0.16% annually between 1961 and 2007 (Chauvin et al., 2012). This growth has been associated with increase in income levels in sub-Saharan Africa which now allows sub-Saharan African countries to consume a more diverse diet compared to twenty years ago.

Food expenses in the sub-Saharan African region account for 50-70% of each household's budget, which is much higher than that of families in other regions (Makino, 2012). As a result, some vulnerability to external conditions, such as price hikes and poor weather, can be observed both at the national and household budget levels.

7. Food Security and Economic Growth

There are profound inter-dependencies between food security and economic growth in sub-Saharan Africa. Food security contributes to economic growth through two major pathways, namely lowering staple food prices and increased productivity (Jones, 2008). When food prices are lowered through increased availability or supply of food, this also leads to a lowering of wage rates (the wage effect), which in turn encourages expansion of output and employment in other sectors, hence overall economic growth. Secondly, increased food security leads to better worker nutrition and greater macro-economic and political stability, and the resultant outcomes are increased productivity and increased efficiency of investment, respectively. The ultimate result will be higher economic growth (Jones, 2008).

In addition, food security objectives underlie some of the contributions of agriculture to economic growth. These include the improved direct welfare effects of agricultural growth on those who participate in farming, either as farmers or farm labourers (Jones, 2008). Agricultural development for improved food security also results in increased upstream demand for inputs and downstream demand for marketing and processing (i.e. backward and forward production linkages) that accompany expanded food production (Jones, 2008).

8. Challenges/ Constraints to Agricultural Development in sub-Saharan Africa

A long list of constraints has hindered the development of agriculture in sub-Saharan Africa. However, some of these constraints can be resolved or alleviated. Sub-Saharan Africa has the necessary fertile land and labour to be food self-sufficient. However, food production faces the scarcity of inputs such as inadequate water and fertilizers (Chauvin et al., 2012). Agriculture in the region is mostly rain-dependent, and this dependence makes it vulnerable to late rainfall onsets and precludes it from obtaining the best possible output (Chauvin et al., 2012). Since food in sub-Saharan Africa is mostly produced by smallholder farmers, inputs such as fertilizers are not readily available. As the growing risks of climate change reduce the quantity of grassland every year, sub-Saharan Africa is far from becoming meat self-sufficient (Chauvin et al., 2012).

Expansion of cultivated land in many sub-Saharan African countries has been constrained by physical access, insecure land tenure, limited access to animal and mechanical power, and reduced availability of labour because of migration, competition from off-farm activities, and communicable diseases such as HIV/AIDS (FAO, 2005). Productivity has remained low because of under-utilization of water resources, limited fertilizer use, limited use of soil fertility management practices, and weak services (research, extension, finance) (FAO, 2005). Recurrent droughts, plagues and related increased risks have discouraged investment in agriculture that is indispensable for raising agricultural productivity (FAO, 2005). Malfunctioning and inefficient markets (largely due to a frail private sector in most countries), insufficient investment in infrastructure,

high transportation costs, weak information systems and a poor regulatory framework have hampered poor remuneration of producers and deterred and incapacitated them from investing and specializing in high-value products (FAO, 2005). Producer prices have remained low and highly volatile, and there are no mechanisms that can help minimize or share the risks borne by producers (FAO, 2005).

Other challenges which sub-Saharan Africa faces that diminish its capacity to catalyze economic growth and reduction of food security include low internal effective demand due to poverty; unfavourable external markets due to subsidized farm products of industrialized countries; climatic risks; limited access to technology and low human capacity to adopt knowledge-intensive skills; poor rural infrastructure which increases transactions costs and reduces competitiveness of products; institutional weaknesses for service provision to the agricultural value chain from pre-production to consumption; and weak policy and regulatory mechanisms that do not adequately support participation of local communities and private sector decision making processes in the agricultural sector (Jones, 2008; InterAcademy Council, 2004).

Another constraint on agricultural development and improved food security is political unrest and armed conflicts (FAO, 2005). They have prevented farmers from producing, displaced the populations, destroyed infrastructure and littered the country-side with landmines. Poor governance, limited interest on the part of the powerful political elite in the fate of the bulk of the population, and weak institutional capacity, have contributed to poor policies that have proven incapable of addressing the challenges of agriculture and rural development (FAO, 2005). Brain drain, hasty implementation of inadequately worked out reforms and urban bias are also prevalent in most sub-Saharan African countries. In the mineral-rich countries, macro-economic conditions have been unfavourable to agriculture and this has undermined its competitiveness (FAO, 2005).

Other reasons why sub-Saharan Africa has failed to achieve sufficient improvement in agricultural production include delays in development and dissemination of appropriate technology, shortage of input supplies (e.g. seeds, fertilizer, machines); lack of irrigation systems; underdeveloped markets or their absence; soil degradation; lack of financial access; limited public and private investment in agriculture; and capacity problems in government administration (Makino, 2012). Some factors that work against the use of new technology include sociological factors such as biases against the use of modern inputs and introduction of new production methods such as the use of herbicides, fertilizer and pesticides, and new crops especially for the local and regional markets (Chauvin et al., 2012).

In the face of a multitude of constraints, government budget cuts made in the wake of structural adjustment programmes have affected agriculture more than other sectors. The share of agriculture in government budgets declined from around 5% in 1990/91 to 3.5% in 2000/1 (FAO, 2005). Declining government agriculture budgets have grossly affected public investment in agriculture and the capacity of public

institutions to provide the agricultural sector with the public goods and services it needs so much (FAO, 2005). Small farmers living in less accessible areas have been hardest hit. Insufficient research and development for improving agricultural productivity and quality persist due to constraints on budget, organizations and personnel (Makino, 2012). With regard to agricultural extension, there are also issues of budget constraints, the limited number and quality of extension workers, underdeveloped dissemination systems, and a lack of appropriate curriculum and teaching materials. As a result, capital and agricultural productivity per worker are lower in sub-Saharan Africa than in any other region in the world (FAO, 2005).

The challenges highlighted above indicate the areas that need to be prioritized for attention in order to make agriculture realize its potential for growth and reduction of poverty and food-insecurity in sub-Saharan Africa. It is important to note that solutions to these challenges go beyond the mandates of traditional of traditional agricultural ministries, and must essentially other ministries covering sectors such as trade, science and technology, natural resource management, infrastructure, education, justice and law and order, and finance.

9. Economic Structural Adjustment and Agriculture

In response to recommendations from the World Bank and the International Monetary Fund, many African governments embarked on ambitious structural adjustment programmes in the 1980s and 1990s (FAO, 1997). One of the aims of structural adjustment was to reverse was to the unfavourable bias against agriculture in the domestic economies of the countries in the region. Strategies directed towards this objective included eliminating food subsidies; raising official producer prices and consumer prices while promoting market liberalization; and reducing foreign exchange deficits (FAO, 1997). Other measures included the dissolution of marketing boards; removal of subsidies on agricultural inputs such as fertilizers and pesticides; and promotion of food and cash crop exports (FAO, 1997).

The impacts of structural adjustment policies on agricultural performance have been variable among countries in sub-Saharan Africa. However, overall agricultural performance in the wake of structural adjustment programmes has been disappointing (FAO, 1997). There has been a negative annual growth rate in the agricultural sector in the post-ESAP period. The fact that sub-Saharan African agriculture has not met the expectations of designers and implementers of adjustment does not mean, claims the FAO (1997), that all the policies have failed. Rather, the policies implemented, particularly price incentives, appear to have been insufficient, as they often by-passed the subsistence sector. The complex circumstances of sub-Saharan African agriculture require more than price policy reform. Other problems also need to be addressed, including poor agricultural marketing structures, infrastructure, storage and transport facilities, lack of credit, land scarcity, poor input supply and other physical constraints facing the sector (FAO, 1997). Structural adjustment policies have paid insufficient attention to these problems, which helps explain

the disappointing performance of agriculture and its weak ability to provide employment and incomes to those people who depend on it for livelihood (FAO, 1997). More support will be necessary for extension work, credit availability, irrigation and encouragement of greater use of inputs such as fertilizers and improved seed.

As a result of the structural adjustment programmes implemented in sub-Saharan Africa in the 1980s and 1990s at the recommendation of the IMF and the World Bank, the system of public agencies providing farmers with access to land, credit, insurance, inputs, and cooperative organizations was dismantled (Makino, 2012). It was expected that once excess government involvement and intervention were gone, private-sector led market mechanisms would become more active and effectively function in place of the previous state and public sector controlled system. However, these outcomes were not fully realized and results have generally not been up to the expectations cited by the architects of the structural adjustment programmes (Makino, 2012).

10. HIV/ AIDS and its impacts on household food security

Energy and nutrient deficiencies, often coupled with infectious and parasitic diseases, hinder the physical performance and work capacity of humans. The resulting loss of productivity may often entail serious consequences for the food security status of affected households. Few infections have the potential for as profound an effect on food production capacities and nutritional status in sub-Saharan Africa as HIV, which causes the disease AIDS (FAO, 1997).

Present morbidity and mortality rates show that in many countries HIV/ AIDS is likely to have a significant impact on the ability of people to produce, transport, sell and buy food. In some rural districts, HIV infection levels have been estimated to exceed 30% for some age-groups.

The direct impact on farms and the serious indirect socio-economic consequences include disappearance of traditional family welfare structures, loss of a trained workforce, and reduced family income (FAO, 1997). The number of orphans is rapidly increasing in all severely affected countries, with the result that traditional coping strategies, where they still exist, may soon be overwhelmed. In some rural communities of sub-Saharan Africa, HIV/ AIDS is now resulting in labour shortages for both farm and domestic work. Besides losing the AIDS patients' labour through sickness and subsequent deaths, family members have to divert time to care for the sick and consequently neglect farm and off-farm activities. This results in loss of potential income and severe food insecurity (FAO, 1997).

Further consequences include a decline in the nutritional and health status of farm families; a decline in educational status as children are forced out of school due to difficulties faced by their households in raising school fees, or dropping out to care for the sick and infected; changes in the social system to adapt to HIV/ AIDS; the break-up of families; a growing incidence of female-headed households; and increasing numbers of vulnerable children and the rural poor (FAO,

1997). The impacts of HIV/ AIDS are likely to be most severely felt among already vulnerable groups such as the malnourished and food-insecure.

11. Opportunities for the Growth of Agriculture and Improvement of Food Security

It appears that the potential for agriculture to grow faster and contribute more effectively to pro-poor growth and increased food security in sub-Saharan Africa is greater now than at any time since the 1960s. According to Jones (2008), this potential is an outcome of three main factors, namely new opportunities arising from the changing socio-economic and political environments; a new professed willingness on the part of African governments and development partners to support agricultural development; and the emergence of localized success stories in sub-Saharan African agriculture that could be broadened, learned from, or replicated.

New opportunities arising from the changing socio-economic and political environments

A wave of economic reforms has been sweeping throughout sub-Saharan Africa. These have broadened the scope and incentives for private sector participation in the agricultural and food sector. In addition, political reforms have created space and a voice for civil society participation in the economy. There has also been increased regional cooperation, through organizations like the African Union, NEPAD and CAAP, FARA, the CGIAR's regional collaborative action plans, Regional Economic Communities (RECs), and sub-regional agricultural research organizations (SROs). The recent increased food prices on the international market favour net food exporters in the region (although they may adversely affect net food importers).

Increased population pressure on land has prompted farmers to adopt agricultural intensification, with a consequent rise in agricultural productivity and food security. The biotechnology revolution has in addition been heralded as the key to increasing food production in sub-Saharan Africa. Furthermore, the information revolution has improved access to commercial and market information by farmers and access to scientific information by researchers. Finally, the emergence of new economic powers such as China, India and Brazil has increased demand for raw agricultural products produced by farmers in sub-Saharan Africa, and availability of cheaper production and processing equipment (Jones, 2008).

A new professed willingness on the part of African governments and development partners to support agricultural development

African leaders, African governments, donors and international organizations have recently pledged to support agricultural development as a pillar of a broader economic development and poverty alleviation strategy. In July 2003, the African heads of state meeting in Maputo endorsed NEPAD's CAADP, which aims to stimulate agricultural growth in sub-Saharan Africa through a focus on smallholder agriculture and creation of enabling conditions for greater private-sector involvement. They also set a target

of 10% of their national budgets to support agricultural and rural development, up from a sub-Saharan Africa average of 2.4%.

There has also been a renewed expression of donor interest in supporting sub-Saharan Africa's agricultural development as a central pillar of broad-based growth strategies. Finally, big philanthropists such as the Bill Gates and Hewlett Foundations have recently begun to show interest in promoting African agricultural development (Jones, 2008).

The emergence of localized success stories in sub-Saharan African agriculture

Countries with recent localized agricultural success stories include Malawi (maize); Kenya (flowers and small-scale dairy); Rwanda (shade-grown coffee); and Burkina Faso (cotton), among others. The experiences of these and other case study success stories provide an opportunity for other sub-Saharan African countries to learn from, adapt or replicate whole or part components of their agricultural development programmes (Jones, 2008).

12. Conclusions and Recommendations

Improving the food security situation in sub-Saharan Africa requires not only economic growth and higher incomes, but also immediate measures to ensure adequate access to food for the hungry. Access to food through social programmes can enable the vulnerable to seize economic opportunities that may arise from development initiatives. To achieve the most direct reduction of poverty, hunger and food insecurity, priority must be given to economic growth in sectors where the poor work; that use factors of production the poor and under-nourished possess; that generate the outputs they consume; and whose development occurs in areas where they live.

The agricultural sector meets all these criteria, and has in the past proved its ability to act as a lead sector for initiating rapid growth and broad-based economic development in the medium term, particularly in less advanced regions of the world such as sub-Saharan Africa. The agricultural sector holds a prominent place in the economies of sub-Saharan African countries and constitutes the primary source of export earnings, and is also the most important source of employment. Developing the agricultural sector has proved to be more effective in reducing poverty than either the manufacturing or service sectors. The agricultural sector can also stimulate the development of rural non-farm activities, which generate income for the poor and food-insecure. Furthermore, it can also generate capital surplus, release labour for other sectors and provide a stable supply of food at affordable prices. To be sustainable, however, agricultural development needs to be supported by broader economic initiatives in the rural areas and other economic sectors.

Agricultural growth can come from expansion of cultivated land, increased productivity or diversification into higher value products. Agricultural growth can also come from reduction of wastage and post-harvest losses. For farmers to have the right incentives to practice intensive agriculture and to increase their production, both price (input and output

prices) and non-price factors (e.g. access to markets and credit) have to be favourable.

While smallholders dominate agriculture in sub-Saharan Africa, the idea of private commercial agriculture is gaining traction as a result of opportunities for economies of scale associated with mechanization and marketing. There may also be possibilities to identify smallholders with an orientation towards commercial agriculture that would help them increase their labour and land productivity. Policy makers should look at the experience with commercial agriculture both in Africa and elsewhere and how successful experiences may be replicated.

There are some success stories which demonstrate that it is possible for sub-Saharan Africa's agriculture to develop. These success stories all point towards the importance of public investment through adequate policies, appropriate institutions, development of technology, establishment of infrastructure and strengthening of human resources to achieve agricultural and rural development. Political and economic stability, and a favourable policy and regulatory framework (including land reform) are among the prominent ingredients for success.

Public services (technical advice, training of farmers and research) are essential to initiate change and development. Research and extension play a key role in adapting technological packages to farm level conditions and diffusing them to farmers. Improvements in agricultural productivity require innovations in technology and application of these technologies, as well as innovations in policies and institutions. Technological change is often a trigger for development, provided markets are responsive and absorb the additional production. This generally requires the establishment of market information systems and promotion of agro-processing industries, but in all cases the existence of public infrastructure (e.g. irrigation facilities, road and transport network) is essential. The innovation depends on the quality and quantity of human capacity and technical resources, and how well the actors involved in innovating are organized.

Capacity (human and institutional) development played a crucial role in advancing the Asian Green Revolution and will be equally crucial to the success of the sub-Saharan agricultural revolution. There is also a need for the creation of, and support for, smallholder farmer organizations and professional organizations of other private-sector operators, as well as mechanisms for consulting them before making important decisions.

Sufficient efforts should be made in linking production with markets. Strengthening linkages between production and input and output markets cuts the transactions costs of producers, thus improving the profitability of their enterprises and the competitiveness of sub-Saharan Africa's agricultural products in international markets. It also provides producers with additional resources to invest in sustainable intensification.

Stabilization of prices is an important factor for encouraging private investment and for making agriculture an engine for

growth and a basis for a solid and diversified economic growth. Macro-economic stability can also contribute to encouraging much-needed savings, while development of human resources, science and technology are essential for the longer term. Investment in agricultural research has proven to be quite profitable anywhere in the world.

All this can only occur if public organizations are efficient and their management is based on good governance, transparent practices and accountability. Governments and their partners must spare no effort to resolve armed conflicts, achieve political stability, prevent future conflicts and adopt improved governance practices.

Governments must design strategies and implement programs for income generation and access to food. Governments must reallocate resources from non-productive ministries to ministries dealing with productive sectors, and from subsidies benefiting the privileged to the provision of public goods for the benefit of all, while also improving public sector efficiency and revenue collection. Regional organizations have to promote peace and cooperation among countries in favour of food security, formulate and raise funds for agriculture and rural development projects and programs at the regional and sub-regional level.

Finally, development partners (donors and implementers) must step up their assistance to less advanced sub-Saharan African countries and orient it to programs that support increased and more stable agricultural production. Owing to the diversity of the region's agro-ecologies and agricultural systems, the sub-Saharan African agricultural revolution will have to be conceived as a series of geographically differentiated revolutions, otherwise referred to as a „rainbow of revolutions“ in development literature. It will also be a nesting of other thematic revolutions, for example an institutional revolution, a gender revolution, and a marketing revolution.

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