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LONG TERM CHALLENGES TO FOOD SECURITY AND RURAL LIVELIHOOD IN SUB-SAHARAN AFRICA

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Addressing Long-Term Challenges to Food Security and Rural Livelihoods in Sub-Saharan Africa

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ABOUT THE PROJECT

This Policy Research Paper has been prepared as part of the research which was conducted in the framework of the GDN Global Research Project, Supporting Policy Research to Inform Agricultural Policy in Sub-Saharan Africa and South Asia. Supported by the Bill & Melinda Gates Foundation, the project aims to help shape North-South and South-South debates on agricultural policies. Designed as a policy research project, it seeks to enrich the body of knowledge related to agricultural issues in two target geographies—Sub-Saharan Africa and South Asia. The views expressed in this publication are those of the author(s) alone..

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ABSTRACT

Although there have been numerous concerted efforts aimed at halting the deterioration of the global food security situation, available evidence indicates only a modest level of success especially in Sub-Sahara Africa (SSA). The region harbors about 180 million of food insecure people and had in the past experienced an increase in the number of the undernourished by 24 million people between 2003 and 2009. In addition, child malnutrition is projected to continue worsening well beyond 2030 and energy intake and other dietary needs in SSA have been characterized either by stagnation or decline compared to the upward global trend between mid 1960 and the late 1990s. This paper aims at informing agricultural policy dialogue by examining the long term challenges to food security and rural livelihood in SSA. Through a critical review of a wide range of literature, the paper provides a synthesis of the nature and pattern of food security challenges, their likely impacts and the opportunities for mitigating the challenges in the region. The economies of many countries in SSA depend heavily on agriculture with the sector playing significant roles in national poverty reduction and food security strategies. Up until early 2000, the sector generally went through policy and budgetary neglect that led to growth stagnation but there is guarded optimism now: agricultural GDP in SSA as a whole grew by more than 3.5 percent in 2008, surpassing the population growth rate, and grain production growth rates have been kept above 3.0 percent. But, despite the positive trends, SSA agriculture remains uncompetitive in the global market and the region as a whole is increasingly becoming a net food importer of major food grains thus increasing its vulnerability to food price volatility in the global markets. Furthermore, SSA still faces challenges in translating agricultural growth (as well as improved political democracy and international goodwill) into real gains in food security and nutritional status of the majority of its people. The region is yet to deal comprehensively with a number of problems: agriculture's low absorptive capacity partly due to weak institutional capacity; low per capita incomes that restrict effective demand; lack of social equity in resource ownership; diseases such as malaria and HIV/AIDS; persistent insecurity hot spots; and, high level corruption. These problems are likely to be compounded in future by climate change impacts in the face of numerous pockets of highly vulnerable communities, especially those living in arid and semi-arid zones; lack of resources needed for climate change adaptation; rising rural populations combined with high incidence of poverty and rising dependency ratios; scarcity of arable land (a consequence of both rising populations and degradation); and, urban youth unemployment. The paper offers strategies not just for managing the future challenges to food security in SSA but also recommends ways of taking advantage of the opportunities that are likely to emerge, for example, from rising urban populations and per capita incomes, increased food supply responsiveness by smallholder farmers and agro-processors, international cooperation and support, and increased investment inflows due to deepening of south-south cooperation.

1 INTRODUCTION

1.1 Background

Food security is when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. There are therefore three key pillars to food security: availability, access and utilization, the latter referring to the nutritional value of food (World Food Summit 1996). Further, it is expected that in a food-secure community, access to food, whether from local sources or from imports, is socially just and environmentally sustainable. Food security is thus a development issue that is closely linked to health and nutrition, sustainable economic development, environment and trade. The root cause of food insecurity in developing countries is the inability of people to gain access to food due to poverty (Inter Academic Council, 2006). In Sub-Sahara Africa (SSA), the problem of food insecurity is further exacerbated by the fact that only 5% of the cropped area is irrigated, compared to 14% in Latin America and 37% in Asia (Ringler et al, 2010); the sector is therefore highly prone to weather-related risks. The agriculture sector accounts for: 20% of the region's GDP, 15% of exports, and 60% of employment (World Bank, 2009). An estimated 40 percent of people in SSA are said to live below the poverty line, with both income and human poverty increasing. While the rest of the world has made significant progress towards poverty alleviation, Africa, and in particular Sub-Sahara Africa, continues to lag behind. Many factors have contributed to this tendency including the high prevalence of HIV/AIDS; civil wars; poor governance; and, frequent drought and famine.

As a way of focusing the attention of the global community towards the problem of poverty, the World Food Summit in 1996 set a target of reducing by half the total number of undernourished people worldwide by 2015. This commitment was reaffirmed at the turn of the century with the establishment of the Millennium Development Goals (MDGs). However, according to recent estimates, only three African countries are likely to reach this goal, namely, Ghana (that reached this target in 2011), Mauritania and Egypt (Omilola et al, 2010). Over a dozen countries are likely to achieve one of the MDG1 elements – halving poverty or hunger by 2015. The absolute numbers of hungry people in SSA have not reduced in recent years and the situation has continued to deteriorate partly due to the upward trend in global food prices, excessive price volatility and rising energy costs amidst a global financial crisis that constrains development funding and humanitarian aid. The wide socio-economic diversity of Africa makes it extremely difficult to offer a common prescription on how to deal with the twin problems of poverty and food insecurity. However, it is generally agreed that for countries with abundant land and water resources, agriculture offers the most realistic basis for achieving broad based economic growth that can be translated into increased employment opportunities and rural household incomes. A realization of this important link between agriculture and sustainable economic growth has brought the sector back into the agenda of Africa's political leadership and its development partners. The Maputo Declaration in 2003 which commits signatories to allocate at least 10 per cent of national budgets to agricultural development in order for the sector to grow by at least 6% annually, is a clear testimony of the renewed interest in the sector.

Following the food crisis of 2007/08 and again in 2010/11 that had serious adverse impacts on the food security status particularly of net food importers/buyers, the issues of domestic food production & distribution have assumed a degree of urgency never witnessed before even among the natural resource rich countries in Africa. Although the contribution of agriculture to food security is being articulated quite cogently in the national development plans, SSA still performs quite poorly in terms of implementation and coordination of policy strategies that aim at increasing performance and global competitiveness of the sector. The capacities of institutions managing agriculture & related industries have remained weak and rarely are the complementary programs (for example, on empowerment of rural communities, health, education, infrastructure, adoption of new technologies and market access) pursued with any degree of consistency and finesse. For countries whose economies are driven predominantly by non-agriculture based industries such as mining, oil and services, challenges relating to growth sustainability, equity in the distribution of national income and other global market forces often create risks that overstretch national resource capacities and hence ability to guarantee food security to all citizens.

Generally, poverty and food insecurity still remain as major concerns in SSA with the situation getting more precarious whenever there are natural disasters, civil unrest and exposure to extremes in the global markets. This paper examines the long term challenges to food security and rural livelihood by presenting a critical review of two distinct but related issues: the nature and pattern of investment in SSA agriculture with analysis of the present situation and prospects for improving its performance in future (Section 2); and, sources of future stress to food security in the region dwelling largely on climatic and demographic changes as well as trends in global food prices (Section 3). In Section 4, the paper proposes policy strategies for averting the impacts of future challenges to food security and/or means of ceasing the opportunities that are unique to SSA in order to manage future impacts of climate and demographic changes. The paper does not dwell on strategies for achieving food security and rural livelihoods in SSA because this has been the subject of intellectual and development discourse for over two decades. However, the heavy focus on agricultural development is intentional and consistent with the overall goal of promoting evidence-based policy making & the significant role the sector plays as a source of food security and livelihood for large rural populations in many countries in Africa.

1.2 Consumption and Nutrition Patterns

In spite of the immense attention being directed to the issue of food insecurity globally, the rate of decline in the number of food insecure populations is still too modest. About 180 million food insecure people, those without access to adequate food to enable them lead healthy and productive lives are in Sub-Sahara Africa (SSA), this count having doubled since 1969–71 (Per Pinstrup-Andersen et al, 2001). FAO (2010) estimates that the number of undernourished people in SSA increased by 24 million between 2003-05 and 2009, largely as a consequence of the food crisis of 2007-08. Countries with the worst hunger indicators as shown by the global hunger index (GHI)[1] are predominantly in SSA, notably where civil strife and wars have persisted: D. R. Congo, Eritrea, Burundi, Niger, Sierra Leone and Somalia (Von Grebmer et al., 2008).

[1]The GHI is a tool developed by IFPRI for regularly tracking the state of global hunger and malnutrition and is designed to capture several dimensions of hunger and under-nutrition including: insufficient food availability (as compared to requirements), shortfalls in nutritional status, and deaths that are directly or indirectly attributable to under-nutrition. This definition is closely related to, but goes beyond the original UNICEF framework that aimed at capturing only three indicators - stunting of children under 5, maternal mortality and child mortality.

Sub-Sahara Africa suffers to a large extent from repressive regimes and political instability that often seriously disrupt food production and distribution. It is the only region where the number of malnourished children has consistently increased since 1970, and also the only region where the absolute numbers are projected to continue to increase through the year 2050. Estimates using IFPRI's IMPACT model show that without climate change, child malnutrition levels in SSA will decline to 24 percent by 2030 and 19 percent in 2050. The absolute number of malnourished children would increase from 30 million in 2000 to 38 million in 2030 before declining to 30 million in 2050. Under moderate climate change, child malnutrition in the region would increase by an additional 1 million and 0.6 million children by 2030 and 2050, respectively (Ringler, et al, 2010).

Globally, there has been a general upward trend in food consumption in terms of kcal/capita/day of dietary energy. On average, comparing the mid-1960s to the late 1990s, energy intake increased by approximately 450 kcal worldwide and in developing countries the increase was about 600 kcal per capita per day (Table 1.1). However, this trend is not evident in SSA with figures from this region showing that dietary energy consumption remained stagnant for most of this period. Projections for 2030 show that, without intervention, dietary energy consumption in SSA will still significantly be lagging behind the world average.

Table 1.1
Global and regional per capita food consumption projections - kcal per capita per day

Region	1964 - 66	1974 - 76	1984 - 86	1997 - 99	2015	2030
World	2358	2435	2655	2803	2940	3050
Developing countries	2054	2152	2450	2681	2850	2980
Near East and N. Africa	2290	2591	2953	3006	3090	3170
Sub-Saharan Africa	2058	2079	2057	2195	2360	2540
Latin America/Caribbean	2393	2546	2689	2824	2980	3140
East Asia	1957	2105	2559	2921	3060	3190
South Asia	2017	1986	2205	2403	2700	2900
Industrialized countries	2947	3065	3206	3380	3440	3500
Transition countries	3222	3385	3379	2906	3060	3180

Source: FAO, 2003

Per capita consumption of major dietary items has remained largely stagnant in SSA and the region lags behind in dietary diversification which is a complimentary measure of food security and nutritional well being. According to a WHO/FAO report (2003), the increase in the quantity and quality of the fats consumed in the diet is an important feature of nutritional transition. There has been a remarkable increase in the intake of dietary fats over the past three decades but consumption in SSA has stagnated compared to the global trends. The region's per capita consumption of livestock products and fruits and vegetables falls below recommended levels despite positive signs of growing per capita incomes and increasing urbanization that should give some impetus to dietary changes.

The world's population is projected to reach 7.5 billion by 2020. A significant proportion of the increase in population will occur in developing countries, more specifically in the urban areas. While rapid urbanization, growth of per capita incomes in developing countries, rising food prices and renewed focus on agriculture signal opportunities for stimulating food supply, the benefits remain highly concentrated. Due to lack of resources, poor farmers in SSA continue to be trapped in abject poverty despite the abundance of economic opportunities around them. All major regions of the world are expected to experience income increases, but Sub-Sahara Africa's average per capita incomes are too low and therefore quite likely to remain below one dollar per day even by 2020 thereby condemning many people in the region to persistent food insecurity. Wodon and Zaman (2008) state that there is a fairly close relationship between poverty and food prices: a 50 percent increase in food prices relegated, on average, 30 million people into poverty in a sample of SSA countries comprising Mali, Burkina Faso, Ghana, D. R. Congo, Guinea, Liberia, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

Generally, SSA has been performing poorly in terms of the key parameters that are considered to be of significance to the region's food security: a) agricultural performance and, in particular, growth in food production; b) poverty; c) functional markets supported by efficient infrastructure and sound macroeconomic policies; and, d) resilience to global impacts arising, for example, from food price volatility and climate change.

1.3 Agricultural performance, poverty and food security in SSA

1.3.1 Trends in agricultural production and trade

Between 1970 and 2000, annual growth rates for grains in SSA averaged below 3%; population growth outpaced agricultural output growth and average food production per capita consistently declined putting large segments of the population at the risk of food insecurity and malnutrition (Abbott and Battisti, 2011). For the continent as a whole, annual per capita production of cereals fluctuated between 140 kg and 175 kg during the 1990s, compared to a global average of 358 kg. Table 1.2 presents a range of agricultural indicators that show that SSA performs poorly in terms of the percentage of irrigated arable land; and, it trails other world regions in terms of value added per worker, fertilizer use, and productivity growth in both crops and livestock activities.

In addition to lagging behind other regions in terms of productivity gains, African agriculture is also becoming increasingly uncompetitive in global markets as highlighted in a review paper by Byerlee (2011). World agricultural trade, the author points out, has approximately tripled in nominal terms in the past 15 years with demand being spearheaded predominantly by China and the Middle East, regions that face severe land or water constraints compared to Africa. African countries have fared rather poorly in capturing these expanding markets and although the continent contributes about 12% of the world population and 5% of agricultural GDP, its share of global agricultural exports has declined from 8% in the 1960s to just 2% in 2009. Much of this decline occurred during the pre-structural adjustment period, but it has continued to fall since 2000 at a time when global exports were steadily rising. Countries in Sub-Sahara Africa particularly performed poorly in terms of increase in the value of net food and agricultural exports over the period 1993-2008 compared, for example, to Brazil, Argentina and Southeast Asian nations. While there have been success stories of countries (e.g. Cote d'Ivoire, Ethiopia, Kenya, Ghana, Uganda, Mozambique and Zambia) that increased their agricultural export market share since 1991, 15 out of 24 countries with a population of over 10 million in Africa lost their share. Conversely, food import shares have been trending upwards thus changing SSA from being a net agricultural exporter in the 1970s to a significant net agricultural importer in the 2000s. Africa's share of global imports increased for all commodity groups, ironically including those for which available technologies and supply of land and labor should confer the continent some degree of comparative advantage. Similarly, Africa's milk and poultry imports have risen rapidly reaching about $US 2.7 billion in 2008 (Byerlee, 2011).

Table 1.2
Agricultural indicators by region

	World	Africa	Sub-Sahara Africa	Latin America & Caribbean	Near East & North Africa	South Asia	East Asia & Pacific	Middle income countries	High income countries
% of irrigated arable land	20.0	7.0	3.8	11.6	28.7	39.3	31.9	19.9	11.9
Added value per worker ($/year)	645	416	285	3 028	1 859	412	461	335	17 956
Per capita cereal production (kg/year)	349	147	128	259	128	224	336	339	746
Cereal yield (kg/ha)	2 067	1 225	986	2 795	1 963	2 308	4 278	2 390	4 002
Livestock productivity	193	164	128	198	147	121	150	191	248
Fertilizer use (kg/ha)	100	22	9	85	69	109	241	111	125

Source: FAO, 2007 – The State of Food and Agriculture in 2007 (Note: the data is composited over recent years but the periods covered for the different indicators may vary slightly)

Recent events in global financial markets, recurrent food crises and climate change impacts have shifted considerable attention to agriculture especially in Africa where such events have had profound influence on the incidence of poverty and food insecurity. The instability of global markets seems to have provoked serious questions regarding the ability of markets (and in essence, unbridled capitalism) as a basis for resource allocation, and in particular distribution of food products and requisite inputs from surplus to deficit regions. In Africa, where poor transport and communication infrastructure is a major contributor to production and distribution costs, instability in the global food prices can have particularly dire consequences on the welfare of the largely rural populations[2]. Although Africa is actively pursuing export oriented policy strategies, market liberation and regional integration, the recent food crises seem to have awakened a sense of urgency about national food self-sufficiency and renewed commitment to agriculture.

While SSA performed relatively well in grain production, instability in the growth rates point to high over-reliance on rainfall and under-utilization of the irrigation potential – Table 1.3. Production is still characterized by underuse[3] of improved seed varieties and fertilizer, poor access to credit facilities, high post-harvest losses and low technical efficiency even among the large scale producers. Although the problems of poor access to rural credit and low adoption of technological innovations are being tackled through various policy strategies (e.g. institutional reforms, input subsidies and price incentives), the interventions generally suffer from lack of finesse in policy implementation, poor targeting, market distortions and inability to scale up and sustain programs especially where they are largely donor driven.

Table 1.3
Grain production – Annual growth rates (percent per year)

	1970-80	1980-90	1990-2000	2000-2005	2005-06	2006-07	2007-08	2005-08
Global	2.9	2.2	0.4	1.8	-0.8	5.8	5.1	3.3
Major Exporters	3.6	1.5	0.8	1.0	-6.4	11.5	4.5	2.9
• United States	3.7	1.5	0.9	1.3	-7.6	22.8	-2.8	3.3
• European Union	3.5	1.4	-1.0	0.5	-5.8	-2.4	21.1	3.6
• Argentina	3.4	-2.6	5.0	-1.0	26.3	1.9	-39.0	-7.7
• Brazil	4.8	1.1	3.9	2.0	10.9	16.2	-7.7	6.0
• China	3.7	4.0	0.0	1.5	6.2	1.0	5.6	4.2
• India	2.1	3.2	2.1	0.2	1.0	8.5	0.9	3.4
Africa	2.6	1.3	1.8	4.4	9.6	-1.5	3.7	3.9
• North Africa	1.9	3.3	0.0	5.9	19.1	-18.1	3.6	0.3
• Sub-Sahara	2.8	0.8	2.3	3.9	6.8	4.1	3.8	4.9

Source: Abbott and Battisti (2011)

[2] The remoteness of the locations of rural farming communities in SSA does not necessarily insulate them from the impacts of global price instability. There are a number of reasons for this: poor farmers are affected by government policy responses (such as trade regulation, safety net programs, etc) and costs of imported agricultural inputs such as fertilizer and petroleum products rise relatively more where infrastructure conditions are poor. Similarly, poor framers are more vulnerable to spikes in domestic food prices as the majority of them are usually net buyers.

[3] Although seed quality and availability are major problems for agricultural producers, especially among the smallholders, effective demand is still a major concern considering the relative lack of varieties specifically adapted to farmers' conditions with poor soils, extreme stress and risks inherent under conditions where irrigation is not practiced and access to credit is low.

1.3.2 Agriculture in Sub-Sahara Africa has grown but food consumption remains low

Since 2003, the number of armed conflicts in SSA has been reduced to just about 4 hot spots although skirmishes that have the potential of slowing down economic growth creep up from time to time. There is progress in macroeconomic management with the improved business environment making it possible to foster more enduring public/private sector partnerships. Similarly, in much of SSA, there have been significant advances in democracy, strengthening of the civil society, freedom of the press and adherence to principles of human rights and equality. These positive trends in governance have led to a significant acceleration of economic growth: in the last decade, the rate of economic growth for Africa rose to 4.6 percent. To some extent, this growth is explained by improved infrastructure, expansion of the manufacturing sector, vibrant telecommunication network (symbolised by increased mobile phone and internet use) and rapid increase in foreign investments, notably from China, India, Brazil and Turkey (Economist magazine, December 2011). While Africa's agricultural growth performance has mostly been achieved through expansion of land area and to some extent driven by stronger commodity prices, there is a definite upturn and a break from past gloom. The agricultural GDP in SSA as a whole grew by more than 3.5 percent in 2008, compared to a population growth rate of 2.0 percent and grain production growth rates have been kept above 3.0 percent (FAO, 2009b).

In spite of all the positive gains SSA agriculture has made in the last two decades, there does not appear to be corresponding increases in food consumption even in the distant future (Wodon and Zaman, 2008). As already shown earlier in Section 1.2 (Table 1.1), projections for 2030 show that, without intervention, SSA will still fall short of the world average per capita dietary energy consumption. And, according to estimates by IFPRI, SSA is the only region where the absolute numbers of malnourished children are projected to continue increasing through the year 2050 (Ringler et al, 2010). The main challenges are seen as: the fast-growing rural population in SSA that imply that considerably higher income growth will be required in order to turn the negative trends around; agriculture's low absorptive capacity; wide spread poverty and discrimination against women and youth (lack of social equity)[4]; diseases such as malaria and HIV/AIDS that persist in much of the region and which have direct impacts (e.g. by lowering agricultural productivity) and indirect impacts (through household asset depletion); per capita incomes that are currently too low and are projected to increase only marginally in future; and, low capacity of the region to deal with weather related disasters.

Regional integration is a promise for market expansion and increased trade in agricultural products; however, free movement of goods and services is hindered by a plethora of non-tariff trade barriers (NTBs). Trade among African nations is also restricted by the rudimentary transport and communication infrastructure that seriously affect land-locked countries. In addition, fear of losing tax revenues especially by smaller countries and entrenched vested interests that tend to perpetuate production inefficiencies among the so called infant industries add to a long list of trade impediments. These barriers increase the cost of doing business among African nations and although some countries have increased their intra-regional trade volumes after signing free trade protocols, many are not gaining and continue to seek trade arrangements with the North where the heightened levels of risks as well as requirements for product quality and standards lock out capital constrained small farmers.

[4] For many countries in SSA, over half the population is aged under 25 and most are not interested in agriculture

1.3.3 Policy reforms targeting agriculture sector in SSA

Many African governments have adopted policies aimed at reorienting their economies towards market regimes although with varying degrees of commitment and success. The reforms have brought some progress in economic growth in many countries but, in some cases, agriculture suffered from stagnation as governments reduced their human and financial support to the sector in lieu of developing domestic manufacturing capacity. By and large, macroeconomic and trade policy reforms have led to a gradual reduction in indirect taxation of agriculture relative to 1980s thus encouraging investment (Anderson and Masters, 2009). Similarly, regional integration initiatives aimed at improving policy harmonization have raised prospects for achieving economies of scale and competitiveness of agribusiness firms based in the region. A number of countries in SSA are now venturing into innovative institutional arrangements and multi-agency partnerships such as rural banking, mobile phone-based money transfer and control/eradication of transboundary crop and livestock diseases.

Africa as a whole is embracing the NEPAD's Comprehensive African Agricultural Development Program (CAADP) as a blueprint for increasing investments to the agriculture sector. The aim of CAADP is to improve food security, enhance nutrition, and increase rural incomes by increasing annual public budgetary allocations to agriculture to 10 percent of national budgets and raising agricultural productivity by at least 6 percent per year. The program is premised on the belief that agricultural growth is essential for improving the welfare of the vast majority of Africa's poor that are disproportionately rural based and hence a means to achieving and sustaining broad-based economic growth.

The CAADP implementation has been rather slow since its launch in 2003 and in many countries the program still faces difficulties of ownership and re-aligning of national policies to conform to its goals (Ackello-Ogutu et al, 2009). In 2007, only about 15 percent of African countries were spending at least 10 percent of their total budget allocations on agriculture; this figure increased to about 36 percent in 2008 (Fan et al, 2009). A number of issues ranging from low stakeholder participation in the CAADP process to poor data availability and quality have exacerbated the challenges of meeting the target goals (Morton, 2010). However, CAADP signaled a major paradigm shift in African Union (AU) member nations' political support and realignment of their national policies and agendas away from budgetary neglect of agriculture.

As a result of the concerns to get agriculture going, particularly following the awareness created by CAADP, other complementary efforts have emerged that are likely to strengthen the contribution of agricultural science, technology and innovation to the region's agricultural development and food security. One of these efforts is the 2006 Framework for African Agricultural Productivity (FAAP), which provides a roadmap to improving agricultural productivity by enabling and accelerating innovation. Importantly, FAAP is motivating bilateral and multilateral donors to take a more coordinated approach to funding agricultural development programs and responding to stakeholder priorities thus harmonizing activities at the country, program and project levels. FAAP responds to CAADP Pillar IV by providing a strategy for revitalizing, expanding and reforming Africa's agricultural R&D capacity and shifting away from a technological package approach towards more focus on integrated innovation systems that actively engage public, private and civil society stakeholders (FARA, 2006). CAADP's Pillar III Framework for African Food Security supports government's design of agricultural programs to ensure broad-based pro-poor growth and improvement in food security.

The organization of the production structure changed further during the 1990s with smallholder participation in production declining significantly between the early 1990s to late 1990s and even further in the new decade. By the early 2000s, smallholders accounted for approximately one-quarter of the export fruit and vegetable production (Dolan and Humphrey, 2000; Dolan & Sutherland, 2002). More recent estimates indicate that the number of smallholder farmers in the FFEV industry is 500,000 (Jaffee et al, 2011). There have also been changes across individual products destined for different export markets. For instance, the share of smallholders in the production of beans—the major fresh export vegetable—fell from more than 60% in the 1980s to 27% in the late 2000s. However, smallholder production of snowpea has increased significantly since the mid 1990s (Jaffee, 2003). Production and export of fresh fruits notably passion fruit and avocadoes also plummeted in the mid to late 2000s mainly because of crop disease, especially in passion fruit.

2 INCREASING INVESTMENTS TO SSA AGRICULTURE

2.1 Public investment in agriculture

The fact that SSA failed to join the Green Revolution band wagon that led to a rapid growth in the production of food grains (particularly rice and wheat) in South Asia is largely as a result of the region's public sector not playing a lead role in creating an enabling environment in the form of agricultural R&D; rural infrastructure; access to markets and financial services; and, policy support (Hazell, 2009). The role of governments in providing such key public goods in order to achieve agricultural intensification and commercialization is well recognized. However, in reality, the sector suffered from a long stretch of historical neglect and many countries are just playing a catching up game as more challenges emerge. These challenges (which include declining soil fertility, water scarcity, the ease of spreading plant and animal diseases/pests, large but aging rural populations and climate change) mean that for the SSA to achieve food security, it can no longer be business as usual. Indeed, policymakers in SSA are now increasingly recognizing that investment in agriculture is essential not only for increasing the welfare of rural households but as a means of cushioning the region from global and weather related impacts. The attention that the agriculture sector has been receiving recently is not just in terms of policy reforms and initiatives such as NEPAD/CAADP but also in the form of, inter alia, increased investments in rural infrastructure (energy, transport, irrigation and water and sanitation), increasing application of science and technology (e.g. debate on the spread and use of GMOs), support to commodity value chains, creating an enabling environment for value addition and building viable public/private partnerships.

The public sector is also playing a leading role in support to agricultural research and development (R&D). The history of R&D in SSA is characterized by limited agricultural research infrastructure left behind by the colonialist at independence, and the relatively low interest of national governments and aid donors in funding this kind of public good. At independence, some countries inherited very specialized research institutes often focused on export crops that suited the needs of the colonialist with little attention given to the production problems of small-scale farmers who had minimal physical, human resource or organizational research capacity (Beintema and Stads, 2004). The early years of the post-independence era saw some shift in emphasis towards food crops, and also catch-up investment in local human capacity building to replace colonial expatriate staff with national researchers and enhancing infrastructure.

During the era of global food abundance from the late 1980s into the 2000s, funding trends show declining public spending in agricultural R&D with slight variation across countries. There has been growth in public expenditures in R&D in a handful of countries like Ghana, Kenya, Nigeria, Sudan, Tanzania and Uganda, but for Africa as a whole public expenditure on R&D has either stagnated or has been too low to make any sizable difference in rural development and poverty reduction (Ariga, 2011). The same study, drawing evidence from Beintema and Stads (2006), found that overall R&D levels stagnated in the 1980s and 1990s while a study conducted covering the period 2001-2008 shows a slight increase in the level of public spending (under inflation adjusted purchasing power parity). Where change was evident, most expenditure was on rehabilitating neglected infrastructure and augmenting low salaries in public research institutions that normally receive about a third of their national budgets from donor funding in addition to support received through collaboration with the CGIAR centres.

As would be expected for a public good, agricultural R&D in SSA is characterized by marked dependence on government support that accounted for over 75 percent of the agricultural R&D capacity in 2000 (Beintema and Stads, 2011). However, some level of investment in R&D is enjoyed by a number of countries through non-profit institutions that are often linked to producer organizations. These institutions were found to be financing coffee in Kenya, Tanzania and Uganda; sugar in Mauritius and South Africa; and, cotton in Zambia. However, contribution of non-profit organizations account for only 3 percent of Africa's total public agricultural research capacity. In 2000, Africa invested $0.70 for every $100 of agricultural output; an intensity ratio lower than the 1981 level of $0.95. Ratios ranged from 0.2 percent or lower in the Gambia, Niger, and Sudan to over 3.0 percent in Botswana, Mauritius, and South Africa; the latter being higher than the intensity ratios in many Western countries (Beintema, 2005).

The absolute levels of public agricultural R&D spending and staffing capacities vary considerably across the 32 countries covered by the agricultural science and technology indicators (ASTI) initiative. In 2008, Nigeria, South Africa, and Kenya invested $404 million, $272 million, and $171 million, respectively, on agricultural R&D, whereas a further 11 countries spent less than $10 million each (all measured in inflation-adjusted purchasing power parity dollars). Some countries reported such low investment levels that they were unlikely to have a sustainable impact on rural development and poverty reduction. The 2008 distribution of research staff by country follows a similar pattern, with Ethiopia, Kenya, Nigeria, and Sudan each employing more than 1,000 full time equivalent (FTE) researchers, and nine additional countries employing fewer than 100 FTEs each (Beintema and Stads, 2011).

2.2 Private sector investment in agriculture

In recent years, agriculture has been increasingly perceived as a sector that offers investment opportunities for the private sector and as a prime driver of agriculture-related industries and the rural non-farm economy (World Bank, 2007)[5]. However, farm production remains dominated by self-employed farm households in Africa as it is elsewhere around the world, thereby influencing the prospects for agribusiness to sell farm inputs or market farm outputs. They face actual and perceived business risks that cannot be mitigated in a cost-effective manner and have been cited to be among the most significant reasons for low agribusiness investment in Africa (CEPA, 2005). The factors influencing private agricultural investment are: size of the market, availability of natural resources, cost of doing business, macroeconomic environment, access to finance and technology and support services.

[5] It is generally well known in the agricultural transformation literature that the relative significance of the sector in GDP shrinks as its productivity increases but the sector remains a significant player in the economy as it supplies raw materials and labor to other sectors. Agriculture is also important for earning foreign exchange and its increased incomes forms a basis for domestic demand for manufactured goods and services.

Activities linked to agricultural production are also attracting foreign direct investment (FDI), including food processing, transport and marketing. Mhlanga (2010) notes that the recent wave of interest in purchasing farmland in some SSA countries, is primarily driven by the need of investor countries to ensure their long-term food and bio-fuel supply, and the suitable agro-climatic conditions in the host countries. These deals are a potential source of increased investments in the sector and they also offer opportunities for transfer of technological skills, depending on the comparative advantages of the firms involved. However, to date, most of the deals have not resulted in actual investment. Examples include: Daewoo Logistics (Republic of Korea) that had interest on leasing 1.3 million ha of land in Madagascar; United Arab Emirates, through the Abu Dhabi Fund for Development, and Saudi-based Hail Agricultural Investment (with interests in Sudan); UK bio-fuel company, D1-BP Fuel Crops (with plans to grow jatropha in Ethiopia, Madagascar, Swaziland and Zambia); and, Flora EcoPower of Germany, that planned to lease 8,000 ha in Oromia Province of Ethiopia for the cultivation of castor seeds. Other ventures include: Odebrecht from Brazil which announced plans to invest in Angola's sugar and ethanol sector; Dole Food Company and Chiquita Brands of the United States of America (aiming to revive the banana industry in Angola); and, Qatar that is considering leasing 40,000 ha of farmland in Kenya as part of a deal to fund the construction of a new multi-million-dollar port in Lamu.

Contrary to what happens in developed countries, the contribution of the private sector to agricultural research in Africa is still very low, accounting for only 2 percent of total investment in research. Private involvement through donor agencies is tilted towards funding of research and development of public agencies (Ariga, 2011). Private investment in R&D in SSA received only $26 million (or 1.7 percent of total R&D funding), mostly spent on crop improvement (Beintema and Stads, 2006). Most of the private sector R&D in developing countries is involved in adaptive research geared towards testing and adapting input technologies from the developed world. In addition, the private sector is playing an increasing role in financing research (instead of conducting research) and many organizations are contracting government agencies and universities to do research on their behalf – for example, the Bill & Melinda Gates Foundation,
Ford Foundation and Rockefeller Foundation.

2.3 Prospects for global funds for agriculture in SSA

2.3.1 Trends in donor funding to agriculture

One of the key assumptions about growth of African agriculture is that there will be continued interest in the sector, despite volatility of global food prices and the woes in financial markets that threaten ODA inflows to the sector. There is evidence showing that donor support to agricultural development has been on an upward trend since around 2001. The main factors driving this change include concerns about rising international commodity prices, and recognition by SSA governments of the important role of agricultural growth in ensuring local food security. Many countries in SSA are also putting in place enabling environments, including institutional reforms, legislations, innovative approaches and political commitment to ensure that projects are run efficiently and cost-effectively (World Bank, 2011). Funding commitments to developing countries was also given impetus when, in 2000, 189 countries signed the United Nation's Millennium Development Goals (MDGs), committing themselves to a number of goals, including halving of extreme poverty and hunger by 2015. For SSA, this commitment was further bolstered by the NEPAD/CAADP framework that elicited pledges and seed money in the form of a multi-donor trust fund amounting to US$ 60 million. However, progress towards regional and national ownership of the MDGs and NEPAD/CAADP has been slow just as have been the donor funds inflows (Spielman et al, 2011).

The MDGs, CAADP and FAAP on their own may not have been capable of catalyzing new resources from foreign donors or governments for agricultural development in Africa. The entry of Bill and Melinda Gates Foundation (BMGF) in 2005 appears to have synergized these initiatives. Between 2003 and 2011, BMGF awarded 269 grants totalling US$ 1.822 billion for agricultural development, of which, 152 grants totalling US$ 1.142 billion were partly or entirely for agricultural development in Africa, while 80 grants totalling US$ 642 million were partly or entirely directed specifically to agricultural R&D in the region (Spielman et al, 2011). An important BMGF investment worth noting is the Alliance for a Green Revolution in Africa (AGRA), established in 2006 as an initiative owned and driven by African priorities. AGRA receives BMGF funding to the tune of US$ 4.2 million per year and presently funds a diversified range of investments in agricultural science (e.g. cultivar improvement and bio-fortification), capacity building and market development (Morton, 2010). While BMGF is not the only player in the field, its funding to agricultural development in 2009 was quite sizeable: 43 percent of the US$639 million that the United States Agency for International Development (USAID) invested in agricultural development and about 11 percent of the $2.6 billion that multilateral and bilateral donors committed in that year. BMGF has also helped convene several agricultural research initiatives that have been successful in leveraging funding from other donors.

The renewed donor interest in agriculture is quite encouraging. However, for donor funds to achieve desirable results and outcomes, the absorptive capacities of the recipients (e.g. smallholder farmers) must be raised through education and institutional innovations that empower them to participate in the projects as equal partners. While this can be flagged as one of the major factors contributing to lack of effectiveness of donor funds in SSA, there are other grey areas. It is safe to say that donor funding is not always such a binding constraint to agricultural development in SSA compared to problems of bad governance and corruption that can easily consume large proportions of donor funds: the channels are usually too long and mired in bureaucracy right from the donor and in SSA, beneficiaries would be lucky to receive US$ 20 out of every US$100 appearing on the signed documents. Furthermore, donor interests tend to change too frequently and the institutions in many countries in SSA simply do not have the human capacity to coordinate numerous donor reporting requirements at the same time. This institutional capacity problem encourages development partners to use foreign experts who lack the knowledge of how local politics influences allocation of national resources. There is now a drive towards new donor architecture to iron out these weaknesses, particularly to ensure donor funds are locked to specific national goals rather than following the strategic objectives of the donor or political whims in the lending country or institution. For the benefits of this new realignment to be realized, there will be need for change in mindset, on both sides.

2.3.2 Donor response to the global food crisis

Spielman et al, (2011) state that "neither the increase in political will generated by the MDGs and NEPAD/CAADP, nor the leadership provided by BMGF, nor the entry of new donors from the private sector and the South were able to catalyze change like the global food price crisis of 2007–2008". The spikes in food prices in 2007 and again in 2010 caught SSA countries unawares, particularly the net food importers.

Although countries resorted to safety net measures to protect the ultra-vulnerable populations, the budgets required for both emergency as well as long term strategies were beyond the fiscal capacities of many African governments. Sub-Sahara Africa in particular had not invested adequate resources to boost food productivity partly due to misguided ideologies about the virtues of industry-led economic growth that ended up denying agriculture the resources needed for transformation and long term productivity growth.

The food crisis was thus a wake up call and once again this was an opportunity for Africa to appeal to the benevolence of the global community and there were positive responses. The G8 countries pledged US$ 22.5 billion at their L'Aquila Summit in 2009 and, in the same year, the USA, under its Feed the Future Initiative, pledged at least $3.5 billion (covering FY 2010 through FY 2012) to address poverty and hunger worldwide (FTF, 2011). The European Commission committed some $3.8 billion, while other donors have made similar commitments under various channels. This is a positive trend and there should be optimism for agricultural development in SSA but whether the pledges are honoured or not will depend to a large extent on the steadfastness of national policies in prioritizing the sector as an economic growth pillar and identification of key areas for investment that have inherent beneficial impacts on employment and food security.

Donor funding for agricultural development in SSA also emanates from South–South official development assistance, notably from Brazil, China, and India. China's recent engagement in Africa was set forth in 2000 by the Forum on China-Africa Cooperation (FOCAC) which proposed an expansive program in economic and social development (AATF, 2010; FOCAC, 2009). Apart from the promise of debt cancellation, reducing trade barriers, and increasing development assistance for African countries, the program committed resources to the training of African agricultural scientists and establishment of agricultural technology demonstration centres supported by Chinese experts. A large component of Chinese support to African agricultural development was made to FAO-led Special Program for Food Security (SPFS) in 2009. The aim of SPFS is to expand FAO's global efforts in eradication of hunger and poverty; China and other developing countries use the mechanism as a means of building capacity for national and regional food security initiatives and for promoting technology transfers and spill-over effects (FAO, 2010).

Research links and technology transfer are also being pursued by Brazil which, in 2006, opened an international office for the Brazilian Agricultural Research Corporation (Embrapa) in Accra, Ghana. The office has pioneered a number of technology transfer partnerships and its example was recently emulated by the Africa Brazil Agriculture Innovative Marketplace which was launched in 2010 during the Brazil-Africa dialogue on food security, fighting hunger, and rural development (Barka, 2011). Generally Brazil has recently developed a strong fraternity with Africa and the benefits of this cooperation are easily demonstrated by the rapid rise in the country's exports to the continent which, according to official records, increased from US$ 2.4 billion in 2002 to US$ 12.2 billion in 2011. Part of the South-South cooperation involves land acquisitions that are continuing to generate heated debate. Although there are FDI related merits for such acquisitions (e.g. technology spill-over and capacity building, especially in the area of irrigation) the deals seem to be shrouded in secrecy and inequitable contractual arrangements that favour wealthy and politically well connected elites at the expense of traditional communities who at present may not have clear tenural rights to their land.

3 FUTURE STRESSES TO FOOD SECURITY IN SSA

3.1 Climate change

3.1.1 Understanding the impacts of climate change

The impact of climate on food security is discussed in this paper with reference to climate change (CC), climate variability (CV), and climate extremes (CE) all of which are closely interlinked. By 2050, anthropogenic CC due to green house gas (GHG) emissions is expected to raise the global temperature by 2°C from the pre-industrial levels even with drastic reductions in GHG emissions starting immediately (EACC, 2009). The increase in global temperature is going to result in frequent weather extremes like intense rainfall, floods, droughts and heat waves that have adverse impacts on agricultural production, food prices, health and general welfare of people.

Although global climate change models have increased greatly in number and quality over recent decades thereby improving the scientific understanding of past, present and future CC, there remains much uncertainty about magnitudes and impacts of CC at any particular location and how best to prepare for them. While the exact nature of the changes in temperature, precipitation and extreme events is not known, there is agreement that future warming across the African continent will range from 0.2°C per decade (low scenario) to more than 0.5°C per decade - high scenario - (Hulme et al, 2001; Desanker and Magadza, 2001). This warming will be greatest over the interior of semiarid margins of the Sahara and central southern Africa. While the primary manifestations of CC are of a physical nature such as changes in temperature, rainfall, sea levels, and increased frequency of extreme weather events, the consequences or secondary manifestations are much more varied, including ecological, social and economic impacts. How people in any given area are affected by climate change will therefore not only depend on the climate changes themselves in that area but also on ecological, social and economic factors (Mendelsohn et al, 2006). Climate changes are hence a prime example of what has been called "socio-ecological systems" with factors from different domains interacting on different spatial and temporal scales (Holling, 2001).

If countries continue to ignore the threats imposed by CC and carry on with development activities in a "business as usual" sense then the costs corresponding to CC pertaining to both agriculture and human welfare can be severe. There are studies that indicate that the developing economies will bear the heaviest impacts of CC and CE (Nelson et al, 2009; IPCC 4th AR; Hellmuth et al, 2009). Specifically, Nelson et al. (2009) report that yield declines in developing economies will be relatively more than in the developed economies and that the economically weaker segments of the population will be the most vulnerable to climate extremes like floods, droughts and heat waves.

Response to CC is primarily in the form of mitigation, adaptation and risk transfer but even after mitigation and adaptation, there are likely to be residual damage (risk). Although mitigation to CC is essential, countries have to incorporate CC adaptation into their development goals. A report by EACC (2009) states that in the absence of such mitigation measures, global temperatures are likely to increase by as much as 2.5-7.0°C by the end of the century. Increase of global temperatures to such levels can result in catastrophic and irreversible

damage like extinction of half of species worldwide, inundation of 30 percent of coastal wetlands, and substantial increases in malnutrition and diarrheal and cardio-respiratory diseases. Furthermore, adaptation costs under such circumstances are expected to be extremely high and even in the event of substantial public/private interventions, the world will not be able to reverse much of the damage caused. Global discussions on climate change (the latest held in Cancun in 2010), offer some hope for poor developing countries to get support for climate change mitigation and adaptation but actual funding still falls below expectations (Binswanger-Mkhize et al, 2011).

3.1.2 Food Security Implications of Climate Change

Impacts on food production

The available literature indicates that changes in precipitation patterns due to climate change will result not only in short term crop failure but will also negatively affect production of most key food crops in the long run in terms of both reduced yields and increased pest proliferation. Although climate change may result in increase in yield for some crops in some regions of the world (for example in those areas in China where the current levels of temperature are below the optimal), by and large, it poses serious threats to crop yields and hence global food security. On the basis of yield declines, the Sub-Sahara Africa region witnesses mixed results both for crop type and region. As discussed in Nelson et al (2009), the ratio of water consumption of crops to their water requirement, also known as irrigation water supply reliability (IWSR), represents the water stress on irrigated crops. The smaller the value of IWSR, the greater is the water stress. Hence, apart from direct effects that climate change has on crop yields due to changes in precipitation pattern, climate change indirectly affects crop yields by increasing the water stress on irrigated crops.

The adverse effect of climate change on crop production in SSA is more pronounced with yields of rice, wheat and maize declining on average by about 15%, 35%, and 9%, respectively (Table 3.1). Estimates based on IFPRI's international model for policy analysis of agricultural commodities and trade (IMPACT) show that both rain-fed and irrigated harvested areas in SSA will decrease by 0.6 percent and 3.5 percent, respectively (Calzadilla et al, 2009). Although rain-fed production is predicted to increase by a nominal 0.7 percent, irrigated production decreases by a sharp 15.3 percent (due to reduced irrigation in some African basins and the fact that some of the irrigated crops such as wheat are very sensitive to heat stress). Overall, total crop harvested area and production are predicted to decline by 0.7 percent and 1.6 percent, respectively.

Climate change impacts vary significantly depending upon the scenario and Global Circulation Model (GCM) chosen. Although the projections of different GCMs converge acceptably at the global scale, the variations are significant at the local level (Connolley and Bracegirdle, 2007; Laurent and Cai, 2007; Whetton et al, 2007). Consequently, this regional variability accounts for the major source of uncertainty in the projection of climate change impacts. As a possible response, Ringler et al (2010) used a 'Comprehensive Climate Change' scenario (CCC) and conclude that climate change will result in variations in yield and area growth, higher food prices and growing child malnutrition, especially in SSA. Notably, with respect to different agro-ecological zones in SSA, the yield impacts (for major crops) are quite heterogeneous in nature and no crop or zone has consistently positive or negative results. While the Central and Southern region witness yield declines in 4 out of 5 and 3 out of 5 crops respectively, 4 out of 5 crops are projected to experience an increase in the yield in both the Eastern and Sudano-Sahelian region. The largest yield declines are experienced by sweet potato and cassava at 15 percent and 12 percent respectively for the Gulf of Guinea (Table 3.2).

Table 3.1

Climate change effects on crop production, no CO2 fertilization, in SSA

	2000 (mmt)	2050 No CC (mmt)	2050 No CC (% change)	CSIRO (% change)	NCAR (% change)
Rice	7.5	18.3	145.6	-14.5	-15.2
Wheat	4.5	11.4	153.3	-33.5	-35.8
Maize	37.1	53.9	45.3	-9.6	-7.1
Millet	13.1	48.1	267.2	-6.9	-7.6
Sorghum	19.0	60.1	216.3	-2.3	-3.0

Source: Nelson et al (2009)

Note: Columns labelled 2050 No CC (%) indicate the percent change between production in 2000 and 2050 with no climate change. The columns labelled CSIRO (%) and NCAR (%) indicate the additional percent change in production in 2050 due to climate change. For example, Maize production in SSA was 37.1 mmt in 2000. With no climate change, SSA production is predicted to increase to 53.9 mmt, an increase of 45.3 percent. With CSIRO scenario, SSA maize production in 2050 is 9.6 percent lower than with no climate change.

Table 3.2

Yield changes (%) for selected crops under climate change in different zones of SSA (2050 projections)

	Maize	Rice	Sweet potato and yam	Cassava	Sugarcane
Gulf of Guinea	0.24	1.38	-15.09	-11.94	-0.50
Sudano-Sahelian	3.30	-0.80	1.98	1.22	0.34
Southern	-0.91	-2.32	1.14	-0.75	1.09
Eastern	-1.92	0.24	1.06	0.42	0.31
Central	-0.79	-0.63	-0.11	-0.14	0.93

Source: Ringler et al (2010).

Impacts of climate change on food prices and consumption

By 2050, even without climate change, world prices for important agricultural crops, notably, rice, wheat, maize, and soybeans are projected to increase by 62%, 39%, 63%, and by 72%, respectively. Accounting for climate change, these prices are projected to increase by an additional +32-37%, +94-111%, +52-55%, and +11-14% for rice, wheat, maize, and soybean, respectively (Nelson et al, 2009). These high food prices will impose serious financial burdens on the economies of SSA as they attempt to mount safety nets for vulnerable groups or sectors while at the same time ensuring that they do not miss out on opportunities presented by the price incentives. But price escalation is not the only concern of SSA; there is also the issue of price volatility that raises a lot of problems for resource poor farmers. Price volatility, in the absence of enterprise diversification, leads directly to income volatility, inadequate access to credit and tendencies towards low risk production technologies, or, generally poor adoption of innovations that could increase responsiveness to rising prices.

Without climate change, increasing per capita income implies reduction in cereal consumption and an increase in meat consumption with the net change being positive: the increase in meat consumption more than offsets the decrease in cereal consumption. Although the trend of decrease in cereal consumption and increase in meat consumption remains the same in the climate change case, the net change is negative: the decrease in cereal consumption is substantial and more than offsets the small increase in meat consumption. As Table 3.3 shows, per capita cereal consumption in SSA decreases from 117 kg/year in 2000 to 115 kg/year in 2050, assuming no climate change while meat consumption increases from 11 kg/year in 2000 to 18 kg/year in 2050. However, in both CC cases (i.e. NCAR and CSIRO), the decrease in cereals is quite substantial; from 117 kg/year in 2000 to 89 kg/year.

Table 3.3
Per capita consumption (kg per year) of cereals and meats - (NCAR and CSIRO)

Year	2000	2050		
Region		No climate change	CSIRO no CF	NCAR no CF
Meat				
South Asia	6	16	14	14
East Asia and the Pacific	40	71	66	66
Europe and Central Asia	42	56	51	51
Latin America and the Caribbean	57	71	64	64
Middle East and North Africa	23	39	36	36
Sub-Saharan Africa	11	18	16	16
Developed countries	88	100	92	92
Developing countries	28	41	37	37
Cereals				
South Asia	164	157	124	121
East Asia and the Pacific	184	158	124	120
Europe and Central Asia	162	169	132	128
Latin America and the Caribbean	123	109	89	87
Middle East and North Africa	216	217	172	167
Sub-Sahara Africa	117	115	89	89
Developed countries	118	130	97	94
Developing countries	164	148	116	114

Source: Nelson et al, 2009; CF: CO2 fertilization

In the absence of climate change, per capita calorie availability by 2050 increases throughout the world and in Sub-Sahara Africa, availability increases by about 6 percent compared to 2000 levels. With climate change, calorie availability in 2050 is not only lower than the no-climate-change scenario but actually declines relative to 2000 levels throughout the world (Table 3.4). There is no significant difference between NCAR and CSIRO case scenarios.

Climate change is expected to have very significant negative impacts on child malnutrition (although absolute estimates of child malnutrition vary across different studies). Child malnutrition levels (in no climate change scenario) are expected to decline from nearly 28 percent (in 2000) to 24 percent and 20 percent in 2030 and 2050 respectively (Calzadilla et al 2009, Ringler et al 2010), the absolute levels are projected to increase by 30 million in 2000 to 38 million and 30 million in 2030 and 2050 respectively. Climate change is further expected to exacerbate the situation with the incremental number of malnourished children being estimated at around 1 million and 600,000 in 2030 and 2050, respectively (Ringler et al (2010).

3.1.3 Adaptation to Climate Change

Methodological approaches

Adaptation to climate change and general socio-economic development are closely intertwined processes. This also implies that "poor people and poor countries are less well prepared to deal with current climate variability than rich people and rich countries" (Parry et al, 2009 pg 21). The same obviously holds true for the preparedness levels to deal with future climate extremes and climate variability which are projected to increase in frequency due to the anthropogenic CC (IPCC, 2007). Some studies have identified a positive correlation between development indicators like literacy, income per capita and institutional capacity with reduced vulnerability to climate events (Noy, 2009 and Bowen et al, 2009) while others suggest good development is one of the best adaptation responses to CC (Nelson et al, 2009 and ECA, 2009).

Table 3.4
Daily per capita calorie availability with and without climate change

Year	2000	2050		
Region		No climate change kcal/day	CSIRO no CF kcal/day	NCAR no CF kcal/day
South Asia	2,424	2,660	2,226	2,255
East Asia and the Pacific	2,879	3,277	2,789	2,814
Europe and Central Asia	3,017	3,382	2,852	2,885
Latin America and the Caribbean	2,879	2,985	2,615	2,628
Middle East and North Africa	2,846	3,119	2,561	2,596
Sub-Sahara Africa	2,316	2,452	1,924	1,932
Developed countries	3,450	3,645	3,190	3,215
Developing countries	2,696	2,886	2,410	2,432

Source: Nelson et al, 2009. CF: CO2 Fertilization

Generally, uncertainties involved in predicting extent and impact of CC, response of public and private sector and general development growth pose serious challenges in developing appropriate adaptation responses to CC. Assessment of impacts is usually hampered because of uncertainty in climate change projections at the local level, for example, in relation to rainfall, rate of sea level rise and extreme weather events (ECA, 2009). Other uncertainties stem from an incomplete knowledge of natural and human system dynamics and limited knowledge of adaptive capacity, constraints and options. The implication of these uncertainties is that there is always variance in predicted impacts of CC. For example, the two climate models (by NCAR and CSIRO) used in many CC adaptation studies, predict quite different future climate impacts by 2050[6] . Although both scenarios predict increase in temperature and resulting increase in precipitation, they differ significantly in absolute estimates of both parameters: the 'wetter' NCAR scenario estimates average precipitation increases on land of about 10 percent (and has higher precipitation in SSA) whereas the 'drier' CSIRO scenario estimates increases of about 2 percent (Nelson et al, 2009).

Costs of adaptation to climate change

One of the most comprehensive studies with the aim of estimating costs attached to climate change adaptation has been undertaken by the United Nations Convention on Climate Change (UNFCCC, 2007). The UNFCCC study covered 6 sectors namely, agriculture, water, health, coastal zones, infrastructure, and ecosystems: out of these, cost estimates were made and reported for 5 sectors. The estimated costs of adaptation to climate change were in the range of $27-66 billion per annum for developing countries. The upper bound estimate of costs to infrastructure sector is nearly ¾ of the total estimated cost. Although the UNFCCC study is considered to be one of the most exhaustive cost estimation studies on climate change adaptation, it has not been free of criticism particularly regarding choice of sectors included in the model and depth of analysis (Parry et al 2009). Another study (EACC) initiated by World Bank (2008) calculated the cost of adaptation in developing countries. Along with the sectors in the UNFCCC study, EACC also reported cost attached to the ecosystem sector along with cost implications for variations in the frequency of extreme weather events due to climate change. The EACC cost estimates to climate change adaptation is much higher relative to the UNFCCC estimates with the total cost of adapting to an approximately 2°C warmer world by 2050 being in the range of $75 billion to $100 billion per year.

In SSA, the total combined cost for all sectors is estimated at around $18.1 billion per year for the NCAR scenario and $16.9 billion per year for the CSIRO scenario. The NCAR scenario costs in SSA represent 20% of the total combined costs of all the developing regions which include: East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. Costs for SSA region in CSIRO scenario account for 22% of the total costs. Generally for all regions except South Asia, the costs are lower for the CSIRO scenario relative to the NCAR scenario, largely due to the lower costs for infrastructure, extreme weather events and health in the CSIRO scenario which more than compensate for the increase in cost for water supply, flood protection and agriculture. For SSA, the costs in water supply and flood protection sector are the highest, not just in the region but also in the world.

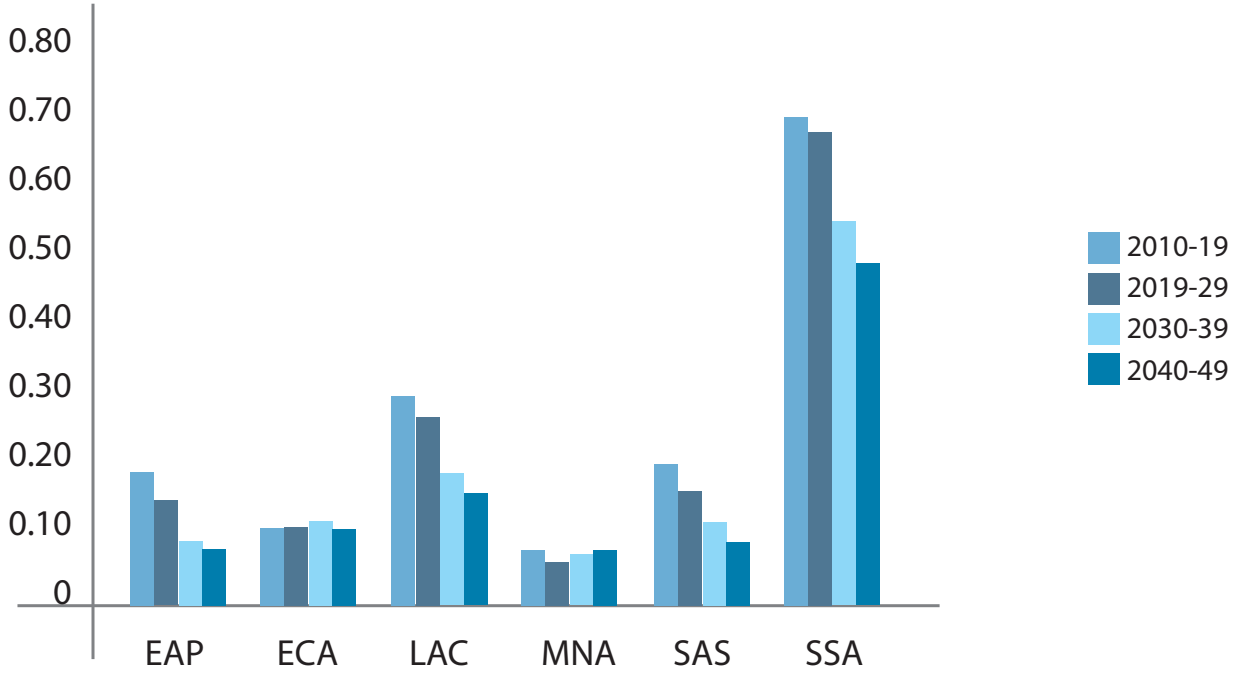
[6] NCAR stands for The National Center for Atmospheric Research, and CSIRO for the Commonwealth Scientific and Industrial Research Organization, Australia

Another notable trend pertaining to adaptation cost is that although in absolute terms the adaptation costs for a country increases over time, the costs as a percent of GDP falls implying that through economic growth, economies become relatively less vulnerable to climate change. However, SSA presents a notable exception in the sense that adaptation costs as a percent of GDP in the region is extremely large in comparison to any other region in the world. This is largely due to the lower GDPs in the region. Figure 3.1 shows the falling GDP share of adaptation costs for all the regions studied by EACC.

Like in the UNFCCC study, infrastructure accounts for the largest share in adaptation cost in the EACC study (in the NCAR scenario). This is possibly due to the high sensitivity of infrastructure to annual and maximum monthly precipitation levels. Sub-Sahara Africa experiences the greatest increase over time with its adaptation costs rising from $1.1 billion a year for 2010–19 to $6 billion a year for 2040–49 (EACC, pg 8). In the Agriculture sector, costs are calculated for example through investment levels required in agricultural research, rural roads, and irrigation to restore the welfare levels measured in terms of restoring childhood malnutrition to levels that would exist in 2050 without climate change. Nelson et al (2009) and EACC studies quote such costs to be around $7-8 billion per year in both the NCAR and CSIRO scenarios.

Agriculture sector costs in SSA region account for nearly 40 percent of the total cost (of all regions studied). The fact that a large proportion of the costs correspond to rural roads underline the extent of development/adaptation deficit present in the region. The key messages embodied in these results point to the importance of improving the productivity of agriculture as a means of meeting the future challenges that climate change represents. The path to the needed agricultural productivity gains varies by region and to some extent, by climate scenario (Nelson et al, pg 16).

Figure 3.1
Total annual costs of adaptation for National Centre for Atmospheric Research (NCAR) scenario as share of GDP, by decade and region (percent, at 2005 prices, no discounting)



Source: Economics of Adaptation to Climate Change study team
Note: EAP is East Asia and Pacific, ECA is Europe and Central Asia, LAC is Latin America and Caribbean, MNA is Middle East and North Africa, SAS is South Asia and SSA is Sub-Sahara Africa.

3.2 Demographic Stresses

3.2.1 Trends in urbanization in Sub-Sahara Africa and implications for food security

Population of SSA has increased two and a half times in last 30 years. Even though the growth rate will slow down, the region's population is projected to increase from 770 million in 2005 to between 1.2 and 1.4 billion in 2025 and between 1.5 and 2 billion in 2050 (UN, 2008). This population growth will however occur in both rural and urban areas with the urban population approaching or surpassing the rural population in many countries (Table 3.5). Over the next 20-25 years, population growth rates for urban centers in SSA will be 3 times the growth rate for rural areas (Anderson and Erbach, 2009; FAO/HLEF, 2009). Despite the rapid rural-urban migration and the growth in urban population, the absolute number of rural people is expected to continue growing. Masters (2010) provides an analysis showing that while growth in the rural populations in South Asia started to slow down in the 1960s, Africa's kept rising with the likelihood that the absolute numbers will continue to trend upwards well past 2030.

The demographic changes have a number of implications for sustaining food security in the future: there will not only be shrinkage in agricultural labor force but also a tendency for those left in agriculture to be older, less productive and more risk averse to new technological innovations; there will be a rise in female headed households – literature shows that these are usually poorer than male headed ones and thus more susceptible to external shocks; and, dependency ratios are likely to rise thus raising the cost of education and health care concurrently with agricultural productivity stagnation. Dependency ratios in SSA are influenced by a number of factors, including rural urban migration; impacts of deaths notably those related to malaria and HIV/AIDS; and, cultural and traditional practices (e.g. extended family systems and obligations). The rapid growth in urban populations will have the tendency to fuel youth unemployment in the cities thus leading, among other problems, to a rapid rise in informal settlements and break down in law and order.

Table 3.5

Population Trends in selected African Countries

Country	Urban population (000)		Percentage Urban		Population growth rate (%)					
	2000	2020	2000	2020	Urban	Rural	Urban	Rural	Urban	Rurali
Angola	4,371	10,697	34	47	5.6	1.8	4.9	2.0	3.8	1.2
Benin	2,630	6,109	42	56	5.4	2.1	4.6	1.5	3.3	1.0
Botswana	1,191	2,142	74	89	13.7	0.9	4.2	-5.5	1.6	0.2
Congo	15,670	39,648	30	43	2.7	3.4	4.5	2.3	4.1	1.4
Eritrea	714	1,738	19	29	4.3	2.2	4.4	1.7	3.9	0.9
Ethiopia	11,679	34,429	18	29	4.6	2.2	5.7	2.5	4.7	1.7
Ghana	7,644	16,742	38	51	4.2	3.1	4.2	1.7	3.2	0.7
Guinea	2,577	6,269	33	46	5.3	1.4	4.9	1.8	3.7	1.1
Kenya	10,043	2,468	33	48	7.7	2.7	5.0	1.2	2.6	0.1
Liberia	1,560	3,457	48	60	5.5	1.8	4.5	2.1	3.4	1.1
Madagascar	5,133	13,088	30	43	5.8	2.6	5.1	2.1	3.8	1.1
Malawi	1,686	4,657	15	26	5.8	2.9	5.2	2.0	4.5	1.4
Mali	3,773	9,462	30	43	5.4	2.2	5.0	1.9	3.8	1.2
Mozambique	7,869	17,344	40	55	10.1	0.8	4.8	0.7	3.2	0.9
Namibia	708	1,528	41	56	5.7	1.7	4.5	0.7	2.9	0.6
Nigeria	56,651	124,888	44	58	5.5	1.8	4.6	1.2	3.0	0.8
Rwanda	472	1,248	6	10	4.4	3.1	4.5	2.2	4.8	1.3
Senegal	4,463	9,090	47	59	3.9	2.2	4.0	1.3	2.8	0.6
South Africa	23,291	39,548	50	59	2.6	2.4	2.7	1.6	2.2	0.0
Tanzania	9,376	23,354	28	42	6.7	2.5	5.2	1.7	3.7	1.0
Uganda	3,180	9,333	14	23	4.8	2.1	5.5	2.5	4.8	1.7
Zambia	4,067	8,019	45	55	2.8	1.8	3.3	1.8	2.9	0.6
Zimbabwe	4,387	8,928	35	49	5.8	2.5	4.1	1.0	2.5	0.0

Source: Anderson and Erbach, 2009.

3.2.2 Demographic challenges and agricultural productivity

Evidence from studies conducted by Jayne et al (2002) indicates that the ratio of land under crop cultivation to agricultural population has been shrinking gradually but consistently in Africa. This ratio has been halved in relatively densely populated countries like Kenya and Ethiopia over the last 4 decades while a declining trend has also been evident in land-abundant countries such as Zambia and Mozambique. In South Africa, although there has been an increase in cultivated land (by about 0.2 percent over the last decades) this has been accompanied by decline in cultivated area per person from 0.4 ha to 0.34 ha/person. This trend of declining availability of land is viewed to have limiting influence on the prospect for sustenance of livelihood of land-constrained households through farming alone without substantial shift in labour from agriculture to non-farm sectors (Jayne et al, 2002; Cambel et al, 2002). The ensuing pressure on land has resulted in bringing of marginal land into production and while commercial operations continue to use fertilizers and chemicals for increased productivity, fallow periods have been reduced. In some African countries, land tenure problems still constitute a disincentive for investment in effective management of natural resources characterized by overexploitation and misuse (Anderson and Erbach, 2009).

In a multi-dimensional sense, poverty involves limited access to physical, human, natural and financial capital (Nkonya et al, 2008). Land-constrained households become vulnerable to investment poverty that limits their participation in soil fertility maintenance and adoption of conservation technologies. Hence, the declining land-man ratios in SSA portray a disincentive to productivity growth through investment in soil, water conservation and sustainable land management practices. Consequently, it could become more difficult to bring land-constrained households out of poverty through increased productivity and enhanced farm income. This interrelationship has been confirmed by Jayne et al (2002) who concluded that there is positive association between household per capita land holdings and per capita income.

3.2.3 The gender dimension in food security in SSA

Roles of women, resource ownership and vulnerability to food insecurity

Women have been known to constitute a larger percentage of the rural population and rural poor than men in SSA. For example, estimates show that women make up 52 percent and 51 percent of the population in Malawi and Mozambique, respectively and that about 93 percent and 80 percent of these women reside in rural areas and engage mainly in subsistence agricultural production and petty trade. Women face inequalities in access to education and health facilities and are affected disproportionately by wars and civil conflict. The predominance of the patriarchal system in SSA relegates women to minority positions and this is more evident in their access to and control over resources and consequently livelihood strategies. The influence of these inequalities and ownership positions on women's livelihood strategies is reflected in their migration patterns forming part of their occupational diversification, which is considered different from the labour intensive diversification for men. Women are known to be involved in informal sector participating in cross-border trading and working in the service industry in hotels and tourist resorts. Considering the centrality of women to food production in SSA where they account for 70-80 percent of household food production (mostly centered on labour provision than decision making and income control), rural-urban migration among women raises important questions on rural land uses and the management of natural resources (ECA, 2004; Whande, 2009).

Evidence from Southern Africa shows that migrant women who enter the job market in urban areas tend to have a broader range of social and economic links with their rural relatives and that these ties tend to be more enduring compared to those of migrant men. Secondly, the work and activities that women undertake during migrations, trading and the informal sector, allow them to spend some time at their rural homes. For example, Zimbabwean women engaging in temporary migration to South Africa often sell agricultural produce from their own gardens and return home to sell goods sourced from the urban areas. The evolving role of men is less clear and questions need to be raised if this translates into men's decreased roles in food production (Whande, 2009).

One of the most visible fallouts of male migration is the significant increase in the number of female-headed households and intensification of women's workload in agriculture as they take up traditional male farming tasks (Fontana and Paciello, 2009). FAO (2002) estimates that the proportion of female headed households in rural SSA is about 31% while UN/POPIN (1995) notes that this results not only in changes in family structure but also in an adjustment in family roles, more importantly, in the division of labour as well as in the way labour is utilized in the community of origin and destination. Consequent upon this adjustment, women often assume major responsibilities and in some countries become the backbone of subsistence food production otherwise referred to as 'feminization of agriculture' and management of family livelihood as household heads. These trends, in essence, expose women to the impacts of climate change and instability in food prices thus necessitating special support and coping strategies during times of crisis (Quisumbing et al, 2008). So far, SSA does not have gender-appropriate strategies for responding for example to spikes in food prices as witnessed in 2007/08 and 2010/11 but this could be partly due to lack of data that could be used to analyse how different gender adjust their time and budgetary allocations during a crisis.

Employment opportunities for youth in agriculture

Youth which makes up a formidable workforce in agriculture have for decades been known to abandon the lands mostly for menial jobs in the urban cities. Youth population is projected to grow by 20 percent between 2005 and 2035 with FAO estimates showing that 70 percent of this population resides in rural areas of SSA (Bennell, 2007). Although economic indices have pointed to some level of growth in SSA, Odhiambo (2006) notes that the growing youth unemployment (estimated at about 20 percent by ILO) is one of the challenges that the region has to cope with. Due to inadequate employment and livelihood opportunities in rural areas, the tendency is for young men to migrate to urban centres in search of better opportunities. Part of the reason for the migration of youth out of agriculture is their frustration at the almost absolute control still held by the older men over land and farming decisions (Tacoli, 2004).

Mass exodus of youth consequently leads to widespread ageing of hands left behind to carry out farming. In addition to declining land productivity, unreliable market and marketing system, other factors like labour intensive nature, unpredictable weather, poor government policy and legal framework, and inability to effectively add value to farm products have been a disincentive to continuous youth engagement in farming. In Kenya for example, youth unemployment is estimated to be 64 percent with only 1.5 percent of the unemployed youth having formal education beyond secondary school while over 92 percent have no vocational or professional skills training (Odhiambo, 2006). With a massively labour depended agriculture, outmigration of youth from the sector connotes a mass erosion of young and productive labour force which undoubtedly has a direct negative impact on agricultural production and job creation in other sectors which are directly or indirectly linked to the sector.

3.3 Global food price trends

3.3.1 Recent trends

Real food prices declined by about 75 percent between 1974 and 2005 (IMF 2007) but since then prices have been on the rise except for a brief respite between July 2008 and June 2010. FAO's food price index reached an all time record in February 2011; this price index demonstrates not just a general upward trend in the average price level compared to the 1990–2006 period but also high volatility. A broad variety of food commodities have been affected by rising prices: for example, prices of wheat and poultry doubled since 2003, those of maize and butter three times and for rice, prices went up four times. The increase in food prices reflects a complex interplay of long-term and temporary factors. Factors that are going to have permanent effects and which have been at work in recent years include bio-fuels production in the United States and European Union which accounted for almost half of the increase in consumption of major food crops in 2007 (IMF, 2008). Increasing demand for fine grains and livestock has been brought about by growth in per capita income in high-growth developing countries such as China and India. High petroleum prices and hence higher costs for fertilizer products have also contributed to higher prices for all agricultural commodities thus giving oil the double edge of acting directly on cost of food production and distribution as well as indirectly by making conversion of grains to bio-fuels profitable. Other factors whose effects may be reversible include droughts, restrictive trade policies and speculation in the commodity markets.

The OECD/FAO Agricultural Outlook for 2011-2020 expects real agriculture and food prices to retreat from the current high levels by 2013, but remain significantly higher for the current decade than the last decade. Maize, vegetable oils, sugar and biodiesel are expected to be about 20 percent higher than in the last decade while oilseeds, pig meat and skim milk powder are expected to be about 10 percent, with the largest price rises expected for poultry meat (34 percent), butter (42 percent), and ethanol (55 percent). Similarly, much higher real prices are also expected to prevail for two key inputs into agriculture, namely, energy and fertilizers. Energy prices are now 250 percent higher than in 2000, and expected to drop back to about 175 percent higher levels by 2020. Fertilizer prices are now 170 percent higher than in 1990 and 2000 and to drop to a level about 80 percent higher by 2020 (OECD/FAO, 2011).

3.3.2 Impacts on food security in SSA

Most African economies are open to world trade hence international price increases are largely transmitted to their domestic economy, a trend likely to continue in the future. In the short run, the food price spikes significantly increase poverty for urban populations and for poor net buyers of food in rural areas, especially in food-importing countries that have only limited ways to prevent international prices to pass through to consumers. As a consequence of the 2008 food crisis, food import bills were expected to rise by more than 1% of GDP in most North, East, and Southern African countries and in a few West African countries (World Bank, 2008). Many of these countries were in addition hit by the rise in global energy prices.

Food prices are major drivers of inflation while price volatility leads to household income risks and uncertainties. The impact of food prices is highly significant on household consumption and nutrition particularly in the arid and rural areas of low income countries where food accounts for a large share of the family budget. Although the current (mid 2010-2011) price surge (which is largely a consequence of global financial crises) has had smaller impact on poverty, its effect has forced 44 million additional people (many of who reside in SSA) into poverty compared to the 75 million that were reportedly impoverished during the 2007-2008 food crisis (World Bank, 2011). Urban poor and the majority of food importing countries of SSA have negatively been impacted by these spikes as higher share of their limited income was being used for food imports. As reported in OECD (2008), each 10 percent increase in the prices of all cereals (including rice) adds nearly US$ 4.5 billion to the aggregate cereals import bill of developing countries that are net importers of cereals.

Impact of the price shock of 2007–08 on the number of undernourished varied markedly across regions and individual countries depending on the net import/export status, and the range and effectiveness of the policy responses adopted (FAO, 2011). Net food importers that happened also to lack the budgetary means of paying for the high prices, or releasing of strategic reserves, were typically the worst hit and the majority were in Africa. Estimates by FAO show that compared to Asia where the number of undernourished was basically constant following price escalation between 2007 and 2008, the number increased by 8 percent in Africa. Although some large countries such as India and China as well as relatively small ones in Africa (e.g. Malawi, Guinea, Tanzania and Zambia) were able to insulate their markets through food export restrictions, such panic responses simply increased prices and volatility in international markets.

Some specific cases of the effects of food price spikes show that in East Africa, more than 17 million people are said to be confronted with food insecurity brought about by the combined effects of below average harvest, high food prices, conflicts and insecurity (USAID, 2009). In Somalia, an estimated 3.2 million people are said to currently require food assistance, where food prices remain high with sorghum and imported rice price reaching a record high of 72 an 32 percent, respectively. For West Africa, a successful 2008 harvest was said to have led to a temporary reduction in staple millet and sorghum prices which subsequently increased towards the end of 2008. Wholesale prices of millet in countries like Mali and Niger remained between 16 and 20 percent higher than they were in the earlier part of 2008. In Southern Africa, an estimated 8.2 million people are said to be affected by high levels of domestic food prices in the region, including 5.1 million in Zimbabwe and about 0.24 million and 0.35 million in Swaziland and Lesotho, respectively.

Unlike the food crises of mid-1970s and the one in 2007-08, the ramifications of the most recent spike that commenced after mid-2010, and is still unfolding, are yet to be fully understood. One of the first studies of this spike in food prices is by Hossain and Green (2011) who examined the food security situation in eight communities in Bangladesh, Indonesia, Kenya and Zambia that had previously been visited in 2009 and 2010. Their findings reveal a more varied impact compared to the price spike of 2007/08. The informal urban sector, small-scale farmers and small traders have generally not done well compared to commodity producers and workers in export sectors. The report also finds that people tend to shift to cheaper and less preferred, and often poorer quality foods. However, the conclusion that "government safety nets have generally failed to protect people from the effects of the price rise thereby resulting in an increase in the level of discontent and stress" is an over-generalization considering that implementation of the interventions is usually knee-jerk in fashion and often fraught with administrative hitches, poor targeting and lack of transparency (HLPE, 2011).

In the longer run, upward trends in food prices could provide major additional opportunities for African farmers, especially in domestic and regional markets that will also grow because of rising incomes. In these markets, farmers compete on the basis of import parity prices rather than the lower export parity prices and with fewer quality and phyto-sanitary barriers. African farmers would have a major opportunity to re-conquer markets lost over the past decades. Internationally, the changing food demand and supply patterns will lead to more South/South trade, which in the long run will bolster the opportunities arising from domestic and regional markets. Of course, whether they are able to seize these opportunities depends on many factors, including trade polices, production costs and infrastructure.

4 POLICY STRATEGIES FOR DEALING WITH FUTURE STRESSES TO FOOD SECURITY IN SSA

This section highlights a few key policy related recommendations that countries in SSA can adopt in response to changes in climate, population and global food prices. It is worth reiterating that the changes do not just present challenges, they also open up new opportunities for SSA: for example, climate change and the recent spikes in food prices helped in mobilising international solidarity to intensify research and funding of global public goods and SSA has definitely benefitted in the process; helping the African political leadership to reassess its commitment to finding home-grown remedies for local problems, including those related to human and financial resources; and promoting strategic and innovative investments (e.g. on infrastructure, telecommunication and early warning and emergency response systems) to deal with future challenges to food security and/or for enabling the region to take advantage of its unique natural comparative advantages as well as the emerging opportunities in global markets.

4.1 Agriculture based opportunities

Taking advantage of agro-climatic diversity: Sub-Sahara Africa has a wide diversity of agro-climatic conditions that make it possible to produce a variety of agricultural products in high demand in both domestic as well as foreign markets and indeed, to significantly improve the nutrition of rural populations. The region as a whole has the advantage of proximity to expanding markets in the Middle East, USA and Europe where it enjoys historical cultural and trade ties and preferences. Agriculture (and its associated industries) where the natural comparative advantage of many countries in SSA lies has recently experienced a sharp rise in foreign direct investments, private equity investments, and sovereign wealth funds. Africa received about $1 billion in 2008 and reports of investment activity over the past two years indicate a sharp increase. Although foreign investment in agricultural land (so called land grab) remains an emotive issue especially among civil society advocates and pastoral communities who fear they will be disenfranchised, Deininger and Byerlee (2010) suggest that it could provide significant benefits to SSA if it is transparently managed.

Increasing use of the abundant natural resources: Other opportunities for Sub-Sahara Africa relate to the region's vast untapped arable land and irrigation potential, expanding domestic and regional markets and rising per capita incomes that, in the short and medium terms, should offer the most attractive opportunities for commercializing and raising productivity especially in the food sub-sector. Urban population is projected to double by 2030 and if per capita income growth rates can be sustained at their current levels (about 4 percent per year), urban food markets are set to quadruple in the next 20 years (World Bank, 2011). Under a business as usual scenario, projections by IFPRI show that dependence on food imports will grow leading to a doubling of cereal, dairy and meat imports by 2025: this will provide a large potential market to act as a basis for implementing competitive non-distortionary import substitution policies (World Bank, 2007b). Sub-Sahara Africa should thus be aiming at being a net exporter of commodities such as rice, maize, soybeans, sugar and palm oil, following the example of recent successes in Latin America and Southeast Asia (World Bank, 2009a) rather than bearing the burden of overdependence on imports.

Adding value and discovering new markets: Sub-Sahara Africa has witnessed rapid demographic changes to which the private sector has appropriately responded in the form of new merchandising and investment strategies, including aggressive advertising; mega retail outlets; and more efficient transport systems, cold storage and warehousing. But product development, investment and trade beyond the border remain subdued: the region's share of world agricultural exports that was close to 8 percent in 1961 declined to a mere 2 percent in 2007 according to FAO statistics quoted by Byerlee (2011). However, the macro-economic environment for business investment has recently improved dramatically thus encouraging value addition, new product development and commercialization as experienced in other land-abundant countries such as Brazil and Thailand in the past 20 years (Binswanger-Mkhize, 2011). For producers in SSA countries to reorient their production structures towards non-traditional exports, which for agriculture comprise a wide range of fresh and processed specialty products and be able to effectively participate in the emerging global niche markets, they will require specialized information and professional knowledge, stronger regulatory and legislative environment as well as good infrastructure and financial resources.

Addressing existing and imminent challenges in human resource capacity: Growing concern exists regarding the lack of human resource capacity in agricultural R&D to enable satisfactory responses to emerging global challenges. National governments and donor organizations must expand their investments in agricultural higher education to allow universities to increase the number and size of their MSc and PhD programs and to improve the curricula of existing programs. The regional community has an important role to play in this regard, particularly when it comes to 'small countries' with limited or nonexistent MSc or PhD training opportunities. Thanks to financial support from development partners who have been working closely with African institutions such as African Development Bank, African Capacity Building Foundation and regional economic institutions, SSA now boasts of highly successful multi-country postgraduate training programs such as the African Economic Research Consortium (AERC) and Collaborative Masters in Agricultural and Applied Economics (CMAAE). But African governments have to work extremely hard in order to ensure sustainability of scholarship grant programs and policy analysis centers such as Economic and Social Research Foundation (Tanzania), Institute for Policy Analysis and Research (Kenya), Economic Research Center (Uganda) and Food, Agriculture and Natural Resources Policy Analysis Network (Southern Africa) and the Forum for Agricultural Research in Africa, the majority of which are heavily dependent on donor funds and technical backstopping by the CG centers.

The expansion of the training initiatives must also address emerging human capacity challenges, including long term sustainable funding mechanisms, brain drain, expanding pools of older scientists in the face of inadequate resources for re-tooling in order to keep up with the frontiers of professional knowledge and increasing shares of junior research staff in a large number of countries.

4.2 Promoting smallholder participation in agricultural markets

Smallholder farmers account for a significant share of marketable agricultural production in Sub-Sahara Africa but individually, their operations are characterized by subsistence and limited participation in markets. Their productivity is low, they add little value to their produce and hence earn a meager proportion (usually no more than 15 percent) of what consumers pay. This situation has been described in literature as low equilibrium poverty trap (Barrett and Swallow, 2006; Barrett, 2008). Improved market access results in commercialization of agriculture, which has short, medium, and long-term benefits to farmers. Kherallah et al (2000) argue that the disappointing failure of market reforms to spur commercialization in Africa was partly due to frequent and arbitrary intervention by the state in markets leading to an erosion of private sector confidence. But it is worth pointing out that at the time SAPs were being popularized, the private sector in most of SSA, probably with the exception of South Africa, Ghana and Kenya, was still too weak to fill the void left by government, nor was it prepared to face high competition under more open borders. This led to chaos and in some cases the private sector itself would seek protection in the form of subsidies, legislated monopoly power and high import tariffs. Even under regional markets, these tariffs and other myriad NTBs persist as government efforts are now directed towards reducing collateral damage to the agricultural export industry in the form of indirect taxation which, according to Masters and Garcia (2009), have come down but are yet to be eliminated.

The agricultural markets in SSA, especially for staple food grains (maize, wheat and rice) remain firmly under the watch of government and often become politically sensitive. The main reasons for this are the large number of smallholders still deriving their livelihood from food production; poor food distribution networks; reliance on rain-fed production; asymmetries in information and capital scarcity among smallholder producers that tilt markets in favour of brokers, transporters and millers; and the seasonal opportunities the food industry offers for corruption in import/export business and emergencies. Inability to sustain market reforms, the desire to nurture infant agro-based industries, policy reversals and market destabilization (by among others, global phenomena, politically instigated unrest and armed conflict) are disturbing realities facing agricultural commodity markets in SSA. In reference to the plight of the African smallholder farmer, Barrett (2008) aptly concludes that making imperfect markets work for small producers will require new kinds of strategies. Government strategies should therefore focus on reduction of information asymmetries; promoting innovative rural financing and access to productive technologies; investments on the enabling environment (physical infrastructure, incentives and services); and well capacitated over-sight institutions managed under public-private partnerships.

In order to make markets work for the African smallholder particularly with regard to food security, governments must foster the use of information and communication technology (ICT) - see Box 1. Furthermore, there are new global trends that can work for or against the African producer and that must be built into the agricultural reform agenda. Trade world wide is today being nurtured through strategic corporate mergers and other off-shore contracting relationships between sellers and buyers. It is being shaped by firms competing, not just on the basis of superior technology and low factor costs but also by attaining competitiveness through dimensions that transcend the enterprise itself (e.g. infrastructure, utilities, financial markets and macroeconomic policy framework – so called, business enabling environment). The private sector will be the dominant factor in linking the large scale commercial farmers and processors with markets while the smaller farmers must organize themselves into economically viable groupings, such as cooperatives, in order to participate and draw commensurate benefits from the value chain. Through such links, the smaller operators can also get equitable access to input and output markets, credit, innovations, knowledge and information. This is the way forward and it is the direction that governments and development partners must foster in order for agriculture to increase its multiplier effects on the economy and to be able to win the fight against poverty and hunger in Africa.

BOX 1 Role of ICT in promoting market access by smallholders in SSA

The common ICT applications are the mobile phone short messages (SMS), web/internet-based resources and tele-centers. Examples of projects applying these innovations include, among others: MPESA (literal meaning: mobile money), Kenya Agricultural Commodity Exchange (KACE) and DrumNet in Kenya; Busoga Rural Open Source and Development Initiative and FoodNet in Uganda; Malawi Agricultural Commodity Exchange (MACE) in Malawi; Manobi in Senegal; TradeNet/E-Soko in Ghana; and, Kilosa Rural Services and Electronic Communication in Tanzania. In the last ten years, the ICT-based applications have gained a lot of popularity in SSA, thanks to donor support from, among others, USAID, IFAD, FAO as well as non-government organizations and telecom service providers. Governments too have played their part; absorbing initial risks and funding the lumpy infrastructure (such as satellites) and legislations needed for mounting ICT services; attracting international investors and service providers and, where necessary, allocating land for businesses; and providing rural electrification and supporting affordable insurance programs.

Despite the high potential of ICT based applications for improving smallholder agriculture and food security, their usage and adoption by smallholder farmers has remained quite low. Recent case studies under an IDRC funded project, eARN Africa (2011) found a high correlation between participation in projects promoting ICT based market information services (MIS) and levels of commercialization and income improvement. However, awareness about such projects and participation remained quite low – averaging just below 50% - in the sample countries (Benin, Ghana, Uganda, Kenya, Malawi and Madagascar). The studies point to a need for expanding coverage of ICT based MIS projects while at the same time working to improve factors such as low levels of education, poor rural infrastructure (both transport and power) and access to credit that hinder participation by rural households.

4.3 Index Insurance as an adaptation response to climate change

The adverse impact of climate change on the agriculture sector is predicted to be substantial, adaptation to which will entail large costs. Apart from using hard adaptation measures like improved irrigation systems, drought resistant crops and development of rural roads, index insurance has become an innovative measure to share climate risks among the members of an insured population. Agricultural insurance based on assessment of crop and animal losses as a basis for valuation of the payout is generally infeasible, but index insurance might be able to work. It uses remote-sensing data which lowers transaction costs, thus making it more viable for the private sector to provide with a lower premium at farm level. By virtue of being independent of the farmers' own actions, index insurance tends to reduce problems of adverse selection and moral hazard. The main weaknesses are that: a) it is heavily dependent on reliable, high quality and extensive data which is a major challenge, especially in developing countries; and, b) it is vulnerable to basis risk: basis risk arises when payout does not match the actual losses, for example, in situations where there is payout with no (or relatively less) losses or, no (or relatively less) payout with actual losses. The problem of basis risk can be met by selection of appropriate index which is highly correlated with actual losses. Installation of appropriate number of weather stations which are in acceptable proximity to the insured crop can not only help to achieve that objective but also help in mitigating the challenge of availability of reliable and quality data (Carriquiry and Osgood, 2008).

Apart from being a risk management tool, index insurance can also be used for development and adapting to future risks associated with climate change. As discussed in Hellmuth et al (2009), a weather shock not only adversely affects poor people during the impact period but its consequences persist even when the crisis is over. In the event of a shock, local coping strategies often break down forcing people to sell their already limited assets (distress sales) leaving them in an even more vulnerable position after the crisis: such vulnerability can persist for years. Further, unwillingness on the part of the lender to provide credit to the farmer (because of the risk of default) implies that the farmers are unable to invest in productivity increasing activities. There is evidence to suggest that farmers sacrifice approximately 10-20 percent of their incomes while practicing traditional risk management strategies. Index insurance can help farmers get access to loans while at the same time incentivising them to invest in productivity increasing activities without worrying about repayment of loans in the event of a weather shock.

Even after achieving comprehensive adaptation to climate change, for example, through "adapted crop varieties, micro-irrigation, rain water harvesting and improved soil conservation practices", there is still considerable risk of residual damage arising from climate change (Hellmuth, pg 8). Index insurance can play an important role in spreading this form of risk among the pool of insured farmers. Moreover, better access to credit due to index insurance can help people invest in intensive livelihood strategies. The resulting increase in wealth and resilience to risk would hence provide the much required buffer from direct impact of climate shocks. However, despite these advantages, index insurance projects, so far, have been small scale, with the exception of India and Mexico where they have been successfully scaled up. For index insurance to be successfully scaled up in SSA, the following conditions should be satisfied:

Demand for the product and affordability: Government subsidies can play a pivotal role with regard to demand and service provision costs but there are challenges to deal with. First, social benefits of insurance should exceed the opportunity cost of subsidies. Secondly, directly subsidizing the premiums may result in the insured taking overly risky behaviour or resulting in over insurance making insurance the cause of income variability instead of crop loss. For this reason, it is important for the government to aim at removing the cause of the high premiums rather than subsidizing the premium itself. This can be done by subsidizing costs incurred towards product development or in introducing pilot projects; providing the required infrastructure to support index insurance (since there is an inherent free rider problem) like installation of weather stations, building capacity, raising awareness, improving delivery mechanisms. Another role for the public sector is to subsidize/pay for the most extreme risk layers (for example extreme drought) and leaving other layers of risk to be covered by the commercial market.

Local ownership and capacity: It is essential that at the scaling up stage, the local markets are able to support the widespread implementation of the project. With the exception of India, weather insurance based markets are virtually nonexistent in the developing world. Establishing 'knowledge foundations' can be a starting point in developing such weather index insurance markets in SSA. But it is important to have the necessary capacity at national (and local) levels to deal, for example, with contract design and insurance salesmanship. It is also necessary that the farming community is aware of the product and has access to it.

Legal and regulatory environment: In order to ensure that consumers are compensated for their losses, the regulatory institutions in the country must make sure that they protect the insurance providers from financial exposure which arises from insuring against events that can be highly correlated thus leading to many payouts in the same year. The central mechanism for this protection is through purchasing of reinsurance from the international markets (Skees and Collier, 2008).

4.4 Managing the impacts of food price instability

4.4.1 Emergency responses

Strategies for responding to food price spikes can be broken into three categories: dealing with emergencies, short term remedies and long term policies and investments (Ghanem et al, 2011 and Ackello-Ogutu, 2011). The main policy objective in cases of emergencies arising for example from weather induced price shocks is to minimize welfare losses especially among the most vulnerable members of the population. Since sharp rises in food prices significantly burden poor consumers, governments should mitigate the impact of price increases and volatility by providing cost-effective, targeted assistance - such as conditional cash transfers - to those in need, rather than resort to market policies, such as generalized subsidies and tax cuts, which are expensive and inefficient. Targeted cash transfer can be a way for dealing with emergencies because they are less demanding in terms of administrative capacity but efforts must be made to ensure that such interventions are understood to be temporary in order to avoid creating unnecessary and unsustainable fiscal burdens and expectations. Further steps that could be considered include providing the World Food Program (WFP) with a more stable source of financing and giving it a line of credit so that it can move quickly when food prices are unusually high for example by sourcing grains within the proximity of the most affected countries. Building the capacity for early warning systems, disaster preparedness and response within the regional economic cooperation institutions (RECs) is an important compliment to emergency response, especially with regard to mobilising resources from the international community and better management of grain reserves to ensure food reaches those in need more easily and cheaply.

Donors, banks and other international agencies have in the past pledged funds for addressing short and medium term effects of the food crisis in SSA. So far, however, a comprehensive strategy has not been put in place nor have the governments in SSA committed adequate financial resources of their own towards initiatives (such as CAADP and MDGs) aimed at addressing the underlying causes of the food crisis within their power (e.g. weak institutions, poor infrastructure and lapses in policy implementation). The proliferation of external interventions and donor pledges appears to create more confusion and inertia among internal mechanisms for generating ideas and resources to deal with the food issue for example through agricultural development and functional markets.

A proposal by von Braun, Lin and Torero (2009) puts emphasis on the importance of a global collective action for modifying the architecture of international financial and agricultural markets to address the problem of price spikes, especially their effects on the livelihoods of the poor. They propose a three pronged approach focusing, first, on developing a modest international physical food emergency reserve to help provide means for expeditious and smooth response to food emergencies. This reserve will be dedicated to emergency response and humanitarian assistance and would be managed by the World Food Program (WFP) and located in major developing-country regions, with countries agreeing to avail storage facilities for these internationally mandated and important stocks.

4.4.2 Short term strategies

The wide diversity of the economies in SSA makes it difficult to specify the likely outcomes of the strategy options adopted to deal with food crisis. The main short term responses to the food crisis by countries in SSA aim principally at muting the inflationary pressure on the economy and protecting the most vulnerable groups, for example, by reducing relevant taxes on food items or imposing export bans. Understandably, the main concern has been to support consumers because in SSA many of these are poor rural and urban households who spend the greater portion of their incomes on food. In response to the 2007-08 food crisis, a number of African countries implemented cash transfers, food-for-work programs and ration schemes. Nearly a dozen countries applied tax reductions and subsidies while others drew from the strategic reserves to help stabilize supplies. Measures targeted at the supply side of the equation were also implemented mainly revolving around input price interventions and subsidies implemented through voucher systems and guaranteed minimum prices for outputs.

Strategies aiming at cushioning domestic markets from fluctuations in border prices can be highly distortionary and their success depends on their timing, how social equity goals are balanced with long term production efficiency interests and, last but not least, how the programs are administered. It is therefore crucial that the policy interventions combine the more common transfer mechanisms with programs that will help farmers, especially the small ones, to respond to market incentives. Although non-tariff trade barriers still persist, regional integration has led to drastic reductions in import taxes for agricultural commodities in much of Africa and further tax reductions may have little effect on controlling price escalation. In theory, most of the SSA countries are quite small in terms of the potential impact they can individually bring to bear on global markets, implying that import taxes would be ideal for reducing excess demand. The efficacy of this strategy is however compounded by several factors, among them: inelastic demand for food, imperfect domestic markets, information asymmetries, poor infrastructure and export restrictions by major global suppliers (FAO-GIEWS, 2008).

4.4.3 Long term strategies

Increasing agricultural productivity

Sub-Sahara Africa has abundant land and water resources making agriculture a priority area in strategies aiming at poverty reduction and industrialization. But the region's wide diversity in terms of factors such as agro-ecological zones, culture, religion, resources endowments and economic development poses challenges to meaningful transformation of the sector. The NEPAD/CAADP efforts that have brought agriculture back in the political and development agenda can attract investments to agriculture but the program, as noted elsewhere in this report, has not been spared the usual lapses in policy implementation and coordination of divergences in stakeholder interests. There is a need for evidence based articulation of high-impact areas within agriculture where resources should be allocated on a priority basis in order to have the largest impact on growth and poverty reduction. The components of agricultural spending that need attention are agricultural administration, research and extension, irrigation, and rural infrastructure. IFPRI simulations show that SSA countries will need to boost their annual agricultural growth to 7.5 percent per year in order to achieve MDG1 requiring agricultural spending to increase to US$13.7 billion per year. If SSA countries fulfil their commitments to allocate 10 percent of their budgets to agriculture under the CAADP framework, the MDG1 target would require additional or incremental spending of US$4.8 billion per year.

There is no route to increasing agricultural productivity that will not involve radical increases in fertilizer use in SSA's agriculture. According to the International Fertilizer Development Center, fertilizer use is extremely low in many SSA countries, averaging 8.8 kg per hectare (ha). If fertilizer use gradually rises to 50 kg/ha, a level that has already been reached by most middle-income countries and which is a target established by an African Fertilizer Summit (in 2006), total fertilizer use will increase by 5 to 6 times. The total cost of fertilizer and improved seeds required to achieve an agricultural growth rate of 7.5 percent is estimated at more than US$9 billion a year. Considering the current level and trend of fertilizer and seed use, the incremental cost of these inputs is about US$6.8 billion per year. These kinds of expenditures are obviously beyond the capacity of SSA's poor farmers.

Fertilizer use correlates closely with area under irrigation and new seed varieties, and here again African countries (with only a few exceptions) significantly lag behind their counterparts in Asia[7]. As the variability of rainfall patterns increases due to climate change, the risks of using chemical fertilizers in degraded tropical soils will increase thus putting into jeopardy any efforts aimed at increasing crop productivity. Although the answer to the dilemma of low fertilizer consumption may lie in exploiting the region's irrigable but idle land, there are inherent socio-economic and environmental challenges that cannot be wished away: prohibitive investment costs for large scale irrigation projects, lack of technical know-how among smallholder farmers, low value-cost ratios for the irrigated crops, competing uses for available water and land resources, and undesirable environmental impacts (Ackello-Ogutu, 2011).

[7] Out of a potential irrigable area of about 600 million ha in the COMESA region, only 2% is under irrigation (WBCSD and IUCN, July 2008) and 75% of crop production in all COMESA countries, except Egypt and Sudan, rely on rainfall.

Agriculture in SSA is also facing a unique dilemma: the temptation for land rich but capital and technology deficient countries in the region to lease some of their land to foreigners originating particularly from India, Saudi Arabia, and South Korea (Kachika, 2010; von Braun and Meinzen-Dick, 2009). These acquisitions were made in countries such as Ethiopia, Madagascar, and Mozambique by private companies. This so called land grab is taking place in the face of alarming fragmentation of farmland in densely populated parts of the continent and in peri-urban areas. These two phenomena (loss of land and fragmentation) constitute a major threat to sustainable food production in SSA but they also offer opportunities in the form of foreign direct investment, employment creation, skills transfer especially for management of irrigated agriculture, raising the stock of global food grains (hence bringing stability to international food prices) and improving financial viability of fertilizer plants located in SSA. These benefits should be complementary to regional and sub-regional efforts aiming at making advances in science and technology relevant to African agriculture, particularly regarding: plant breeding and application of biotechnology; broadening the use of information technology tools; and, building of indigenous human capacity in science and agricultural policy analysis. South-south cooperation in these areas should in the long run boost agricultural productivity and food security in SSA.

Improving trade policies

The volatility in the international food markets since 2007 requires co-ordination and co-operation but many countries instead resort to unilateral initiatives whose overall outcome is worse for all (von Braun et al, 2008). Trade has the potential for being a valuable long term tool for coping with regional and national supply (and price) fluctuations, but its effectiveness has been reduced by the failure to implement fair and rule-based trade for agriculture through the Doha Round of negotiations. Ultimately, however, completion of the Doha Round is critical to creating a well regulated system of trade. At the regional level, the economic coordination institutions (RECs) aim to reduce intra-regional trade barriers. Through the RECs, it is possible to implement more coordinated trade policies such as the elimination of unjustified non-tariff barriers and outlawing arbitrary export bans. Similarly, harmonization of product standards and customs requirements across countries can increase intra-regional trade and stabilize food prices. Such cooperation, coordination and openness will foster trade flows and definitely help blunt the amplitudes of food price swings in the regional markets.
The RECs in SSA can also play a role in enhancement of trade related market information and intelligence systems. Mechanisms for collating and sharing food balance sheets between different countries already exist in most parts of Africa but they need to be strengthened in order to cover longer time horizons and options for remedial actions. Similarly, initiatives such as RATIN, and institutional innovations such as the Eastern Africa Grain Council (EAGC) and FEWSNET do collect and disseminate market data but they face problems of capacity and sustainability.

An alternative long term strategy of reducing risks of individual countries struggling to achieve grain self-sufficiency is to establish a global food reserve system (von Braun, et al., 2009). But, although experiences of global market failures during the 2007-08 crisis lent some degree of merit and attractiveness of policies promoting long term national food self-sufficiency, this approach generally runs the risk of producing an inefficient production system with excessive reserves and a diminished global grain market. An alternative that the authors put forward is that of establishing a virtual food reserve to help prevent market price spikes and to keep prices closer to levels dictated by long-run market fundamentals, like supply and demand, without putting at risk the coordinated global reserves.

5 CONCLUSIONS

Sub-Sahara Africa is now doing well at least in terms of increasing food production and in time this should be translated into successful achievement of the MDGs. The diversity of the region and its abundant land and water resources should make it possible to achieve the following key milestones: enabling poor rural households not just to gain access to food but to also make them net sellers for longer periods of the year and more regularly; raising the level of commercialization at all levels of the commodity value chains; increasing the volume of intra-regional trade in agricultural commodities; and, helping the region as a whole to gain lost ground in competitiveness and access to global food markets. For agriculture to play a lead role in economic growth and poverty reduction in SSA, the sector will require more investments particularly in infrastructure; building stronger partnerships with the private sector; promoting increased use of science and technology; and reducing impediments that hinder market participation by smallholders. There is now much more commitment on the part of government and private sector to increase investments in agriculture and the NEPAD/CAADP framework has already created the necessary political awareness and justification for increased budgetary allocations to the sector.

The whole African continent is quite upbeat about its new-found political maturity, institutional democratization, awareness about human rights and freedom of the press. These positive trends signal a turnaround for the continent's economic growth, improved welfare and equitable participation in the economy especially by the agrarian communities, women and youth. Similarly, renewed donor interest in SSA agriculture especially following the food crisis in 2007/08 and increased prospects of more FDI and technical support coming from south-south cooperation all suggest that financial resources will not be the real constraint hindering agricultural development and hence effective contribution of the sector towards achievement of food security. However, even with the best of scenarios for funding prospects, increased investments in agriculture and growth in national economies, SSA still faces both short and long term challenges in translating this growth into real gains in food security and nutritional status of the majority of people in the region. Projections for 2030 show that SSA will still fall short of the world average per capita dietary energy consumption and it is the only region where the absolute numbers of malnourished children will continue increasing through the year 2050. The main challenges in the short term are seen as: agriculture's low absorptive capacity; wide spread poverty and per capita incomes that are too low to form a strong future foundation for effective demand; lack of social equity; diseases such as malaria and HIV/AIDS; persistent insecurity hot spots that destabilise large populations thereby undermining provision of basic services; and, high level corruption that costs tax payers millions of dollars annually. If no actions are taken, there will still be manifestations of some or many of these problems even after 2030 and in the process exacerbating what are viewed as long term challenges: climate change impacts, demographic changes and increased exposure of SSA to global phenomena such as changes in food prices (that are projected to have strong upward trends) and instability in financial markets (that could for example increase risks in FDI inflows to SSA).

Climate change introduces daunting food security challenges for SSA. Although there is now better scientific understanding of past, present and future climate change, there is still much uncertainty about the magnitudes and impacts of such changes at any particular location and how best to prepare for them. Vulnerability of SSA to climate change impacts arises mainly from lack of resources needed for adaptation, including lack of early warning systems and disaster preparedness; underdeveloped economies or what can be referred to as 'small country' syndromes; and lack of weather based insurance products.

Despite these challenges, SSA has several opportunities for ensuring its future food security. Considering the huge role that agriculture plays in the economies of many countries in SSA, the first order of business must be to increase agricultural production and productivity by increasing area under cultivation especially for major food grains (maize, rice and wheat) – this is practically feasible for many countries, otherwise the hue and cry about the so called 'African land grab' would be irrelevant; increased use of high yielding seeds, fertilizer and irrigation; adding value and reducing post-harvest losses; and, improving smallholder access to agricultural markets. The opportunities in agriculture must be looked at in the context of the wide diversity in SSA especially with respect to availability of arable land and tenure systems, demographic and gender/youth pressures, and alternative (non-agricultural) sources of livelihood such as minerals, oil and tourism. The paper offers strategies not just for managing the future challenges to food security in SSA but also recommends ways of taking advantage of the opportunities that are likely to emerge, for example, from rising urban populations and per capita incomes, increased food supply responsiveness by smallholder farmers and agro-processors if the upward price trends persist, international cooperation and support, and increased investment inflows due to south-south cooperation between the region and the newly industrialized countries in the south.

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Further information

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