Why has Africa become a net food importer?

Explaining Africa agricultural and food trade deficits

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WHY HAS AFRICA BECOME A NET FOOD IMPORTER?

Explaining Africa agricultural and food trade deficits

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ROME, 2011

ISBN 978-92-5-107088-8

ABSTRACT

That Africa has become a net importer of food and of agricultural products, despite its vast agricultural potential, is puzzling. Using data mainly for the period 1960-2007, this report seeks to explain Africa's food-trade deficit since the mid-1970s. The core finding is that population growth, low and stagnating agricultural productivity, policy distortions, weak institutions and poor infrastructure are the main reasons. A typology of African countries based on data between 2000 and 2005 reveals that the state of food import dependency is different across the continent and varies according to countries' levels of income. Although the few and relatively rich countries in Africa had the highest net food imports per capita (USD 185 per year in real terms), they had ample means to pay for their food import bills using revenue from non-agricultural sources. Conversely, the majority of the Africa's low-income countries (mostly in Sub-Saharan Africa), where two-third of its population lives, had been net food importers; they imported far less food per capita (USD 17 per year) but had difficulty covering their food imports bills, as their export revenues were limited. Overall, between 1980 and 2007, Africa's total net food imports in real term grew at 3.4 percent per year, but this growth was mostly fuelled by population growth (2.6 percent per year); the increase in per capita food import was only about 0.8 percent per year. Food consumption on per capita basis grew only at about 1 percent per year, while food production grew at an even smaller rate of less than 0.1 percent per year. The slow growth of food consumption and imports per capita is consistent with the weak economic growth and unchanged dietary pattern in the continent. Food import share, regardless of income levels, is relatively small and represents less than 5 percent of per capita income (GDP per capita). Because the share of food expense in household income is generally high in Africa, especially in Sub-Saharan Africa, that the share of food imports over GDP is small implies that domestic production has largely contributed to feeding Africa's population. Still, domestic food production has remained relatively low and increased only by 2.7 percent per year, just barely above population growth rate. This implies that any increase in per capita consumption had to be met by an increase in imports. The weak growth in food production arises from various constraints including those linked directly to agricultural productivity. Data and evidence from literature highlight that technical, infrastructural and institutional constraints share the blame. Likewise, distortions arising from both internal and external economic and agricultural policies (especially the protection and subsidies from developed countries and taxation on food production within Africa) have affected food productivity, production and trade in Africa. However, the examples of a few successful practices in African agriculture and the fact that the domestic food production has managed to keep up with population growth inspire optimism that the future is not all dark. There is a lot of room for improvement for agricultural productivity in these low-income countries to the point at which production growth outpaces the growth of population and per capita consumption.

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Acknowledgements

This report benefits from the valuable contributions and comments made by Nikos Alexandratos, Aziz ElBehri, David Hallam, Suffyan Koroma, Jamie Morrison, Alexander Sarris, Josef Schmidhuber, Ramesh Sharma, and Marcela Villarreal. Technical support from Rita Ashton and Claudio Cerquiglini is gratefully acknowledged.

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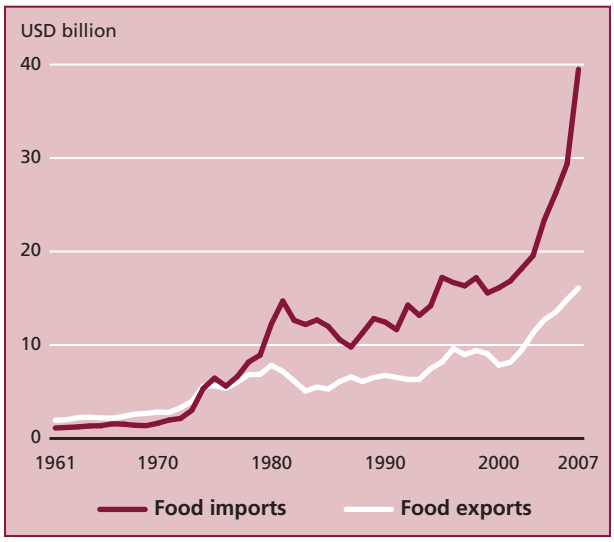
1 Introduction

Despite its vast agricultural potential, Africa as a continent has remained a net importer of agricultural products in the last three decades. In 1980, Africa had an almost balanced agricultural trade when both agricultural exports and imports were at about USD 14 billion, but by 2007 its agricultural imports exceeded agricultural exports by about USD 22 billion (FAOSTAT, 2011). For food trade in particular, Africa food trade deficit had started at an earlier time (mid-1970's) and ever since it has grown fast and exceeded USD 13 billion in 2005 (Figure 1). The increase in food imports since the mid-1970s has been particularly striking for basic foodstuffs such as dairy products, edible oils and fats, meat and meat products, sugar and especially cereals, implying that food import has been increasingly important in ensuring food security (Figure 2).

FIGURE 1. AFRICA'S FOOD IMPORT AND EXPORT TRENDS (CURRENT VALUES)

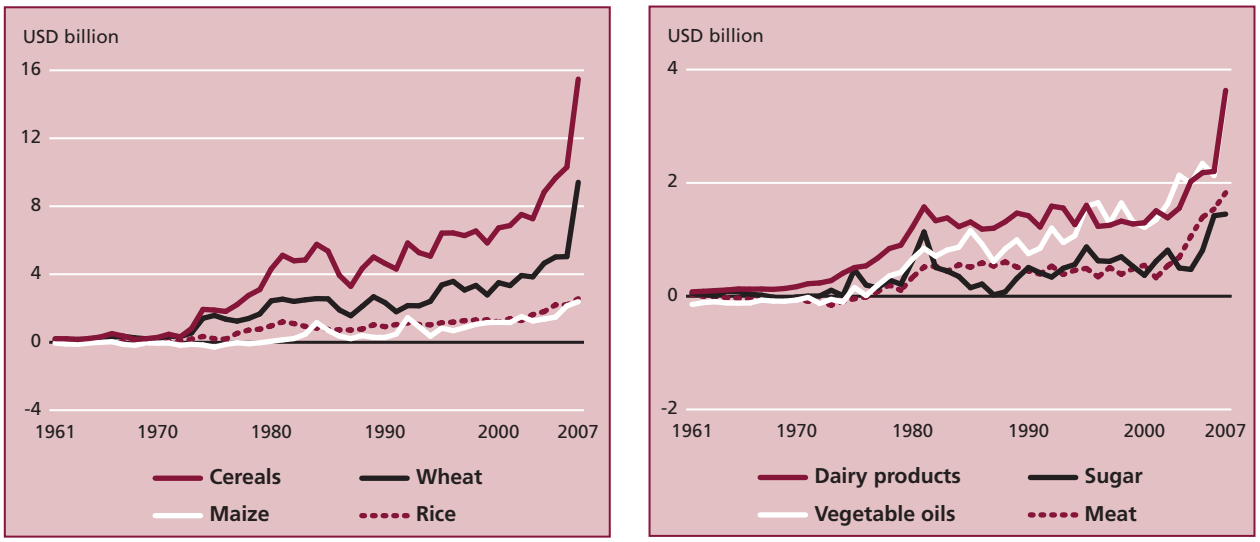


Source: FAOSTAT, 2011

Food import dependency is viewed differently depending on each individual country's ability to pay its food import bill. For some oil or mineral-rich countries (e.g. Botswana, Libya) or for some of the relatively more industrialized countries (e.g. Mauritius), importing some types of food products (like fruits and vegetables) seems more beneficial than producing these products at home, especially since they have enough foreign currency reserves to pay for the food import bills. But for cash-strapped countries (e.g. Burundi, Central African Republic, Eritrea), persistent food import becomes a problem when the high and rising food import bills take money away from other important development agendas without resolving food insecurity. The problem is even bigger for countries where exports rely mainly on agriculture but the revenues from traditional exports such as cocoa, coffee and spices are less certain and at the mercy of volatile international market prices. FAO data show that in 2007, only about one-third (19 out of 53) of African countries had enough agricultural export revenue to pay for their food import bills, and the rest had to draw money from other resources or wait for food donations to ensure a stable food supply. In countries like Burundi, Cap Verde, Comoros, Djibouti, Eritrea, Gambia, Sao Tome and Principe and Somalia, the total export revenues of total merchandise (agriculture and non-agriculture) were far short of agricultural (including food) import bills. Detailed investigation of the issue of food insecurity in Africa has already been the object of other FAO reports and is not the focus of the present.[1] However, the specific concern over the ability of some African countries to afford increasingly costly food imports to improve food security has motivated the search for answers on why Africa has become a net food importer.

[1] See the latest State of Food Insecurity, FAO, 2010

FIGURE 2. AFRICA'S NET IMPORTS OF SELECTED FOOD GROUPS (CURRENT VALUES)



Source: FAOSTAT, 2011

Countries aiming to tackle the high and rising food import bills and to solve food insecurity face two different pathways. One pathway is to reduce directly the agricultural (including food) trade deficit by finding ways to reduce agricultural imports and boost agricultural production and agricultural exports. (Methods such as import substitution, export diversification, and protection policies belong to this solution.) The other pathway is to temporarily ignore the agricultural trade imbalance and to find ways to increase exports in non-food or non-agriculture sectors (services, tourism, oil and mining, etc.) to finance food bills. Debates rage on which one of the two pathways is optimal and sustainable for each country, but the two are not mutually exclusive. For instance, building trade infrastructure (such as roads, ports, and laboratories) can benefit both agricultural and non-agricultural exports whether or not targeting a balanced agricultural trade is the priority. Similarly, development of tourism, an effort to boost non-agricultural activities, does not preclude but may even enhance efforts to improve productivity and efficiency of local agricultural production to supply hotels and restaurants; it may in the end contribute to reducing the agricultural trade deficit. Hence, for countries where high food import bills are a real burden, the problem is less a matter of choosing a single pathway but more of determining broadly the types of actions that will reduce the burden of persistent and high import bills, given available resources. Determining which actions can reduce food import bills and ensure food security requires a full investigation of the causes of the persistent and rising net agricultural and food imports.

Various studies (e.g. Omamo *et al.* 2006; Diao *et al.* 2008) have documented the causes of the persistent growth in net agricultural and food imports in Africa and have cited a host of explanations such as low productivity, poor agricultural and trade infrastructure, low internal and external trade capacity, low investment in agricultural resources (human, natural, financial, equipment), domestic and foreign policy distortions, high population growth, and political instability and civil unrest. However, views still diverge on what really are the most important determinants to be addressed at the country, regional, or continental levels in order to reverse these net import trends. Such prioritization is needed because investment resources are scarce and the demand for action is pressing. Revisiting the causes of net food import is not only crucial to making a consistent and up-to-date set of priorities regarding how to deal with food production and trade problems; it is also important in clarifying the arguments on whether food import is an anomaly to be reversed or an optimal solution toward achieving food security.

2 Objectives and definitions

The objective of the investigation documented in this report is to review the state of African food and agricultural trade and to explore some of the main causes of Africa food import dependency and slow growth of agricultural and food exports. Specifically, the aim is to:

1. update the information on past and recent trends in Africa's food and agricultural production, consumption, and trade;
2. review and explore some of the various explanations of African food import and export trends and especially the persistence of rising food imports;
3. discuss what, if necessary, can be done to reverse the African food deficit trend or to solve the problems caused by it.

The focus is on the 53 African countries (see Figure 3): Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Congo, Cote d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon,

FIGURE 3. A MAP OF THE AFRICAN CONTINENT

Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe.

In this publication, agriculture is regarded as the production of food and goods through farming. Unless otherwise stated, agricultural products in this report exclude forestry, fishing, and fibres or wool. Food products in this report include semi-processed and processed food (cheeses, butter, frozen vegetables, flour, juices, etc). More details are found in Annex 1.

Chapter 3 lays out the main challenges for Africa on agricultural trade. It dissects the pattern, composition, and flow of African food and agricultural trade and highlights the seriousness of food insecurity in the continent. A typology of African countries based on how the extent of food-trade deficits depends on countries' levels of income is presented. Chapter 4 explores the reasons on the demand side of the increase in food import and investigates whether the increase in imports is due to the increase in population size or a significant hike in imports per capita. Chapter 5 seeks technical explanations for why domestic supply has not been able to respond fully to the increase in demand and addresses productivity issues. Chapter 6 discusses the roles of both domestic and foreign agricultural production and trade policies in making Africa food-import dependent. This chapter revisits the evolution of economic and agricultural policies constraining the continent's productivity growth and welfare. Chapter 7 concludes the report.

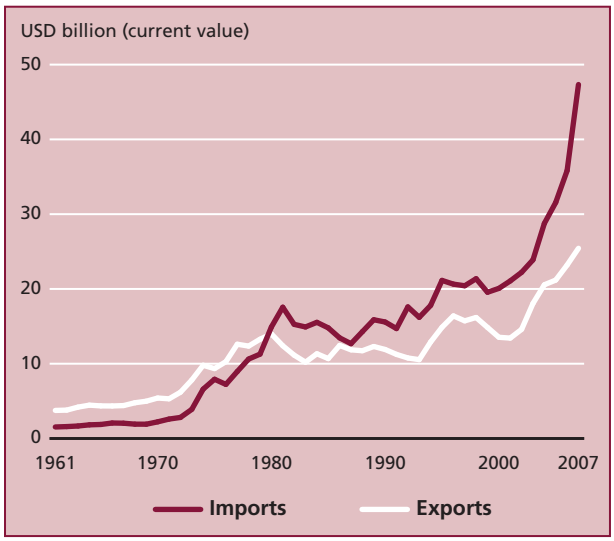
3 Overview of Africa's food trade challenges

3.1 FOOD IMPORTS RISING FASTER THAN AGRICULTURAL AND FOOD EXPORTS

Africa lost its status as a net exporter of agricultural products (food included) during the early 1980s when prices of raw commodities (mainly coffee, cocoa and spices), which constituted the bulk of its agricultural export revenues, tumbled and local food production grew sluggishly. Since 1980, agricultural imports have grown consistently faster than agricultural exports and in 2007 reached a record high of USD 47 billion (FAOSTAT, 2011, COMTRADE, 2010), yielding a deficit of about USD 22 billion[1] (see Figure 4).

Although for Africa as a continent, agricultural export revenue alone can no longer pay for agricultural imports, agricultural and food-trade balances vary across countries. This disparity in agricultural trade balance will be explored further in later chapters. The following are key characteristics of Africa's food and agricultural trade.

FIGURE 4. AFRICAN IMPORTS AND EXPORTS OF AGRICULTURAL PRODUCTS



Source: FAOSTAT, 2011

[1] Both COMTRADE and FAO sources agree on the same figure with slight discrepancies.

African food imports composed mainly of cereals and livestock products

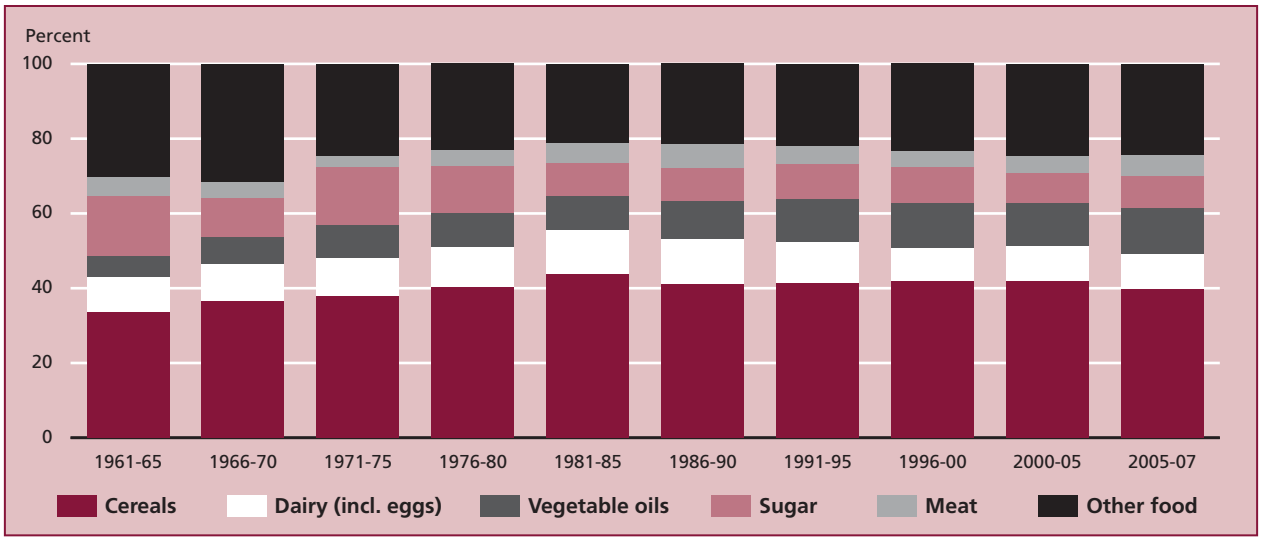
Between 1980 and 2007 Africa net food imports in real terms grew at an average 3.4 percent per year (FAOSTAT 2011), and it may be asked 'what fuelled this rise in agricultural and especially food imports?' Data show (as presented earlier in Figure 2) that carbohydrate, the primary staple, is the main driver of this growth and also constitutes the bulk of African food imports. This is confirmed in the Figure 5 showing that cereals alone are the largest commodity imports. Although the composition of food imports varied slightly from period to period, cereals (including rice, maize, and wheat), and livestock products (dairy and meat) represented at least 50 percent of Africa total food imports. Imports of cereals and livestock products peaked at nearly 60 percent of total food imports in the early 1980s but have slightly declined thereafter. The value of sugar and vegetable oil imports has remained at about 20 percent of total imports.[2]

Sluggish and concentrated agricultural exports

Compared with the fast growing food imports, Africa's agricultural exports have not increased much (as shown in Figure 4). Moreover, Africa as a continent has not managed to diversify much its agricultural and food exports since the 1960s. The composition of Africa's agricultural exports between 1961 and 2007 described in Figure 6 shows that despite the efforts in recent years to include 'non-traditional' export products (such as flowers, semi-processed fruits and vegetables and textile products), the traditional exports (coffee, cocoa, tea, and spices) along with beverages and

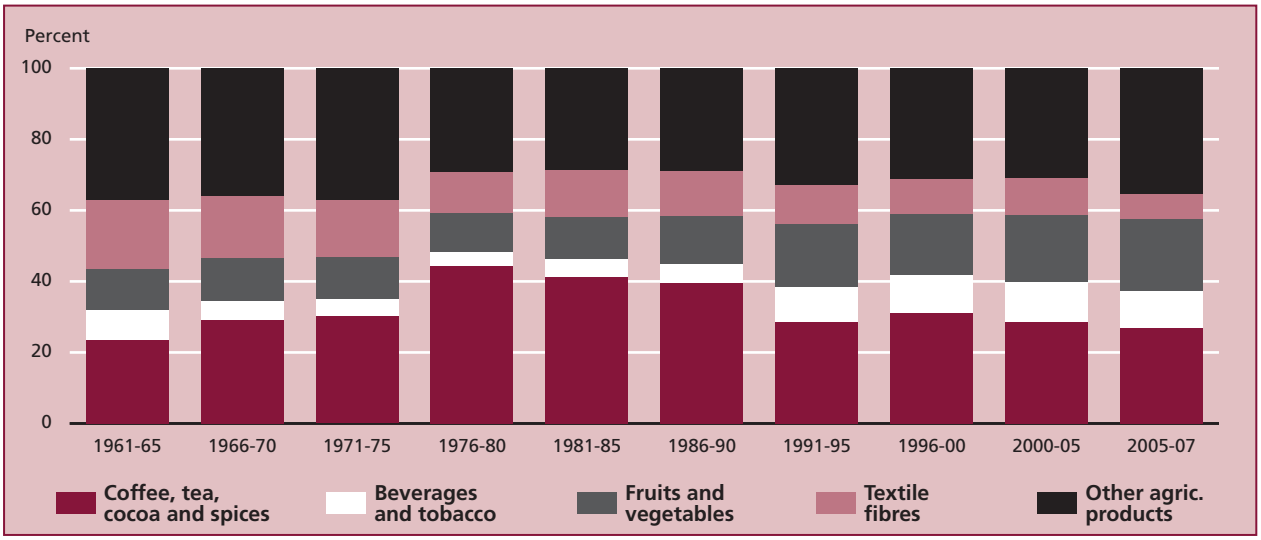
[2] See Annex 2 for cereal import values in real terms.

FIGURE 5. COMPOSITION OF AFRICA FOOD IMPORT VALUES



Source: FAOSTAT, 2011

FIGURE 6. COMPOSITION OF AFRICA AGRICULTURAL EXPORT VALUES



Source: FAOSTAT, 2011

tobacco still cover an important share (35 percent in 2006-07) of agricultural exports and remain the largest components of food exports (tobacco aside).[3] Since 2000, the shares of these traditional export products have slightly fallen, slowly giving way to fruits and vegetable exports. These are average figures for the continent, so the actual export composition varies across countries. There are countries (e.g. Kenya) where the 'non-traditional' export commodities such as fruits and vegetables and flowers have become the backbone of agricultural exports. It is also important to note that cereals are among Africa's other main agricultural exports but cereals' export shares have been fluctuating. However, as it is discussed in section 3.2, most of the cereal exports are for markets within Africa, while exports of fruits and vegetables, as well as coffee, cocoa, and spices, are for markets outside the continent mostly .[4]

[3] Annex 2 shows the relative net export shares of some agricultural commodities.

[4] Also, most of the processed food produced in Africa remained in the continent and was not traded with the rest of the world.

Agricultural exports no longer the main source of foreign currencies

African agricultural exports as a fraction of total merchandise exported have fallen sharply over the years indicating that the revenues from other export categories (e.g. apparel and textile, fisheries, mining, oil) have risen steadily (Table 1). Between 1960 and 2007, the share of agricultural exports out of total merchandise exports fell from 42 percent to less than 6 percent. The falling share has been mostly pronounced in West Africa. This is perhaps due to the rise in export of fossil oil and minerals as well as the rise in textile export under free export processing zones in that region.

3.2 LOW LEVELS OF AGRICULTURAL TRADE BOTH WITHIN AFRICA (INTRA-TRADE) AND BETWEEN AFRICA AND THE REST OF THE WORLD (EXTERNAL TRADE)

In general, the values of agricultural imports to and exports from Africa are only small portions of the world's total agricultural trade. For instance, between 2005-2007, African agricultural imports and exports each represented less than 5 percent of the world's agricultural imports and exports (Figure 7). The dismal performance of African agricultural trade reflects the high levels of internal and external trade barriers despite the continent's vast agricultural potential.

The level of African intra-trade in agriculture and food products is low in comparison with its total trade volume. According to COMTRADE (2010) data (Table 2), between 2004-2007 only one-fifth of African food exports stayed in Africa, whereas 88 percent of Africa's total agricultural imports originated from outside the continent. However, the share of intra-trade of food over the total food trade varied greatly among commodities and was high in some cases. Cereals, live animals, meat, and dairy products were the most intra-exported food products, representing 67, 61, 58 and 55 percent respectively out of Africa's total export of these products. Conversely, 92 percent of the exports of fruits and vegetables, 90 percent of coffee, cocoa, and tea, and 89 percent of spice went outside the continent. Likewise, the most intra-imported products were coffee, cocoa, and tea (41 percent in total), and spices (29 percent). While some African countries have been importing their cereals, oils and fats, and dairy products from other African countries, such intra-imports have remained less that 10 percent of Africa's total imports for these products; the rest, about 90 percent, has to be imported from outside the continent, especially from North America and from Europe. Africa's main agricultural import origins and export destinations have been the European Union and Asia (see chart in Figure 8), especially China, India, and Japan.

It is noted that official trade statistics may not include some cross-border trade, especially on live animals and some basic foodstuff. These figures should be interpreted cautiously.

3.3 PAYMENT OF FOOD IMPORT BILLS

Food insecurity challenges

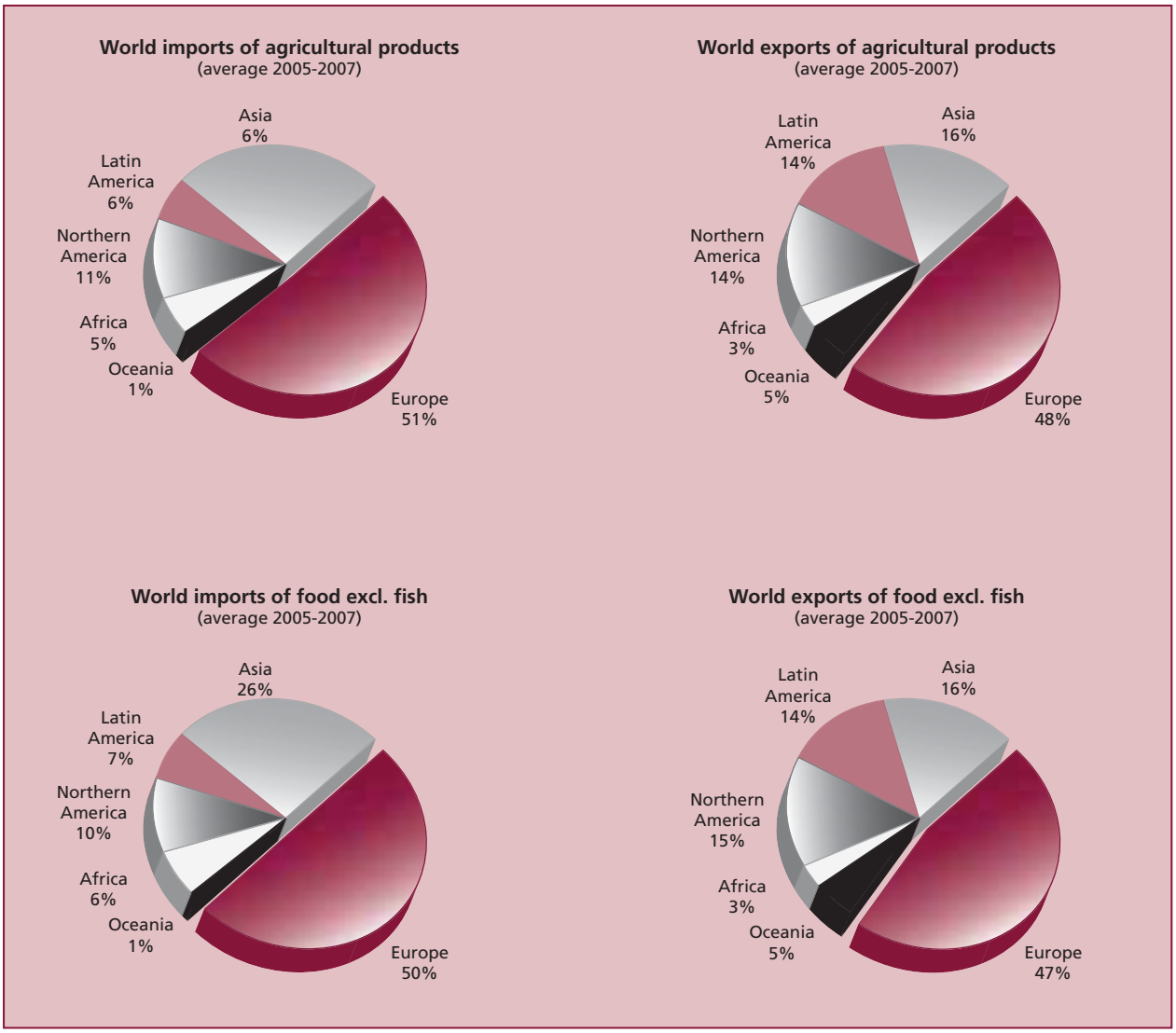
Food insecurity issues in Africa are treated in other reports (e.g. State of Food Insecurity, FAO 2010) but the present report highlights only how food import dependency is linked to food security for

TABLE 1. SHARE OF AFRICAN AGRICULTURAL EXPORTS IN TOTAL EXPORTS

Region	Share of agricultural exports in total merchandise exports						
	1961-70 Avg	1971-80 Avg	1981-90 Avg	1991-00 Avg	2001-05 Avg	2006	2007
Africa	0.423	0.222	0.140	0.124	0.091	0.065	0.058
Eastern Africa	0.500	0.542	0.542	0.464	0.366	0.361	0.300
Middle Africa	0.437	0.265	0.138	0.066	0.031	0.014	0.015
Northern Africa	0.401	0.133	0.062	0.062	0.042	0.029	0.029
Southern Africa	0.266	0.189	0.088	0.087	0.078	0.063	0.058
Western Africa	0.614	0.234	0.199	0.171	0.147	0.110	0.083

Source: FAOSTAT, 2011

FIGURE 7. SHARES OF AFRICAN AGRICULTURAL AND FOOD IMPORTS



Source: FAOSTAT, 2010

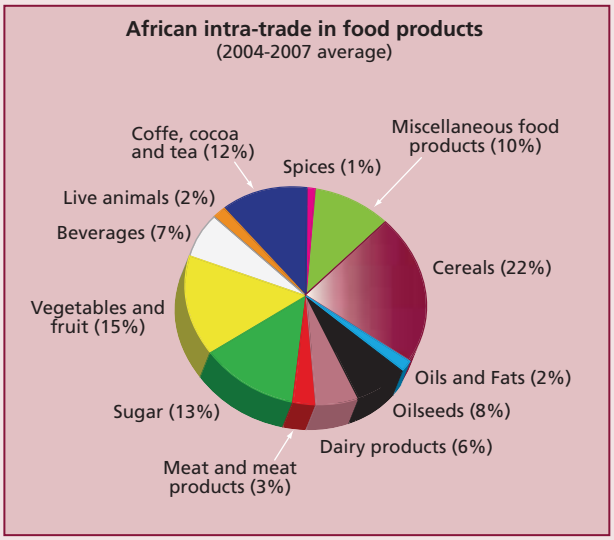
Africa. The yearly average figures on the world's undernourished population in Table 3 show that, between 2005-2007, while Africa's population represented only about a seventh of the world's population it hosted about one-fourth of the world's undernourished. During the same period, Africa's undernourished made up about one-fourth of its total population, and they lived mostly in Sub-Saharan Africa. These alarming food insecurity figures have remained almost unchanged (though the proportion of the undernourished declined slightly since 1990-92) and highlight the severity of the food security challenge that Africa is still facing.

Similarly, the figures on cereal and meat consumption in Tables 4(A), 4(B) and 5, offer a glimpse of how some African regions' basic food consumption is far behind that of the rest of the world. The lowest apparent consumption (or utilization) per capita is in Central Africa for cereals (with just less than one-fourth of the world's average)[5] and in Central, Eastern and Western Africa consumption of meat is the lowest (less than one-third of the world's average).

However, it is noted that actual cereal for human consumption for Africa is just slightly below the world's average and is particularly high in North Africa (Table 4(B)).

[5] These numbers are called 'apparent' consumption (or utilization) since they are estimated as the difference between supply (production and import) and export, assuming that there is no change in the stock. They may include other items such as feed for animals.

Box 1. Africa's total trade and intra-trade of food products, 2004-2007

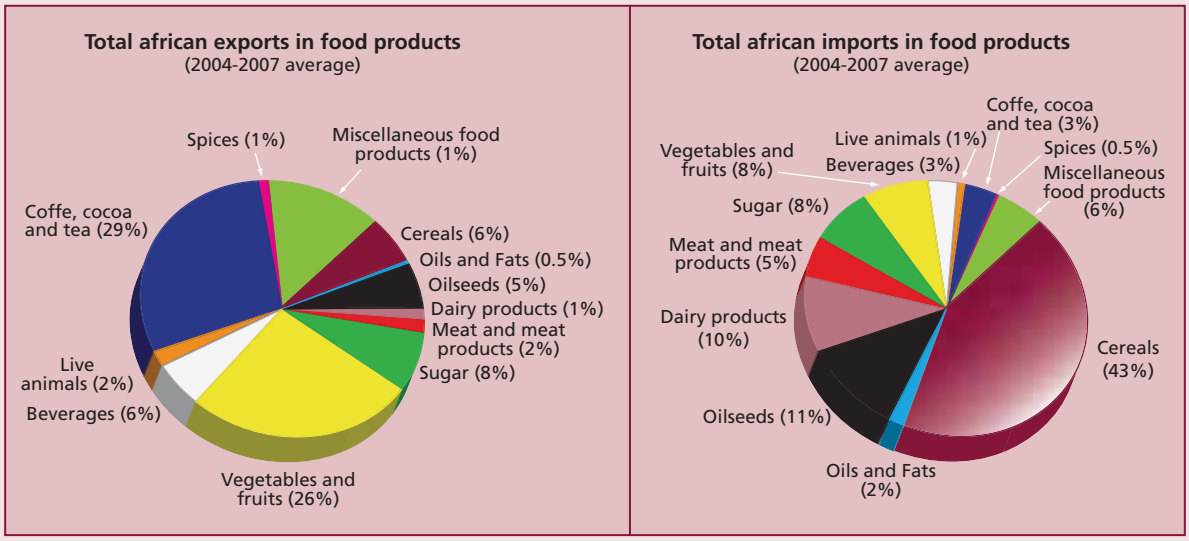


Source: COMTRADE, 2010

Note: The graph is based on the value of imports of food reported by African countries, which may slightly differ from the corresponding reported exports of food by the African trade partners.

Average figures for 2004-2007 reveal that the major imported commodities have been cereals, oilseeds, and dairy, covering respectively 43 percent, 11 percent, and 10 percent of total imports, whereas coffee, cocoa, and tea as well as fruits and vegetables have been the most important exported commodities in Africa, having respective shares of about 30 percent and 26 percent of total exports.

Most of the cereal exports are for markets within Africa, while exports of fruits and vegetables, as well as coffee, cocoa and spices are mostly for markets outside the continent.



Source: COMTRADE, 2010
Note: African intra-trade is included

TABLE 2. SHARES OF AFRICA'S FOOD TRADE (2004-2007 AVERAGE)

	Africa's export to:			Africa's import from:		
	World*	Africa	% of intra-trade	World*	Africa	% of intra-trade
	million USD			million USD		
Cereals	975	656	67.3	10 546	643	6.1
Oils and Fats	82	34	42.0	409	46	11.3
Oilseeds	952	238	25.0	2 706	218	8.0
Dairy products	229	127	55.4	2 320	168	7.2
Meat and meat products	334	195	58.5	1 312	86	6.6
Sugar	1 364	506	37.1	1 830	367	20.0
Vegetables and fruits	4 599	365	7.9	1 864	428	23.0
Beverages	978	306	31.3	804	203	25.2
Live animals	347	212	61.1	196	54	27.8
Coffee, cocoa, tea	5 147	513	10.0	842	344	40.8
Spices	179	20	11.0	117	34	28.9
Miscellaneous food products	2 334	253	10.8	1 353	302	22.3
Total	**17 520**	**3 423**	**19.5**	**24 299**	**2 892**	**11.9**

Source: COMTRADE, 2010
* World trade includes Africa intra-trade

TABLE 3. PROPORTION OF UNDERNOURISHED POPULATION

Countries	Total population	Number of people undernourished				Proportion of undernourished in total population			
	2005-07 Avg	1990-92	1995-97	2000-02	2005-07	1990-92	1995-97	2000-02	2005-07
	millions	millions				%			
World	6 559.3	843.4	787.5	833.0	847.5	16	14	14	13
Developed countries	1 275.6	16.7	19.4	17.0	12.3	-	-	-	-
Developing countries	5 283.7	826.6	768.1	816.0	835.2	20	17	17	16
Africa	888.4	169.8	192.6	207.3	207.2	28	28	26	23
Sub-Saharan Africa	729.6	164.9	187.2	201.7	201.2	34	33	31	28
Asia and The Pacific	3 558.7	587.9	498.1	531.8	554.5	20	16	16	16
Latin America and the Caribbean	556.1	54.3	53.3	50.7	47.1	12	11	10	8

Source: FAO - State of Food Insecurity (SOFI 2010)
Note: Undernourishment (sometimes also called malnutrition) refers to the condition of people whose dietary energy consumption is continuously below a minimum dietary energy requirement for maintaining a healthy life and carrying out a light physical activity with an acceptable minimum body weight for attained height. (See Annex 3 for Africa minimum dietary requirements.)

Paying the food import bills

With regards to food security, the persistence of food-import dependency may not be a problem in some African countries (like Botswana, Libya, or Mauritius) where foreign currency sources other than agricultural exports (e.g. mineral, oil exports, or tourism) can cover the food import bills (Table 6). As in some industrialized but natural resource-constrained nations, strong non-agricultural exports may help sustain large food imports over the years. However, the bulk of African countries still have weak non-agricultural exports and no stable source of foreign currency.

TABLE 4(A). CEREAL (UTILIZATION): CONSUMPTION PER CAPITA

Country Groups	Per caput utilization					Average annual growth (percent)					
	1961-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	1962-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	1962-2007
	kg/year					%					
World	295	317	309	307	310	1.14	-0.24	0.41	-1.63	1.02	0.40
Africa	168	184	189	195	195	0.48	0.31	0.94	-0.21	-0.02	0.43
Eastern Africa	144	129	133	140	140	0.04	-0.54	1.32	1.25	0.15	-0.04
Central Africa	73	66	74	80	82	-0.34	-0.09	3.39	0.32	2.30	0.24
Northern Africa	233	295	315	312	313	1.76	0.69	0.80	-3.01	0.11	1.05
Southern Africa	291	296	274	278	276	0.97	-0.36	-0.41	-0.34	-0.70	0.18
Western Africa	147	174	187	201	201	-0.56	1.38	1.52	2.49	0.01	0.59
Least Developed Countries	144	151	163	171	175	0.19	0.29	1.57	0.73	2.19	0.44
Central America	245	330	390	410	401	2.86	0.59	1.70	7.12	-2.36	1.72
Caribbean	123	148	160	169	171	3.09	-0.25	1.62	1.92	0.75	1.40
South America	224	258	278	291	300	1.01	0.48	1.13	1.80	2.93	0.85
Asia	193	239	243	243	245	1.68	0.52	-0.14	0.20	0.79	0.93

Source: FAOSTAT, 2011

TABLE 4(B). CEREAL (FOOD): CONSUMPTION PER CAPITA

Country Groups	Per caput food consumption					Average annual growth (percent)					
	1961-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	1962-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	1962-2007
	kg/year					%					
World	135	148	145	145	145	0.60	0.15	-0.21	0.11	-0.10	0.29
Africa	124	135	138	142	143	0.48	0.21	0.47	0.93	1.01	0.38
Eastern Africa	112	107	110	113	114	0.15	-0.31	0.51	1.24	0.69	0.03
Central Africa	60	56	63	68	70	-0.20	-0.02	3.17	1.34	2.54	0.34
Northern Africa	173	210	211	212	212	1.59	0.19	0.15	0.70	0.14	0.78
Southern Africa	177	177	181	183	182	0.21	0.07	0.05	0.06	-0.34	0.11
Western Africa	109	129	138	145	148	-0.23	1.21	0.91	1.49	2.60	0.62
Least Developed Countries	120	125	129	130	131	0.21	0.20	0.24	0.58	1.03	0.23
Central America	151	165	162	160	159	0.50	0.15	-0.44	1.03	-0.65	0.23
Caribbean	82	86	93	94	94	1.42	-0.03	0.73	0.61	0.00	0.67
South America	104	111	116	116	115	0.60	-0.11	1.96	-3.18	-1.16	0.32
Asia	139	162	156	154	154	1.27	0.21	-0.53	0.18	-0.23	0.56

Source: FAOSTAT, 2011

In 2007, only about one-third of African countries (19 out of 53 countries) had enough agricultural export revenues to pay for their food import bills, while the remaining majority had to draw from other sources. Moreover, for countries like Burundi, Cap Verde, Comoros, Djibouti, Eritrea, Gambia, Sao Tome and Principe and Somalia, total export revenues on all merchandises (agricultural and non-agricultural) were far short of agricultural (including food) import bills. This highlights the problem of food-import dependency, especially the difficulties facing households and governments in these countries in finding ways to pay for the rising import bills.

TABLE 5. MEAT (FOOD): CONSUMPTION PER CAPITA

Country Groups	Per caput food consumption					Average annual growth (percent)					
	1961-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	1962-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	1962-2007
	kg/year					%					
World	26.8	33.4	38.2	39.4	39.6	1.50	1.08	0.73	1.53	0.36	1.21
Africa	13.1	14.0	14.6	15.4	15.3	0.34	0.16	0.96	1.86	-0.16	0.35
Eastern Africa	12.5	10.6	10.1	10.3	10.2	-0.74	-0.97	1.33	0.72	-1.14	-0.59
Central Africa	10.8	10.8	10.6	10.9	11.0	-0.25	-0.03	0.80	0.44	1.38	0.01
Northern Africa	13.0	17.9	20.9	22.1	22.1	0.85	1.72	0.78	0.55	0.10	1.20
Southern Africa	33.6	36.0	40.1	46.8	46.0	0.52	0.81	1.88	7.67	-1.81	0.90
Western Africa	9.9	10.6	11.1	11.5	11.8	1.35	-0.47	1.40	1.97	2.27	0.60
Least Developed Countries	9.1	8.7	9.8	10.6	10.8	-0.08	0.10	3.00	1.76	1.77	0.41
Central America	24.6	37.0	51.4	54.8	55.5	1.97	2.13	2.25	2.10	1.31	2.06
Caribbean	21.7	25.5	29.0	33.1	35.3	1.60	0.69	2.21	6.36	6.50	1.48
South America	39.8	51.9	65.7	67.5	69.7	0.95	1.94	-0.81	4.91	3.29	1.33
Asia	8.4	18.1	26.5	28.2	27.9	4.26	4.21	1.54	1.98	-1.21	3.77

Source: FAOSTAT, 2011

3.4 A TYPOLOGY OF AFRICAN COUNTRIES AND ITS IMPLICATIONS

Cluster analysis

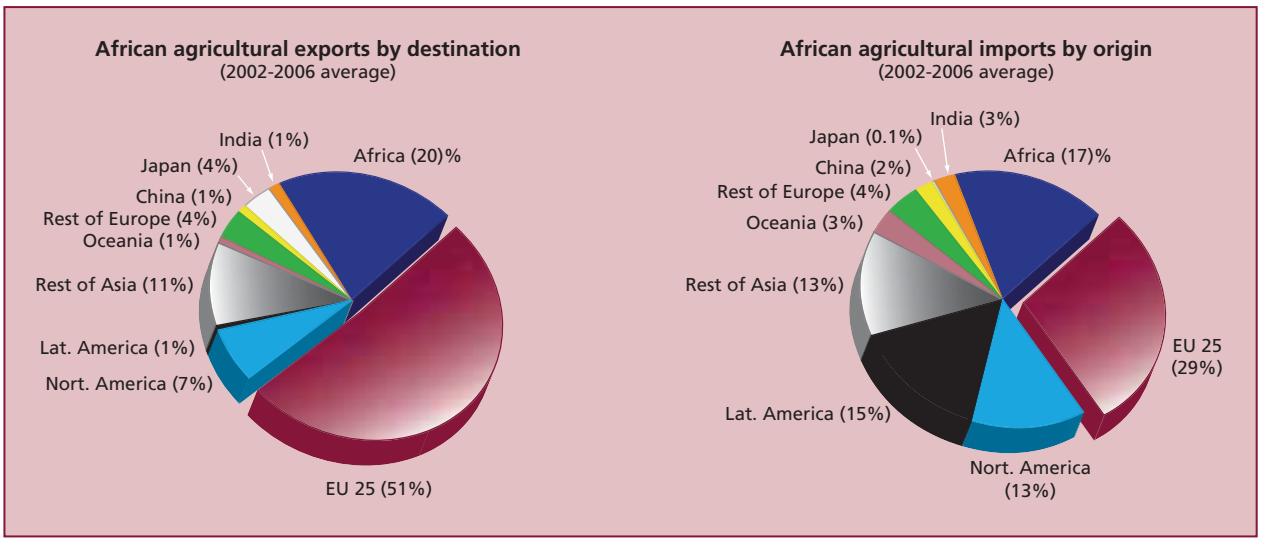
Because of the high agro-economical diversity of the African continent, there is no single set of characteristics that represents its state of agricultural trade and food-import dependency. Regions and countries within the continent differ in many aspects including levels and growth of agricultural trade, the severity of the impact of food-import dependency, and levels and growth of income.[6] Therefore, a better understanding of the trade and food security challenges requires a disaggregation of the information at hand, and one step toward this disaggregation is the creation of country clusters (a typology) that will provide information on some major implications of the food-trade deficits. This typology does away with the usual regional classification that has been often based mainly on the geographical proximity criterion and that sometimes masks the variability of individual members' characteristics. This cluster study may be useful when making specific recommendations relevant to individual countries and defining the priority of actions needed to address the issues linked to food trade deficit.

To this end, a basic correlation analysis is performed on specific variables such as the levels of income and imports per capita; ratio of food-import value to total export value; level of fertilizer use; cereal yields and food security index (i.e. the proportion of undernourished to total population). One of the main results from the correlation matrix (presented in Annex 4) reveals that the richer the countries, the more food they import, and also the more fertilizer they use, and the higher their yields. Such information helps draw a typology of African countries on their food-trade status based on their levels of income.

The groups and sub groups emerging from the clustering are presented in Table 7. It is noted that the typology is based on country data between the years 2000 and 2005. The majority of the high-income African countries such as Botswana, Equatorial Guinea, Gabon, Libya, and Seychelles (see sub-column *f* in Table 7) are large net food importers. The only net food exporter among the high-income African countries is Mauritius, mainly

[6] See O'Connell (2008) for a typology based on resource endowment wherein African countries are divided into three groups: landlocked resource-scarce economies (e.g. Burkina Faso, Burundi), coastal resource-scarce economies (e.g. Kenya, Mozambique); and resource-rich economies (e.g. Botswana, Nigeria).

FIGURE 8. AFRICAN AGRICULTURAL IMPORTS BY ORIGIN AND EXPORTS BY DESTINATION



Source: GTAP version 7 trade time series database

because of its large sugar industry. The high-income, net food importers have the highest net food imports per capita (in real terms) at about USD 185 per year, which is 3.5 percent of their per capita GDP. Although these five net importers represent only about 1 percent of the total African population, their net food imports are about 10 percent of that of the continent. These rich, net food importers have no problem paying for their food imports because they have enough revenues from non-agricultural sources such as oil, mining, and tourism.

At the opposite end, in the first main column of Table 7, are the numerous lowest income countries in Africa, among which Chad, Côte d'Ivoire, Ghana, Guinea-Bissau, and Madagascar are the only net food exporters. The majority of the lowest income countries in this group, such as Burkina Faso, Burundi, The Gambia, Democratic Republic of the Congo, Ethiopia and the rest in sub-column *b* are net food importers. They have the lowest net food imports per capita (deflated value) at about USD 17 per person per year, which is less than one-tenth of the rich countries' import and about 5 percent of the group average GDP. per capita These low-income countries host more than two-thirds of African population but account for only 40 percent of the total net food imports. The food import bill of the group has remained below total export revenue; only a few net food importers in this group can barely cover their import bills by their total merchandise exports. Countries in this group have also the lowest levels of fertilizer use and agricultural GDP per worker. The group's average cereal yield is also among the lowest.

Between these two extremes are the middle income countries, among which South Africa and Swaziland are the only net food exporters whereas (see sub-column *d*) Algeria, Cape Verde, Congo, Egypt, Morocco, Namibia, and Tunisia are net food importers. These middle income and food importing countries represent only 18 percent of the African population, but they are responsible for almost half of the total net food imports for the continent. They spend about USD 55 per year and per person for net food imports (in real terms); this amount is only about 3.3 percent of their GDP per capita. The food import bills in this group are way above their agricultural export revenue and slightly larger than the value of their total merchandise export. This middle income group has the highest levels of agricultural productivity and fertilizer use.

Direct implications

Several points can be made straight from this typology. First, though food import increases with income level, with the rich importing eleven times more than the poor countries per capita, it is striking that on a per capita basis the proportions of average net food imports over GDP in all the groups, regardless of the income level, are relatively small and are strikingly similar (between 3 and 5 percent of GDP). This shows that the extent

of the food imports in Africa at continental level are perhaps less alarming than is often thought. More important, as food expenses often claim a significant share (sometimes up to 70 percent - see Table 9, Chapter 4) of total expenditures (or total income) of the majority of households in Africa, this low amount and share of imports indicate that despite its weakness, domestic production has contributed significantly to satisfying Africa's food demand.

Second, the low amount (USD 17 per year) and low share (about 5 percent of GDP) of net food imports per capita in the lowest income countries in Africa suggest than the food-import dependency is not an insurmountable problem and can be reversed by any increase in productivity, which is still low and has a lot of potential for improvement, especially in cereal and livestock production. For instance, increasing fertilizer use and agriculture intensification on existing farmlands could lead to an increase in the levels of productivity and production. Table 7 indicates that this group has the lowest stock of human capital (proxied by both primary and secondary school enrolment ratio) and the lowest level of infrastructure (smaller share of paved roads), both of which indicate that there is much room for improvement.

Third, the middle income countries in Africa have the highest agricultural productivity, so it is puzzling that they still import more food on aggregate and on a per capita basis than the poorer countries. Two possible explanations are that some of these countries have almost exhausted their resources for agricultural production, or simply that they have little or no comparative advantage (because of high production costs) in producing some types of food at home and prefer to import food.

Fourth, for all the net importers in all groups, agricultural exports can no longer pay for food imports and, like the high-income countries (which have no problem paying their food import bills because of their oil, mining, or tourism revenues), the low-income countries in Africa must look beyond agricultural exports to find stable foreign currency sources to pay for their food imports.

The typology and results above indicate that the heart of the concerns over food trade deficit is in Sub-Saharan Africa (except the few well-off countries such as South Africa, Botswana). It is thus important that while this report addresses Africa as a whole, emphasis is often put on Sub-Saharan Africa in many of the discussions.

TABLE 6. FOOD IMPORT BILLS AND EXPORT REVENUES

Countries/Regions	Ratio of food imports to: Total agricultural exports (1) and total merchandise exports (2)													
	1961-70 Avg		1971-80 Avg		1981-90 Avg		1991-00 Avg		2001-05		2006		2007	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Algeria	0.79	0.26	6.16	0.17	45.07	0.18	49.44	0.20	55.51	0.11	33.56	0.07	59.01	0.08
Angola	0.13	0.08	0.63	0.13	12.46	0.14	92.50	0.08	255.55	0.05	213.80	0.03	160.75	0.03
Benin	0.50	0.43	0.69	0.59	1.37	0.70	0.95	0.36	0.78	0.66	0.99	0.93	1.14	0.72
Botswana	0.71	0.55	0.66	0.17	1.36	0.13	2.47	0.12	3.91	0.09	5.57	0.06	2.64	0.08
Burkina Faso	0.47	0.44	1.07	0.99	1.07	0.81	2.14	0.52	0.51	0.38	0.74	0.51	0.70	0.47
Burundi	0.16	0.13	0.22	0.21	0.25	0.23	0.41	0.36	1.16	0.78	1.34	1.03	1.42	1.34
Cameroon	0.11	0.09	0.15	0.10	0.26	0.13	0.38	0.09	0.62	0.15	0.78	0.13	0.54	0.12
Cape Verde	7.42	2.49	54.10	6.86	27.81	5.69	199.66	7.62	316.88	6.37	49.01	6.19	190.80	8.33
Central African Republic	0.31	0.19	0.43	0.24	0.42	0.16	0.64	0.16	1.12	0.15	1.04	0.23	0.77	0.19
Chad	0.20	0.20	0.25	0.21	0.22	0.18	0.23	0.15	0.49	0.11	0.55	0.02	0.80	0.02
Comoros	0.76	0.47	1.08	0.70	1.10	0.87	3.75	1.79	1.92	1.05	2.81	1.34	5.00	1.57
Congo	1.27	0.21	1.95	0.14	6.07	0.07	9.92	0.08	5.92	0.07	5.36	0.04	5.64	0.06
Côte d'Ivoire	0.22	0.15	0.20	0.13	0.21	0.13	0.19	0.11	0.17	0.09	0.22	0.09	0.23	0.09
Democratic Republic of the Congo	0.45	0.10	0.64	0.12	1.03	0.20	2.74	0.46	11.10	0.22	15.32	0.26	14.01	0.22
Djibouti	...	...	...	1.56	9.10	2.70	15.59	4.55	8.96	3.11	3.03	2.85	7.61	4.96
Egypt	0.47	0.34	1.41	0.60	4.38	0.97	5.18	0.58	2.89	0.30	3.11	0.18	3.15	0.25
Equatorial Guinea	0.01	0.01	0.13	0.11	0.51	0.17	1.81	0.08	4.98	0.01	10.54	0.00	9.44	0.00
Eritrea	...	...	...	...	...	...	...	...	64.82	8.44	38.81	4.63	2.86	6.62
Ethiopia	...	...	...	...	...	...	...	...	0.92	0.55	0.45	0.38	0.45	0.36
Ethiopia PDR	0.06	0.05	0.11	0.10	0.49	0.45	...	...	...	...	...	...	...	...
Gabon	2.99	0.06	8.45	0.04	13.36	0.05	15.97	0.05	12.40	0.04	3.94	0.03	4.60	0.04
Gambia	0.25	0.24	0.39	0.31	2.29	1.08	5.04	2.66	4.77	2.79	12.19	4.57	4.13	3.83
Ghana	0.27	0.19	0.15	0.10	0.22	0.10	0.46	0.15	0.62	0.26	0.56	0.24	0.67	0.23
Guinea	0.44	0.17	1.15	0.16	2.54	0.11	3.67	0.22	3.89	0.21	2.60	0.25	3.16	0.27
Guinea-Bissau	0.88	0.74	2.81	2.28	1.65	1.13	1.70	1.28	0.71	0.55	0.88	0.37	0.96	0.71
Kenya	0.23	0.14	0.16	0.09	0.18	0.12	0.33	0.20	0.35	0.17	0.36	0.19	0.41	0.22
Lesotho	1.50	1.22	3.57	1.99	6.75	2.57	17.45	0.86	59.52	0.26	28.64	0.17	69.26	0.15
Liberia	0.47	0.12	0.57	0.11	0.84	0.18	3.21	0.24	1.06	0.82	1.43	0.94	1.24	0.74
Libyan Arab Jamahiriya	30.61	0.15	...	0.05	...	0.08	24.16	0.10	87.22	0.06	213.00	0.02	144.26	0.03
Madagascar	0.14	0.13	0.20	0.16	0.29	0.22	0.54	0.21	0.78	0.34	1.30	0.45	1.26	0.18
Malawi	0.13	0.11	0.10	0.09	0.11	0.10	0.26	0.22	0.23	0.20	0.15	0.14	0.15	0.13
Mali	0.36	0.25	0.57	0.45	0.39	0.31	0.34	0.20	0.51	0.17	0.77	0.21	0.86	0.18
Mauritania	0.53	0.24	1.90	0.32	3.03	0.32	4.19	0.33	11.61	0.49	14.54	0.18	14.74	0.23
Mauritius	0.35	0.34	0.36	0.29	0.42	0.21	0.60	0.15	0.77	0.15	0.84	0.14	1.21	0.19
Morocco	0.58	0.26	1.12	0.32	1.35	0.23	1.40	0.20	1.57	0.17	1.28	0.13	2.07	0.21
Mozambique	0.19	0.15	0.39	0.28	2.97	1.34	4.22	1.08	3.07	0.26	1.22	0.16	1.29	0.16
Namibia	0.23	0.03	0.28	0.05	0.66	0.08	0.88	0.12	0.73	0.12	0.88	0.10	0.75	0.07
Niger	0.12	0.11	0.58	0.23	1.50	0.28	1.47	0.29	2.22	0.64	2.89	0.46	2.22	0.28
Nigeria	0.20	0.12	1.43	0.08	3.14	0.10	2.59	0.07	3.72	0.07	4.19	0.06	9.28	0.08
Rwanda	0.16	0.11	0.24	0.20	0.38	0.33	2.22	0.79	1.69	0.70	0.94	0.45	1.15	0.49
Sao Tome and Principe	0.21	0.19	0.25	0.20	0.83	0.63	1.55	0.97	2.72	2.00	3.44	3.00	5.11	3.17
Senegal	0.61	0.47	0.93	0.39	1.82	0.39	3.34	0.46	4.09	0.55	3.20	0.59	3.92	0.70
Seychelles	0.82	0.63	3.18	0.99	16.76	0.69	27.86	0.47	44.26	0.19	30.59	0.23	19.81	0.23
Sierra Leone	1.30	0.22	1.14	0.30	2.37	0.55	11.48	3.89	13.54	1.89	6.13	0.46	5.19	0.52
Somalia	0.36	0.34	0.68	0.63	1.14	0.95	1.23	0.73	2.35	0.96	3.64	0.90	2.98	0.86
South Africa	0.20	0.06	0.19	0.04	0.40	0.03	0.51	0.04	0.42	0.03	0.57	0.04	0.72	0.04
Sudan	0.15	0.14	0.26	0.24	0.48	0.40	0.54	0.36	1.11	0.17	2.25	0.18	3.18	0.11
Swaziland	0.28	0.14	0.15	0.08	0.26	0.14	0.36	0.13	0.72	0.12	0.42	0.07	0.86	0.08
Togo	0.25	0.16	0.38	0.14	0.81	0.30	0.46	0.20	0.70	0.15	1.16	0.30	0.44	0.13
Tunisia	0.81	0.37	1.30	0.23	2.34	0.18	1.23	0.11	1.31	0.09	0.74	0.09	1.21	0.10
Uganda	0.09	0.08	0.06	0.06	0.09	0.08	0.32	0.24	0.83	0.29	0.77	0.30	0.62	0.25
United Republic of Tanzania	0.13	0.11	0.24	0.18	0.26	0.19	0.48	0.35	0.72	0.26	1.02	0.30	0.98	0.28
Zambia	2.90	0.04	5.62	0.06	4.39	0.05	1.62	0.08	0.79	0.12	0.68	0.06	0.36	0.03
Zimbabwe	0.09	0.03	0.04	0.01	0.05	0.02	0.19	0.08	0.29	0.14	1.56	0.84	0.66	0.15
Africa	0.31	0.13	0.56	0.11	1.05	0.14	1.12	0.14	1.19	0.11	1.27	0.08	1.55	0.09
Eastern Africa	0.18	0.09	0.21	0.11	0.32	0.17	0.48	0.22	0.65	0.24	0.78	0.26	0.68	0.21
Central Africa	0.22	0.10	0.40	0.10	0.85	0.11	1.42	0.09	2.17	0.07	2.97	0.04	2.64	0.04
Northern Africa	0.54	0.22	1.58	0.16	3.70	0.23	3.45	0.21	3.11	0.13	2.69	0.08	3.54	0.10
Southern Africa	0.23	0.06	0.23	0.04	0.49	0.04	0.63	0.05	0.56	0.04	0.65	0.04	0.82	0.05
Western Africa	0.29	0.18	0.52	0.12	0.77	0.14	0.79	0.13	0.88	0.13	1.01	0.11	1.46	0.12

Source: World Bank, WDI, 2009 and authors' calculations

TABLE 7. TYPOLOGY OF AFRICAN COUNTRIES

	Low Income Countries (average 2000-2005 GDP cap <975 constant 2000 USD)		Middle Income Countries (976 <average 2000-2005 GDP <3855 constant 2000 USD)		High Income Countries (average 2000-2005 GDP cap>3856 constant 2000 USD)		Total
	Net Food Exporters	Net Food Importers	Net Food Exporters	Net Food Importers	Net Food Exporters	Net Food Importers	
	a	*b*	*c*	*d*	*e*	*f*	
	Chad Cote d'Ivoire Ghana Guinea-Bissau Madagascar	Angola Benin Burkina Faso Burundi Cameroon Cen. African Rep Comoros Congo, Dem Rep Djibouti Eritrea Ethiopia The Gambia Guinea Kenya Lesotho Liberia Malawi Mali Mauritania Mozambique Niger Nigeria Rwanda Senegal Sierra Leone Sudan Tanzania Togo Uganda Zambia Zimbabwe	South Africa Swaziland	Algeria Cape Verde Congo, Rep. Egypt Morocco Namibia Tunisia	Mauritius	Botswana Equatorial G. Gabon Libya Seychelles	
Number of countries	5	31	2	7	1	5	51
Total Population (2005)	70 392 530.00	623 721 390.50	48 016 838.00	156 094 045.80	1 243 253.00	9 815 091.00	909 283 148.30
%	7.74	68.59	5.28	17.17	0.14	1.08	100
Net Imports of Food (Avg 2000-2005)		5 039 722.53		6 126 220.53		1 294 616.47	12 460 559.53
%		40.45		49.16		10.39	100
Net Exports of Food (Avg 2000-2005)	1 975 366.87		671 526.27		35 805.00		2 682 698.13
%	73.63		25.03		1.33		100
GDP per capita (constant 2000 USD)	286.78 (162.96)	329.67 (172.29)	2303.25 (1246.44)	1667.06 (453.56)	4073.1	5299.19 (1496.42)	1147.03 (1652.17)
Net imports of food per capita (USD)	-24.87 (39.75)	18.06 (25.27)	-37.91 (30.69)	63 (56.13)	-41.56	196.38 (225.92)	34.14 (92.57)
Net imports of food per capita, deflated by US CPI, base year 2000 (USD)	-23.34 (37.28)	16.84 (23.62)	-36.4 (30.36)	54.88 (51.85)	-38.94	185.31 (213.22)	31.46 (87.09)

TABLE 7. TYPOLOGY OF AFRICAN COUNTRIES (CONT'D)

	Low Income Countries (average 2000-2005 GDP cap <975 constant 2000 USD)		Middle Income Countries (976 <average 2000-2005 GDP <3855 constant 2000 USD)		High Income Countries (average 2000-2005 GDP cap>3856 constant 2000 USD)		Total
	Net Food Exporters (Mcap-Xcap<0)	Net Food Importers (Mcap-Xcap>0)	Net Food Exporters (Mcap-Xcap<00)	Net Food Importers (Mcap-Xcap>0)	Net Food Exporters (Mcap-Xcap<00)	Net Food Importers (Mcap-Xcap>0)	
	a	*b*	*c*	*d*	*e*	*f*	
Ratio of food imports to total agricultural exports	0.55 (0.24)	13.49 (45.06)	0.57 (0.21)	54.98 (117.22)	0.77 (35.74)	30.32	18.81 (56.89)
Ratio food imports over total merchandise exports	0.26 (0.18)	0.81 (1.43)	0.08 (0.07)	1.03 (2.27)	0.15	0.08 (0.07)	0.67 (1.39)
Agriculture value added per worker (constant 2000 USD)	343.62 (248.9)	265.41 (156.02)	1819.34 (758.03)	1625.34 (705.97)	4878.88	840.07 (534.83)	672.16 (886.02)
Gross food production 1999-2001 (1000 I$)	2086350 (1602426)	2173061 (4158945)	4316531 (5849911)	3604651 (4991830)	175846.2	227185.8 (304143.2)	2215177 (3897898)
Cereal yield (kg per hectare)	1427.56 (568.79)	1077.49 (350.84)	2015.4 (1056.04)	1807.47 (2500.83)	7405.92	870.98 (570.45)	1372.29 (1340.85)
Agricultural land (% of land area)	58.81 (12.02)	49.24 (21.88)	81.45 (0.78)	35.33 (24.57)	55.7 (15.07)	19.87	46.78 (23.41)
Fertilizer consumption (100 grammes per hectare of arable land)	88.48 (74.95)	76.62 (100.46)	431.49 (101.74)	974.21 (2042.69)	2618.92	190.82 (201.39)	275.94 (847.68)
Roads, paved (% of total roads)	14.31 (10.74)	19.72 (14.7)	24.65 (7.57)	52.13 (29.11)	98.43	49.31 (36.61)	28.02 (24.9)
School enrolment, secondary (% net)	16.54 (10.25)	19.94 (9.23)	49.09 (25.82)	57.41 (16.98)	74.94	60.72 (35.68)	32.61 (23.7)
Total enrolment, primary (% net)	58.91 (11.2)	61.89 (16.1)	85.29 (12.83)	92.38 (6.3)	94.1	90.5 (4.24)	70.11 (18.96)
Prevalence of HIV, total (% of population ages 15-49)	7.05 (6.55)	6.48 (8.22)	2.31 (1.24)	6.07 (8.76)	1.3	3.05 (2.92)	5.86 (7.43)
Share of agricultural exports to total merchandise exports	0.49 (0.18)	0.34 (0.27)	0.14 (0.09)	0.07 (0.05)	0.19	0.01 (0.01)	0.28 (0.26)
Share of agricultural imports to total merchandise imports	0.24 (0.24)	0.25 (0.15)	0.1 (0.08)	0.19 (0.07)	0.14	0.15 (0.08)	0.22 (0.15)
Proportion of undernourished in total population	23.75 (14.97)	32.21 (17.31)	18	20 (1.41)	6	26	29.45 (16.67)
Foreign direct investment, net inflows (% of GDP)	5.55 (8.95)	4.24 (5.22)	2.06 (0.32)	3.26 (2.96)	1.35	3.23 (3)	4.01 (5.05)
Official development assistance %GDP)	0.15 (0.12)	0.14 (0.1)	0.01 (0.01)	0.04 (0.06)	0.004	0.01 (0.01)	0.11 (0.1)

Source: FAOSTAT, 2010; World Bank, WDI, 2009; Authors' own calculations
Note: The numbers in parenthesis correspond to the standard deviation for the group

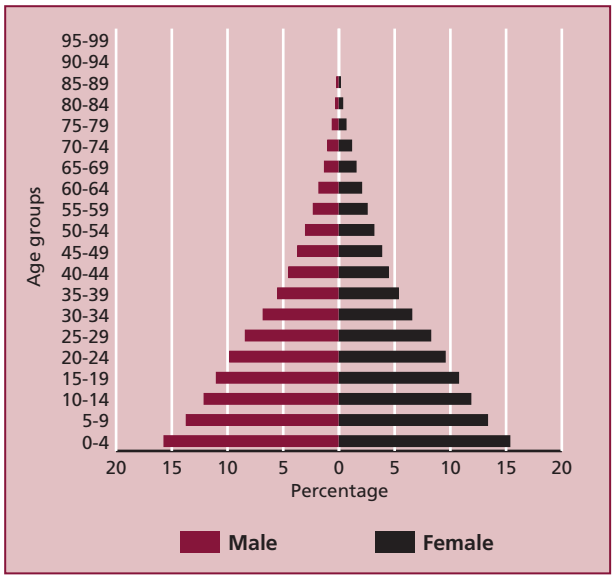
4 The demand causes of rising food imports

4.1 POPULATION SIZE, STRUCTURE AND GROWTH

In the last five decades, Africa has always been the continent with the highest population growth rate, which suggests that Africa's growing population is one of the drivers of its food import increase. In 2007, Africa's population growth rate was at 2.34 percent, which was nearly the double of the worlds' population growth rate (Table 8). The population structure in Figure 9 shows that about 40 percent of the African population is under the age of 15. Africa's young and growing population poses a serious challenge to food security, implying that in areas where local production is low, food will have to be imported to satisfy demand.

If the growing population size has contributed to the rise in imports, it is important to know whether the population growth *per se* or the growth in net food imports (or consumption) per capita is

FIGURE 9. AFRICA'S POPULATION, AGE AND GENDER STRUCTURE IN 2008



Source: US Census Bureau, International Data Base, 2010

TABLE 8. POPULATION AND AVERAGE ANNUAL GROWTH

Countries/ Regions	Total population					Total population - Annual growth				
	1961-80	1981-00	2001-05	2006	2007	1961-80	1981-00	2001-05	2006	2007
	million					%				
World	3 727	5 318	6 354	6 592	6 671	1.94	1.63	1.27	1.22	1.20
Africa	377	651	880	943	965	2.68	2.69	2.37	2.34	2.34
Eastern Africa	111	197	273	295	303	2.85	2.87	2.61	2.61	2.62
Middle Africa	42	75	107	116	119	2.64	3.05	2.91	2.75	2.66
Northern Africa	89	149	189	199	202	2.61	2.34	1.71	1.73	1.74
Southern Africa	26	43	54	56	56	2.61	2.24	1.38	1.20	1.14
Western Africa	109	187	257	277	284	2.58	2.72	2.57	2.57	2.56

Source: FAOSTAT, 2011

the main reason for the import rise. Data indicate that between 1980 and 2007 the total net food imports (in real term, i.e. deflated,) for Africa as a continent grew at about 3.4 percent per year while population grew at about 2.6 percent annually. This implies that population growth has been a main driver of the food import growth and that per capita food imports grew only at 0.8 percent per year. Figure 10 (left panel) confirms such an explanation and shows that although per capita net imports of food have been on an upward trend, the trend tended to fluctuate between USD 8 and 15 per capita between the mid-1980s and 2006. The deflated value of per capita food imports (right panel) shows a similar but clearer pattern, with net imports stabilizing around USD 10-18 during that period. Such a stagnation of per capita net imports contrasts the steady and sharp increase in total net food imports since the 1980's and confirms that the population increase played an important role in the increase in Africa's import demand for food over the last three decades.[1]

4.2 PER CAPITA FOOD CONSUMPTION

The slow growth or stagnation of per capita food imports, at least during the period 1980-2000, does not necessarily imply that the actual food consumption per capita has not increased much either. However, the data summarized in previous tables (Tables 4A and 4B and 5) indicate that food consumption per capita in Africa has remained lower than the world's average. Figure 11 expands such information by including consumption trends in key commodities and confirms that both the levels and patterns of consumption have not changed much, especially since the mid-80's, for the staple food products such as cereals, meat, and dairy. For cereals in particular, daily consumption has increased from 350 g only to about 375 g per person since the early 1980's and has remained fairly stable at that level. Similarly, meat and dairy (excluding butter) consumption has remained below 50 and 100 g respectively per person per day. These amounts may come as a surprise and refute the view that an increase in Africa's per capita food consumption (due to changes in income, dietary patterns etc.) has fuelled the rise in food imports.

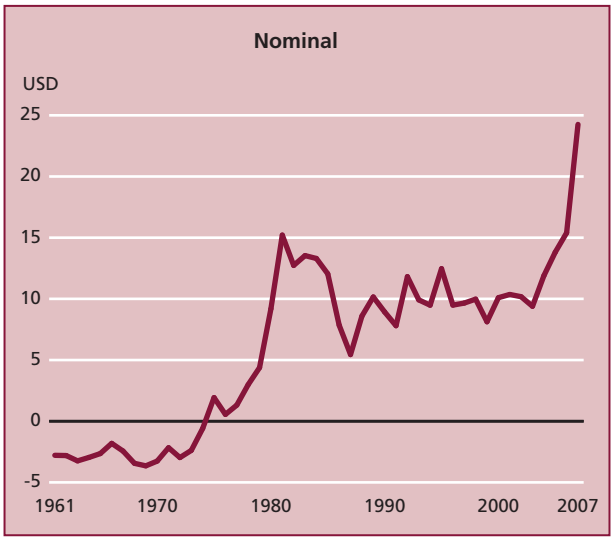
Still, to explain these patterns, it is important to further explore three of the structural determinants of food consumption per capita, namely dietary pattern, income, and proximity to markets.

Dietary patterns

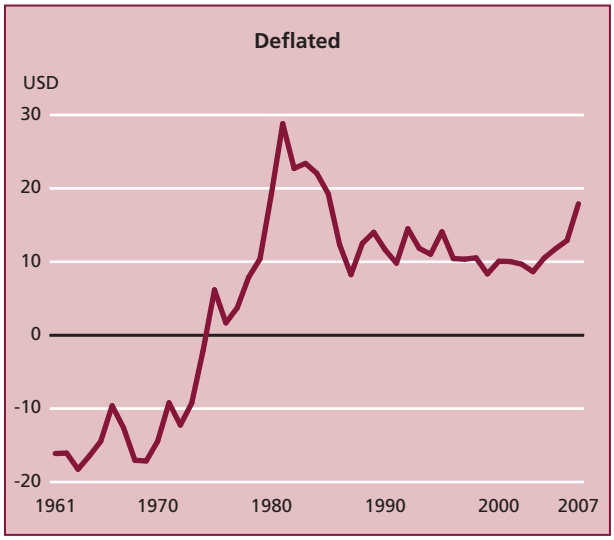
An increase in per capita consumption, if any, can be driven by a change in dietary pattern. It has often been argued that globalization and especially advanced urbanization (see Box 2)

[1] This accounting ignores the years of 2007-2008 food price surges.

FIGURE 10. PER CAPITA NET FOOD IMPORTS IN AFRICA

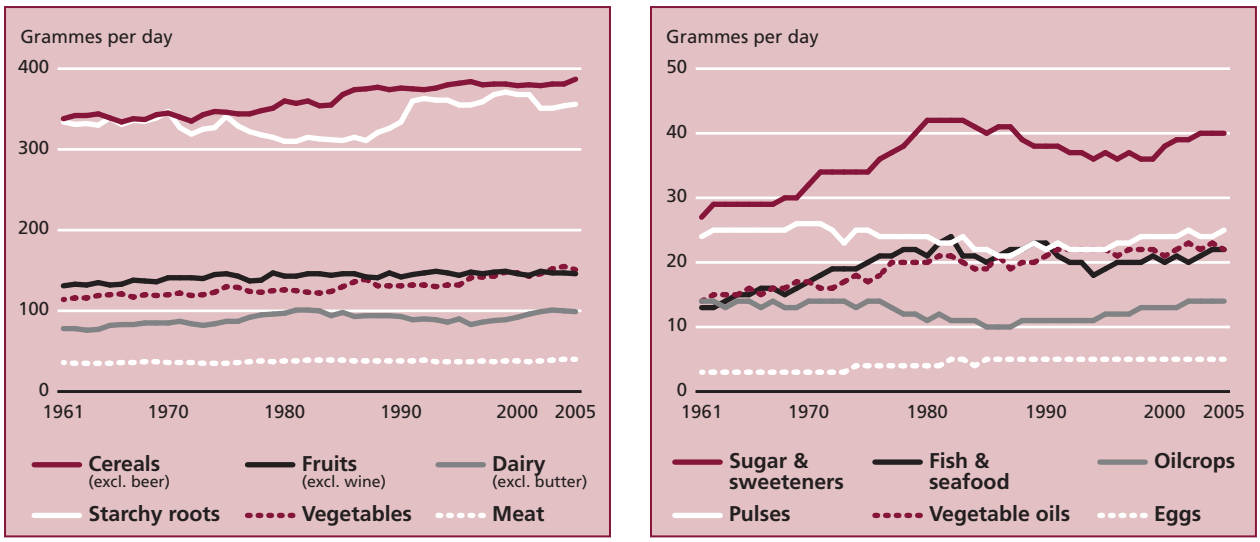


Source: FAOSTAT, 2010



Source: FAOSTAT, 2010, IFS, 2010, Authors' own calculations
Note: CPI (Base Year 2000)

FIGURE 11. PER CAPITA FOOD CONSUMPTION



Source: FAOSTAT, 2011

might influence consumers' preferences for the types and amounts of food they consume and how they procure it. However, evidence is mixed, and authors remain divided on whether dietary pattern has really changed for the average African consumer.

Delgado *et al*. (1999) claimed that urban consumption of livestock products (meat and dairy products, and especially cheese or butter) has increased since the mid-1990's not only because of the rise in income but also the rise in awareness of the diversity of nutrient sources corresponding to the increase in imported products. Relatively high value-added food such as the pre-cooked or ready-to-eat food has boosted consumption. Consumers moving to towns and cities, being attracted by job opportunities and better living conditions, have discovered growing numbers and types of food outlets such as supermarkets and fast food restaurants at their disposal. These new outlets have made food more accessible to consumers and may have contributed to the rise in consumption per person in some countries. Yet another possible cause of the change in dietary pattern is education, which may tilt consumption toward processed food (such as processed dairies, cheese, and cured/salted meat).

But other analyses provide evidence that refutes these claims. Sudrie (1985) shows that in Sub-Saharan Africa, for instance, urbanization has not contributed to food import dependency. Similarly Pica-Ciamarra and Otte (2009) provide evidence that the dietary pattern for Africa as a continent has not changed much. In particular, they showed that at least the proportion of livestock product consumption has not increased much on a per capita basis. Figure 12 below seems to support the latter hypothesis, indicating that the composition of average consumption for key commodities in Africa has hardly changed. These are, however, average figures at the continent level and ignore the differences within a region or a country or provinces. Changes in dietary pattern as a driver of the higher consumption in some imported food products in some countries remain a possibility.

Besides, as Figures 11 and 12 show, roots (such as cassava and taro), which in international trade are less familiar (than, say, maize and other grains) because they are often produced and consumed almost wholly locally, have played an important role in Africa's food security and may have attenuated food imports. They are a source of nutrients and especially carbohydrates, and their relatively high level of consumption share indicates they are complements to and sometimes substitutes for importable commodities like cereals (wheat or rice). Indeed, FAO data (FAOSTAT, 2011) indicate that production of roots such as cassava has been on the rise in Sub-Saharan Africa, which helps explain why food imports per capita have stagnated.

It is also worth digging further into whether the import preference has shifted towards a

Box 2. Urbanization in Africa

Region	Total population - rural					Total population - urban				
	1961-80	1981-00	2001-05	2006	2007	1961-80	1981-00	2001-05	2006	2007
	%					%				
World	63.8	57.0	52.2	51.0	50.6	36.2	43.0	47.8	49.0	49.4
Africa	76.3	67.7	62.8	61.6	61.1	23.7	32.3	37.2	38.4	38.9
Eastern Africa	89.2	81.9	78.3	77.5	77.2	10.8	18.1	21.7	22.5	22.8
Middle Africa	75.7	67.0	61.2	59.4	58.8	24.3	33.0	38.8	40.6	41.2
Northern Africa	63.9	55.4	50.8	49.7	49.4	36.1	44.6	49.2	50.3	50.6
Southern Africa	56.4	50.9	44.7	43.2	42.7	43.6	49.1	55.3	56.8	57.3
Western Africa	78.4	66.7	59.4	57.7	57.1	21.6	33.3	40.6	42.3	42.9

Source: FAOSTAT and authors' calculation, February 2010

Between 1961 and 2007, the proportion of urban population out of total population increased from 24 percent to about 40 percent; the highest is in Southern Africa, where 57 percent of total population is living in and around the cities.

more or less processed food, which could be an indication of any change in dietary pattern. Selected COMTRADE (2010) and FAO (FAOSTAT, 2011) data on cereal, bovine meat, and dairy imports for the last 10 years sorted by the degree of processing were examined and showed that there has not been much change over the years.[2] For instance, wheat imports still consist mostly of grain or more often semi-processed product (flour). Most of the bovine meat imports for the largest African importers have remained in the form of chilled or frozen meat (semi-processed) and less in the form of highly processed cured or salted or cooked meat.[3] Similarly, dairy imports include mainly the semi-processed form (such as powder milk), and much less cheese or butter. All this information indicates that the change in dietary patterns remains hard to prove, at least at the continent level. But because the average continental figures may mask some changes in dietary patterns at the regional or national levels, these figures need to be interpreted cautiously.

Income effect

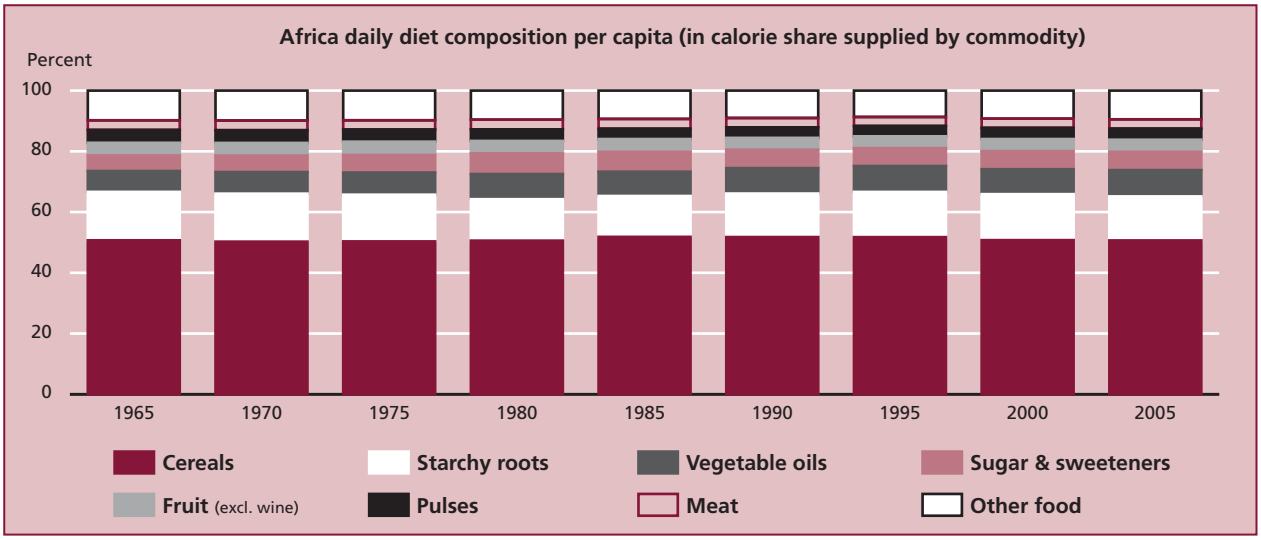
One of the most important potential contributors to the increases in food consumption and imports, is an increase in per capita income. Because many African households spend large portions of their income on food (Table 9) and because income elasticity for food consumption is relatively high for many African countries especially those in Sub-Saharan Africa (Table 10), a high and sustained increase in income would indeed lead to a sharp increase in per capita consumption.

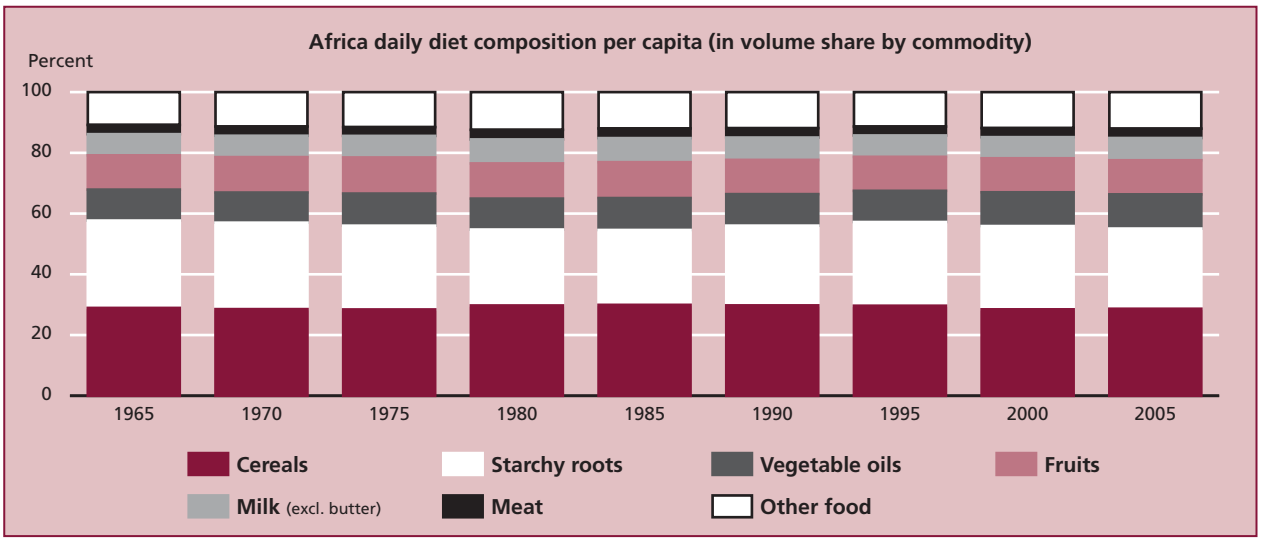
Table 11 shows, however, that for the last five decades per capita income growth has been weak in most of the African continent. Since the late 1990's, many countries have had on average a sustained but still modest growth of per capita income, which in many cases exceeded the population growth rate. This sluggish growth in per capita income at the continental level is consistent with the slow growth of the levels of per capita

[2] This information on food imports by processing categories for the largest Africa exporters are available upon requests. Some examples for bovine meat and dairy and meat for selected importing countries are shown in Annex 5.

[3] This is subject to some caution since the cross-border trade of live animals has not been fully reported in official statistics which makes the comparison difficult.

FIGURE 12. COMPOSITION OF PER CAPITA FOOD INTAKE IN AFRICA





Source: FAOSTAT, 2011

consumption. However, in some countries with fast economic growth in recent years (e.g. Ghana and Mozambique), per capita food consumption is expected to rise significantly (Regmi *et al*. 2001).

Proximity to markets and other structural causes

The growing number of food outlets including the so-called 'supermarket revolution' in some African cities (Reardon *et al*., 2003; Neven and Reardon, 2004) has considerably increased African urban consumers' access to food. Moreover, growing tourism industries in many countries (e.g. Kenya, Mauritius, and Tanzania) may have had significant impacts on the type and volume of marketed food, especially because of the increase in consumption and imports for food products that the countries lack in quality or in volume. War and natural disasters may also affect individual and total food consumption within a country. Further investigation is needed to provide more evidence on the effects of these potential influences on per capita consumption at the country level, because the continental data are insufficiently precise to resolve such effects.

4.3 FOOD PRICES AND IMPORTS

The quantity of food imported depends on current and expected international price levels, and in

TABLE 9. FOOD BUDGET SHARES FOR SELECTED AFRICAN AND OECD COUNTRIES

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods	Total Food Expenditure
	Percent of total food expenditures								% of total expenditures
AFRICA									
Northern Africa									
Egypt	9.25	24.65	23.62	4.56	10.1	8.36	12.53	6.92	48.08
Morocco	11.85	20.15	19.91	1.92	6.55	8.6	18.41	12.6	45.61
Tunisia	13.66	13.83	13.56	5.02	10.6	4.32	28.19	10.84	35.95
Eastern Africa									
Kenya	15.49	32.49	5.13	0.43	15.1	2.64	17.57	11.17	45.82
Madagascar	5.92	44.47	9.65	3.79	2.09	2.35	26.18	5.56	65.88
Malawi	4.86	40.44	17.48	12.84	3.23	3.11	13.21	4.83	53.35
Mauritius	24.69	10.06	15.55	8.36	10.5	5.22	17.86	7.79	28.12
Tanzania	4.74	39.55	9.6	6.38	3.56	3.3	24.22	8.65	73.24
Zambia	12.98	18.45	24.38	12.28	6.02	6.55	13.12	6.22	60.81
Zimbabwe	13.91	23.7	22.04	2.61	8.99	6.68	10.02	12.04	25.58
Middle Africa									
Cameroon	19.14	16.07	16.22	4.66	1.25	3.79	31.21	7.65	43.8
Congo	9.53	10.67	9.23	14.5	3.86	2.5	44.85	4.87	46.92
Gabon	9.53	10.67	9.23	14.5	3.86	2.5	44.85	4.87	47.94
Western Africa									
Benin	9.45	23.57	14.27	7.56	4.13	4.48	33.24	3.29	55.4
Cote d'Ivoire	19.52	19.6	14.38	2.16	4.42	1.49	23.26	15.18	44.32
Guinea	19.14	16.07	16.22	4.66	1.25	3.79	31.21	7.65	43.69
Mali	6.76	34.39	14.1	3.01	3.81	8.11	9.89	19.93	53.27
Nigeria	2.73	34.08	12.88	15.22	5.61	5.15	15.44	8.89	72.97
Senegal	6.54	26.51	13.93	13.12	4.4	14	13.08	8.47	53.35
Sierra Leone	5.29	34.94	4.38	12.73	1.13	12.2	16.47	12.82	62.09
Southern Africa									
Botswana	36.43	24.23	11.86	0.73	4.7	2.25	6.23	13.58	32.8
Swaziland	11.95	25.25	22.87	2.28	9.42	4.36	11.33	12.53	27.48
OECD									
Australia	25.24	13.5	16.91	3.11	9.67	1.65	18.34	11.56	15.07
Germany	28.25	14.87	20.3	1.87	7.11	2.27	8.28	17.05	13.09
Japan	23.15	22.28	7.82	17.02	4.79	0.66	12.79	11.49	14.88
Korea	17.82	20.7	12.69	11.69	5.02	0.88	21.23	9.97	31.64
Mexico	18.88	21.67	17.33	3.12	10.88	2.3	13	12.82	26.63
Turkey	9.47	20.34	13.55	1.01	12.84	8.42	23.23	11.14	32.6
United Kingdom	47.53	8.31	12.57	2.25	6.88	1.27	12.02	9.16	16.37
United States	28.71	11.39	19.58	1.19	8.59	1.77	14.66	14.11	9.73

Source: USDA, Economic Research Service, 2003

TABLE 10. INCOME ELASTICITY FOR FOOD SUB-GROUPS FOR SELECTED AFRICAN AND OECD COUNTRIES

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods
AFRICA								
Northern Africa								
Egypt	0.898	0.411	0.685	0.77	0.741	0.438	0.55	0.683
Morocco	0.974	0.452	0.694	0.793	0.757	0.472	0.563	0.691
Tunisia	0.816	0.379	0.602	0.683	0.654	0.399	0.486	0.6
Eastern Africa								
Kenya	1.618	0.583	0.808	0.975	0.906	0.596	0.665	0.805
Madagascar	1.372	0.579	0.827	0.975	0.917	0.596	0.678	0.824
Malawi	1.538	0.592	0.828	0.991	0.925	0.606	0.681	0.825
Mauritius	0.565	0.254	0.438	0.491	0.473	0.274	0.351	0.437
Tanzania	1.7	0.619	0.859	1.035	0.963	0.633	0.707	0.856
Zambia	1.513	0.594	0.833	0.994	0.93	0.608	0.685	0.83
Zimbabwe	1.217	0.514	0.734	0.865	0.814	0.529	0.602	0.731
Middle Africa								
Cameroon	1.227	0.529	0.761	0.893	0.842	0.545	0.623	0.758
Congo	1.466	0.567	0.794	0.949	0.887	0.581	0.653	0.791
Gabon	0.788	0.358	0.605	0.68	0.654	0.384	0.486	0.603
Western Africa								
Benin	1.336	0.568	0.812	0.956	0.9	0.584	0.665	0.809
Cote d'Ivoire	1.25	0.535	0.767	0.902	0.85	0.551	0.628	0.764
Guinea	1.084	0.493	0.73	0.845	0.802	0.511	0.595	0.727
Mali	1.656	0.596	0.827	0.998	0.928	0.61	0.681	0.824
Nigeria	1.693	0.608	0.843	1.018	0.946	0.622	0.694	0.84
Senegal	1.194	0.536	0.787	0.914	0.866	0.554	0.642	0.784
Sierra Leone	1.459	0.571	0.802	0.957	0.895	0.586	0.659	0.799
Southern Africa								
Botswana	0.989	0.458	0.7	0.801	0.764	0.478	0.568	0.697
Swaziland	1.022	0.461	0.679	0.788	0.747	0.477	0.554	0.677
OECD								
Australia	0.388	0.143	0.318	0.35	0.34	0.168	0.25	0.317
Germany	0.402	0.153	0.328	0.362	0.351	0.177	0.259	0.327
Japan	0.388	0.16	0.312	0.345	0.334	0.179	0.247	0.311
Korea	0.576	0.187	0.478	0.524	0.51	0.234	0.374	0.477
Mexico	0.807	0.36	0.63	0.704	0.679	0.389	0.504	0.628
Turkey	0.826	0.364	0.648	0.723	0.698	0.396	0.518	0.646
United Kingdom	0.432	0.169	0.351	0.387	0.375	0.194	0.277	0.35
United States	0.134	0.05	0.11	0.121	0.117	0.059	0.086	0.109

Source: USDA, Economic Research Service, 2003
Note: These are unconditional (Marshallian) income elasticities of demand

TABLE 11. AFRICA GDP PER CAPITA LEVELS AND GROWTH RATES

Country	GDP p/c - constant 2000 USD						GDP p/c - growth (annual %)					
	1961-70	1971-80	1981-90	1991-00	2001-07	2008	1961-70	1971-80	1981-90	1991-00	2001-07	2008
	USD						%					
World	2 898	3 728	4 240	4 862	5 568	6 024	3.3	1.9	1.4	1.4	1.8	0.8
Sub-Saharan Africa	**488**	**584**	**551**	**504**	**550**	**619**	**2.3**	**0.8**	**-1.0**	**-0.5**	**2.4**	**2.5**
Algeria	1 187	1 665	1 919	1 722	2 016	2 191	2.1	3.1	-0.2	-0.2	2.7	1.5
Angola	..	..	802	607	854	1 357	..	..	0.6	-1.6	9.8	11.8
Benin	289	294	313	312	348	359	1.0	0.1	-0.2	1.4	0.6	1.8
Botswana	313	871	1 812	2 877	4 135	4 440	5.7	11.2	7.5	3.7	3.5	-2.2
Burkina Faso	142	154	175	197	244	263	1.1	1.0	0.9	2.3	2.4	1.5
Burundi	101	131	147	127	109	111	2.9	0.8	1.2	-3.2	0.0	1.4
Cameroon	503	594	856	608	674	710	-0.2	3.8	0.5	-1.1	1.3	1.9
Cape Verde	..	..	770	998	1 360	1 632	..	..	3.6	3.6	3.8	4.5
Central African Republic	337	345	294	243	227	230	-0.1	-0.9	-1.4	-0.8	-1.2	0.9
Chad	234	194	173	175	232	251	-1.1	-4.0	2.6	-0.8	7.2	-3.1
Comoros	..	405	426	385	381	370	..	..	0.3	-1.0	0.1	-1.4
Congo, Dem. Rep.	322	300	235	119	87	99	0.4	-2.6	-2.0	-8.2	1.7	3.2
Congo, Rep.	652	832	1 237	1 060	1 132	1 214	1.4	3.4	2.1	-0.7	1.4	3.7
Cote d'Ivoire	729	982	756	616	551	530	4.4	0.6	-3.2	-0.8	-1.8	-0.1
Djibouti	..	..	1 177	896	785	849	..	..	..	-4.3	1.4	2.1
Egypt, Arab Rep.	517	680	1 028	1 249	1 531	1 784	2.9	4.3	2.8	2.3	2.6	5.1
Equatorial Guinea	..	..	573	1 110	5 852	8 692	..	..	-2.4	17.3	20.3	8.4
Eritrea	..	..	..	186	164	148	..	..	..	3.6	-2.0	-1.2
Ethiopia	..	..	134	117	144	190	..	..	-0.8	-0.1	5.1	8.5
Gabon	2 638	5 548	4 859	4 553	4 044	4 157	6.0	6.5	-0.9	-1.1	0.2	0.2
Gambia, The	297	325	342	320	335	374	1.4	1.3	-0.1	-0.5	1.7	3.0
Ghana	277	263	206	238	283	327	0.5	-1.8	-0.8	1.6	3.0	4.0
Guinea	..	333	327	348	390	417	..	-0.3	0.2	0.9	0.9	6.0
Guinea-Bissau	172	165	166	181	137	128	..	-2.0	3.0	-0.3	-3.5	0.5
Kenya	275	396	427	418	422	464	1.3	4.3	0.4	-1.0	1.8	0.9
Lesotho	170	244	299	390	455	525	3.2	5.6	1.5	2.1	2.9	3.4
Liberia	715	791	535	122	153	148	1.8	-1.0	-10.5	4.5	-3.5	2.4
Libya	..	..	..	6 482	6 780	7 740	..	..	..	-0.9	2.0	5.0
Madagascar	404	382	295	251	246	271	0.5	-1.7	-2.1	-1.3	0.6	4.0
Malawi	112	151	143	143	140	165	2.3	2.9	-1.9	1.6	0.5	6.9
Mali	208	236	217	223	278	295	1.3	1.9	-1.5	1.4	2.6	1.9
Mauritania	464	472	435	419	443	..	5.8	-0.9	-0.9	0.1	1.9	..
Mauritius	..	1 572	2 004	3 178	4 273	4 929	..	..	4.9	4.0	3.2	4.7
Morocco	707	930	1 102	1 248	1 534	1 770	2.4	2.5	1.7	0.9	3.9	4.6
Mozambique	..	203	169	201	299	365	..	..	-0.5	2.5	5.9	4.5
Namibia	..	2 309	2 032	1 988	2 365	2 692	..	..	-2.3	1.3	3.6	1.0
Niger	355	264	214	171	167	180	-0.4	-1.5	-2.9	-1.7	0.8	6.0
Nigeria	307	435	342	368	417	487	2.6	2.1	-1.5	-0.0	3.7	3.0
Rwanda	195	220	253	220	256	313	0.2	2.2	-1.1	1.6	4.2	8.2
Sao Tome and Principe	..	..	..	..	..	..	..	..	..	..	5.2	3.9
Senegal	573	512	478	451	504	530	-1.1	-1.2	-0.3	0.3	1.7	-0.2
Seychelles	2 467	3 694	4 547	6 581	7 335	8 267	1.2	5.9	2.4	3.1	1.2	1.3
Sierra Leone	242	279	269	191	224	262	2.5	0.3	-1.3	-4.5	8.1	2.4
Somalia	..	..	..	..	..	..	-1.0	-1.8	1.5	..	..	..
South Africa	2 683	3 280	3 293	2 980	3 339	3 764	3.5	1.1	-0.9	-0.4	3.0	1.3
Sudan	266	274	267	308	422	532	-0.9	0.7	-0.1	3.2	5.1	5.9
Swaziland	577	715	959	1 240	1 458	1 559	..	3.2	4.5	1.5	1.6	1.1
Tanzania	..	..	260	256	310	362	..	..	2.2	-0.0	3.9	4.4
Togo	259	312	284	251	248	245	5.1	1.7	-2.3	-0.4	-0.3	-1.4
Tunisia	731	1 144	1 417	1 748	2 338	2 760	3.2	5.1	1.1	3.1	3.9	4.1
Uganda	..	..	176	217	288	348	..	..	-0.1	3.4	3.8	6.0
Zambia	564	537	420	330	341	387	0.7	-1.9	-2.1	-2.0	2.8	3.4
Zimbabwe	493	627	618	632	509	..	3.0	-0.1	0.8	-0.6	-5.4	..

Source: World Bank - WDI, 2009 and authors' calculation

theory food imports increase when the international price falls or is expected to fall. However, based on the trends in figure 13, such a direct relationship seems not to hold. The reason is that there are many other factors involved. For instance, a high international price for food is a signal of food scarcity in international markets and may prompt food importers in Africa to build up their stocks for fear of shortages; hence, an increase in food imports. The resulting net food import increases are shown in the upward trends of prices and per capita food imports since 2003. This increase in import demand may push import prices even higher. Additionally, there can be a time lag between the price change and import demand response because of imperfect information. Estimation of the extent of the impact of prices on the level of net food import demand (i.e., price elasticity of demand) and of the contribution of price variations to food import growth at the country level would clarify the interaction between Africa's food import volume and prices but is beyond the scope of this study.

FIGURE 13. AFRICA PER CAPITA NET FOOD IMPORT INDEX AND FOOD PRICE INDEX

Source: FAOSTAT, 2011. Author's own calucation.

5 The supply causes of rising food imports

Rising food imports imply that growth in domestic supply has been unable to match the increase in demand. Table 12 shows that although Africa's total agricultural output has increased over the years, many African countries still have the lowest agricultural GDP per capita in the world. This is true despite the important role of agricultural production in their economies. For instance in 2005, Sub-Saharan Africa's agricultural GDP per capita was just about one-fourth of the world's average (Table 12 and Figure 14).

Similarly, although FAO data show that during the period 1961-2007, Africa's total food production increased on average by 2.7 percent per year, its per capita food production rose only by about 0.06 percent per year. Figure 15 shows that Africa's food production index per capita declined noticeably until the mid-1980s before rising sluggishly, never re-attaining its pre-1970 levels. This stagnation in production per capita reflects Africa's slow productivity growth, which could be caused by low and stagnating growth of yields, of low land use per person, or of both (see Box 3 as an example for cereal production). Malton and Spencer (1984) have argued that besides the often cited institutional and organizational barriers, technical barriers remain the major impediments to African agricultural production growth. It is therefore important to disentangle these causes by first examining the technical explanations of the low growth of food production per capita before reviewing other constraints such as the lack of capital investment, degradation of infrastructure, and the role of policies.

5.1 ARABLE AND AGRICULTURAL LAND AVAILABILITY

Different parts of the African continent face different agricultural land availability issues, but overall, many countries in Africa have the highest proportion of potential agricultural land to total area (see Table 13). The data from Global Agro-Ecological Zone (IIASA-FAO, 2011) specifically show that except for Northern Africa, African regions boast sizeable amounts of land (between 21-37 percent of land area) that have little or no climate, soil, or terrain constraints to suit rain-fed crop production (see Annex 6). Despite such potential, some suitable land remains idle or badly maintained and data show that utilized agricultural land per capita in Africa has declined (see Table 14). For instance, in 2005 Sub-Saharan Africa had the highest proportion of agricultural land (relative to total land area) at about 40 percent (see Table 13), but available arable land[1] per person shrank from 0.5 ha in 1960 to 0.2 ha in 2005 (see Table 14). Although the declining arable land per capita underlines how population increase stresses arable land availability in Africa, it also indicates that investment and land management policies aimed at expanding arable land have failed.

Although Africa stands amongst the continents that still have areas that can be exploited or transformed at lower cost into agricultural production, the ownership of these lands lies with

[1] FAO defines arable land as the land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in. Arable land should be distinguished from "agricultural land", which additionally includes land under permanent crops (ie. land cultivated with long-term crops which do not have to be replanted for several years -such as cocoa and coffee; land under trees and shrubs producing flowers; and nurseries -except those for forest trees) as well as permanent meadows and pastures (ie. land used permanently -five years or more- to grow herbaceous forage crops, either cultivated or growing wild).

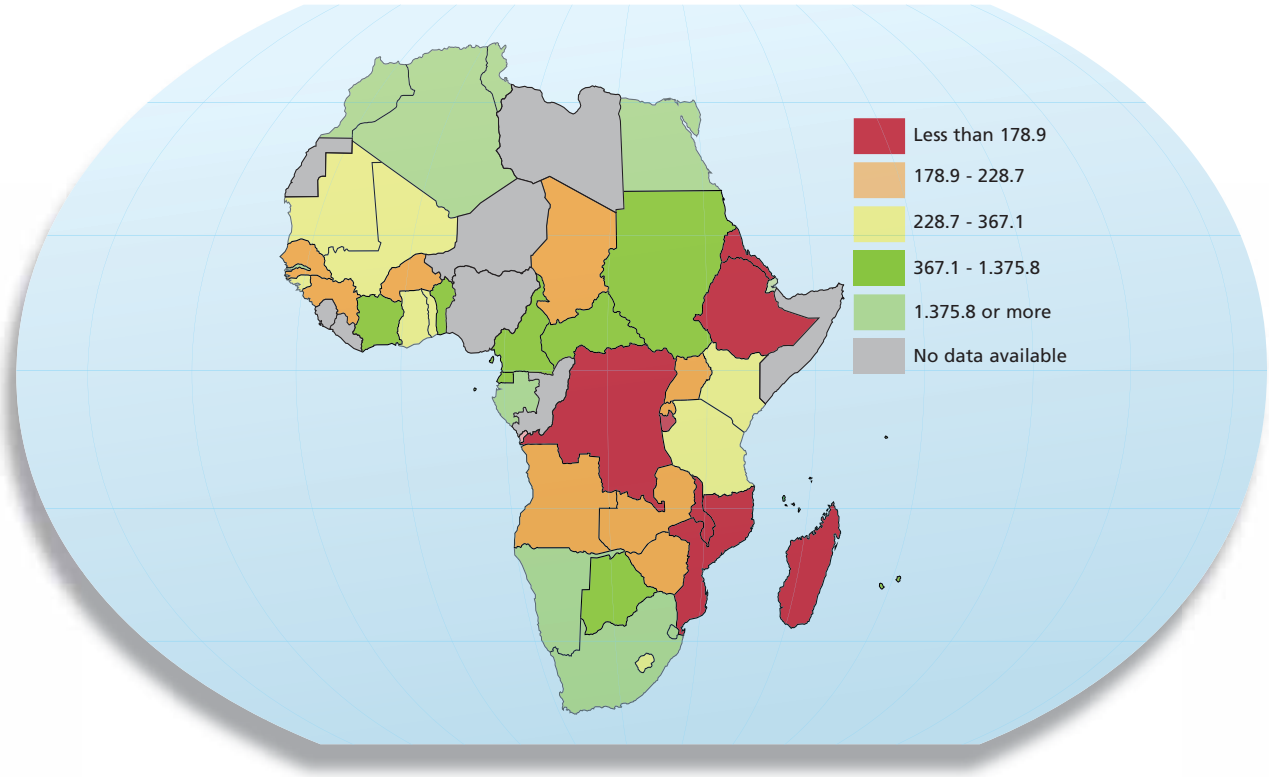
TABLE 12. AGRICULTURAL GDP PER WORKER

Country	Agriculture value added per worker (constant USD 2000)								
	1961-1970 Avg	1971-1980 Avg	1981-1990 Avg	1991-2000 Avg	2001	2002	2003	2004	2005
World	**383.5**	**653.5**	**710.0**	**784.0**	**856.8**	**861.1**	**875.2**	**911.3**	**938.7**
Northern Africa									
Algeria	539.2	943.2	1 519.1	1 880.4	1 980.8	1 905.3	2 222.2	2 233.1	2 218.6
Egypt Arab Rep.	839.4	955.6	1 262.1	1 673.2	1 915.3	1 971.8	2 014.5	2 072.0	2 128.2
Libya					..	..	..	..	..
Morocco	920.9	1 007.6	1 150.3	1 341.3	1 386.9	1 453.6	1 766.7	1 849.0	1 622.8
Sudan	402.4	461.5	437.5	529.4	663.4	679.1	675.1	665.4	661.3
Tunisia	812.6	1 359.5	1 678.8	2 370.3	2 464.6	2 173.0	2 615.7	2 853.8	2 630.1
Eastern Africa									
Burundi	74.2	105.4	106.4	93.8	78.6	79.6	74.3	71.5	64.4
Comoros		358.4	381.8	383.4	422.0	430.7	434.5	426.9	435.8
Djibouti			76.7	68.4	61.0	61.6	62.1	63.9	64.9
Eritrea				98.1	82.2	73.0	61.8	57.5	94.1
Ethiopia				155.9	165.2	158.6	139.0	159.2	177.1
Kenya	283.6	338.5	347.5	307.3	339.6	323.1	326.3	327.1	344.2
Madagascar	223.5	204.6	183.3	181.2	181.3	174.7	172.8	174.1	174.5
Malawi	83.0	96.9	85.1	101.1	125.6	116.0	118.8	120.6	109.0
Mauritius		2 408.8	3 246.5	4 229.0	5 068.9	5 397.6	4 727.2	4 966.7	5 338.1
Mozambique			102.1	113.9	126.1	137.8	142.8	147.2	154.3
Rwanda	130.5	155.2	173.1	166.4	175.3	195.4	182.6	179.7	184.5
Seychelles		670.1	536.9	439.5	487.2	480.2	451.9	439.0	432.9
Somalia					..	..	..	..	..
Tanzania			239.1	244.3	267.8	276.6	283.2	295.1	305.9
Uganda			155.0	167.0	186.3	189.0	182.9	164.4	179.0
Zambia	210.1	207.4	186.5	185.1	198.0	192.5	200.2	206.8	203.8
Zimbabwe	273.8	293.1	253.7	269.6	306.5	236.5	234.0	227.2	204.6
Middle Africa									
Angola			194.2	104.6	129.3	141.5	154.6	172.0	196.2
Cameroon	250.4	325.6	423.6	455.1	589.1	608.4	628.7	649.5	665.7
Central African Republic	264.0	291.8	286.2	315.8	393.0	389.7	375.4	383.6	383.9
Chad	192.2	170.1	150.7	195.1	216.7	211.0	217.5	201.7	225.3
Congo Dem. Rep.	208.9	182.0	180.5	182.5	152.1	150.4	149.5	147.6	149.0
Congo Rep.				301.8	..	..	..	..	..
Equatorial Guinea				927.1	897.0	889.9	974.5	975.0	1 059.9
Gabon			1 134.7	1 311.8	1 544.3	1 491.7	1 536.1	1 577.5	1 662.8
Sao Tome and Principe					..	..	..	..	..
Western Africa									
Benin	216.2	229.5	276.9	384.9	469.9	496.7	499.8	520.4	535.7
Burkina Faso	97.9	95.8	101.3	133.1	162.5	162.2	174.3	164.6	178.9
Cape Verde			1 454.0	1 400.0	1 588.7	1 501.6	1 543.3	1 489.9	1 510.1
Cote d'Ivoire	639.5	684.3	595.9	653.2	768.4	752.1	765.8	800.9	817.4
Gambia The	258.0	292.9	270.7	209.9	268.1	187.3	218.3	243.7	244.4
Ghana	386.1	386.7	306.6	298.6	319.5	324.9	302.9	324.7	331.9
Guinea			139.0	152.1	178.5	184.6	186.9	190.1	193.0
Guinea-Bissau	272.7	244.2	190.9	226.1	226.3	219.9	229.4	237.8	246.1
Liberia				509.3	..	..	..	..	..
Mali	149.5	158.6	175.6	212.8	227.9	215.0	247.7	231.3	243.9
Mauritania	507.4	411.7	523.7	554.6	414.5	367.0	374.2	337.7	356.3
Niger	320.1	199.7	156.0	151.4	153.9	152.2	156.7	..	..
Nigeria					..	..	..	..	..
Senegal	291.5	276.6	248.8	225.7	234.4	178.1	209.6	208.8	226.8
Sierra Leone				327.9	..	..	..	..	..
Togo	249.8	243.3	284.6	337.7	335.3	351.5	341.8	346.6	352.8
Southern Africa									
Botswana	188.2	455.4	422.8	463.3	398.6	397.0	408.6	393.7	367.1
Lesotho	300.4	356.5	299.9	291.1	351.2	248.2	250.5	260.0	228.7
Namibia		967.5	929.0	1 147.0	1 245.3	1 371.8	1 433.1	1 453.7	1 542.7
South Africa	785.3	1 188.8	1 655.7	1 877.4	2 142.7	2 341.6	2 356.2	2 458.5	2 670.4
Swaziland		1 202.6	1 184.8	1 138.5	1 175.9	1 249.0	1 321.2	1 294.5	1 375.8
Country Groups									
Sub-Saharan Africa			269.0	257.6	275.3	273.0	270.8	277.9	287.5
Middle East & North Africa	799.4	1 014.2	1 365.7	1 698.7	1 843.5	1 921.2	2 022.8	2 276.2	2 313.0
High income	6 285.4	7 628.6	11 471.9	17 079.6	21 924.7	22 845.7	23 404.5	25 514.6	27 582.3
High income: OECD	6 406.1	7 807.2	11 817.0	17 776.1	23 041.4	24 022.2	24 634.9	26 881.9	28 573.9
High income: non OECD			4 699.1	8 007.1	9 605.0	10 050.9	10 207.4	10 845.9	..
Low & middle income	257.8	331.4	389.7	477.6	533.3	537.5	557.4	576.5	597.6
Low income			209.2	235.4	258.7	256.9	259.1	267.4	276.7
Lower middle income	215.3	257.3	314.7	405.2	461.2	462.2	482.3	497.5	518.2
Upper middle income	1 307.3	1 470.5	1 799.3	2 085.9	2 383.1	2 489.5	2 606.6	2 721.8	2 834.7
LDCs: UN classification			206.2	220.3	241.5	239.9	240.8	245.8	254.1

Source: World Bank, 2009, World Development Indicators

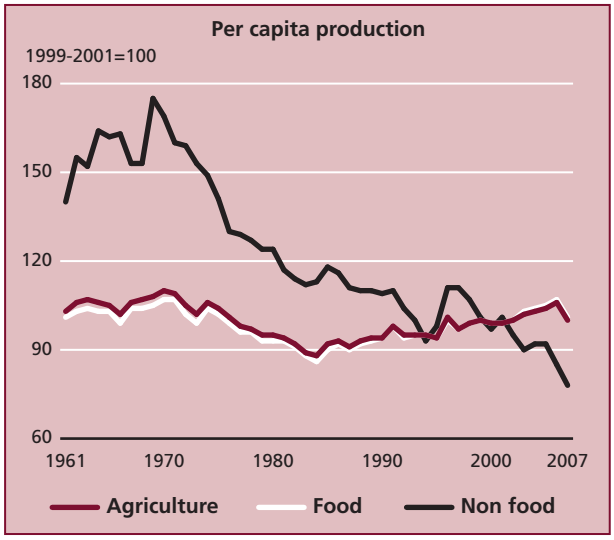
FIGURE 14. COMPARING THE LEVELS OF AGRICULTURAL VALUE ADDED PER WORKER IN AFRICA

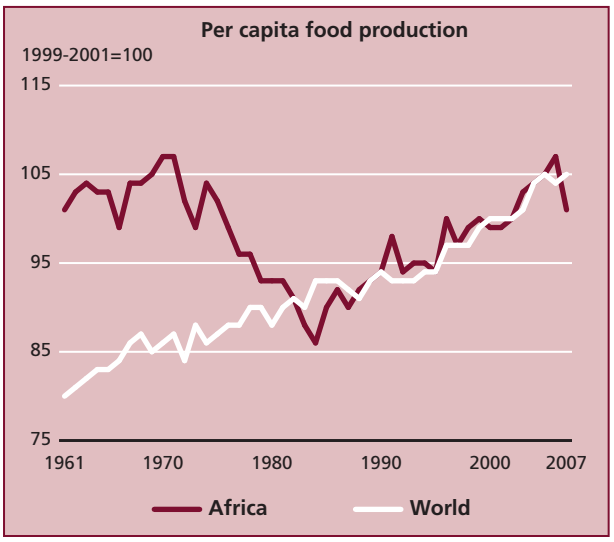
Year 2007 (Constant USD 2 000)



Source: World Bank, 2009, World Development Indicators

FIGURE 15. AFRICA'S PER CAPITA AGRICULTURE AND FOOD PRODUCTION INDICES





Source: FAOSTAT, 2010

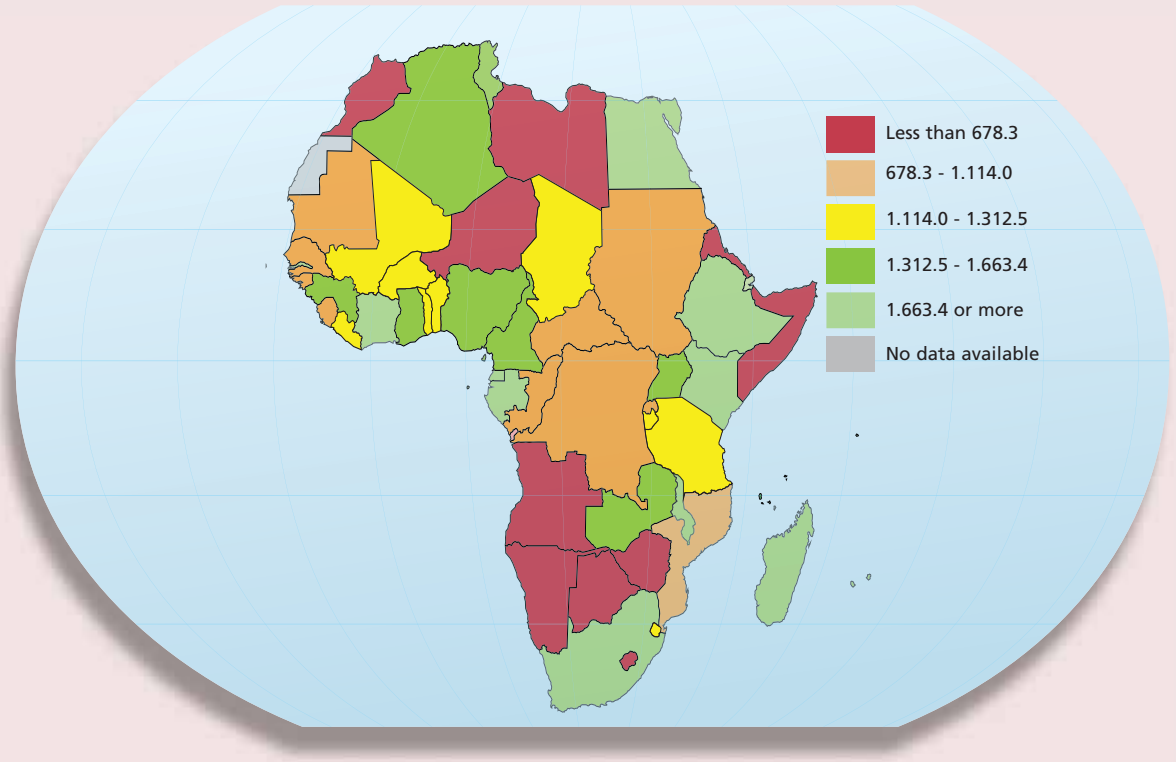
Box 3. Yearly growth of cereal production in Sub-Saharan Africa, 1962-2007

	Average growth rates (%)					
	Production		Yield		Harvested area	
	SSA	World	SSA	World	SSA	World
Cereals (average)	**2.8**	**2.2**	**1.2**	**2.0**	**1.6**	**0.2**
Wheat	3.6	2.5	1.5	2.3	2.1	0.2
Maize	3.7	3.4	1.3	2.3	2.4	1.1
Barley	2.5	1.7	1.8	1.6	0.7	0.1

Sources: FAOSTAT, 2010; World Bank, WDI 2009; Authors' own calculations

Sub-Saharan Africa (SSA) cereal production growth per year was 2.8 percent surpassing the world's average but more than half of that growth came from the increase in harvested area. Yields' growth especially for wheat and maize have remained weak and hampered the increase in cereal production. Cereal yields are lowest in Central and Southwestern Africa.

AFRICA: OVERVIEW OF CEREAL YIELDS (KG PER HECTARE), 2007



Source: World Bank, 2009, World Development Indicators

TABLE 13. AGRICULTURAL LAND AS A PERCENTAGE OF LAND AREA

Countries	1961-70 Avg	1971-80 Avg	1981-90 Avg	1991-00 Avg	2001	2002	2003	2004	2005
	%								
World	**36.3**	**37.3**	**38.6**	**38.1**	**38.3**	**38.2**	**38.2**	**38.2**	**38.2**
Northern Africa									
Algeria	18.7	18.6	16.4	16.6	16.8	16.7	16.8	17.3	17.3
Egypt, Arab Rep.	2.7	2.7	2.6	3.2	3.4	3.4	3.4	3.5	3.5
Libya	6.9	8.1	8.8	8.8	8.8	8.8	8.8	8.9	8.9
Morocco	55.0	61.0	66.3	68.9	68.0	67.9	68.1	68.1	68.1
Sudan	46.0	46.4	48.6	54.6	56.4	56.3	57.0	57.0	57.6
Tunisia	55.6	57.3	56.2	60.4	61.1	62.8	63.0	63.3	62.9
Eastern Africa									
Burundi	65.2	80.1	83.5	84.8	89.8	91.2	91.3	90.9	90.6
Comoros	54.8	57.2	64.9	73.7	79.0	79.0	79.0	79.5	79.5
Djibouti	56.1	56.1	56.1	63.0	72.5	73.4	73.4	73.4	73.4
Eritrea	…	…	…	73.5	74.6	74.6	74.9	74.9	75.3
Ethiopia	…	…	…	30.6	31.4	30.6	31.8	33.4	33.9
Kenya	44.3	44.7	46.0	47.1	47.2	47.1	47.2	47.4	47.5
Madagascar	60.6	61.4	62.3	64.4	70.2	70.2	70.2	70.2	70.2
Malawi	32.9	34.8	39.1	41.4	44.5	45.6	47.2	48.8	48.8
Mauritius	51.2	55.9	56.1	55.7	55.7	55.7	55.7	55.7	55.7
Mozambique	59.4	59.9	60.3	61.0	61.3	61.6	61.8	61.8	61.8
Rwanda	55.1	65.1	73.8	66.9	70.9	75.0	78.4	78.6	78.6
Seychelles	10.9	10.9	12.8	13.0	13.0	13.0	13.0	13.0	13.0
Somalia	70.0	70.1	70.2	70.2	70.3	70.5	70.6	70.7	70.7
Tanzania	31.5	36.5	38.0	38.4	38.5	38.6	38.8	38.8	38.8
Uganda	49.1	52.7	58.5	61.6	62.5	62.5	63.2	64.0	64.5
Zambia	29.3	30.1	30.8	32.5	33.7	34.0	34.2	34.4	34.6
Zimbabwe	29.4	31.2	32.8	36.0	38.5	39.0	39.4	39.9	40.4
Middle Africa									
Angola	46.0	46.0	46.0	46.1	46.0	46.0	46.2	46.2	46.2
Cameroon	16.7	18.2	19.6	19.7	19.7	19.7	19.7	19.7	19.7
Central African Republic	7.7	7.9	8.0	8.2	8.3	8.3	8.4	8.4	8.4
Chad	38.0	38.1	38.3	38.5	38.6	38.6	38.8	38.8	39.1
Congo, Dem. Rep.	9.7	9.9	10.1	10.1	10.1	10.1	10.1	10.1	10.1
Congo, Rep.	30.9	30.9	30.9	30.8	30.9	30.9	30.9	30.9	30.9
Equatorial Guinea	11.6	11.9	11.9	11.9	11.9	11.6	11.6	11.6	11.6
Gabon	20.3	20.1	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Sao Tome and Principe	37.1	38.5	40.0	47.3	56.2	57.3	58.3	59.4	59.4
Western Africa									
Benin	14.1	17.2	19.5	24.2	29.5	30.4	31.3	32.2	32.2
Burkina Faso	29.9	31.2	33.5	35.4	38.7	39.1	39.8	39.8	39.8
Cape Verde	16.1	16.1	16.3	17.5	17.9	18.4	18.4	18.4	18.4
Cote d'Ivoire	50.4	52.9	57.1	61.4	61.9	62.6	62.6	63.8	63.8
Gambia, The	52.6	55.8	61.3	65.9	77.9	77.9	79.4	81.4	81.4
Ghana	51.4	52.0	54.3	58.8	64.0	64.5	64.8	64.8	64.8
Guinea	47.9	48.1	48.4	49.6	50.2	50.5	50.7	51.1	51.2
Guinea-Bissau	48.4	48.9	51.5	54.7	57.9	57.9	58.0	58.0	58.0
Liberia	26.8	26.7	26.9	26.9	27.0	27.0	27.0	27.0	27.0
Mali	26.0	26.2	26.3	29.2	32.2	32.3	32.4	32.4	32.4
Mauritania	38.3	38.3	38.4	38.6	38.6	38.6	38.6	38.6	38.6
Niger	25.0	23.9	24.6	28.5	30.4	30.4	30.4	30.4	30.4
Nigeria	76.1	76.9	78.2	78.4	77.3	79.3	79.7	80.2	81.2
Senegal	41.8	41.8	41.8	41.6	42.4	42.4	42.4	42.6	42.8
Sierra Leone	36.7	37.4	38.1	38.3	38.6	39.1	39.7	40.2	40.2
Togo	56.5	53.7	56.9	62.4	66.7	66.7	66.7	66.7	66.7
Southern Africa									
Botswana	45.9	45.9	45.9	45.8	45.8	45.8	45.8	45.8	45.8
Lesotho	84.0	77.0	76.0	76.7	76.9	76.9	76.9	76.9	76.9
Namibia	46.9	47.0	47.0	47.1	47.2	47.2	47.2	47.2	47.2
South Africa	80.8	78.4	78.4	81.6	82.0	82.0	82.0	82.0	82.0
Swaziland	86.4	82.0	74.8	78.3	80.9	80.9	80.9	80.9	80.9
Country Groups									
Sub-Saharan Africa	40.0	40.4	41.2	42.6	43.4	43.5	43.7	43.9	44.0
Middle East & North Africa	22.6	23.3	23.1	23.9	24.0	24.0	24.1	24.3	22.4
High income	38.0	37.9	37.8	38.7	38.5	38.2	38.0	37.9	38.1
High income: OECD	38.9	38.7	38.1	37.2	36.8	36.5	36.3	36.2	36.3
High income: non OECD	29.2	29.4	34.2	53.1	55.5	55.4	55.4	55.5	55.5
Low & middle income	35.5	37.1	39.0	37.9	38.2	38.2	38.2	38.3	38.2
Low income	32.7	33.2	33.8	35.7	36.9	36.9	37.2	37.3	37.4
Lower middle income	40.8	42.9	46.6	49.6	51.1	50.9	51.0	51.1	50.7
Upper middle income	…	…	…	30.1	30.1	30.0	30.0	30.1	30.1
LDC's : UN classification	34.9	35.4	36.1	37.5	38.5	38.5	38.8	38.9	39.1

Source: FAOSTAT, 2011; World Bank, 2009: World Development Indicators

TABLE 14. ARABLE LAND (HECTARES PER PERSON)

Country	1961-1970 Avg	1971-1980 Avg	1981-1990 Avg	1991-2000 Avg	2001-2004 Avg	2005
World	**0.34**	**0.30**	**0.26**	**0.23**	**0.20**	**0.20**
Northern Africa						
Algeria	0.52	0.41	0.31	0.30	0.20	0.20
Egypt, Arab Rep.	0.10	0.10	0.01	0.00	0.00	0.00
Libya	1.04	0.70	0.46	0.38	0.30	0.30
Morocco	0.51	0.42	0.40	0.34	0.30	0.30
Sudan	0.84	0.68	0.53	0.50	0.50	0.50
Tunisia	0.67	0.58	0.43	0.30	0.30	0.30
Eastern Africa						
Burundi	0.22	0.25	0.20	0.19	0.10	0.10
Comoros	..	0.20	0.20	0.18	0.10	0.10
Djibouti	0.00	0.00	0.00	0.00	0.00	0.00
Eritrea	..	..	..	0.13	0.10	0.10
Ethiopia	..	..	..	0.20	0.18	0.20
Kenya	0.36	0.28	0.20	0.20	0.20	0.10
Madagascar	0.34	0.30	0.28	0.20	0.20	0.20
Malawi	0.30	0.25	0.21	0.20	0.20	0.20
Mauritius	0.10	0.10	0.10	0.10	0.10	0.10
Mozambique	0.30	0.27	0.23	0.21	0.20	0.20
Rwanda	0.17	0.16	0.10	0.10	0.10	0.10
Seychelles	0.00	0.00	0.00	0.00	0.00	0.00
Somalia	0.30	0.23	0.18	0.19	0.18	0.20
Tanzania	0.51	0.45	0.40	0.30	0.25	0.20
Uganda	0.43	0.36	0.30	0.23	0.20	0.20
Zambia	1.35	1.01	0.76	0.56	0.50	0.40
Zimbabwe	0.49	0.39	0.30	0.30	0.30	0.30
Middle Africa						
Angola	0.50	0.42	0.31	0.23	0.20	0.20
Cameroon	0.85	0.72	0.55	0.42	0.38	0.30
Central African Republic	1.02	0.87	0.71	0.55	0.50	0.50
Chad	0.87	0.71	0.59	0.47	0.40	0.40
Congo, Dem. Rep.	0.35	0.28	0.20	0.14	0.10	0.10
Congo, Rep.	0.44	0.33	0.24	0.20	0.18	0.10
Equatorial Guinea	0.43	0.55	0.43	0.29	0.20	0.20
Gabon	0.26	0.40	0.36	0.30	0.25	0.20
Sao Tome and Principe	0.00	0.00	0.00	0.00	0.05	0.10
Western Africa						
Benin	0.40	0.40	0.38	0.33	0.40	0.30
Burkina Faso	0.42	0.40	0.40	0.33	0.40	0.30
Cape Verde	0.17	0.10	0.10	0.10	0.10	0.10
Cote d'Ivoire	0.40	0.27	0.20	0.20	0.20	0.20
Gambia, The	0.32	0.30	0.23	0.20	0.20	0.20
Ghana	0.20	0.20	0.20	0.20	0.20	0.20
Guinea	0.20	0.20	0.10	0.10	0.10	0.10
Guinea-Bissau	0.40	0.36	0.30	0.26	0.20	0.20
Liberia	0.30	0.20	0.20	0.18	0.10	0.10
Mali	0.40	0.32	0.30	0.43	0.43	0.40
Mauritania	0.27	0.14	0.19	0.20	0.20	0.20
Niger	3.19	2.06	1.45	1.48	1.20	1.10
Nigeria	0.56	0.44	0.34	0.26	0.20	0.20
Senegal	0.65	0.47	0.35	0.26	0.20	0.20
Sierra Leone	0.19	0.10	0.10	0.10	0.10	0.10
Togo	1.01	0.74	0.60	0.50	0.45	0.40
Southern Africa						
Botswana	0.65	0.47	0.34	0.24	0.20	0.20
Lesotho	0.40	0.26	0.20	0.20	0.20	0.20
Namibia	0.94	0.74	0.56	0.45	0.40	0.40
South Africa	0.62	0.50	0.40	0.38	0.30	0.30
Swaziland	0.35	0.31	0.20	0.20	0.20	0.20
Country Groups						
Sub-Saharan Africa	0.55	0.44	0.35	0.30	0.30	0.20
Middle East & North Africa	0.43	0.34	0.25	0.20	0.20	0.20
High income	0.50	0.50	0.42	0.40	0.40	0.40
High income: OECD	0.50	0.50	0.47	0.40	0.40	0.40
High income: nonOECD	0.10	0.10	0.10	0.11	0.10	0.10
Low & middle income	0.30	0.23	0.20	0.20	0.20	0.20
Low income	0.34	0.30	0.20	0.20	0.20	0.20
Lower middle income	0.25	0.20	0.20	0.20	0.18	0.10
Upper middle income	0.46	0.40	0.36	0.43	0.40	0.40
LDCs: UN classification	0.40	0.33	0.30	0.20	0.20	0.20

Source: FAOSTAT, 2011; World Bank, 2009: World Development Indicators

TABLE 15. AFRICA AVERAGE YIELDS FOR SELECTED FOOD PRODUCTS

Commodities	Country Groups	Yields						Average Annual Growth (percent)					
		1961-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	2008	1961-80 Avg	1981-00 Avg	2001-05 Avg	2006	2007	2008
Maize (tonnes/ha)	**World**	**2.54**	**3.77**	**4.63**	**4.75**	**4.97**	**5.11**	**2.73**	**2.02**	**2.39**	**-1.84**	**4.55**	**2.83**
	Africa	1.26	1.51	1.72	1.74	1.70	1.82	3.08	2.04	-0.57	-1.00	-2.24	7.32
	Eastern Africa	1.13	1.36	1.36	1.41	1.46	1.30	1.61	2.00	-3.35	15.29	3.32	-10.99
	Central Africa	0.76	0.81	0.93	0.87	0.88	0.87	0.03	1.52	0.28	-8.07	0.63	-0.21
	Northern Africa	2.34	3.95	5.82	6.11	6.15	6.28	3.64	3.87	2.30	-3.82	0.73	2.09
	Southern Africa	1.58	1.98	2.79	3.09	2.56	3.82	9.36	12.97	6.28	-11.36	-17.24	49.56
	Western Africa	0.84	1.16	1.49	1.67	1.55	1.76	1.79	2.35	3.44	4.89	-7.40	13.79
Palm oil (tonnes/ha)	**World**	**4.99**	**9.98**	**12.91**	**14.72**	**13.89**	**14.08**	**3.36**	**2.93**	**3.23**	**4.12**	**-5.64**	**1.39**
	Africa	3.57	3.72	3.65	3.80	3.78	3.74	0.52	0.02	-0.37	5.37	-0.34	-1.19
	Eastern Africa	9.16	11.57	13.15	13.20	13.20	13.20	1.67	1.13	0.20	0.00	0.00	0.00
	Central Africa	8.39	7.65	10.30	10.29	10.26	10.84	-0.05	0.78	3.25	-2.51	-0.38	5.70
	Northern Africa	...	...	...	...	...	...	...	...	...	...	...	...
	Southern Africa	...	...	...	...	...	...	...	...	...	...	...	...
	Western Africa	3.10	3.31	3.20	3.34	3.33	3.24	0.63	-0.03	-0.40	5.79	-0.37	-2.67
Beans dry (tonnes/ha)	**World**	**0.52**	**0.63**	**0.72**	**0.75**	**0.71**	**0.73**	**0.49**	**1.69**	**-0.47**	**4.60**	**-4.36**	**2.23**
	Africa	0.63	0.66	0.61	0.60	0.61	0.62	0.38	0.17	-1.55	5.45	1.36	0.59
	Eastern Africa	0.69	0.68	0.60	0.61	0.63	0.62	-0.20	0.07	-1.85	11.10	1.90	-1.74
	Central Africa	0.51	0.54	0.56	0.51	0.51	0.52	1.37	0.57	-1.46	-4.52	-0.51	1.12
	Northern Africa	1.16	1.32	1.84	1.90	1.97	1.26	0.05	2.34	5.11	1.92	3.49	-35.66
	Southern Africa	0.77	1.06	1.19	0.80	0.50	1.07	6.05	6.78	2.72	-32.58	-37.70	115.20
	Western Africa	0.31	0.39	0.55	0.52	0.58	0.61	0.50	4.47	2.87	-15.05	12.96	5.10
Cassava (tonnes/ha)	**World**	**8.31**	**9.78**	**10.96**	**12.12**	**12.09**	**12.46**	**1.12**	**0.66**	**1.57**	**8.09**	**-0.29**	**3.10**
	Africa	6.17	7.90	9.10	9.96	9.58	9.85	1.04	1.20	1.77	5.46	-3.81	2.80
	Eastern Africa	5.25	6.96	7.90	9.13	8.67	8.97	2.30	0.92	1.59	12.00	-5.01	3.52
	Central Africa	5.67	7.14	8.27	8.30	8.36	8.35	0.45	1.53	0.90	-0.90	0.69	-0.14
	Northern Africa	3.11	2.11	1.74	1.73	1.67	1.67	-0.62	-1.55	-0.20	0.70	-3.85	0.00
	Southern Africa	...	...	...	...	...	...	...	...	...	...	...	...
	Western Africa	8.25	9.44	10.32	11.40	10.77	11.18	0.59	0.76	2.26	5.07	-5.58	3.80
Cow milk (hg/anim)	**World**	**19 254**	**21 108**	**22 375**	**23 040**	**23 328**	**23 432**	**0.68**	**0.49**	**0.46**	**1.83**	**1.25**	**0.45**
	Africa	4 477	4 513	4 627	4 569	4 775	4 765	-0.12	0.12	-0.53	2.88	4.51	-0.21
	Eastern Africa	2 802	3 083	3 178	3 321	3 428	3 333	0.36	0.17	0.42	8.11	3.22	-2.77
	Central Africa	3 666	3 694	3 670	3 642	3 641	3 615	0.23	-0.05	-0.31	0.17	-0.03	-0.71
	Northern Africa	5 902	6 399	6 295	5 899	6 472	6 699	0.56	0.46	-2.68	2.06	9.71	3.51
	Southern Africa	17 988	18 006	18 407	20 836	20 770	18 833	0.42	-0.55	4.00	10.14	-0.32	-9.33
	Western Africa	2 292	2 221	2 131	2 117	2 124	2 126	-0.21	-0.27	-0.25	-0.09	0.33	0.09
Cattle meat (hg/anim.)	**World**	**1 795**	**2 018**	**2 034**	**2 074**	**2 083**	**2 092**	**1.02**	**0.23**	**0.19**	**1.22**	**0.43**	**0.43**
	Africa	1 447	1 451	1 453	1 496	1 496	1 486	0.22	-0.06	0.26	1.49	0.00	-0.67
	Eastern Africa	1 242	1 228	1 278	1 284	1 292	1 279	0.01	0.30	-0.06	0.23	0.62	-1.01
	Central Africa	1 379	1 450	1 475	1 477	1 476	1 476	0.08	0.37	-0.24	0.34	-0.07	0.00
	Northern Africa	1 433	1 488	1 581	1 644	1 650	1 622	0.15	0.22	1.42	0.92	0.36	-1.70
	Southern Africa	1 906	2 191	2 341	2 585	2 559	2 553	0.53	0.80	1.59	5.47	-1.01	-0.23
	Western Africa	1 522	1 358	1 225	1 240	1 227	1 233	0.31	-1.20	-0.05	1.56	-1.05	0.49

Source: FAOSTAT, 2011

TABLE 16. FERTILIZER CONSUMPTION (100 GRAMMES PER HECTARE OF ARABLE LAND)

	1961-1970 Avg	1971-1980 Avg	1981-1990 Avg	1991-2000 Avg	2001	2002	2003	2004	2005
World	**392.0**	**693.8**	**917.6**	**938.1**	**971.2**	**1 071.4**	**1 129.7**	**1 246.4**	**1 236.3**
Northern Africa									
Algeria	96.0	262.8	264.9	120.9	138.9	96.4	60.0	208.1	230.1
Egypt, Arab Rep.	1 161.6	1 986.9	3 849.4	3 864.6	4 573.0	4 325.3	6 277.5	6 512.0	7 330.7
Libya	39.4	201.2	461.7	410.8	403.3	662.9	330.7	516.6	671.3
Morocco	89.8	218.7	349.6	354.4	424.7	656.0	590.3	693.0	425.7
Sudan	26.6	44.6	54.8	37.2	51.4	34.7	35.0	46.1	25.8
Tunisia	78.3	146.6	305.7	345.6	360.5	252.2	363.4	375.3	644.2
Eastern Africa									
Burundi	1.2	8.9	26.3	34.1	35.9	13.4	3.0	11.2	34.9
Comoros	0.0	0.0	0.0	30.7	37.5	..	..	..	..
Djibouti	0.0	7 144.0	222.0	0.0	0.0	..	..	..	..
Eritrea				114.2	97.3	62.4	16.3	0.1	22.0
Ethiopia				141.6	125.9	168.7	56.4	187.2	115.6
Kenya	77.4	137.5	213.9	247.6	292.5	271.4	338.8	408.7	379.0
Madagascar	32.1	41.3	37.0	36.1	30.7	20.9	21.5	21.8	53.7
Malawi	48.8	151.1	242.9	286.8	124.9	210.6	211.9	142.1	352.8
Mauritius	2 389.3	2 581.9	2 749.1	3 184.0	2 855.0	2 205.9	2 958.0	1 369.7	2 574.9
Mozambique	21.6	52.2	39.2	19.2	62.2	63.3	81.4	55.5	16.2
Rwanda	1.1	4.4	14.5	6.2	3.0	..	..	..	..
Seychelles	0.0	0.0	1 292.0	65.0	200.0	..	..	..	..
Somalia	16.6	19.0	21.9	2.4	4.8	..	..	..	..
Tanzania	11.7	36.8	44.0	38.1	8.8	33.6	47.5	58.1	103.7
Uganda	11.5	8.3	0.8	4.6	11.4	14.6	18.0	16.5	10.7
Zambia	30.3	113.2	148.9	105.9	69.2	0.0	0.0	0.0	0.0
Zimbabwe	334.3	543.9	576.4	520.7	472.7	404.7	453.5	268.2	264.0
Middle Africa									
Angola	17.9	60.5	42.9	19.4	0.0	16.6	17.9	45.0	22.6
Cameroon	19.7	38.9	66.0	55.3	88.1	58.6	77.0	127.1	78.7
Central African Republic	6.0	9.1	5.4	3.2	3.1	..	..	..	..
Chad	2.7	15.9	17.4	32.1	48.6	..	..	..	..
Congo, Dem. Rep.	3.4	12.0	10.2	6.6	2.9	..	..	..	..
Congo, Rep.	53.3	58.1	35.9	66.5	94.4	..	..	..	..
Equatorial Guinea	93.1	24.6	0.0	0.0	0.0	..	..	..	..
Gabon	0.0	9.5	59.0	12.1	9.2	55.8	36.2	51.1	83.4
Sao Tome and Principe	..	..	..	..	..	..	..	..	..
Western Africa									
Benin	18.0	22.5	45.1	147.8	126.9	163.7	8.0	0.5	0.0
Burkina Faso	0.9	14.6	47.3	82.7	3.7	4.3	46.9	51.7	126.3
Cape Verde	0.0	19.7	10.3	12.1	55.2	..	..	..	..
Cote d'Ivoire	69.6	207.6	161.4	229.2	221.6	263.2	249.0	217.8	142.2
Gambia, The	17.9	99.1	126.0	53.5	25.4	0.0	85.5	71.7	87.3
Ghana	9.3	82.4	67.7	37.5	76.4	48.8	67.1	110.8	56.0
Guinea	39.2	22.6	8.8	32.8	32.0	22.9	17.9	33.7	28.2
Guinea-Bissau	0.0	8.3	18.8	19.6	80.0	..	..	..	..
Liberia	24.4	113.9	60.5	0.0	0.0	..	..	..	..
Mali	9.0	52.1	87.1	89.6	90.1	..	..	..	..
Mauritania	3.1	51.1	41.7	79.5	59.4	..	..	..	..
Niger	0.1	1.1	2.8	2.7	3.4	5.9	4.5	3.5	3.2
Nigeria	2.0	22.9	95.8	89.6	77.5	55.0	75.3	49.1	67.2
Senegal	51.8	131.7	78.7	106.8	121.5	146.2	130.4	151.9	120.9
Sierra Leone	21.8	39.3	37.3	36.2	6.0	..	..	..	..
Togo	0.6	9.4	41.0	65.1	76.5	48.9	70.1	31.6	81.8
Southern Africa									
Botswana	41.4	45.9	25.7	71.5	122.0	..	..	..	..
Lesotho	12.9	69.9	142.5	182.9	343.7	..	..	..	..
Namibia	0.0	0.0	0.0	0.9	3.7	39.0	14.1	31.3	19.3
South Africa	323.2	649.5	716.4	529.2	516.8	439.7	542.7	568.2	451.4
Swaziland	346.9	684.8	856.3	402.4	393.3	..	..	..	..
Country Groups									
Sub-Saharan Africa	52.3	110.4	137.0	120.0	113.4	109.6	118.9	126.2	112.6
Middle East & North Africa	116.3	295.8	601.9	677.7	835.1	875.7	941.3	1 098.9	1 126.8
High income	847.9	1 237.3	1 281.1	1 249.2	1 214.4	1 237.2	1 434.0	1 509.4	1 479.5
High income: OECD	850.1	1 241.9	1 280.2	1 248.3	1 214.3	1 220.1	1 409.2	1 504.7	1 465.4
High income: nonOECD				1 281.7	1 219.0	..	..	..	..
Low & middle income	1 49.3	412.3	736.4	823.4	885.0	1 010.9	1 018.6	1 151.1	1 148.4
Low income	56.9	147.4	231.0	323.5	352.0	359.9	351.3	364.0	346.7
Lower middle income	1 18.0	375.7	838.1	1 201.1	1 282.2	1 448.5	1 393.5	1 585.7	1 632.5
Upper middle income	2 84.7	649.8	802.8	495.0	539.1	611.0	715.0	806.3	733.0
LDCs: UN classification	20.0	61.8	111.6	143.5	152.1	..	..	..	..

Source: World Bank, 2009: World Development Indicators

TABLE 17. IRRIGATED LAND AS A PERCENTAGE OF CROPLAND

	1961-1970 Avg	1971-1980 Avg	1981-1990 Avg	1991-2000 Avg	2001	2002	2003
World					**17.9**	**17.6**	**18.0**
Northern Africa							
Algeria	3.4	3.4	4.4	6.9	7.0	6.9	6.9
Egypt, Arab Rep.	100.0	100.0	100.0	99.5	100.0	99.9	100.0
Libya	7.2	9.8	15.1	21.4	21.9	21.9	21.9
Morocco	12.4	13.7	14.4	13.1	15.4	15.6	15.4
Sudan	13.8	13.8	13.7	12.3	11.3	11.2	10.2
Tunisia	..	..	..	..	7.0	7.3	7.1
Eastern Africa							
Burundi	1.4	1.1	1.2	1.4	1.6	1.6	1.5
Comoros	..	..	..	..	..	..	..
Djibouti	..	..	..	..	..	..	..
Eritrea	..	..	..	4.8	3.7	3.7	3.5
Ethiopia	..	..	..	2.7	2.5	2.7	2.5
Kenya	0.5	0.9	0.9	1.3	1.6	1.6	1.8
Madagascar	14.1	17.6	26.4	31.1	30.6	30.6	30.6
Malawi	0.2	0.9	1.0	1.6	2.4	2.3	2.2
Mauritius	12.6	14.3	15.6	17.4	19.8	19.8	20.8
Mozambique	0.6	1.4	2.6	2.8	2.8	2.7	2.6
Rwanda	0.6	0.4	0.4	0.6	0.7	0.6	0.6
Seychelles	..	..	..	..	..	..	..
Somalia	10.0	11.1	18.0	18.9	18.7	16.3	15.7
Tanzania	0.4	0.8	1.4	1.5	1.7	1.8	1.8
Uganda	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Zambia	0.1	0.4	0.5	1.5	2.6	2.9	2.9
Zimbabwe	1.6	2.7	3.1	4.2	5.2	5.2	5.2
Middle Africa							
Angola	2.3	2.3	2.4	2.3	2.4	2.4	2.2
Cameroon	0.1	0.2	0.3	0.3	0.4	0.4	0.4
Central African Republic	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Chad	0.3	0.3	0.4	0.6	0.8	0.8	0.8
Congo, Dem. Rep.	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Congo, Rep.	0.0	0.3	0.2	0.4	0.4	0.4	0.4
Equatorial Guinea	..	..	..	..	..	..	..
Gabon	2.0	1.1	0.9	1.3	1.4	1.4	1.4
Sao Tome and Principe	28.9	27.8	26.8	22.6	18.9	18.5	18.2
Western Africa							
Benin	0.1	0.4	0.6	0.5	0.4	0.4	0.4
Burkina Faso	0.1	0.3	0.5	0.7	0.5	0.5	0.5
Cape Verde	5.0	5.0	5.6	6.6	6.4	6.1	6.1
Cote d'Ivoire	0.3	0.9	1.1	1.1	1.1	1.1	1.1
Gambia, The	0.8	0.6	0.6	1.0	0.6	0.6	0.6
Ghana	0.5	0.5	0.6	0.6	0.5	0.5	0.5
Guinea	2.1	5.5	7.6	6.4	5.8	5.6	5.4
Guinea-Bissau	6.0	5.7	4.7	4.5	4.6	4.6	4.5
Liberia	0.0	0.4	0.3	0.5	0.5	0.5	0.5
Mali	3.6	3.1	3.1	3.1	5.0	5.0	4.9
Mauritania	7.6	17.1	15.9	10.1	9.8	9.8	..
Niger	0.1	0.2	0.4	0.5	0.5	0.5	0.5
Nigeria	0.7	0.7	0.6	0.7	0.8	0.8	0.8
Senegal	3.4	3.0	3.5	3.5	4.4	4.8	4.8
Sierra Leone	0.6	2.9	5.0	5.4	5.3	5.0	4.7
Togo	0.1	0.1	0.2	0.3	0.3	0.3	0.3
Southern Africa							
Botswana	0.2	0.3	0.5	0.3	0.3	0.3	0.3
Lesotho	0.3	0.3	0.4	0.8	0.9	0.9	0.9
Namibia	0.6	0.6	0.6	0.9	1.0	1.0	1.0
South Africa	6.9	7.9	8.7	8.9	9.5	9.5	9.5
Swaziland	27.1	23.5	26.0	25.5	26.0	26.0	26.0
Country Groups							
Sub-Saharan Africa	2.6	3.0	3.3	3.5	3.6	3.6	3.5
Middle East & North Africa	19.5	20.6	22.3	29.3	33.3	33.7	33.7
High income	..	..	..	..	..	10.9	..
High income: OECD	..	..	..	..	10.5	10.6	10.8
High income: nonOECD	..	..	..	..	..	..	..
Low & middle income	14.8	17.6	19.0	20.6	20.3	19.8	20.4
Low income	5.9	7.5	9.7	13.4	14.7	14.9	14.6
Lower middle income	..	..	..	26.1	28.6	28.8	28.7
Upper middle income	..	..	..	11.6	9.1	8.6	9.3
LDCs : UN classification	6.1	7.1	8.4	9.2	10.4	10.5	10.2

Source: World Bank, 2009: World Development Indicators

TABLE 18. AGRICULTURAL MACHINERY, TRACTORS PER 100 KM² OF ARABLE LAND

Country	1961-70 Avg	1971-80 Avg	1981-90 Avg	1991-00 Avg	2001	2002	2003	2004	2005
	%								
World	**114.7**	**149.1**	**184.6**	**188.3**	**192.9**	**195.2**	**197.6**	**213.0**	**214.1**
Northern Africa									
Algeria	52.4	62.9	103.0	123.9	128.1	129.5	130.9	132.4	134.5
Egypt, Arab Rep.	57.2	96.2	215.1	288.4	317.1	314.7	324.0	323.4	325.3
Libya	18.5	80.0	155.8	197.3	219.0	219.0	219.0	227.1	227.1
Morocco	13.2	24.4	41.2	47.2	57.3	58.4	58.4	58.4	58.5
Sudan	2.5	7.2	7.8	7.1	7.6	7.9	7.6	9.2	9.3
Tunisia	48.4	72.6	84.9	116.1	137.7	139.3	138.7	139.0	143.2
Eastern Africa									
Burundi	0.0	0.3	1.4	1.8	1.7	1.7	1.7	1.7	1.8
Comoros	…	…	…	0.3	0.6	0.6	0.6	0.6	0.6
Djibouti	42.0	54.0	68.0	80.0	80.0	80.0	80.0	80.0	80.0
Eritrea	…	…	…	8.8	8.2	8.2	7.8	7.8	7.3
Ethiopia	…	…	…	3.0	2.8	3.0	2.7	2.4	2.3
Kenya	17.5	16.7	19.9	22.4	24.5	25.2	25.1	25.3	25.5
Madagascar	8.8	7.9	6.0	3.6	2.4	2.2	2.1	1.9	1.9
Malawi	3.7	7.4	7.7	7.4	6.5	6.2	5.8	5.5	5.5
Mauritius	30.2	30.4	34.3	37.5	42.0	48.0	50.3	51.5	53.5
Mozambique	11.8	16.4	15.7	13.6	13.7	13.5	13.9	14.2	14.5
Rwanda	0.8	1.2	1.0	0.9	0.6	0.5	0.5	0.5	0.5
Seychelles	96.0	298.0	382.0	400.0	400.0	400.0	400.0	400.0	400.0
Somalia	8.8	13.6	17.6	12.3	9.6	8.8	9.4	9.6	10.2
Tanzania	28.5	18.3	9.5	11.1	20.4	23.4	23.2	23.4	23.4
Uganda	2.2	4.8	7.8	9.3	9.2	9.2	9.0	8.9	8.7
Zambia	4.6	8.1	10.4	11.4	11.4	11.4	11.4	11.4	11.4
Zimbabwe	65.3	65.7	59.9	67.6	74.5	74.5	74.5	74.5	74.5
Middle Africa									
Angola	13.2	32.2	35.4	34.4	34.3	33.2	31.2	31.2	31.2
Cameroon	0.2	0.6	0.9	0.8	0.8	0.8	0.8	0.8	0.8
Central African Republic	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Chad	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Congo, Dem. Rep.	1.3	2.2	3.3	3.6	3.6	3.6	3.6	3.6	3.6
Congo, Rep.	7.6	12.8	13.5	14.5	14.3	14.1	14.1	14.1	14.1
Equatorial Guinea	3.4	7.0	7.6	8.9	13.1	13.1	13.1	15.4	16.2
Gabon	24.8	29.5	27.0	27.9	28.6	28.6	28.6	28.6	28.6
Sao Tome and Principe	584.0	1212.0	865.0	383.3	208.3	178.6	156.2	138.9	138.9
Western Africa									
Benin	0.7	0.7	0.8	0.9	0.8	0.7	0.7	..	..
Burkina Faso	0.2	0.4	1.0	4.7	4.4	4.3	4.1	4.1	4.1
Cape Verde	0.9	2.4	5.5	9.4	11.4	11.3	11.7	12.2	12.4
Cote d'Ivoire	4.5	13.5	19.4	21.6	29.0	27.3	27.6	26.3	26.5
Gambia, The	3.5	3.0	2.4	2.8	2.5	2.9	3.0	3.1	2.9
Ghana	12.3	18.1	17.3	11.7	8.9	8.6	8.6	8.6	8.6
Guinea	18.9	47.2	53.8	46.7	54.0	52.4	50.2	46.2	46.3
Guinea-Bissau	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
Liberia	2.8	6.8	8.2	8.7	8.6	8.6	8.5	8.5	8.5
Mali	1.9	4.0	7.3	7.2	5.6	5.5	5.4	5.4	5.4
Mauritania	1.5	10.1	10.6	7.6	7.8	7.8	7.8	7.8	7.6
Niger	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Nigeria	0.5	2.7	6.0	9.6	10.5	9.9	9.8	9.7	9.4
Senegal	1.0	1.6	2.0	2.5	2.8	2.8	2.8	2.8	2.7
Sierra Leone	3.2	3.9	8.9	2.2	1.6	1.5	1.5	1.4	1.5
Togo	0.3	0.4	0.5	0.4	0.3	0.3	0.3	0.3	0.3
Southern Africa									
Botswana	28.5	47.0	84.7	157.4	159.2	159.2	159.2	159.2	159.2
Lesotho	6.9	33.1	53.7	59.6	60.6	60.6	60.6	60.6	60.6
Namibia	28.3	35.6	42.9	41.4	38.6	38.6	38.7	38.7	38.7
South Africa	114.3	134.6	129.9	75.8	47.5	45.9	44.4	42.8	42.7
Swaziland	57.5	136.1	219.1	203.7	221.9	221.9	221.9	221.9	221.9
Country Groups									
Sub-Saharan Africa	16.3	20.2	20.3	15.9	14.0	13.9	13.5	13.5	13.4
Middle East & North Africa	22.7	44.3	93.8	127.0	147.0	150.2	150.1	147.0	154.5
High income	292.4	355.2	401.2	419.0	425.8	430.5	434.8	436.6	436.4
High income: OECD	293.5	356.4	403.5	421.2	427.6	432.8	432.1	433.3	433.4
High income: nonOECD	117.0	166.8	162.0	291.9	327.9	307.8	584.6	627.5	609.2
Low & middle income	20.1	42.6	77.2	102.9	110.5	112.5	114.2	122.1	123.8
Low income	7.1	10.6	15.7	33.1	37.2	37.0	36.5	36.6	36.4
Lower middle income	7.2	23.8	51.5	80.0	98.2	103.2	107.5	124.6	127.6
Upper middle income	60.0	103.2	172.7	164.4	158.5	157.3	157.2	156.0	157.6
LDC's: UN classification	4.1	6.7	7.3	7.0	7.5	7.7	7.6	7.9	8.0

Source: World Bank, 2009: World Development Indicators

TABLE 19. AGRICULTURAL R&D PUBLIC EXPENDITURES AS A PERCENTAGE OF AGRICULTURAL GDP IN SELECTED AFRICAN COUNTRIES

Country	1981-90 Avg	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Benin	...	...	0.46	0.37	0.77	0.55	0.42	0.47	0.46	0.47	0.55	0.57
Botswana	1.13	1.29	1.40	1.76	2.11	2.16	2.57	2.98	4.01	5.17	5.61	7.50
Burkina Faso	0.40	0.66	0.88	0.99	1.15	0.91	0.48	0.87	0.83	1.01	1.20	0.68
Côte d'Ivoire	0.76	0.59	0.36	0.43	0.75	0.63	0.53	0.60	0.78	0.82	0.98	0.63
Ethiopia	0.04	0.04	0.03	0.07	0.16	0.15	0.15	0.14	0.23	0.23	0.26	0.00
Ghana	0.01	0.02	0.02	0.04	0.05	0.06	0.08	0.12	0.15	0.16	0.31	0.39
Kenya	0.20	0.52	0.61	1.35	1.92	1.38	0.95	0.72	0.67	0.89	1.07	0.00
Madagascar	0.06	0.12	0.14	0.13	0.21	0.24	0.19	0.40	0.20	0.18	0.17	0.00
Malawi	0.03	0.04	0.06	0.05	0.24	0.22	0.12	0.13	0.32	0.31	0.36	0.63
Mali	0.84	0.75	0.63	0.69	1.25	1.07	0.95	1.09	1.15	1.19	1.43	1.61
Morocco	1.17	0.78	1.12	1.20	0.80	0.87	0.52	0.90	0.60	0.74	1.09	1.01
Niger	0.47	0.33	0.33	0.44	0.75	0.54	0.95	0.84	1.20	0.25	0.28	0.25
Nigeria	...	...	...	...	...	...	...	...	...	...	...	...
Senegal	1.71	0.97	1.08	1.05	2.59	1.50	1.44	1.60	1.68	1.44	1.40	1.30
South Africa	0.64	1.17	1.63	1.64	1.50	2.01	2.10	2.25	3.06	3.10	3.43	...
Sudan	0.00	0.01	0.03	0.03	0.05	0.04	0.08	0.07	0.11	0.13	0.18	...
Togo	0.79	0.48	0.39	0.41	0.83	0.64	0.53	0.55	0.56	0.34	0.95	0.66
Zambia	0.00	0.03	0.03	0.05	0.19	0.20	0.55	0.49	0.34	0.33	0.44	...

Source: Agricultural Science and Technology Indicators, 2010 and World Development Indicators, 2009

TABLE 20. ROAD PAVED AS A PERCENTAGE OF TOTAL ROAD

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
World	**36.3**	**42.4**	**39.0**	**39.7**	**41.8**	**41.4**	**40.8**	**38.6**	**43.4**	**35.9**	**36.3**	**..**	**..**	**..**	**..**	**..**	**..**
Northern Africa																	
Algeria	67.0	70.0	66.0	66.7	68.0	68.9	68.9	68.9	68.9	68.9	68.9	..	..	..	70.2	..	..
Egypt, Arab Rep.	72.0	72.0	73.0	72.0	75.0	78.0	78.1	78.1	78.1	78.1	78.1	..	..	..	81.0	..	..
Libya	51.7	52.7	53.8	54.9	56.0	57.1	..	..	..	57.2	57.2	57.2	..	..	..	..	..
Morocco	49.1	49.5	49.5	49.6	50.2	50.2	50.2	52.3	52.3	56.3	56.4	56.4	56.4	56.9	56.9	61.9	61.9
Sudan	33.8	33.7	33.7	34.5	35.4	36.2	36.3	36.3	36.3	36.3	36.3	36.3	..	..	..	..	..
Tunisia	76.1	75.5	74.6	76.0	77.4	78.8	78.9	78.9	63.7	63.8	68.4	65.4	..	..	65.8	..	..
Eastern Africa																	
Burundi	..	..	..	..	..	..	..	..	..	7.1	7.1	..	..	..	10.4	..	..
Comoros	69.3	70.7	72.1	73.5	75.0	76.5	..	..	76.5	76.5	76.5	76.5	..	..	..	..	..
Djibouti	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	45.0	45.0	..	..	..	..	..
Eritrea	19.4	19.8	20.2	20.6	21.0	21.4	21.8	21.8	21.8	21.8	21.8	21.8	..	..	..	..	..
Ethiopia	15.0	15.0	15.0	15.0	15.0	15.5	15.3	15.3	14.0	13.3	12.0	12.0	12.0	12.9	12.7	13.4	12.7
Kenya	12.8	13.3	13.8	14.3	13.6	13.8	12.1	12.1	12.1	12.1	12.1	..	..	..	14.1	..	..
Madagascar	15.4	15.4	15.4	11.5	..	11.5	11.6	..	..	11.6	11.6	11.6	..	..	..	..	..
Malawi	22.0	17.0	17.0	18.0	18.0	20.0	20.0	19.0	..	..	..	..	..	45.0	..	..	..
Mauritius	93.0	93.0	93.0	93.0	93.0	93.0	95.0	95.0	96.0	96.0	97.0	98.0	98.0	100.0	100.0	100.0	100.0
Mozambique	16.8	17.2	17.5	17.8	18.2	18.6	18.7	18.7	18.7	18.7	18.7	18.7	..	..	..	..	..
Rwanda	9.0	9.2	9.4	9.6	9.7	9.9	9.1	..	..	8.3	8.3	..	..	..	19.0	..	..
Seychelles	56.9	58.0	59.1	60.3	61.5	62.8	80.3	84.5	..	..	..	..	..	96.0	..	..	..
Somalia	11.1	11.3	11.5	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	..	..	..	..	..
Tanzania	37.0	37.0	37.0	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	..	..	8.6	..	..	..
Uganda	..	..	..	..	..	..	..	..	..	..	..	..	..	23.0	..	..	..
Zambia	16.6	16.9	17.3	17.6	18.0	..	..	..	..	..	..	22.0	..	..	..	..	..
Zimbabwe	14.0	15.0	16.0	17.0	54.9	48.0	47.4	47.4	47.4	..	..	..	19.0	..	..	..	..
Middle Africa																	
Angola	..	..	..	..	..	..	..	..	..	10.4	10.4	10.4	..	..	..	..	..
Cameroon	10.5	10.9	11.3	11.7	12.1	12.5	12.5	12.5	12.5	12.5	8.1	..	..	..	8.4	..	..
Central African Republic	..	..	..	..	2.1	2.1	2.1	2.4	2.7	..	..	..	..	..	..	..	..
Chad	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	..	..	..	..	..	..
Congo, Dem. Rep.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1.8	..	..
Congo, Rep.	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	..	..	..	5.0	..	..
Equatorial Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gabon	8.2	8.2	8.2	8.2	8.2	8.2	9.9	9.9	9.9	9.9	9.9	..	..	..	10.2	..	..
Sao Tome and Principe	61.6	62.8	64.1	65.4	66.7	68.0	68.1	68.1	68.1	68.1	68.1	68.1	..	..	..	..	..
Western Africa																	
Benin	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	..	..	..	..	..	9.5	..	..
Burkina Faso	16.6	17.1	17.6	18.2	18.7	16.0	16.0	16.0	16.0	16.0	..	..	..	..	4.2	..	..
Cape Verde	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	78.0	69.0	69.0	..	..	..	..	..
Cote d'Ivoire	8.7	8.9	9.1	9.2	9.4	9.6	9.7	9.7	9.7	9.7	9.7	..	..	..	8.1	..	..
Gambia, The	32.0	32.6	33.3	34.0	34.6	35.3	35.4	35.4	35.4	35.4	35.4	..	..	19.3	19.3	..	..
Ghana	19.6	23.0	23.5	23.9	24.4	24.9	24.1	..	..	29.6	29.6	18.4	..	17.9	..	14.9	..
Guinea	15.2	15.2	15.5	15.8	16.1	16.4	16.5	16.5	16.5	16.5	16.5	..	..	9.8	..	..	..
Guinea-Bissau	8.3	8.7	9.1	9.4	9.8	10.2	10.3	10.3	10.3	..	..	..	27.9	..	..	..	..
Liberia	5.5	5.6	5.7	5.9	6.0	6.1	6.2	6.2	6.2	6.2	6.2	6.2	..	..	..	..	..
Mali	10.9	11.1	11.3	11.5	11.8	12.0	12.1	12.1	12.1	12.1	12.1	..	..	..	18.0	..	..
Mauritania	11.0	11.0	11.1	11.1	11.1	11.2	11.3	11.3	11.3	11.3	11.3	..	..	..	..	30.3	26.8
Niger	29.0	..	..	..	7.9	7.9	7.9	7.9	7.9	7.9	..	25.7	25.7	25.0	20.5	20.6	20.5
Nigeria	30.0	30.0	30.0	30.0	21.3	18.8	18.8	30.9	30.9	..	..	..	..	..	15.0	..	..
Senegal	27.2	27.8	28.3	28.3	28.4	28.5	29.3	29.3	29.3	29.3	29.3	..	..	29.3	..	..	..
Sierra Leone	10.6	10.8	11.0	11.0	11.0	8.0	8.0	8.0	8.0	7.9	7.9	..	8.0	..	..	..	..
Togo	21.2	21.6	31.0	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	31.6	..	..	..	..	..
Southern Africa																	
Botswana	32.0	34.0	19.9	21.1	22.2	48.0	52.0	54.0	56.0	..	..	..	35.3	35.1	33.2	32.6	..
Lesotho	18.0	17.0	16.0	15.0	15.0	17.9	17.9	16.8	17.3	18.3	18.3	18.3	..	..	..	..	..
Namibia	10.8	10.9	10.9	7.3	7.9	7.9	11.4	13.2	13.5	13.6	..	..	12.8	..	..	..	..
South Africa	29.8	..	..	..	..	41.5	19.7	19.7	19.7	20.3	20.3	17.3	..	..	..	..	..
Swaziland	53.6	54.7	58.6	59.8	28.2	..	..	..	..	..	..	..	30.0	..	..	..	..
Country Groups																	
Sub-Saharan Africa	16.0	15.3	15.8	15.0	15.0	14.7	13.9	15.3	13.8	12.1	11.9	..	..	..	..	..	..
Middle East & North Africa	72.0	72.0	72.0	72.0	68.0	68.9	73.5	62.9	63.7	68.9	68.4	65.1	..	..	81.0	..	..
High income	72.9	81.2	81.2	85.9	86.0	80.7	83.7	81.6	88.1	89.0	90.0	87.0	87.3	100.0	87.0	85.7	..
High income: OECD	79.8	84.6	81.2	86.3	86.0	83.3	87.9	86.6	88.3	90.9	90.9	87.0	82.8	99.5	86.4	79.0	..
High income: nonOECD	72.9	74.4	80.8	82.1	83.2	80.5	81.3	81.5	87.0	86.2	85.4	89.5	..	100.0	97.5	100.0	..
Low & middle income	24.0	23.9	23.9	23.9	24.2	25.9	24.6	24.6	28.0	23.1	23.1	..	..	..	..	..	..
Low income	16.0	15.3	15.5	15.8	15.5	13.8	12.8	13.7	14.0	13.3	12.1	..	..	..	..	..	..
Lower middle income	39.4	39.5	41.8	43.8	40.0	39.5	39.0	33.6	36.3	35.4	37.6	39.0	..	..	..	..	..
Upper middle income	50.5	52.7	52.6	51.8	52.5	50.1	52.0	43.6	52.3	49.0	41.8	..	..	..	..	..	..
LDC's: UN classification	16.0	15.3	15.4	15.0	14.2	12.7	12.2	15.3	14.0	13.3	12.1	..	..	..	..	..	..

Source: World Bank, 2009: World Development Indicators

the States, and their distribution poses problems because of the lack of transparency and the difficulty of enforcing ownership claims. These problems often create conflicts with small farmers who have stayed in areas for relatively long periods of time but who lack any legal right to exploit the land. Many African governments have been unable to resolve these land issues, which limit the countries' abilities to organize production practices and attract investments to increase food production.

It is noted also that, in some African countries, the rapid urbanization and expansion of other development or industrial projects have taken away a sizeable amount of local agricultural land from food producing communities.

5.2 LOW YIELDS AND PRODUCTIVITY

Yield is neither a complete nor a perfect measure of total productivity, but it provides a broad insight into how Africa's levels and growth of agricultural productivity, hence production, lag far behind those of the rest of the world, especially for main food staples such as cereals, vegetable oils, dairies, and meat. Table 15 compares yield levels and growth on selected commodities and groups of commodities and reveals the huge productivity gap between Africa and the rest of the world. For instance, between 1960 and 2008, world maize yields doubled from 2.5 to more than 5 tons per hectare, while Africa's yields stayed at less than 2 tons per hectare. Similarly, during the same period, average cow milk production per animal in Africa remained below 0.5 tons per animal, which is only one-fourth of the world's average. With such low productivity level and growth and with the decline in arable land per capita, it is no surprise that agricultural production grew slower than local demand; this has contributed to the increase in import bills in many countries in Africa. Low agricultural productivity also implies both misallocation of resources and inefficiencies that translate into relatively higher production costs that reduce competitiveness.

As the low level of yields is one of the reasons why growth in production (both total and per worker) is weak, it is important to explain why productivity in general is low. The technical causes of low productivity in Africa can be grouped into three broad categories: limited access to essential inputs and equipment, slow transfer and adoption of technology, and negative supply shocks such as natural disasters and diseases.

5.2.1 Limited access to essential inputs, equipment, and market infrastructure

Land degradation

Land degradation has been a major constraint on agricultural (crop and livestock) production in many African countries. Crop and grazing lands have been continuously depleted of soil nutrients, and any expansion of agricultural activities on new land holds only short-lived benefit, because there is hardly any restoration of the soil quality (Malley *et al.*, 2009). Moreover, many African countries experience soil erosion, and conservation techniques are often neglected. These have negative impacts on yields and productivity.

Low fertilizer uses and difficulty of control of pests and diseases

One way to reverse land degradation is to use fertilizer, but in many African countries the use of fertilizer in agricultural production remains low in comparison with the level of use in the rest of the world (Table 16). For instance, in 2005, the average amount of fertilizer used per hectare in Sub-Saharan Africa was only about 11 kg, which was less than one-tenth of the world's average. The low level of fertilizer use stems from the relatively high prices and inefficient delivery systems. Moreover, despite Africa's agro-climatic conditions that make its agricultural sector highly vulnerable to animal and plant diseases, the use of pest controls and animal vaccines is still limited.

Water constraint

Water for food production (including livestock) is threatened by other water uses (e.g. energy for industries and urban centres, or for non-food production). Regional or tribal conflicts often arise because of competition over water use. Moreover, even available water sources for agriculture often cannot reach the users because of the lack of infrastructure. In regions frequently hit by drought, water stress reduces yields especially for production under an extensive farming system (Malley *et al.*, 2009). As Table 17 shows, except for a few countries (e.g. Egypt and Madagascar) the proportion of irrigated land to total cropland

is relatively small, indicating that African crops and livestock are highly vulnerable to prolonged droughts.

Low mechanization, poor infrastructure and inadequate equipment

Animal traction and engines supply 75 percent of power needs in agriculture in other developing regions such as Asia and Latin America, while in Africa they represent only 35 percent of agricultural power source; the remaining 65 percent comes from human muscle (FAO-UNIDO, 2008). Table 18 compares the number of tractors used per 100 sq. km of arable land and confirms the low level of mechanization of African agriculture. The relatively high and fluctuating costs of energy and the relatively high price of equipment are among the reasons for the limited use of motorised agricultural equipment by farmers in Africa. Similarly, the use of large equipment such as tractors is not suited to areas where food production is on small and scattered lands. Moreover the level of mechanization is often associated with the state of the irrigation systems, as irrigated land is more likely to accommodate mechanization, whereas dry land is less amenable.

Many countries in Africa still lack basic agricultural infrastructure such as irrigation dams, storage facilities and cold chains and modern slaughter houses and this lack of infrastructure limits productivity and production. Similarly the lack of basic equipment affects not only the quantity but also the quality of products. For instance, in East Africa the lack of appropriate and sanitized equipment in slaughter houses and the lack of cold chain in the dairy sector have reduced the quality of meat and milk circulating in the market.

5.2.2 Limited technology transfer and adoption

Available technology does not always reach African farmers. One reason is the high costs associated with technology transfer and adoption. Animal vaccines or improved seeds are still considered as luxuries for many small farmers in Africa. Another common obstacle to technology transfer and adoption in Africa is the lack of human capital and the lack of investment in agricultural research and extension (Wolf, 2007; Bingswanger-Mkhize, 2009; von Cramon-Taubadel *et al.*, 2009). The lack of human capital can be seen through the relatively low secondary school enrolment, especially in Sub-Saharan Africa (See Annex 7). Moreover, as Table 19 shows, African countries' government investments for agricultural research are small- less than 2 percent of agricultural output except in Botswana and South Africa. For many years, many African policy makers have not given enough attention and resources to the educational needs of the agricultural and food production sectors. Indeed, many African countries do not have at hand an effective extension program to expand the use of technology, even sometimes the most basic forms. Undoubtedly, the lack of clear policies to speed technology transfer and adoption is one of the sources of the lack of productivity growth.

The slow pace of technology adoption, which results in low levels of productivity and production, is also reflected in the types of farming system and the high seasonality of Africa's agricultural production. Although there has been a move towards more intensive production systems as seen primarily in the proliferation of peri-urban agriculture, the African agricultural production systems remain largely extensive, especially for food crops and livestock production (Ellis and Sumberg, 1998). The contribution of urban agriculture to food security has increased but it still remains limited (Zezza and Tasciotti, 2010). In livestock production, for instance, pastoralism is still the dominant livestock production system in many African countries despite the increase in livestock raising near cities (Maitima *et al.*, 2010).

Whereas an extensive farming system offers some advantages such as limited pollution, organic purity of the crop or livestock products, and mobility to reach needed resources, it can also be an obstacle to productivity growth because of the difficulty of controlling input use that can, for instance, increase the number of growing seasons (i.e., reduce seasonality), and because of the difficulty of controlling risks like contagious plant and animal diseases. Extensive farming systems compound even lower yields and profits as they deplete already scarce resources (fresh water, soil nutrients) of the exploited areas.

5.2.3 Supply shocks: natural disaster, diseases, oil shocks

Natural disasters such as cyclones, droughts, and flooding spells have affected production by destroying crops and livestock and also by

damaging infrastructures. Climate changes have contributed to some of these disasters (especially drought or desertification) in some of Africa's production areas (Odingo, 1990; Sultan and Janicot, 2006).[2] Frequent outbreaks of animal diseases have often left animal production in tatters (e.g. Rift Valley Fever for bovines in East Africa or Avian Influenza for poultry in West Africa; Rinderpest; foot and mouth diseases). The lack of prevention and awareness and the limited access to insurance coverage worsen the effects of the natural disasters and animal and crop diseases on the performance of agricultural sector.

Similarly, human diseases such as HIV/AIDS (see Box 4), malaria, and cholera that hinder the efficiency of the agricultural workforce reduce both productivity and production of agricultural products in many African countries (see Steinberg *et al.*, 2002).[3] Human diseases also affect trade balances because, for instance, many importing countries will refuse food shipments for years from countries with disease outbreaks (e.g. cholera or bubonic plague) for health safety reasons.

Supply shocks arising from disruptions in the international market such as the oil shock in the early 1970s and global recessions such as in early 2000s have affected Africa's agricultural production by lowering demand while input and equipment prices and the cost of living in general remain high (stagflation) for rural households. These shocks have also tightened the already limited financial resources devoted to agricultural development and investments in human capital and agricultural research. Supply shocks delayed the growth in agricultural production, and their negative effects may persist for many years.

5.3 POOR INFRASTRUCTURE AND SERVICES AND LOW INVESTMENT

5.3.1 Infrastructure and services

Although, on the aggregate, the low level of productivity stands as the main cause of Africa's weak domestic supply responses, there are also cases where domestic production is high but does not reach consumers because of the lack of infrastructure, mainly roads, within a country or a region. Ndulu and O'Connell (2008b) stated that African trade and growth have been hampered by its remoteness: the continent is not well connected to the rest of the world, and even within the continent, cities, towns, and villages are often isolated from one another. This remoteness is mainly due to the lack or degradation of infrastructure, which constitutes a barrier to trade and weakens the supply response to rising food demand (Wanmali and Islam, 1997). The inefficiency is demonstrated by the fact that within many African countries, there are many areas with food production surpluses while other parts suffer from severe shortage. For instance, before 2000 and for many countries, especially those in Sub-Saharan Africa, only 17 percent or less of all roads are properly paved (See Table 20 before 2000). Degraded rural roads, insufficient and ill-equipped harbours, and deficient transportation equipment increase production and marketing costs that make local food products uncompetitive for both the domestic and export markets. Farmers are often forced to sell at low prices to the nearest buyers or be faced with the chance of losing their entire harvests, while food exporters struggle with the lack of appropriated storage facilities and many days of delay at ports.

As rural infrastructures are degraded and access to local markets remains difficult for farmers, wholesalers (collectors) and transporters often make wide marketing margins at the expense of farmers. Many agricultural markets have become oligopsonistic, where an increase in retail price (due for example to the reduction of price distortions) may not benefit producers. In this case, any increase in price will likely be retained by agents elsewhere in the marketing chain (middlemen, manufacturers, wholesalers or retailers). Food producers are often price takers, and when they perceive no benefit from a price increase, their incentive to increase production declines further.[4]

5.3.2 Lack of investment in food production

Besides the lack of resources to build infrastructure, lack of investment (financial and physical capital) has weakened domestic food production in developing countries, including those in Africa. Estimates of both the level and growth of public and private agricultural investments in Africa have remained low compared with those in the rest of the world (See Box 5). There has been a growing interest in

[2] See also Hulme (1996).
[3] See Drimie and Gandure (2005), and also Rugalema (2000).
[4] See Barrett and Mutambatsere (2008a).

agricultural investment from rich but agricultural resource-constrained countries that become increasingly aware of the need to have a secure and stable food supply (von Cramon-Taubadel *et al.*, 2009). (This will be elaborated in the policy chapter.) While the economy-wide implications of foreign agriculture investment remain subject to debate, it is widely accepted that the lack of investment in agriculture has prevented food growers from accessing essential inputs and equipment, and thus hampered food output growth.

5.4 INSTITUTIONAL DEFICIENCIES, INSECURITY, AND CONFLICTS

The courses of post-independence politics in Africa have been erratic and marked by numerous internal and even regional conflicts. These conflicts often arise because of rivalries for the control of resources (land, water, forest, minerals, and oils); the 'curse' of resource-rich countries, as some authors (Collier *et al.* 1999) called it, seems to hover over many parts of the continent and make these locations unstable and unsafe. As discussed earlier, these conflicts have affected productivity and production because the labour force has been displaced and the already weak input delivery and output distribution are brought to their knees. Worse, some infrastructure (roads, ports) needed for food production and distribution may be blocked or damaged. Likewise, during wars, livestock movement is limited or confined to areas where grassland is scarce. This implies that if regional and internal conflicts are resolved, an increase in production and productivity could emerge, as is the case in the once war-torn countries of Mozambique, Rwanda, and Uganda.

Institutional deficiencies, insecurity and conflicts in many African countries affect not only food production but also consumers' preference and choice as well. On the production side, Fulginiti, Perrin and Yu (2004) show that, in Sub-Saharan Africa's colonial heritage, lack of political freedom, conflicts, and war have had significant impact on agricultural production and productivity. On the consumption side, the absence or weakness of structures that protect consumers' rights and control the safety and quality of food circulated in the market in many African countries, including the richer ones, is widely known (Henson *et al.* 2000; FAO/WHO, 2003; Bagumire *et al.* 2009) has encouraged entry of cheaper foreign products whose sanitary quality are sometimes suspect (i.e., the dumping of expired or nearly expired products). These problems have certainly contributed to the food-trade deficit in many African countries.

As an example of the lack of institutions, marketing boards that bore some of the roles of market institutions have been abolished (often for good reasons), but there has been no replacement to fill in as an entity for trade and market surveillance. Chambers of Commerce or of Industry in many African countries often limit their activities to issues concerning large-scale farming, whose influence on the setting agenda far exceeds that of small-scale farming. Additionally, insurance markets for crops or livestock have remained difficult to implement and expand. Similarly, with the exception of a few countries (such as Ethiopia, Kenya, and South Africa), the majority of African countries do not have an operating platform for commodity exchanges. These institutional deficiencies have reduced the effectiveness of policy reforms and efforts to raise production and productivity.[5]

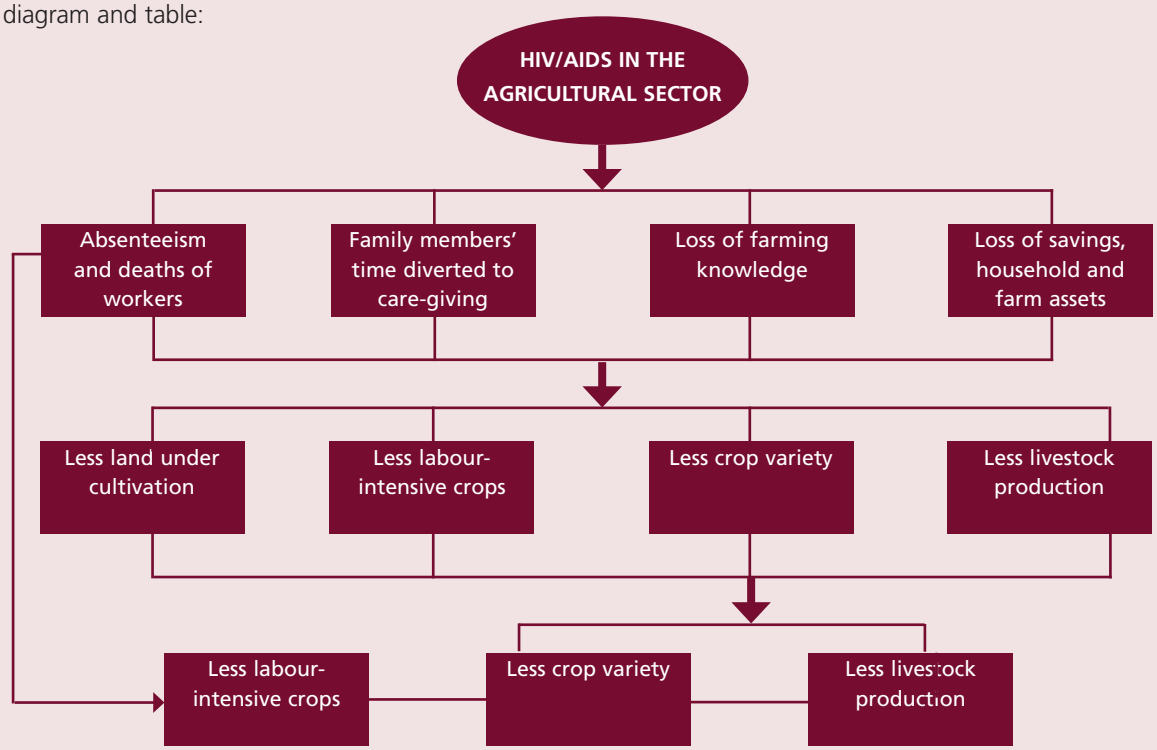
Fafchamps and Minten (2009) conclude that insecurity affects rural welfare in some African countries. Box 6 shows the high frequency of civil tensions in the majority of African countries. Instability and insecurity disrupt input delivery and output distribution and create uncertainties that reduce incentives to invest in and adopt new technology. Similarly, conflicts and especially wars displace workforce and livestock and disrupt production processes and productivity. The disruption of input deliveries and displacement or migration of workforce or livestock are abrupt and, in many cases, irreversible. Conflicts and wars also destroy the already degraded infrastructure, worsen food production and food distribution, and increase the dependency on food donations and imports.

Insecurity and instability are among the problems that have turned away both local and foreign investors. The consequences of the insecurity that starts in one country may easily spread to neighboring countries, leading to regional crisis affecting most agricultural producers in the region. Theft of crops and live animals is widespread in many parts of rural Africa and it dampens expectations and motivation of farmers.

[5] More analyses and discussions on agricultural reforms and institutions are found in Kherallah *et al.* (2002), Barrett and Mutambatsere (2008a, 2008b), and Kopperschmidt and Matutes (1997).

Box 4. The effects of HIV on agricultural production and productivity

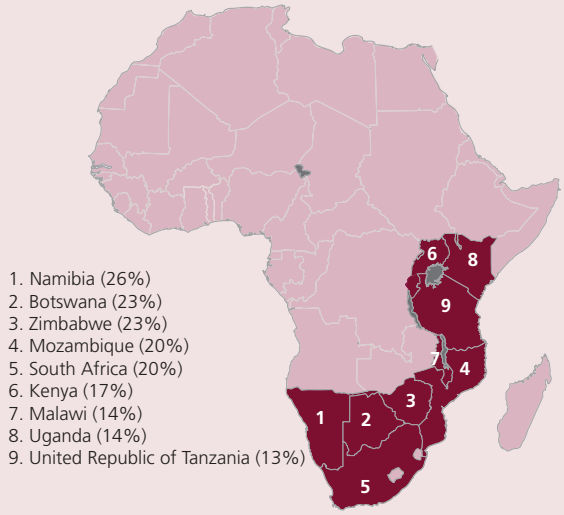
HIV/AIDS affects agricultural production in a number of ways. Cash income and labour are partly diverted to cope with and/or compensate for the effect of HIV/AIDS, shrinking the level of workforce available for farm and off-farm activities as well as reducing the amount of money available to the households. The consequences for food crop production include (i) the reduction in land use, which is mainly due to the limited ability of family members to work on the fields, as well as the rigidities of land inheritance and tenure systems; (ii) the decline in crop yields due to the shortage of human and financial resources for activities such as long-term soil conservation or control and coping mechanisms for pests and crop diseases; and (iii) the decline in the variety of crops grown, represented by a switch from crops that are labour demanding to those that are easy to plant and maintain. Similarly, there have been studies illustrating the negative impact of HIV in the form of gaps in the informal transmission mechanisms of agricultural knowledge and managements skills (Halswimmer, 1994). The complex of effects of HIV/AIDS on the agricultural sector and within the rural communities are illustrated in the following diagram and table:



Source: United Nations, Department of Economic and Social Affairs, Population Division

PROJECTED LOSS IN AGRICULTURAL LABOUR FORCE THROUGH AIDS IN THE NINE HARDEST HIT AFRICAN COUNTRIES, 1985-2020

FAO has projected that by 2020 HIV will have claimed the lives of one-fifth or more of all those working in agriculture in many southern African countries, severely affecting household capacity to produce and buy food. Slater and Wiggins (2005) provide illustrative paths through which HIV/AIDS affects the agricultural households.



Source: http://www.fao.org/hivaids/

Box 5. Estimates of gross capital formation in agriculture

Agricultural investment in Africa has not followed the increasing trend of other regions such as Latin America and the Caribbean or Asia, as the table below shows. In 1980, Africa's gross capital formation in agriculture was more or less comparable with those of the other two regions, but since then Africa has failed to keep up with the others. For instance, between 1980 and 2007, Asia's gross capital formation in agriculture went from three to eight times higher than that of Africa.

After 2005, estimated figures on gross capital formation in agriculture for all of Africa show a tendency towards an increase in agricultural investment, although this trend is not shared by all the African regions. The share of agriculture in total gross capital formation remains among the highest worldwide, but this is attributed to Africa's low level of total gross capital formation. These figures are only estimates based on a small number of countries and need be interpreted cautiously.

UNCTAD data on Foreign Direct Investment in agriculture below show that Africa's shares in flows and stocks have been far lower than those of other developing regions.

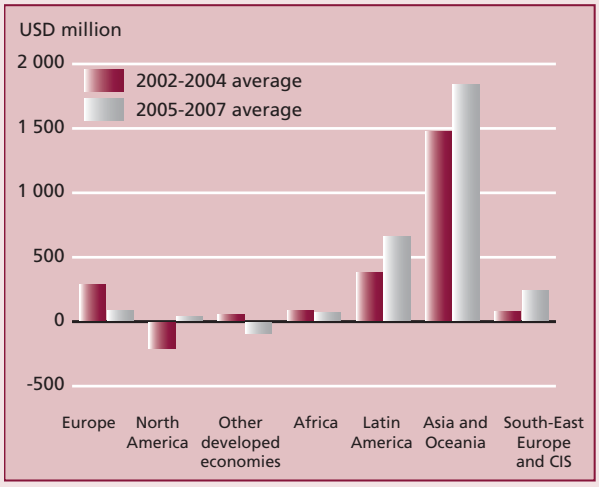
ESTIMATED GROSS CAPITAL FORMATION IN AGRICULTURE*, 1980-2007 (MILLIONS OF USD AND PERCENTAGE SHARE IN TOTAL)

Region	Value (USD million)						Share in total gross capital formation (%)					
	1980	1990	1995	2000	2005	2007	1980	1990	1995	2000	2005	2007
World	**215 585.6**	**272 894.8**	**279 923.8**	**255 830.7**	**386 403.3**	**525 413.0**	**7.5**	**5.5**	**4.4**	**3.7**	**4.0**	**4.4**
Developed economies	77 677.0	112 885.7	112 177.9	97 233.8	122 049.5	145 681.1	3.9	2.9	2.3	1.9	1.8	1.9
Developing economies	104 336.1	115 161.8	155 359.5	150 929.7	248 042.7	354 478.2	16.8	14.0	11.5	9.8	9.2	9.3
Africa	**20 117.1**	**15 870.5**	**14 004.9**	**14 317.8**	**22 336.6**	**34 617.8**	**18.5**	**17.3**	**14.2**	**14.1**	**12.9**	**13.9**
N. Africa	4 757.1	6 115.4	5 375.6	5 836.2	7 525.8	11 754.8	12.1	15.1	11.7	11.8	10.3	11.6
W. Africa	10 119.6	3 317.9	2 711.5	2 697.2	5 732.2	10 157.4	30.2	31.8	31.5	27.6	30.6	31.5
Centr. Africa	1 260.3	1 458.0	1 177.8	1 058.1	1 899.6	2 589.3	22.0	24.6	25.7	20.5	16.4	15.7
E. Africa	1 751.2	2 796.1	2 512.9	3 030.8	4 654.8	6 630.7	37.3	40.7	36.2	34.4	33.1	32.0
S. Africa	2 228.9	2 183.1	2 227.3	1 695.5	2 524.2	3 485.6	8.7	7.8	6.9	5.9	4.6	4.5
LAC	**16 573.1**	**21 636.0**	**23 386.3**	**21 530.4**	**28 145.2**	**44 837.9**	**8.5**	**9.6**	**6.9**	**5.5**	**5.8**	**6.2**
S. America	10 600.1	15 683.6	18 669.2	13 771.3	19 390.0	33 620.3	8.4	10.1	7.0	6.1	6.7	7.1
Centr. America	4 850.0	4 432.5	3 839.7	6 663.3	7 620.6	9 767.7	8.9	8.5	6.8	4.8	4.6	4.6
Caribbean	1 122.9	1 520.0	877.5	1 095.7	1 134.6	1 449.9	8.8	7.8	4.6	3.8	3.3	3.4
Asia	**67 272.5**	**77 235.1**	**117 414.2**	**114 662.8**	**197 028.2**	**274 435.0**	**21.2**	**15.3**	**13.0**	**11.0**	**9.8**	**9.7**
West Asia	4 332.2	8 903.2	10 408.8	10 075.9	12 414.4	19 378.2	6.3	11.6	10.3	8.5	5.8	5.8
South, East and S.E. Asia	62 940.3	68 331.9	107 005.3	104 586.9	184 613.7	255 056.8	25.2	16.0	13.3	11.4	10.2	10.2
Oceania	373.4	420.1	554.1	418.8	532.7	587.5	20.1	15.4	16.3	14.7	10.8	10.1
S.E. Europe & the CIS	**33 572.5**	**44 847.3**	**12 386.4**	**7 667.1**	**10 311.2**	**25 253.7**	**11.4**	**19.0**	**10.5**	**10.6**	**7.4**	**6.2**
S.E. Europe	3 109.4	2 038.8	1 478.3	1 269.1	2 556.9	3 517.3	13.6	17.2	18.8	14.9	10.5	10.3
CIS	30 463.1	42 808.5	10 908.1	6 398.0	13 754.3	21 736.3	11.2	19.1	9.9	10.0	7.1	5.8

Source: UNCTAD, 2009, World Investment Report: Transnational Corporations Agricultural Production and development

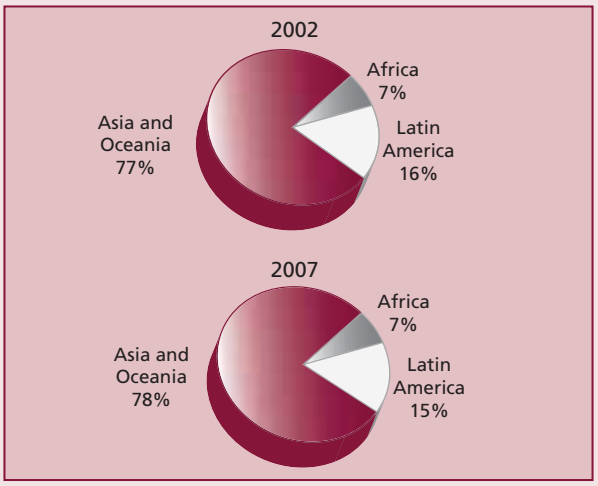
* Agriculture, hunting, forestry and fishing. Note: Gross capital formation (GCF) data are available for 10-30 countries only, which account for 13% 18% of total GCP. For other countries, the share of agriculture, hunting, forestry and fishing in value added was applied to total GCF to estimate GCF in agriculure.

INWARD FDI FLOWS IN AGRICULTURE BY REGION



Source: UNCTAD, 2009

INWARD FDI STOCK IN AGRICULTURE BY DEVELOPING REGION



Source: UNCTAD, 2009

More recent estimations (UNCTAD's 2009 World Investment Report) show that after the recent economic crisis and the corresponding switch of FDI recipient from developed to developing countries, Africa's inflows rose to a record level, with the fastest increase in West Africa (a 63 percent rise over 2007). In 2008, FDI inflows into Africa reached USD 88 billion, with the recipients being countries with abundant natural resources.

Box 6. Indicators of the frequency of civil tensions

	1996	1997	1998	1999	2000	2001	2002	2003	2004	20085	2006	2007	2008
Northern Africa													
Algeria	29.6	30.2	30.3	33.4	29.9	35.6	16	2.5	15.4	5.8	0.3	7.4	11
Egypt	5.7	10.1	0	0.2	1.9	1.8	0.5	1.4	1.7	3.3	1.7	0.1	6.3
Libya	…	…	…	…	…	…	…	…	…	…	…	0	0.2
Morocco	2.9	0.4	0.5	0.1	0.1	0	0	0	0.9	0.5	0	1.3	1.8
Sudan	…	…	…	…	…	…	…	…	…	…	…	…	8.8
Tunisia	0	0	0.1	0.6	0.1	0	0.7	0.6	0	0.7	0	0	0.7
Eastern Africa													
Burundi	…	…	…	…	…	…	…	…	…	…	…	…	2.1
Comoros													
Djibouti	…	…	…	…	…	…	…	…	…	…	…	…	0.7
Eritrea													
Ethiopia	11.8	3	0.4	6.2	1.4	2.1	10.6	3.8	6.5	3.3	1.7	2.7	3.2
Kenya	2.5	6.4	8.5	0	0	1.9	0.5	1.7	1.1	2.8	1.4	16	9.8
Madagascar	…	…	…	…	…	…	…	…	1.7	2.2	1.2	1.8	0
Malawi	…	…	…	…	…	…	…	…	…	1.4	1.4	0.7	0
Mauritius	0	0	0	1.3	0	0	0	0	0.5	0.2	0	0	0
Mozambique	8.4	0	0	0.7	1.7	0	0	1.1	1	0.2	0	0.5	1
Rwanda	…	…	…	…	…	…	…	…	0	0	0.1	0	0.9
Seychelles	…	…	…	…	…	…	…	…	…	…	…	…	0
Somalia													
Tanzania	1.2	0.5	0.2	0	0	1.5	0	0.1	0.1	1.3	0	0.5	0.1
Uganda	19.5	3.8	2.6	2.4	0	6	3.6	4.3	9.8	2.2	1.9	5.3	1.7
Zambia	1.2	1.1	1.2	0.9	0.1	4.4	0.3	1.4	0.5	0.5	0.7	2	0.5
Zimbabwe	2.1	2.2	2.8	1.3	4.2	3.2	4.1	1.2	0.9	1.1	1	6.4	8.3
Middle Africa													
Angola	…	…	…	…	…	…	…	…	10.1	0.7	0.5	0	0.2
Cameroon	5.8	11.3	0.3	0.4	0.6	0.2	0.1	0.2	0.5	0.8	0.9	0	1.6
Central African Republic	…	…	…	…	…	…	…	…	…	…	…	…	2.9
Chad	1.1	1.4	0.6	5	6.7	4.1	2.6	4	1	2.8	9.4	4	3.5
Congo	…	…	…	…	…	…	…	…	0.5	0.5	0.2	0.1	0
Congo Dem. Rep.	…	…	…	…	…	…	…	…	5.4	4.7	7.8	7	8.6
Equatorial Guinea	0.5	0	0.5	0	0	0	0	0.2	0.3	0	0	0	0
Gabon	2.3	0.2	0.6	0.2	0	0	0.4	0	0.1	1.1	0.6	0.8	0.5
Sao Tome and Principe													
Western Africa													
Benin	…	…	…	…	…	…	…	…	0.7	0	0.2	0	0
Burkina Faso	0	0.8	0.3	0.6	2.4	0.6	0.6	0	0.5	0.2	0.5	0.1	1.3
Cape Verde	…	…	…	…	…	…	…	…	…	…	…	0	0
Côte d'Ivoire	4	0.9	0.8	5.3	6.9	0.7	3.4	4.7	6.3	4.7	4.6	2	1.7
Gambia	…	…	…	…	…	…	…	…	…	…	…	…	0
Ghana	1.2	0	0.1	1.1	0.5	1	1	0.3	0.5	0	0	0	0.7
Guinea	…	…	…	…	…	…	…	…	…	…	…	…	1.6
Guinea-Bissau													
Liberia	…	…	…	…	…	…	…	…	…	…	…	2.2	0.7
Mali	0.8	3.4	0.3	2.2	0	0	0	0.1	0.1	0.6	0.5	1.7	3.1
Mauritania	…	…	…	…	…	…	…	…	…	…	…	…	3.6
Niger	…	…	…	…	…	…	…	…	1.4	0.9	0.3	4.2	5.7
Nigeria	7.3	12.8	2.5	11.8	6.6	9.9	4.8	2.6	7.6	1	5.4	6.8	9.9
Senegal	0.1	4.9	0.7	1.4	1.4	1.2	1.9	1.7	2.3	1.2	1.1	1.6	0.8
Sierra Leone	…	…	…	…	…	…	…	…	…	…	…	…	0.1
Togo	…	…	…	…	…	…	…	…	…	…	…	…	0
Southern Africa													
Botswana	0	0	0	0	0	0	0	0	0	0	0	0	0
Lesotho	…	…	…	…	…	…	…	…	…	…	…	…	0
Namibia	0.9	0	0	1.9	1	0	0	0	0	0	0	0	0
South Africa	21.2	10.1	4.9	9.3	4.7	0.6	0.8	0.3	2.7	0.8	2.2	4.7	5
Swaziland	…	…	…	…	…	…	…	…	…	…	…	…	0

Source: OECD African Economic Outlook 2009, Statistical Annex

Note: The civil tension indicator is a weighted average of the values of 5 individual indicators (number of strikes, number of dead, number of injuries, number of demonstrations, and coups d'état and attempts) which take values between 0 (=non-occurrence) and 3. Calculations are based on information taken from the weekly newspapers

6 The roles of economic and agricultural policies in Africa agricultural and food trade

So far, this report has discussed some of the direct and somewhat technical explanations of the weak supply responses from the domestic market side and has focused on issues such as the lack of access to technology and inputs (e.g. financial, physical, and human capital; land; fertilizer; and energy) and weak market and trade institutions. But the reasons why these technical problems occur often stem from the countries' economic and agricultural policies (Frisvold and Ingram, 1995). At minimum, the coincidence of the period of lack of economic progress and the period of poor productivity growth invites further explorations about the role that current and past policies play in shaping Africa's food production and trade. If for instance available technology has not been much used, it is no exaggeration to claim that it is because farmers have not been trained enough as a country's general policy has not allotted enough resources to the reinforcement of agricultural research and extension. Similarly, production and export taxes may have discouraged farmers from adopting new technology and increasing production. It is therefore important to review the roles of economic and agricultural policies in explaining not only the low level of productivity but also the reasons for persistent food-trade deficits in many low-income countries in Africa.

Moreover, the literature focusing on the influence of food policies (and generally of economic policies) on food trade abounds, but the debate on what policies are held more responsible for decreases in productivity remains inconclusive. As an example, although it is known that distortions originating from both domestic and foreign agricultural policies have affected Africa's food trade, the extent of their impact remains unclear. Authors are divided on which policies play the largest roles, as both sides of the arguments vie for the most compelling evidence. Addressing these questions is important in shaping the arguments for the priority of actions needed to deal with the negative impacts of the policies. This chapter starts with outlines of the features of economic growth and the major policy trends in Africa since the 1960s, and ends with some thoughts about the challenges ahead and policy choices.

6.1 AFRICAN GROWTH CHARACTERISTICS

A comprehensive study (Ndulu *et al.*, 2008a, 2008b) of Africa's economic growth from 1960-2000 reveals a number of growth characteristics as, partially, the results of the main economic policies implemented (including agricultural and food policies). These characteristics show that what happened in the agricultural sector is often an image of the country's economy. These characteristics provide some explanations of how Africa has switched from being a net food exporter before the early 1970s to a net food importer afterwards. In addition to the slow productivity growth and diversity in the growth rate, the other major characteristics of economic growth in Africa are summarized below.

Divergence and slow capital accumulation

In comparison with industrialized countries, African countries, like many in Asia and Latin America, were less developed in the 1960s. Africa's economies were even slightly better than many countries in the developing world at that time and were expected to achieve a high growth rate to catch up with and 'converge' towards the growth and prosperity enjoyed in Europe and North America. More than four decades later, many Asian and some Latin American countries have caught up

while Africa remains behind (Collier and Gunning, 1999). The sluggish economic growth entails low productivity in many sectors including agriculture. This can be traced back to the failure of the overall economic policies underlying the lack of growth and development in many African countries.

Likewise, low capital (physical, financial, and human) accumulation is among the main features of the African economy. This is spurred by the lack of clear investment policies and a failure to exploit the comparative advantages of the continent and attract the needed investment. Major infrastructure, for instance, remains degraded, and this situation increases transaction costs and discourages incentives to expand profits.

No structural transformation in a volatile growth

The African economies remain less industrialized than those in the rest of the world. An example is the structure of exports, which are still mainly based on low-skill and low-technology products. In mining as in agriculture, for instance, crude and raw products are exported instead of the processed forms. This failure to achieve a structural transformation is linked to tariff escalation as well as various policies, including a lack of investment in human capital, lack of openness, and of the will to take down trade barriers. Similarly, the reliance on a limited range of export commodities whose prices are highly volatile has, unsurprisingly, made economic growth in many African countries volatile (Fosu, 1992). The growth volatility is exacerbated by various internal shocks (war, conflicts, natural disasters, and diseases) and often by erratic domestic policies between the shocks.

6.2 THE EVOLUTION OF AFRICA'S ECONOMIC AND AGRICULTURAL POLICIES

6.2.1 Anti-production and anti-trade biases in the post-independence era

Economic policies in post-independence Africa have been guided by protection of urban consumers at the expense of poor producers (Croser and Anderson, 2010). This was mostly done through high production and export taxes, which are either still applied or temporarily reinstated to this day. Marketing boards were created to control the domestic price and import of food grains and some key export commodities such as coffee, edible oil, spices, and sugar. The first decade of the post-independence era coincided with a decade of a relatively sustained growth in agricultural productivity and strong domestic production for many African countries. This is attributed in part to guaranteed non-reciprocal preferential access to markets of former colonial powers and also to a relatively high consumer (especially urban consumer) demand boosted by positive economic growth in the newly independent African states.

With the start of the import substitution period in the late 1960s (or mid-1970s for some countries), driven by the attempt to tread a fast industrialization path to reach self sufficiency, many African countries reinforced market controls on many sectors, including the food and agricultural sectors. They also established high protection (in favour of the 'infant' industries) and export restrictions that led some authors to name this period as Africa's most 'anti-trade' period. Severe state interventions along the production and marketing chains, including the input delivery system, were imposed. Unsurprisingly, the policy shift contributed to or at least coincided with the start of the decline of productivity growth, especially in agricultural and food production, and ironically led to an increase in the food-trade deficit (despite the aim to reduce dependence on imports) because exports were also sanctioned.

The hurdle in the import substitution policy was that the poor quality of essential inputs including managerial and production skills did not match the considerable amount of agro-industrial investment. Even worse, the launch of this policy was untimely, as it was hampered by the low demand in both local and international markets, which had been badly battered by the first oil shocks of the 1970s. As a result, the import substitution policy utterly failed. For the food sector, some authors (e.g. Balassa, 1971), while not faulting the idea that Africa needs to retain value-added from processing its raw products, associate this failure with the disconnect between the already taxed and weakened local agricultural production and the high demand for raw materials for the newly built food processors. The blame also was put on the unforeseen but considerable distortions of resources that it created (Burton, 1989). For many African countries, the lack of economic growth triggered by this anti-trade period persisted for many years afterwards.

6.2.2 The structural adjustment era

Since the early 1980s, some African countries starting to realize that the import substitution policies were failing, have gone through a series of macroeconomic reforms that include the Structural Adjustment Programs, with varying degrees of implementation among countries. These programs consisted of providing aid packages and mainly aimed at reducing fiscal deficit, encouraging output and export growth, and alleviating poverty. Because of the importance of agriculture in the economy of many African countries, the agricultural sector has been highly affected by these reforms. The drastic changes include privatization of state-owned farms and food manufacturing and the gradual dismantling of marketing boards for many key commodities. New exchange-rate policies, especially the devaluation or depreciation of the highly overvalued currencies, were implemented and aimed at encouraging exports. Similarly, the liberalization of input markets was designed to spur competition and eventually to lower input prices. However, despite these policies, the food-trade deficit increases and productivity continues to languish, indicating at the least that even if these policies yield some advantages, they have not succeeded in reversing Africa's food-import dependency. This mixed result has become a source of debate regarding how effectively the adjustment programs in the 1980s improved food production and trade in Africa.[1]

Authors differ in their assessments of the effects of these reforms. Some (e.g. Sahn *et al.*, 1996) found that these reforms were overall necessary and beneficial, especially for the poor urban consumers and food farmers. For instance, devaluation of the overvalued currency has slowly raised the competitiveness of some agricultural exports. Moreover, the reduction of import barriers led to relatively cheaper food prices for consumers, while reduction of state control on agricultural prices lifted farm prices. However, others, (e.g. Schatz, 1994; Mkandawire and Soludo, 2002) were far more critical of the reforms. For instance, the currency devaluation in many African countries aimed at boosting agricultural export revenues has also increased the costs of imported inputs and equipment, especially for agricultural and food production. Moreover, under the fiscal reforms, subsidies (mainly of inputs) to farmers were abruptly cancelled with dire consequences for poor food producers. Similarly, the volatility and uncertainty generated by these reforms (especially by exchange rate policies and trade liberalization) introduced yet a new source of risk for farmers to manage (Collier *et al.*, 2000). But the strongest criticisms of these reforms are centred around their speed and timing and the conditions attached to the reforms, which some see as damaging to the welfare of the poorest Africans (Mosley, 1996). Nevertheless, both sides of the arguments admit that the impacts are different across countries and depend on the degree of implementation of the reforms (Oyejide, 2002).

6.2.3 The trade liberalization era

Africa and the multilateral trade negotiations

The emphasis on openness as one of the tools to promote economic growth and reduce poverty started under the Structural Adjustment program, but it picked up steam in the mid-1990s after the Uruguay Round. Although there are still many trade barriers in place, this period has seen the undoing of some of the 'anti-trade' policies in many African economies. Many developing countries in Africa have conducted (or at least been committed to) a reduction in their trade barriers. For agricultural products, the Agreement on Agriculture in this era has been seen also as a start of the reversal of their past 'anti-agricultural' bias. African countries started to realize that for their agricultural production to be competitive, they have to stop taxing it. Many countries in Africa have lifted taxation, provided some subsidies to their agricultural production, and in some cases reduced their own protection. However, some policies such as export bans are often called back up during food-shortage crises. Anderson *et al.* (2010) show this policy reversal through a level-of-protection index. However, the increased openness has not yet erased the food-trade deficit of the

[1] One of many widely discussed policies has been input subsidies. There are ample examples of African countries where inputs (especially fertilizers) were subsidized in the first decade of the post-independence era and where productivity and production increased. There are currently, however, strong debates on whether these subsidies are financially sustainable and on the difficulty of targeting the subsidies to the needy. If the goal of these subsidies has been to boost African agriculture not only to climb but also to stay in a higher production path, the risk of both production and productivity falling back once the programme is suspended remains real.

continent as a whole. Some authors blame the food dependency under openness on the lack of competitiveness of African agriculture, whereas others point to unfair trade rules and policies in the developed countries. This latter, namely the developed countries policies' contribution to food-import dependency in Africa, will be discussed later in section 6.3.

There is active debate as to whether intervention through trade policy provides an appropriate way of promoting agriculture's contribution to food security and economic growth via improvements in food staples productivity, or whether such policies actually suppress growth and poverty reduction efforts both through their direct impact on food prices and by preventing appropriate resource reallocation. Although it is widely agreed that productivity levels in food staples production in poorer developing countries need to increase and it is recognized that governments will need to assist in the alleviation of constraints, there has been little consensus on the trade policy interventions that could support such an increase in productivity levels. It is recognized that trade policy should not be used as the main instrument to "correct" market failures that are preventing productivity increases in agricultural production and/or investment into higher value activities. However, for a defined period during which state interventions to promote productivity enhancing investments are being made, some level of border protection may be required for producers to be able to react positively to the incentives created by such interventions.

A key difficulty with the current trade policy debate is that recent arguments in support of further liberalization have tended to be based on analytical studies which either fail to recognize, or are unable to incorporate insights from the agricultural development literature. As an example, a well established insight is that agricultural producers in many developing countries face widespread market failures which can significantly reduce their ability to generate investible surpluses from agricultural production, and to use these surpluses to facilitate diversification into higher value activities.

The process of agricultural commercialization and the associated diversification into higher value added activities in cases of successful agriculture-led growth has been observed to require significant government intervention at early stages of development to alleviate the pervasive nature of market failures which are reflected in weak input and output markets, lack of seasonal financing, and limited availability of risk management instruments. These, combined with the weak producer risk-bearing capacity if let unaddressed can threaten the success of the process.

However, whilst experience from episodes of agricultural growth suggests that government intervention is likely to be critical, there is still an unresolved question as to whether a less than liberal trade policy should be a component part of such intervention. The question therefore becomes one of when, rather than if countries should open their agriculture sectors to greater competition.

The long term objective of a more liberal agricultural trade policy regime is not questioned. But this is because in the long run, markets (input, credit, output, including adequate risk management instruments) are expected to function adequately, thus not necessitating government interventions over and above regulatory controls. In the absence of such well functioning markets, and in conjunction with other targeted state interventions, a less than liberal trade policy regime may have a role to play in countries with underdeveloped agriculture sectors, much as it did in the now more advanced economies when they were at earlier stages of development. When markets function adequately, it may then be appropriate to liberalize agricultural trade policy to release further agricultural growth potential. Many arguments for, or against, further trade liberalization essentially come down to the issue of sequencing.

In circumstances where the agriculture sector is still to play out its potential growth enhancing role, some forms of border protection might therefore have an important role to play in complementing policies to assist the expansion of agricultural trade. This can be done in two broad ways:

First, by providing a more stable and remunerative investment environment for import competing commodity sectors in which the country does not necessarily presently hold a comparative advantage, and which could contract in the face of greater import competition, but which are critical to the development of agricultural and wider rural growth, and could become competitive in the medium run. Providing a better investment environment could

promote the levels of investment in productivity-enhancing technologies, generating surpluses and in turn enhancing international competitiveness, or allowing the diversification of resources into more "competitive" sectors. This is a prima facie case argument for a moderate level of protection (for example, through special product provisions) while such improvements in productivity are being achieved and provides the rationale for "special product" provisions, for example.

Second, by preventing short term disruption to domestic sectors which may otherwise be competitive, but which by virtue of susceptibility to risk in conjunction with limited access to risk management instruments and safety nets, could suffer from exposure to low-cost, often subsidized, imports and associated price instability. This provides the rationale for a variable level of border protection (e.g. through access to a "Special Safeguard Mechanism").

Proliferation of regional trade agreements

The recent evolution in African trade policy, following the embrace of trade openness, has been marked by the proliferation of trade agreements. These trade agreements were motivated by the needs to formalize trade arising from geographical proximity and especially to engage in more negotiations that could improve trade partners' national welfare. Besides their bilateral agreements with different nations from within or outside the continent, the majority of African countries are now engaged in at least three different formal trade agreements: the WTO multilateral agreement, regional trade agreements, and preferential trade agreements mainly with the EU. Forty two African countries[2] (out of 53) have joined the WTO, and since the Uruguay Round Agreement on Agriculture in 1995, they have made various commitments to liberalize their agricultural trade, especially to lower tariffs and eliminate other import restrictions. Also, Africa now counts as many as twelve official regional trading arrangements (RTAs), with several countries subscribing to multiple RTA memberships (Koroma *et al.* 2009).[3]

In addition to being members of WTO and RTA's, many African countries, shortly after their independence from colonial rule, have been given some preferential access to European markets for some commodities such as sugar, banana, and fish. Agreements such as the Lomé Convention, Cotonou accord, and recently the new Economic Partnership Agreements (EPA) have offered such preferential access, although the terms of reference have converged toward full reciprocity to both parties.

For many African countries, however, there have always been conflicts between their domestic agendas and international trade commitments. For instance, despite the commitment to liberalize trade, government policies such as export bans, subsidies, or high tariffs are still widely used. These inconsistencies often arise from the countries' reluctance to forego tax revenues and the wish to protect some key stakeholders (consumers or producers). There are also sometimes conflicts arising among their commitments under various trade agreements, as for example agreeing to different and incompatible product sanitary standards. These inconsistencies may confuse decision making along the food production and marketing chains and affect the flow of food production and trade. Yet another drawback is that while the preferential trade agreements provide market opportunity, they may also lock input resources into the production and export of the few commodities selected in the agreement at the expense of the production and export of other promising agricultural and food products.

[2] The countries are: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, The United Rep. of Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe

[3] The twelve RTAs are the Arab Maghreb Union (AMU); Economic and Monetary Community of Central Africa (CEMAC); Common Market for Eastern and Southern Africa (COMESA); East African Community (EAC); Economic Community of Central African States (ECCAS); Economic Community of West African States (ECOWAS); Southern Africa Development Community (SADC); South African Customs Union (SACU); West African Economic and Monetary Union (WAEMU); Permanent Inter-State Committee for Drought Control in the Sahel (CILSS); Inter-Government Authority on Development (IGAD); and Mano River Union (MRU).

6.3 FOREIGN AGRICULTURAL POLICIES

6.3.1 Heavy production and export subsidies and high protection

The evidence of the effects of the distortions, caused by developed countries' heavy farm and export subsidies and high protection (tariff escalation) for various food commodities, are discussed in various studies (e.g. Tangerman, 1989; Wailes, 2004; Anderson and Masters 2009; and Anderson *et al.*, 2010). There is a consensus among analysts that the extent to which these policies had weakened the domestic sector can been seen in the inability of agricultural production to tackle the high level of rural poverty in Sub-Saharan Africa.

High level of subsidies and dumping

The high levels of subsidies from the OECD countries in many years and for main food products such as grains, sugar, oil, and livestock products, have been keeping the international prices of these commodities below their free-trade levels.[4] Between 1986 and 2007, the average annual OECD support (the producer support estimate or PSE) was about 31 percent of total value of their production. In 2007 PSE estimates for OECD countries were estimated at USD 256 billions of which USD 18, 19 and 20 billion were allocated as single commodity transfers for rice, beef and veal, and milk respectively. In addition to the large subsidies, the dumping of agricultural products such as the surpluses in grains and poultry meat from developed countries has depressed market prices. The immediate effect of depressed farm price is that it encourages surges in food imports (FAO 2005) and discourages the expansion of domestic production. OECD subsidies on non-food products like cotton have stripped some African farmers their ability to increase their incomes and access to food.

High protection barriers

At global market level, average agricultural commodity tariffs (applied MFN) have always been high, lowering farm prices and food export revenues especially in developing countries. Food products such as grains, livestock products and sugar and sweeteners are the most protected by high tariffs. For instance, the maximum EU applied tariff on dairy products reached beyond 160 percent and the average was 50 percent in 2007 (WTO, 2010). It is important to note however that tariffs and protection are high under both the trade between poor and richer countries (North-South trade) and the trade among developing countries (the South-South trade). For instance, in 2007-2008 the average applied MFN tariff that Kenya's agricultural products faced was low at about 15 percent at the EU borders compared with 22 percent at the Ugandan border.

Moreover, tariff escalation in the international market limits developing countries' market access and discourages the food sector in Africa from exporting processed food (Tangermann, 1989). Processed food such as meat or grain products faces higher tariffs than live animals or husked grain.[5] Tariff escalation has reduced Africa's opportunity to diversify food exports while making export revenue vulnerable to raw commodity price shocks. It represents also a loss of value addition that could have been captured by the domestic food sector and other sectors.

Non-tariff barriers are another form of protection and refer primarily to quotas and quantitative restrictions; customs and administrative procedures; sanitary and phytosanitary (SPS) measures; technical barriers to trade (e.g. technical standards, testing and certification, labeling and packaging requirements); as well as anti-dumping duties and other so-called "trade remedies". Non-tariff barriers based on regulations and standards such as some of the SPS requirements along with import licensing have imposed high cost of compliance, impeded food export and discouraged food production in developing countries. Disdier *et al.* (2008) showed that SPS and Technical Barriers to Trade (TBT) are prominent in the OECD agricultural sector and negatively influence total OECD imports and that SPS and TBT significantly reduce developing countries', including African countries' exports. These export barriers penalize the domestic food sector by limiting its ability to expand food production and food export.

[4] See also Annex 8 for a comparison of the levels of assistance on rice.

[5] For specific figures on tariff escalation worldwide, see page 13 in Gibson *et al*. (2001).

Reducing these subsidies and trade protections is the object of WTO negotiations that started with the Uruguay Round Agreement on Agriculture. It has been a wide consensus that among other negotiating issues, tariff liberalization would be the one that would produce the greatest effects on Africa's food trade balance. There has been indeed some slow but noticeable reversal of these policies following past and on-going trade negotiations (Anderson and Masters, 2009; Swinnen, 2009), but the effects of the policy reversal seem to be rather limited.

6.3.2 Preferential trade

Some African countries especially those in Sub-Saharan Africa face lower barriers under the Generalized System of Preference (GSP), the Lomé and then Cotonou Agreement (for Africa Caribbean and Pacific or ACP countries), the African Growth and Opportunity Act (AGOA) and the Everything but Arms (EBA). These non-reciprocal preferential agreements are granted by developed countries such as the EU, the US and Japan and provide market opportunities for food and agricultural exports. However, Brenton and Ikezuki (2004) show that from these non-reciprocal preferences only a very small number of beneficiaries receive substantial transfers and that for many countries in sub-Saharan Africa the value of preferences represents only a small proportion of the value of exports.

More recently, the Economic Partnership Agreements, under the Cotonou Agreement, is a new framework and preferential agreement between the EU and ACP countries which aims to be reciprocal but compatible with the WTO rules. Although the increased and guaranteed access ensure food export revenues, there have been concerns that a removal of the tariffs facing EU exports to Africa would divert trade away from within the ACP group and undermine the already fragile regional integration process in Africa.

Preferential trade agreements may in some cases generate inconsistencies between domestic agendas and the trade commitments under the preferential agreements that may, affect the flow of food production and trade; the reciprocity aspect may worsen the ability to import food because of the government's further losses of revenues from the removal of trade taxes. Moreover, preferential trade agreements may, as stated in the previous subsection, continue to lock input resources into the production and export of the few commodities selected in the preferential agreement at the expense of the production and export of other promising agricultural and food products.

6.3.3 Food aid policies

Food aid plays an important role in Africa's food market and trade and both the food aid policies of the donors and those of the recipients shape the rationale and impact of food aid on food consumption and food trade. Table 21 summarizes the amount of food aid African countries received and highlights Africa's share of the food aid distributed worldwide, especially in cereals and pulses, although the amount of food aid varies over the years. Nunn and Qian (2011) found that the amount of food aid that Africa received from large donors (US or EU) is correlated with the level of surpluses in the donor countries and facilitated by their colonial ties. They also found that a typical food aid response is correlated with production shortfalls happening two years before but that donors continue to give food regardless of the change in production in the recipient countries (i.e. regardless of whether the recipient still needs the food aid or not) when the donors have food surplus.

It is not surprising then that the effects of food aid, beyond saving the lives of the poor and vulnerable, are still much debated. Some authors (e.g. Donovan *et al.*, 1999) argue that while food aid provides emergency assistance, it may also make countries dependent by distorting domestic market prices. By competing directly with local production, food aid may depress local food prices, and hence discourage domestic food production in food deficit areas. Conversely, the purchase of food grains in surplus areas by food aid agencies may shore up price and draw resources away from other rural activities; such high prices can be encouraging for the producers in the surplus areas, but only as long as the food-aid program continues. Others (e.g. Abdulai *et al.*, 2005) argue that one of the positive effects of food aid is that it has provided basic nutrients and energy to the otherwise weak and undernourished workforce and thus has made the workforce more productive, thereby boosting rural activities like food production. The debate about the effects

TABLE 21. FOOD AID TO AFRICA FOR SELECTED COMMODITIES

Commodities/ Commodity Groups	Country groups	2000	2001	2002	2003	2004	2005	2006
Total cereals (tonnes)	**World**	**8 820 582**	**7 371 853**	**8 361 725**	**6 697 146**	**5 878 913**	**5 385 533**	**3 815 554**
	Africa	**3 475 523**	**2 090 858**	**3 659 186**	**3 312 917**	**2 914 058**	**3 068 815**	**2 239 026**
	Eastern Africa	2 266 794	1 336 411	2 633 193	2 266 916	1 593 255	1 791 458	1 235 682
	Central Africa	317 647	278 565	311 138	303 270	197 722	197 115	166 594
	Northern Africa	511 174	158 620	173 113	212 420	658 459	575 581	460 174
	Southern Africa	3 495	7 099	117 721	111 566	14 191	30 776	11 475
	Western Africa	376 413	310 163	424 021	418 745	450 431	473 885	365 101
	Africa as a % of World	39.4	28.4	43.8	49.5	49.6	57.0	58.7
Non-cereals (tonnes)	**World**	**1 232 778**	**1 423 102**	**1 391 588**	**1 169 835**	**838 005**	**1 024 340**	**843 356**
	Africa	**417 216**	**323 394**	**368 853**	**488 927**	**457 261**	**604 344**	**430 595**
	Eastern Africa	250 385	192 016	207 613	271 526	266 196	302 437	243 524
	Central Africa	63 806	45 445	66 264	74 025	51 298	54 525	35 032
	Northern Africa	33 429	33 982	22 981	43 208	76 867	153 961	92 551
	Southern Africa	2 167	1 361	10 574	12 924	6 361	7 960	4 777
	Western Africa	67 429	50 590	61 421	87 244	56 539	85 461	54 711
	Africa as a % of World	33.8	22.7	26.5	41.8	54.6	59.0	51.1
Skim milk evap. (tonnes)	**World**	**94 960**	**45 755**	**56 291**	**60 611**	**44 632**	**3 235**	**19 713**
	Africa	**18 106**	**4 298**	**2 250**	**6 413**	**2 362**	**545**	**8 722**
	Eastern Africa	1 419	931	1 482	3 303	509	132	8 706
	Central Africa	122	115	301	271	500	65	...
	Northern Africa	1 873	1 090	67	957	816	214	5
	Southern Africa	38	51	41	...	...	...	...
	Western Africa	14 654	2 111	359	1 882	537	134	11
	Africa as a % of World	19.1	9.4	4.0	10.6	5.3	16.8	44.2
Other dairy products (tonnes)	**World**	**869**	**204**	**1 200**	**...**	**1 651**	**342**	**45**
	Africa	**268**	**99**	**76**	**...**	**883**	**45**	**45**
	Eastern Africa	152	10	21	...	398	...	...
	Central Africa	30	...	...	...	59	...	...
	Northern Africa	47	89	45	...	120	45	45
	Southern Africa	7	...	10	...	91	...	...
	Western Africa	32	...	...	...	215	...	...
	Africa as a % of World	30.8	48.5	6.3	...	53.5	13.2	100.0
Fish and products (tonnes)	**World**	**7 767**	**8 871**	**10 602**	**10 377**	**4 384**	**13 110**	**2 671**
	Africa	**2 018**	**1 200**	**1 275**	**2 796**	**1 614**	**1 549**	**19**
	Eastern Africa	28	420	...	1 908	492	1 011	...
	Central Africa	258	...	...	341	534	...	...
	Northern Africa	931	...	684	...	323	258	6
	Southern Africa	...	...	...	...	...	...	...
	Western Africa	801	780	591	547	265	280	13
	Africa as a % of World	26.0	13.5	12.0	26.9	36.8	11.8	0.7

TABLE 21. FOOD AID TO AFRICA FOR SELECTED COMMODITIES (CONT'D)

Commodities/ Commodity Groups	Country groups	2000	2001	2002	2003	2004	2005	2006
Meat and products (tonnes)	**World**	**56 594**	**18 188**	**23 291**	**952**	**3 144**	**3 467**	**2 766**
	Africa	**5 806**	**528**	**483**	**682**	**3 024**	**2 012**	**482**
	Eastern Africa	...	269	...	377	3 024	...	393
	Central Africa	...	...	...	...	...	1 187	89
	Northern Africa	...	...	40	...	...	...	...
	Southern Africa	...	...	...	...	...	...	...
	Western Africa	5 806	259	443	305	...	825	...
	Africa as a % of World	10.3	2.9	2.1	71.6	96.2	58.0	17.4
Total pulses (tonnes)	**World**	**256 480**	**281 498**	**402 384**	**441 831**	**335 351**	**407 873**	**317 035**
	Africa	**168 388**	**172 962**	**203 931**	**246 612**	**259 283**	**334 151**	**248 621**
	Eastern Africa	101 091	98 276	120 159	145 685	155 878	187 237	156 995
	Central Africa	30 544	32 559	36 900	44 219	29 210	34 200	19 268
	Northern Africa	17 486	14 283	13 601	18 694	46 114	72 996	42 135
	Southern Africa	1 488	1 022	7 874	7 678	3 302	4 653	3 751
	Western Africa	17 779	26 822	25 397	30 336	24 779	35 065	26 472
	Africa as a % of World	65.7	61.4	50.7	55.8	77.3	81.9	78.4
Total sugar (tonnes)	**World**	**49 268**	**73 797**	**30 079**	**37 328**	**24 102**	**79 542**	**39 170**
	Africa	**18 450**	**8 140**	**8 972**	**22 395**	**9 676**	**33 870**	**27 245**
	Eastern Africa	11 566	2 239	1 821	3 041	3 033	1 657	2 791
	Central Africa	1 768	1 792	3 755	7 252	1 697	2 689	1 277
	Northern Africa	3 645	3 046	2 058	2 685	2 930	27 625	19 599
	Southern Africa	13	66	68	186	54	38	18
	Western Africa	1 458	997	1 270	9 231	1 962	1 861	3 560
	Africa as a % of World	37.4	11.0	29.8	60.0	40.1	42.6	69.6
Vegetable oils (tonnes)	**World**	**418 469**	**488 476**	**454 873**	**455 280**	**320 788**	**385 285**	**285 979**
	Africa	**187 148**	**129 568**	**141 683**	**189 129**	**170 557**	**207 224**	**135 657**
	Eastern Africa	121 647	87 114	79 982	114 748	98 075	110 762	72 928
	Central Africa	30 300	10 052	23 924	19 512	16 640	15 026	13 614
	Northern Africa	7 993	13 192	6 119	19 902	25 634	43 972	24 602
	Southern Africa	617	222	2 520	5 045	2 914	3 266	1 008
	Western Africa	26 591	18 988	29 138	29 922	27 294	34 198	23 505
	Africa as a % of World	44.7	26.5	31.1	41.5	53.2	53.8	47.4
Other Non-Cereals (Tonnes)	**World**	**389 154**	**569 744**	**431 607**	**197 845**	**122 779**	**201 993**	**214 939**
	Africa	**33 221**	**11 376**	**17 399**	**41 505**	**17 709**	**57 613**	**36 949**
	Eastern Africa	24 372	4 343	4 619	4 685	6 169	2 745	4 502
	Central Africa	2 112	2 169	4 805	9 682	4 279	4 047	2 061
	Northern Africa	5 099	3 251	2 353	2 685	3 860	36 126	25 758
	Southern Africa	17	66	129	201	54	41	18
	Western Africa	1 621	1 547	5 493	24 252	3 347	14 654	4 610
	Africa as a % of World	8.5	2.0	4.0	21.0	14.4	28.5	17.2

Source: FAOSTAT, 2011 and Authors' own calculation

of food aid extends to a broader discussion over how effective foreign assistance to African farmers (e.g. donations in seeds, fertilizers) is in promoting growth in production.[6] Such debate and discussion often remain inconclusive.

6.4 LONG RUN POLICY IMPACTS ON FOOD PRODUCTIVITY, TERMS OF TRADE AND WELFARE

The literature is rich in details about the history and analyses of the international agricultural policies in Africa since the 1960 and especially their impacts on food production. Examples of these studies include Sahn *et al.* (1996); Kherallah *et al.* (2002); Barrett and Mutambatsere (2008a); Diao *et al.* (2008); and Anderson and Masters (2009).[7] The distortions from both domestic and foreign policies have had immediate effects on food trade balance and food availability, but in the log run they may also lead to the persistence of structural issues impeding food production and trade in Africa. Two examples of the long run effects are the effects on Africa food and agricultural productivity and the persistent effects on Africa's terms of trade in the food and agricultural sector.

6.4.1. Impact on productivity and technology adoption

To begin with, the various studies that are just cited earlier emphasize that in Africa food trade one of the key issues for the food-import dependency has been the weak supply response of the domestic market. Thus, it is important to focus on what has made the supply responses weak and productivity low in many African countries. To this end, policy analysis requires digging deeper and more directly into the ways past and current agricultural policies have affected farmers' decisions to adopt technology and to increase agricultural output. Two main channels are known to link agricultural productivity (hence, production) with these distortions: (i) the level of output prices received by farmers and (ii) trade volume by induced technology and spillover effects. It seems that all of the agricultural production and trade policies from both developed and developing countries described so far have in one way or the other affected producers' incentives to adopt technology and to increase production and trade volume. A closer look at these two channels helps provide an explanation for Africa's increasing net food imports.

The first channel links output prices to productivity, hence production, and this link is based on the farmers' price incentives and expectations. This is documented in various work (e.g. Schultz, 1956, 1979; Smookler, 1966; Bingswanger, 1978; Fulginiti and Perrin, 1992) showing evidence that price expectation and incentive constitute one of the important channels that link economic and agricultural policies (ranging from input policy to production, trade, and investment policies) to farmers' access to inputs and technology and thus, determine their decisions to increase production. Through this channel, depressed farm prices discourage any incentive to increase production and reduce the motivation to adopt technology. Moreover, low farm prices imply low revenue and low profit, hence limit the availability of financial resources needed for investment in technology, including purchases of optimal amounts of essential inputs. This seems to have been the case in Africa, as the domestic taxation of agriculture and the distorted commodity prices in the international markets coincide with the low level of productivity and production.

The second important channel, as explained in Grossman and Helpman (1990, 1991) and Coe and Helpman (1995), is based on the relation between international trade and technology use. Here the arguments have two complementary aspects. One is that if a country is closed and has no or little trade (both export and import), the country will lose the benefit arising from trade exposure as well as the opportunity to accumulate and imitate the technology embedded in traded products, i.e., it will lose the 'spillover' effects of trade. This will reduce the motivation to innovate and increase productivity. The other complementary aspect is that accumulation of technology depends on the level of technology embedded in the traded products. In other words, a country will benefit from the technology spillover if only its export demand shifts towards more technology-embedded or high value products, as this shift entices efforts to adopt technology and increase productivity. Again, this second channel linking trade to technology seems to sit well with the evidence of how Africa's anti-

[6] See Annex 9 for some figures on official development assistance in Africa.

[7] See also Ndulu *et al.*, 2008a, 2008b.

trade policies before the 1990s and its inability to export processed products coincided with the lack of growth in agricultural productivity.

The strength of these arguments lies in their ability to encompass the effects of not only agricultural production and trade policies but also economic policies in general, in explaining the lack of productivity growth in African agriculture. Because the agricultural sector has been deeply entrenched in African economies, macroeconomic policies have unambiguously impacted Africa's agricultural productivity. For instance, following the currency devaluation, which was aimed at increasing export competitiveness, the production and productivity of many export crops improved while the prices of imported inputs (fertilizers, insecticides) rose, harming productivity growth for food crops such as rice and maize. These arguments based on price incentives and trade and technology spillovers offer useful explanations of the contribution of various policies to the current state of agricultural productivity.

6.4.2 Terms of trade and welfare effects

The long run effects of policy distortions that food sector in Africa has endured include the persistent efficiency loss in misallocation of resources and this may reduce the food sector's flexibility to revert quickly to an efficiency enhancing re-allocation of resources even after the removal of the distortions. Similarly, endowments such as labour and land that have been left idle or unproductive for a long period because of lack of food market opportunities may take a long time to adjust to new improvements in the market. Moreover, one aspect of the long term effects that is related to these inefficiency and endowment effects is the terms of trade effects of policy distortions. Prices of the traditional export commodities have not grown much while prices of imported food have gone up fast. In this regard, Dimaranan et al (2004) show that the food sector in some countries with deteriorated terms of trade during a long period because of price distortions has difficulties to respond positively to tariff cuts.

To these long-term effects, one can add also the food production and trade capacities that have remained weak or even absent for many years because of the policy impacts. Building and expanding these capacities would take time and delay the responses to any sudden positive change in the market. Anderson *et al.* (2010) conclude that although at global level, consumers in developed countries bear the brunt of the negative welfare impact of policy distortions in the international food markets, there is a strong evidence that some developing countries in Africa (e.g. Egypt for rice or South Africa for sugar) and especially their farmers, long experienced significant welfare reduction because of the distortions. All these long terms effects depress total welfare at household and country level and may have kept many countries in Africa under food import dependency in the last four decades.

6.5 THE CHALLENGES AHEAD AND POLICY CHOICES

It is clear from the typology in chapter 3 that the bulk of the problem lies with the group of net food importers with low income and low productivity. If one sizes up the challenges ahead for the food sector in Africa, then it is on how to increase production to strengthen the domestic response to the rising food demand and remain competitive in the international markets for these countries. It is thus important to summarize some of the policy choices that many African countries may face. For this, it is equally important to recall that all has not been dark for the African food sector in the last five decades and that there has been however a noticeable positive development in the last few years. Examples of the few bright spots reported in some studies and reports (such as Haggblade and Hazell, 2010; OECD, 2010) show that some practices have worked well. These bright spots reinforce a message from the analysis and view that despite its weakness, food production growth in Africa as a whole did manage to keep up with population growth. Although much remains to be done to feed the food insecure population in Africa, these best practices offer a better guidance to policy choices. It is therefore important to take into account these best practices while laying down the challenges ahead.

6.5.1 Challenges in reforming domestic and border and international policies

On internal and external reforms to reduce food trade barriers

Although the reduction of the domestic and foreign distortions that depress prices can, through price

expectation, give incentive to farmers to increase production and adopt technology, the fate of the multilateral negotiations remain uncertain. Similarly, reduction of trade barriers including barriers to export of processed foods is an important way to boost agricultural production and productivity through the trade spillover effects, but many countries including those in Africa are not ready to lose revenues from trade taxes. There are however encouraging signs as for instance, abolition of the public marketing controls since the early 1990s which have led to the increase in sales of raw milk sale and contributed to the expansion of the dairy sector in Kenya (Ngigi *et al.*, 2010).

In some cases, the opening up of Africa's internal and external agricultural trade has not been accompanied by the elimination of distortions that depress the prices of food from developed countries. Such a unilateral openness unfairly lead to import surges which harm the already weak domestic agricultural sectors. Unfortunately, the latter is still the case, as evidenced by some studies on the origin of import surges in developing countries (FAO 2005.) This is indeed one of the arguments that African and other developing countries have put forward in the negotiations under WTO, justifying the need for some safeguards against the food import surges on some key products including food products.

The removal of agricultural production and trade distortions and the evidence of their impact or on how to go about it still stir many debates. However, it remains puzzling that despite the decline in subsidies and tariffs in developed countries and the elimination of taxation on African agriculture in recent years (Anderson *et al.*, 2010; and as shown in Annex 8), there has been no noticeable improvement in the agricultural productivity level, at least based on average figures at hand. One explanation is that the effect of liberalization on lifting the productivity has not been strong enough to counter the effects of other domestic constraints (land, input, institutions, and human capital). For instance, the spillover effect through embedded technology requires the presence of a high level of human capital stock to accumulate and use these technologies, but as in the food processing industry, for example, many countries in Africa still lack the required human capital stock to receive and exploit these technologies. Studies (e.g. Wailes, 2004; Tocarick, 2008) warn of the skewed distributional impacts and overestimation of the benefits of agricultural trade liberalization for low-income countries in Africa and serve as a reminder that what holds back productivity growth in the poorer nations is not a single factor but a combination of many factors that need to be addressed comprehensively.

On preferential trade agreements

The lack of flexibility in some preferential arrangements will continue to lay serious challenges to African countries. There are numerous possibilities to make some of the current preferential trade arrangements more beneficial to African countries without hurting the US or EU and their other trading partners. Skully (2010) cites as an example the use of historical entitlement in the US peanut imports which gives limited market access to African countries although preferred (i.e. traditional) sources such as Argentina cannot fulfil their quota. Under current rules, other countries (such as African countries) cannot fill the Argentina quota. In this case, the market access initiatives such as the Africa Growth and Opportunity Act (AGOA) that provides zero tariff to selected commodities from Africa can be further expanded by reviewing the US current quota allocation among main import sources. Negotiation on making such rules more flexible has not been pursued enough but it may prove beneficial for Africa food and agricultural exports and enhance the opportunity AGOA provides.

On regional policies on market access and non-tariff barriers

That better infrastructure and equipment play important role in improving production and productivity can be seen in the relative success of the smallholder dairy examples in Kenya. Better milk collection systems and use of cold chains to maintain milk and dairy product quality (Ngigi *et al*, 2010) have boosted production and productivity. Similarly, almost all success stories from the horticulture production in East Africa and livestock export from Sudan have been based on improving the infrastructure along the production and marketing chains. There has been effort to expand and

regionalize these types of success. However, it is yet to be seen how regional policies will emerge to tackle at regional level non-tariff barriers including the poor state of the regional transportation and communication systems among countries in Africa.

6.5.2 Challenges over input access and technical constraints

Input subsidy dilemma

Policies and actions to increase the access to inputs such as fertilizer, pesticides, and animal vaccines are highly important but difficult to implement. One way to increase input access is input subsidy. Haggblade and Hazell (2010) report that the success of the increase in maize yields and production in Eastern and Southern Africa (mainly in Kenya and Zimbabwe) in the 1960s was based on the successful diffusion of hybrid maize seeds, making some other essential inputs such as fertilizer affordable to farmers. In this example, it is often cited that the input subsidies have made maize the main basic staple in Eastern and Southern Africa to this day. However, input subsidies may continue to be difficult to implement because they are costly, unsustainable and require serious targeting to avoid moral hazard and selection bias. As O'Connell (2008) notes, one of the problems, especially in Sub-Saharan Africa is the misallocation of financial resources that are sometimes guided more by favouritism than efficiency. In the input subsidy case, the targeting of whom to help has been compromised by lack of information and often exasperated by misallocation of funds to the already richer farmers. Why input subsidy use continues to be debated to this day highlights the difficulty associated with its motivation and implementation.

Education and technology policies

There is a consensus that most of the agricultural technology that Africa needs is readily available either in the continent itself or abroad and faults the lack of local research and extension to facilitate the technology transfer and adoption (Bingswanger-Mkhize, 2009). The removal of technical barriers hampering productivity has become one of the priorities of the African Union's Africa Agriculture Agenda initiative. However, it remains linked to the inability to improve African farmers' education and to strengthen agricultural research and extension.

Because of limited resources allocated to education, many countries in Africa, as in other developing countries, still face the old dilemma of having to choose a priority between investment to provide general education for all and investment that emphasizes preparing an elite for high education (The Phelps vs. Lucas arguments). This is a policy choice that has no clear-cut answer, as each has advantages and risks. Education for all will lift overall literacy rates and spark development but in the short run may not yield the high level of key skills required for a quick technology transfer and implementation to trigger growth. On the other hand, emphasis on educating mainly a few elite may prompt increases in productivity in the short run but may engender risks of insufficient skilled manpower to oversee economic activities, besides the all-to-familiar 'brain drain' risk. Many countries in Africa have treaded between the two lines, and the evidence shows that productivity remains low. One could think that in the immediate future, increasing the size of the resources allocated to education is among the top priorities regardless of the path chosen.

Although much remains to be done to overcome technical barriers in Africa's food sector, there are a few encouraging examples. Access to and diffusion of techniques to restore soil fertility in arable land has proven successful, as the cases of soil fertility management in Zambia and Western Kenya show. Farmers in these areas have been using simple techniques such as minimum tillage systems that allow water and soil organic retention, along with crop rotation and use of manure. Additionally, in livestock, the use of dairy breeds and animal disease control since the early 1960s have contributed to the trebling of dairy production in Kenya. Likewise, bovine meat production per head has increased due to better control of animal diseases. One can also cite the success of the efforts to fight Rinderpest diseases on livestock (mainly cattle) in 35 countries in Africa after the launch of mass vaccination campaign under the Pan African Rinderpest Campaign in the mid-1980s. Similarly, regional initiatives under the Common Africa Agriculture Development Programme (CAADP) have been aimed at the removal of technical barriers preventing such successes, especially for land and water management and fertilizer use, and the results show some progress but at a slow pace (OECD, 2010).

6.5.3 Challenges linked to foreign agricultural investment

Many low-income countries in Sub-Saharan Africa have recently been the target of new foreign agricultural investment originating from advanced or emerging economies (e.g. The Golf States, China, India, Russia, South Korea) that have limited agricultural land and insecure food supply. These investments bring new resources (skills, technology, and infrastructure) and especially make use of local resources previously unused, such as labor and land. The expected benefits for the host countries include payroll tax revenues and profit taxes, while for the investing countries the benefit is mainly a reliable and relatively stable food supply. The exact extent of these impacts remains unknown and may vary across countries and the types of investment. The successes in agricultural production and development (e.g. fruits and vegetables in East Africa, livestock production in Sudan) show that the private sector and foreign investment have played important roles by linking farmers to input and output markets. For instance, these investments have eased the access to credit and essential inputs and have guaranteed an outlet for food products at a stable and agreed upon price.

There is a concern, however, that if the host countries are food insecure, the foreign investment in agriculture may worsen the food insecurity problem by reducing the competitiveness of domestic food (and agricultural) production and especially by elevating production cost and food prices for local consumers.[8] The reduced competitiveness arises from the increased competition for land and labour (especially if they are mobile across sectors). Also, as food price rises, local food producers may still profit indirectly from the investment, but the gain may be temporary as it can be diminished by the entry of relatively cheaper imports. High local food prices entice the entry of cheaper imports, which cuts consumer loss but increases the country's dependency on food imports. However, it cannot be said outright that the foreign agricultural investment is all harmful; the resulting welfare effects depend much on how the employment gain and the returns to the owners of land and labour offset their losses from increased food and input prices. The rise in production costs (especially land and labour) has negative effects on other non-agricultural sectors, jeopardising for instance the comparative advantages in exporting labour-intensive products (textile), and as a consequence, the foreign agricultural investment may increase food-import dependency. However, the impact of the foreign agricultural investment on food security depends on how much additional purchasing power it has created to allow the host countries to afford food imports.

6.5.4 Efficiency or self-sufficiency?

This policy dilemma is no longer an issue for some of the relatively high-income countries in Africa, as they have already solved the problem by importing some of the food products that are costly to produce at home. True, many of these countries are still looking for food supply stability (e.g. by directly investing in other countries), but it seems that for them, efficiency has won over self-sufficiency. Because these rich countries have enough revenues, they can afford to pay for food imports. But, as the poorer countries in Africa grow, can they follow in the footsteps of the richer ones? To address this question, it is useful to check how the efficiency and self-sufficiency debates play out regarding two important issues, namely food security and export diversification.[9]

Rationale for food security

If ensuring food security is a country's main goal, then the examples of Africa's richer countries show that it is indeed feasible to secure access to food by developing non-food or non-agricultural activities and then using the cash revenues from these activities to import food. Implementing such a strategy is, however, difficult and less straightforward because in many of the poor African countries, agricultural and food production are not activities that can be transformed or abandoned overnight. Agricultural activities have been the mainstay of the rural livelihoods, and the farmers' flexibility to switch from food to cash crops (or vice versa), let alone from food production to, say, tourism, is hardly a given. One complication is that food crops are seasonal while cash crops may be perennial (or

[8] Collier *et al*. (2009) cited also the risk for Africa having investors who are not interested in helping the country's agricultural sector but arrive seeking a quick profit.

[9] FAO (2008) offers more analyses on biofuel and food security that highlight the dilemma energy vs. crop and is an illustration of such debates.

sometimes vice versa). Moreover, data show that even richer countries have never fully abandoned their agricultural and food production to specialize on non-food sectors. Mauritius, for instance, remains a sugar producer and exporter despite the prosperity enjoyed by its tourism and textile industries. Similarly, grain (rice, wheat) production in Egypt remains high.

This implies that for food security reasons, the low-income net importing countries in Africa may still need to maintain their basic agricultural structure for long time to come, and regardless of the choice between self-sufficiency and efficiency, increasing agricultural productivity may remain amongst their top priorities to at least use the full potential of their domestic production. Nevertheless, putting priority on productivity increase cannot be seen as a striving toward self sufficiency at any cost. As the examples of the richer countries in Africa and elsewhere show, attaining a high level of productivity does not prevent a country from choosing efficiency over self-sufficiency by importing some amount and type of food. Focusing all efforts on self-sufficiency is a repeat of the failed import substitution policy when the resources required to attain self-sufficiency are costlier than importing food.

Export diversification

In the African context, export diversification has always been related to food security. Many studies and reports (e.g. Fosu, 1992, Ben Hammouda *et al.,* 2006; African Union, United Nations Office for the Special Adviser on Africa, New Partnership for Africa's Development, Organization for Economic Cooperation and Development, 2010) assert that the concentration of export, especially agricultural export, on only a few agricultural commodities is one of the explanations for both the food-trade deficit and the lack of economic growth in many African countries. The rationale behind the export diversification rests on two pillars. The first is that diversification reduces the risk of export revenue volatility due to the commodity price swing and volatility. The second, no less important, is that diversification increases the level of export revenue, which indicates that it could be an efficient way to achieve food security.[10]

Diversification can be seen and interpreted from various angles but in the context of African agricultural production and trade, the two most important forms are vertical and horizontal diversification. Vertical diversification is aimed at expanding export to include the processed forms of the same type of commodity that is already exported in raw form (e.g. chocolate along with cocoa beans or cocoa paste; cured meat along with live animals), whereas horizontal diversification refers to the expansion of exports to other types of commodities including non-agricultural or non-food products (e.g. horticultural products, fisheries, services). For many African countries that still face tariff escalation and other external hurdles (e.g. excessive sanitary or phytosanitary requirements etc.) for processed food exports, their attempts to diversify food export have been mostly reduced to horizontal diversification. Nonetheless, any type of export diversification in Africa faces also several internal hurdles such as the lack both of adequate resources and of production and managerial skills. In many African countries, these resource and skill constraints have delayed the start of the diversification process that often goes in hand with income growth. However, some successful experiences, such as the cases of production and exports of fruits, vegetables and flowers (e.g from Kenya and East Africa in general) and textile and fishery exports (Mauritius and Madagascar), show that when both the internal and external barriers are reduced, diversifying exports to ensure a stable export revenue that helps pay the food import bills is feasible.

[10] The endogenous growth model (Romer, 1990) also shows that diversification of inputs (or intermediate inputs) induces increases in input productivity and hence increases in land and labour productivity and overall output.

7 Conclusions

That despite its vast agricultural potential, Africa switched from a net exporter to a net importer of agricultural products in the 1980s, and especially that it has become a net importer of food since the mid-1970s, in particular, has been puzzling. The persistence of the food-trade deficit becomes a problem for some cash-strapped countries where the sources of foreign currencies, including agricultural export revenue, to pay for the rising food bills are limited. This report explored the causes of these agricultural and food-trade deficits and provided insights into the implications of the deficits for food security and agricultural development of the African continent. First this report described the challenges linked to agricultural trade deficits in Africa, especially the increase in net food and agricultural imports in the face of food insecurity. A typology of African countries was presented to help understand the extent of food trade deficit in the continent. Then the report delved into the potential causes of the rising food imports on both the demand and supply sides. The roles of agricultural production and trade policies in the food production and food-trade deficits were also discussed. The main finding of this exploration is that population growth coupled with low and stagnating productivity in food and agricultural production, on the one hand, and policy distortions, poor infrastructure and weak institutional support on the other hand, are the main reasons for the increase in the food-trade deficit in Africa. Specifically, the investigation revealed the following findings.

On the typology

- A preliminary examination of the data at hand informed that food-trade deficit varies according to the countries' level of income. Based on this information, a typology of African countries was constructed and showed that net food imports increased with income levels but that the proportions of food imports with respect to GDP per capita were small, at most 5 percent, regardless of the level of income. High-income countries in Africa had high net food imports per capita, but they did not have problems paying for their large food imports because they had ample sources of foreign currencies. They had also higher access to agricultural technology and higher yields. For these high-income countries, the possible reason for importing food was that importing was cheaper than producing some types of food locally. Conversely, low-income countries imported less food per capita, but their agricultural export revenues, or even sometimes their total merchandise export revenues, could not cover their relatively small food import bills. These low-income countries, mostly in Sub-Saharan Africa, have had the lowest yields and productivity, which means that efforts to increase productivity and to boost export revenues would reduce their imports and help pay the food import bills.

On the demand and import sides

- Africa's total net food imports have increased by an average of 3.4 percent per year (between 1980 and 2007). Although food imports have increased, their composition has not changed for the last 30 years. High demand in cereals, and to a lesser extent, livestock products (meat and dairy products), sugar, and vegetable oils have been behind this rise in African imports. Cereals, meat and dairy import values represent more than half of total food import values. The surge in imports of these basic food products

highlights the contribution of food imports to ensuring food security.

- Although total food imports have increased, net food imports per capita have not grown much in real terms (especially since the mid-1980s): they remained on average and in real terms at less than USD 20 per year and per person, and grew only at 0.8 percent per year.
- The increase in total import volume is therefore linked mainly to the 2.6 percent increase in population per year.
- There was no noticeable change in either the level of food consumption per capita or in the dietary pattern; this is consistent with the weak per capita income growth in most of Africa, especially in Sub-Saharan Africa.

On the supply and export sides

- Agricultural exports are no longer the main source of foreign currency for many countries in the continent. For the whole continent, the share of agriculture in total exports fell from 42 percent in the 1960s to under 10 percent in 2001-2007.
- Africa food exports have not been much diversified: cocoa, coffee, tea, and spices have remained the most exported food.
- Food production increased by 2.7 percent per year since 1960 but just barely managed to keep up with the average yearly 2.6 percent population growth, not being able to respond to any increase in per capita income. Food production per capita grew only at about a tenth of a percent per year. Indeed if there was a sharp increase in consumption per capita, food imports would have grown further to satisfy the domestic demand.
- Two of the reasons food production has not increased much are that arable land area per person decreased and the yields stagnated at low levels. Constraints on agricultural yields and productivity include limited access to inputs (fertilizers, land and water); slow transfer and adoption of technology; and insecurity, conflicts, and natural disasters. The lack and degradation of infrastructure for production and marketing contributed also to keeping agricultural productivity low.
- It is also important to note that despite African countries' increased participation in the numerous regional trading arrangements and in multilateral trade negotiations, the levels of both external and internal agricultural trade in Africa have remained low. African agricultural exports and imports represented less than 5 percent of the world agricultural trade. Intra-trade is even lower than external trade: only one fifth of African food exports stayed in Africa, and only 12 percent of Africa's individual countries' total agricultural imports originated from within the continent.

After exploring the technical explanations of the food-trade deficits, this report delved further into the role of policies and institutions in explaining the trend of Africa's food trade by outlining the evolution of economic and agricultural policies. Compiled evidence from the literature showed that some of the technical constraints often arise from distorting policies and weak institutional supports. Specifically, both internal and foreign agricultural and food policies have affected the flow of Africa food trade and the report emphasized on how these policies have short and long term effects on food production and trade.

These findings lead to numerous implications and various interpretations but one aspect that deserves attention is the state of Africa's domestic supply. Much has been said about domestic production not being able to meet domestic demand fully, but the relatively small shares of food imports in GDP are signs that domestic food production has played a significant role in feeding the growing African population. Still, the weakness of domestic production especially for Sub-Saharan Africa lies mainly in its inability to deal with an eventual sustained increase in per capita consumption. Unless food production per capita increases or unless many surplus areas in the continent are connected to the market, any sharp increase in per capita consumption, because of, say, a sudden increase in income or a dramatic change in dietary pattern in the low income countries, will only be met by an increase in food imports.

The analysis in this report addressed African agricultural and food-trade deficit at the continent level, and the use of aggregate data may have masked what really happened in each individual country. Additionally, the figures were in many cases averages over many periods or over many

commodities (e.g. cereals include rice, maize, wheat, etc.), and ignored differences in location (rural vs. urban) or income (rich or poor) within the countries. Therefore, the use of aggregate data requires that the figures be interpreted cautiously. The typology analysis has been meant to be a step taken toward disagregation but is not a substitute for full-fledged country case studies on food-trade deficit.

The findings in this report open avenues for further analyses and research at country level. At least three main areas deserve close and immediate attention. First, the interaction and contribution of the various factors leading to food-trade deficit have to be explored further to provide further insight into the priority of actions when addressing food trade deficit issues. It is important to understand at country level, for instance, whether internal or external policy distortions play the most prominent role in depressing prices and hence impacting the levels of production and productivity, and how much of these impacts are magnified by the technical, resource or institutional constraints in the country. Second, in the face of the proliferation of regional trading arrangements in Africa and the low levels of internal and external trade, it is important to analyze how existing trading arrangements and rules can be further exploited to help improve food trade within Africa. Third, African countries continue to implement macroeconomic reforms in the evolving context of global competition for inputs and for food products. Assessing the impacts of these past and on-going reforms and evolution (structural adjustment, poverty reduction, agricultural investment policies, etc.) will help shape the accompanying measures of future reforms to ensure viable food markets. Given Africa's still vast and untapped agricultural potential (both in terms of resources and market opportunities), the question to be addressed can be easily reformulated into 'What can be done to make Africa a competitive net food exporter?' These are all examples of large but important areas of research that will further contribute to defining how Africa's food trade can yield more benefits to its young, and growing population.

Annexes

ANNEX 1

"Food" according to the 2004 definition of the Codex Alimentarius Commission's Committee on General Principles is defined as any substance, whether processed, semi-processed, or raw that is intended for human consumption, and includes drink, gum and any substance which has been used in the manufacture, preparation, or treatment of "food".

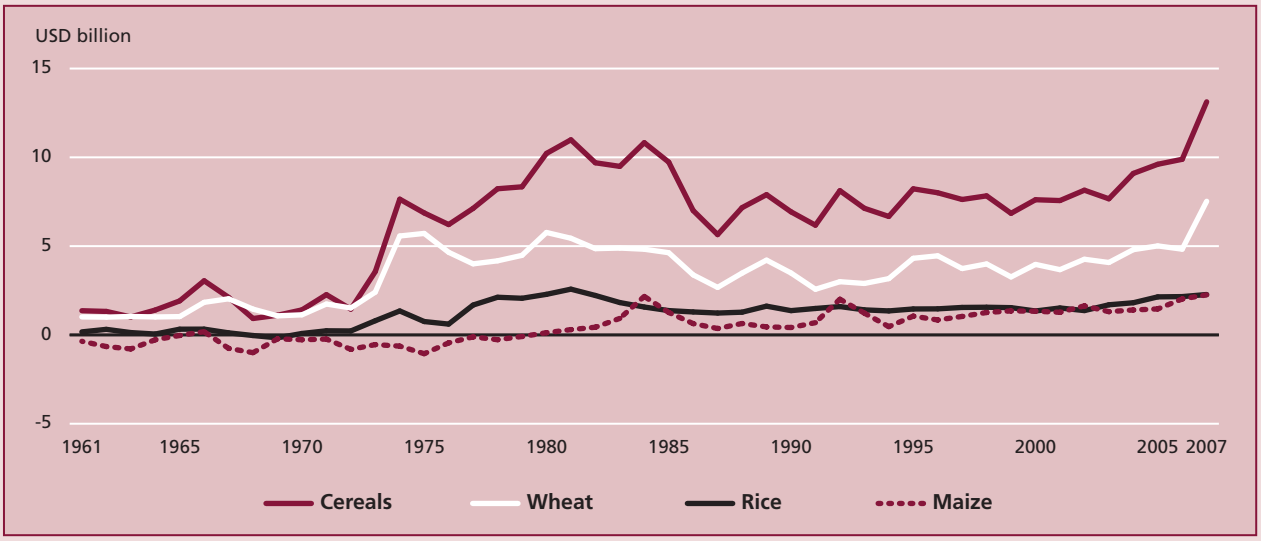
In this report, food refers to all raw, semi-processed, or processed substances that are intended for human consumption. This includes cereals, fruits, vegetables, meat, milk and dairy products, oils and fats, but does not include drinks and beverages.

FOOD EXCLUDING FISH*

15	Wheat	191	Chick peas	402	Onions (incl. shallots), green	587	Persimmons	1016	Goats
16	Flour of Wheat	195	Cow peas, dry	403	Onions, dry	591	Cashewapple	1017	Goat meat
18	Macaroni	197	Pigeon peas	406	Garlic	592	Kiwi fruit	1018	Offals of Goats, Edible
19	Germ of Wheat	201	Lentils	407	Leeks and other alliaceous vegetables	600	Papayas	1019	Fat of Goats
20	Bread	203	Bambara beans	414	Beans, green	603	Fruit, tropical fresh nes	1020	Goat milk, whole, fresh
21	Bulgur	211	Pulses, nes	417	Peas, green	604	Fruit Tropical Dried Nes	1021	Cheese of Goat Mlk
22	Pastry	212	Flour of Pulses	420	Leguminous vegetables, nes	619	Fruit Fresh Nes	1022	Butter of Goat Mlk
27	Rice, paddy	216	Brazil nuts, with shell	423	String beans	620	Fruit Dried Nes	1023	Milk Skimd Goats
28	Rice Husked	217	Cashew nuts, with shell	426	Carrots and turnips	622	Fruit Juice Nes	1034	Pigs
29	Milled/Husked Rice	220	Chestnuts	430	Okra	623	Fruit Prp Nes	1035	Pig meat
31	Rice Milled	221	Almonds, with shell	446	Maize, green	624	Flour of Fruits	1036	Offals of Pigs, Edible
32	Rice Broken	222	Walnuts, with shell	447	Sweet Corn Frozen	625	Fruit,Nut,Peel, Sugar Prs	1037	Fat of Pigs
36	Rice bran oil	223	Pistachios	448	Sweet Corn Prep or Preserved	626	Homogen. Cooked Fruit Prp	1038	Pork
38	Rice Flour	225	Hazelnuts, with shell	449	Mushrooms and truffles	661	Cocoa beans	1039	Bacon and Ham
41	Breakfast Cereals	229	Brazil Nuts Shelled	450	Dried Mushrooms	662	Cocoa Paste	1040	Pig Butcher Fat
44	Barley	230	Cashew Nuts Shelled	451	Canned Mushrooms	664	Cocoa Butter	1041	Sausages of Pig Meat
45	Pot Barley	231	Almonds Shelled	460	Veg.Prod.Fresh Or Dried	665	Cocoapowder&Cake	1042	Prep of Pig Meat
46	Barley Pearled	232	Walnuts Shelled	461	Carobs	666	Chocolate Prsnes	1043	Lard
48	Barley Flour and Grits	233	Hazelnuts Shelled	463	Vegetables fresh nes	687	Pepper (Piper spp.)	1057	Chickens
49	Malt	234	Nuts, nes	466	Juice of Vegetables Nes	689	Chillies and peppers (Capsicum spp.) and allspice (Pimenta spp.)	1058	Chicken meat
50	Malt Extract	235	Prepared Nuts (Exc.Groundnuts)	469	Vegetables Dehydrated	692	Vanilla	1059	Offals Liver Chicken
56	Maize	236	Soybeans	471	Vegetables in Vinegar	693	Cinnamon (canella)	1060	Fat Liver Prep (Foie Gras)
57	Germ of Maize	237	Soybean oil	472	Vegetables Preserved Nes	698	Cloves	1061	Meat of Chicken Canned
58	Flour of Maize	239	Soya Sauce	473	Vegetable Frozen	702	Nutmeg, mace and cardamoms	1062	Hen eggs, with shell
60	Maize oil	240	Soya Paste	474	Veg.in Tem. Preservatives	711	Anise, badian, fennel, coriander, cumin, caraway seeds and juniper berries	1063	Eggs Liquid
68	Popcorn	241	Soya Curd	475	Veg.Prep. Or Pres.Frozen	720	Ginger	1064	Eggs Dried
71	Rye	242	Groundnuts, with shell	476	Homogen.Veget.Prep	723	Spices, nes	1065	Fat of Poultry
72	Flour of Rye	243	Groundnuts Shelled	486	Bananas	866	Cattle	1066	Fat of Ptry Rend
75	Oats	244	Groundnut oil	489	Plantains	867	Cattle meat	1068	Ducks
76	Oats Rolled	246	Prepared Groundnuts	490	Oranges	868	Offals of Cattle, Edible	1069	Duck meat
79	Millet	247	Peanut Butter	491	Orange juice, single strength	869	Fat of Cattle	1072	Geese and guinea fowls
80	Flour of Millet	249	Coconuts	492	Oranjuice Concentrated	870	Meat-CattleBoneless(Beef&Veal)	1073	Goose and guinea fowl meat
83	Sorghum	250	Coconuts Desiccated	495	Tangerines, mandarins and clementines	871	Cattle Butch.Fat	1074	Offals Liver Geese
84	Flour of Sorghum	251	Copra	496	Tangerine Juice	872	Meat of Beef,Drd, Sltd,Smkd	1075	Offals Liver Duck
89	Buckwheat	252	Coconut (copra) oil	497	Lemons and limes	873	Meat Extracts	1079	Turkeys
90	Flour of Buckwheat	256	Palm kernels	498	Lemon juice, single strength	874	Sausage Beef&Veal	1080	Turkey meat
92	Quinoa	257	Palm oil	499	Lemon juice, concentrated	875	Preparations of Beef Meat	1081	Offals Liver Turkeys
94	Fonio	258	Palm kernel oil	507	Grapefruit (incl. pomelos)	877	Homogen.Meat Prp.	1083	Pigeons, Other Birds
95	Flour of Fonio	260	Olives	509	Juice of Grapefruit	878	Liver Prep.	1089	Bird meat, nes
97	Triticale	261	Olive oil, virgin	510	Grapefruit juice, concentrated	882	Cow milk, whole, fresh	1091	Other bird eggs, with shell
98	Flour of Triticale	262	Olives Preserved	512	Citrus fruit, nes	883	Standardized Milk	1096	Horses
101	Canary seed	263	Karite Nuts (Sheanuts)	513	Citrus juice, single strength	885	Cream Fresh	1097	Horse meat
103	Mixed grain	264	Butter of Karite Nuts	514	Citrus juice, concentrated	886	Butter Cow Milk	1098	Offals of Horses
104	Flour of Mixed Grain	267	Sunflower seed	515	Apples	887	Ghee,Butteroil of Cow Milk	1107	Asses
108	Cereals, nes	268	Sunflower oil	518	Apple juice, single strength	888	Milk Skm of Cows	1108	Meat of Asses
109	Infant Food	270	Rapeseed	519	Apple juice, concentrated	889	Milk Whole Cond	1110	Mules
110	Wafers	271	Rapeseed oil	521	Pears	890	Whey Condensed	1111	Meat of Mules
111	Flour of Cereals	274	Oil of Olive Residues	523	Quinces	891	Yoghurt	1126	Camels
113	Cereal Preparations, Nes	280	Safflower seed	526	Apricots	892	Yogh Conc.Or Not	1127	Camel meat
114	Mixes and Doughs	281	Safflower oil	527	Dry Apricots	893	Butterm.,Curdl,Acid.Milk	1128	Offals of Camels,Edible
115	Food Prep,Flour,Malt Extract	289	Sesame seed	530	Sour cherries	894	Milk Whole Evp	1129	Fat of Camels
116	Potatoes	290	Sesame oil	531	Cherries	895	Milk Skimmed Evp	1130	Camel milk, whole, fresh
117	Potatoes Flour	292	Mustard seed	534	Peaches and nectarines	896	Milk Skimmed Cond	1140	Rabbits and hares
118	Frozen Potatoes	293	Mustard oil	536	Plums and sloes	897	Milk Whole Dried	1141	Rabbit meat
121	Tapioca of Potatoes	295	Flour of Mustard	537	Plums Dried (Prunes)	898	Milk Skimmed Dry	1150	Other Rodents
122	Sweet potatoes	299	Melonseed	538	Plum juice, single strength	899	Milkdry Buttrmilk	1151	Meat of Other Rod
125	Cassava	306	Vegetable Tallow	539	Plum juice, concentrated	900	Whey Dry	1157	Other Camelids
126	Flour of Cassava	307	Stillingia Oil	541	Stone fruit, nes	901	Cheese of Whole Cow Milk	1158	Meat Oth Camelids
127	Tapioca of Cassava	311	Kapokseed in Shell	542	Pome fruit, nes	903	Whey Fresh	1159	Offals Other Camelids
135	Yautia (cocoyam)	312	Kapokseed Shelled	544	Strawberries	904	Cheese of Skimmed Cow Milk	1160	Fat Other Camelids
136	Taro (cocoyam)	313	Oil of Kapok	547	Raspberries	905	Whey Cheese	1163	Game meat
137	Yams	329	Cottonseed	549	Gooseberries	907	Processed Cheese	1164	Meat Dried Nes
149	Roots and Tubers, nes	331	Cottonseed oil	550	Currants	908	Reconsti.Ted Milk	1166	Meat nes
150	Flour of Roots and Tubers	339	Oilseeds, Nes	552	Blueberries	909	Prod.of Nat.Milk Constit	1167	Offals Nes
151	Roots and Tubers Dried	340	Oil of vegetable origin, nes	554	Cranberries	910	Ice Cream and Edible Ice	1171	Animals Live Nes
156	Sugar cane	343	Flour of Oilseeds	558	Berries Nes	946	Buffaloes	1172	Prepared Meat Nes
157	Sugar beet	358	Cabbages and other brassicas	560	Grapes	947	Buffalo meat	1181	Beehives
160	Maple Sugar and Syrups	366	Artichokes	561	Raisins	948	Offals of Buffaloes,Edible	1182	Natural honey
161	Sugar crops, nes	367	Asparagus	562	Grape Juice	949	Fat of Buffaloes	1232	Food Prep Nes
162	Sugar Raw Centrifugal	372	Lettuce and chicory	567	Watermelons	951	Buffalo milk, whole, fresh	1241	Liquid Margarine
163	Sugar Non- Centrifugal	373	Spinach	568	Other melons (incl. cantaloupes)	952	Butter of Bufmilk	1242	Margrine Short
164	Sugar Refined	378	Cassava leaves	569	Figs	953	Ghee Oil of Buf	1243	Fat Prep Nes
165	Molasses	388	Tomatoes	570	Figs Dried	954	Milk Skim of Buf		
166	Other Fructose and Syrup	389	Tomatojuice Concentrated	571	Mangoes, mangosteens, guavas	955	Cheese of Bufmilk		
167	Sugar, nes	390	Juice of Tomatoes	572	Avocados	976	Sheep		
168	Sugar Confectionery	391	Paste of Tomatoes	574	Pineapples	977	Sheep meat		
172	Glucose and Dextrose	392	Tomato Peeled	575	Pineapples Cand	978	Offals of Sheep,Edible		
173	Lactose	393	Cauliflowers and broccoli	576	Juice of Pineapples	979	Fat of Sheep		
175	Isoglucose	394	Pumpkins, squash and gourds	577	Dates	982	Sheep milk, whole, fresh		
176	Beans, dry	397	Cucumbers and gherkins	580	Pineapple Juice Conc	983	Butter,Ghee of Sheep Milk		
181	Broad beans and horse beans, dry	399	Eggplants (aubergines)	583	Mango Juice	984	Cheese of Sheep Milk		
187	Peas, dry	401	Chillies and peppers, green (Capsicum spp.)	584	Mango Pulp	985	Milk Skmd Sheep		

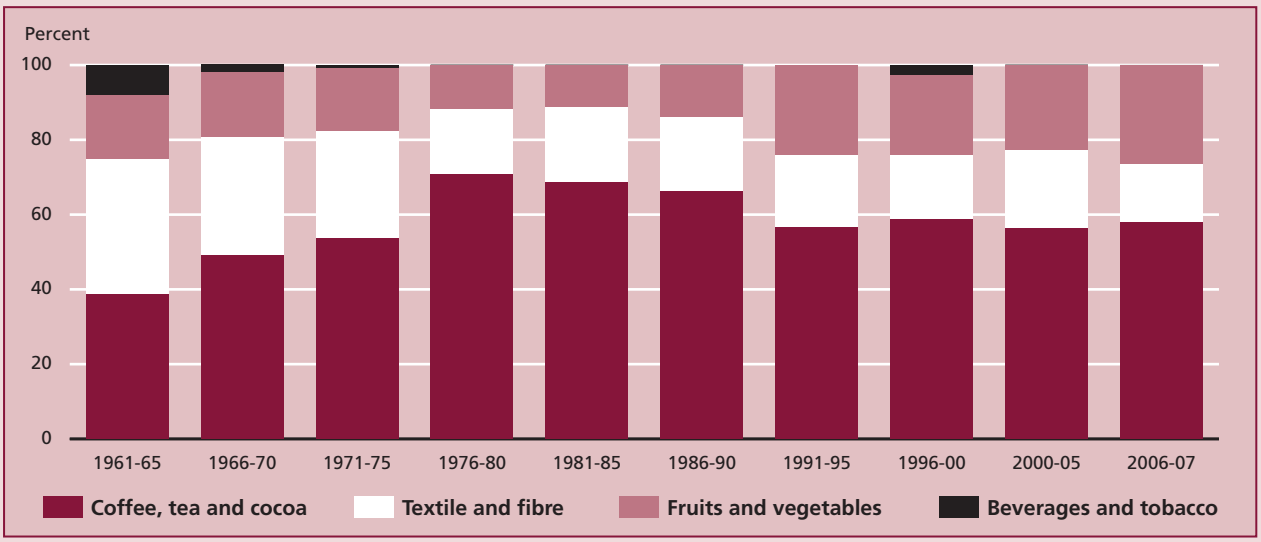
* The codes correspond to FAOSTAT classification

AFRICA: NET IMPORTS OF CEREALS (DEFLATED BY US CPI)



Source: FAOSTAT, 2010; IMF, 2010
Note: CPI base year 2005

RELATIVE VALUE SHARES OF NET EXPORTS OF MAIN AGRICULTURAL PRODUCTS IN AFRICA



Source: FAOSTAT, 2010

AFRICA: MINIMUM DIETARY ENERGY REQUIREMENTS (KCAL/PERSON/DAY)

Country	1990-92	1995-97	2000-02	2004-06
World [1]	1790	1802	1817	1825
Africa [1]	1740	1751	1762	1768
Northern Africa [1]	1767	1795	1822	1832
Algeria	1740	1780	1820	1830
Egypt	1800	1820	1840	1840
Libyan Arab Jamahiriya	1800	1840	1850	1860
Morocco	1740	1780	1820	1840
Sudan	1750	1750	1760	1770
Tunisia	1770	1800	1840	1850
Western Sahara	...	...	...	...
Eastern Africa [1]	1726	1735	1743	1749
Burundi	1710	1700	1710	1720
Comoros	1730	1750	1750	1760
Djibouti	1770	1780	1810	1820
Eritrea	1660	1660	1670	1680
Ethiopia	1660	1660	1670	1680
Kenya	1710	1740	1750	1750
Madagascar	1740	1740	1750	1760
Malawi	1720	1720	1720	1720
Mauritius	1850	1850	1870	1870
Mozambique	1790	1800	1800	1800
Réunion	...	...	...	...
Rwanda	1640	1670	1690	1710
Seychelles	1720	1730	1740	1740
Somalia	...	...	...	...
Tanzania, United Republic of	1730	1740	1740	1730
Uganda	1700	1700	1700	1700
Zambia	1740	1750	1740	1750
Zimbabwe	1750	1770	1780	1800
Middle Africa [1]	1751	1757	1764	1769
Angola	1730	1730	1740	1740
Cameroon	1770	1780	1790	1800
Central African Republic	1720	1730	1730	1730
Chad	1740	1740	1740	1740
Congo	1780	1790	1800	1800
Congo, Democratic Republic of	1750	1750	1750	1750
Equatorial Guinea	...	...	...	...
Gabon	1770	1780	1800	1820
Sao Tome and Principe	...	...	...	...
Western Africa [1]	1739	1745	1752	1755
Benin	1710	1720	1720	1730
Burkina Faso	1720	1720	1730	1730
Cape Verde	1730	1760	1790	1800
Côte d'Ivoire	1750	1760	1780	1780
Gambia	1760	1760	1770	1770
Ghana	1760	1770	1790	1800
Guinea	1750	1750	1760	1760
Guinea-Bissau	1730	1730	1720	1720
Liberia	1730	1740	1730	1730
Mali	1720	1720	1720	1720
Mauritania	1770	1770	1780	1790
Niger	1720	1720	1720	1720
Nigeria	1730	1730	1740	1750
Senegal	1750	1760	1770	1770
Sierra Leone	1760	1760	1750	1750
Togo	1740	1750	1760	1760
Southern Africa [1]	1740	1758	1780	1795
Botswana	1760	1790	1810	1830
Lesotho	1740	1750	1760	1770
Namibia	1730	1740	1770	1790
South Africa	...	...	...	...
Swaziland	1730	1750	1780	1790

Source: FAOSTAT - Food Security and authors' calculation, February 2010

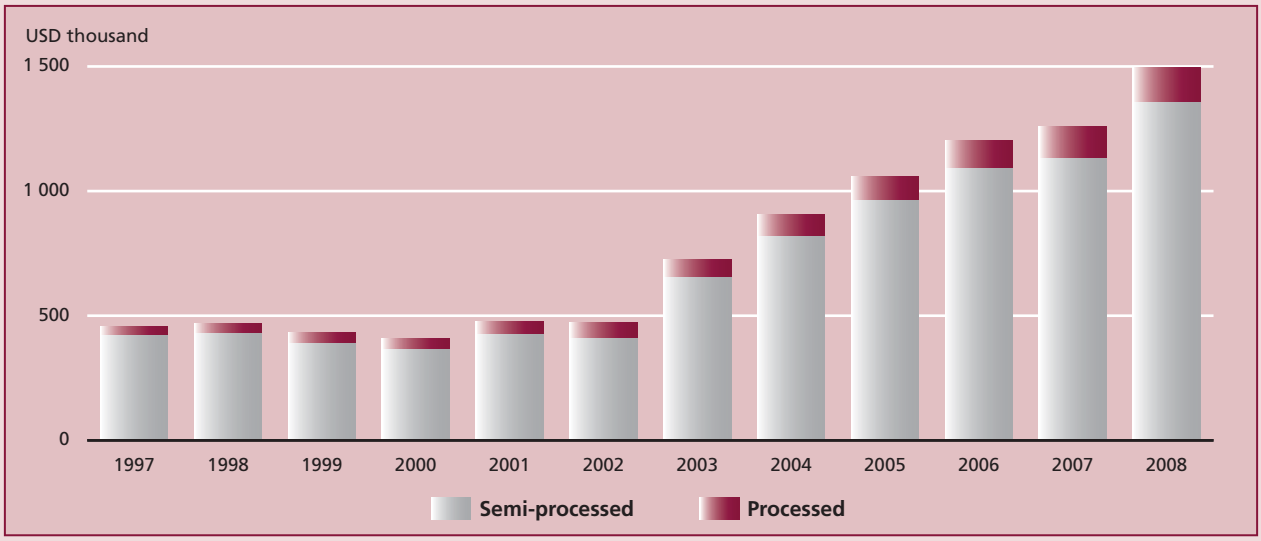
[1] Authors' own calculation (average over the individual countries)

CORRELATION MATRIX FOR AFRICA TYPOLOGY

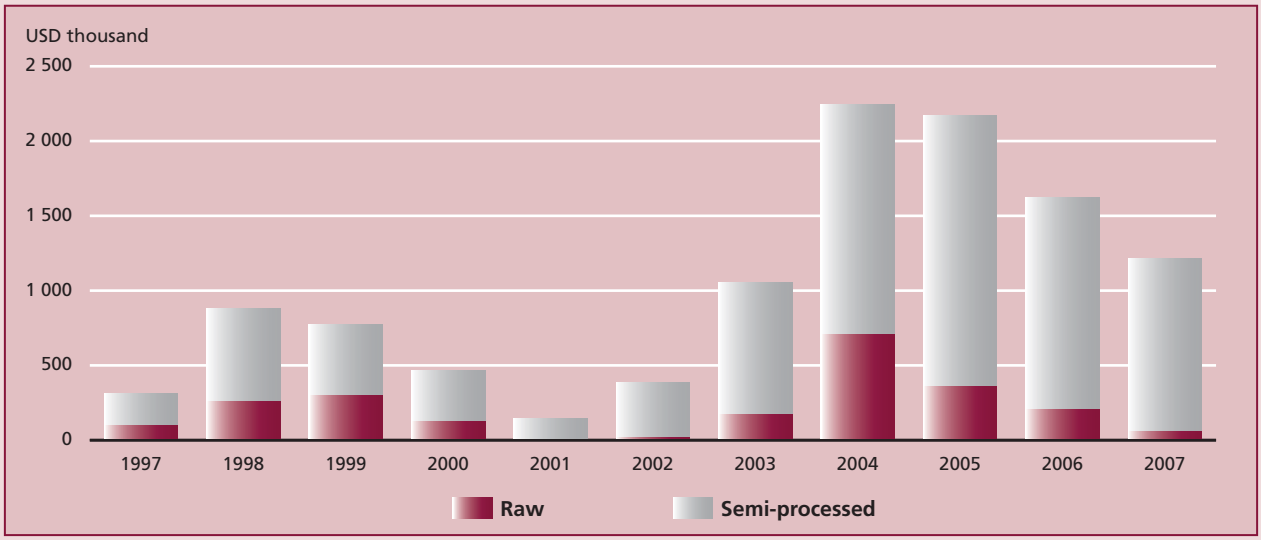
	Correlation Matrix (* denotes significance at the 5% level)								
	Net imports of food per capita (USD)	Ratio of food imports to total agricultural exports	Ratio food imports over total merchandise exports	GDP per cap, PPP (constant 2005 international USD)	Agriculture value added per worker (constant 2000 USD)	Gross food production 1999-2001 (1000 USD)	Cereal yield (kg per hectare)	Agricultural land (% of land area)	Fertilizer consumption (100 grams per hectare of arable land)
Net imports of food per capita (USD)	1								
Ratio of food imports to total agricultural exports	0.3170*	1							
Ratio food imports over total merchandise exports	0.1415	0.4956*	1						
GDP per cap, PPP (constant 2005 international USD)	0.5676*	0.0984	-0.1986	1					
Agriculture value added per worker (constant 2000 USD)	-0.0415	0.0618	-0.0905	0.4795*	1				
Gross food production 1999-2001 (1000 USD)	-0.155	-0.1137	-0.1939	-0.0768	0.258	1			
Cereal yield (kg per hectare)	-0.2205	-0.1752	-0.1469	0.2599	0.6721*	0.3176*	1		
Agricultural land (% of land area)	-0.3535*	-0.209	0.1334	-0.3456*	-0.0431	0.0845	-0.0573	1	
Fertilizer consumption (100 g. per hectare of arable land)	-0.0288	-0.06	-0.0928	0.1716	0.5392*	0.3844*	0.8776*	-0.2005	1

Source: FAOSTAT, 2011 and authors' own calculation

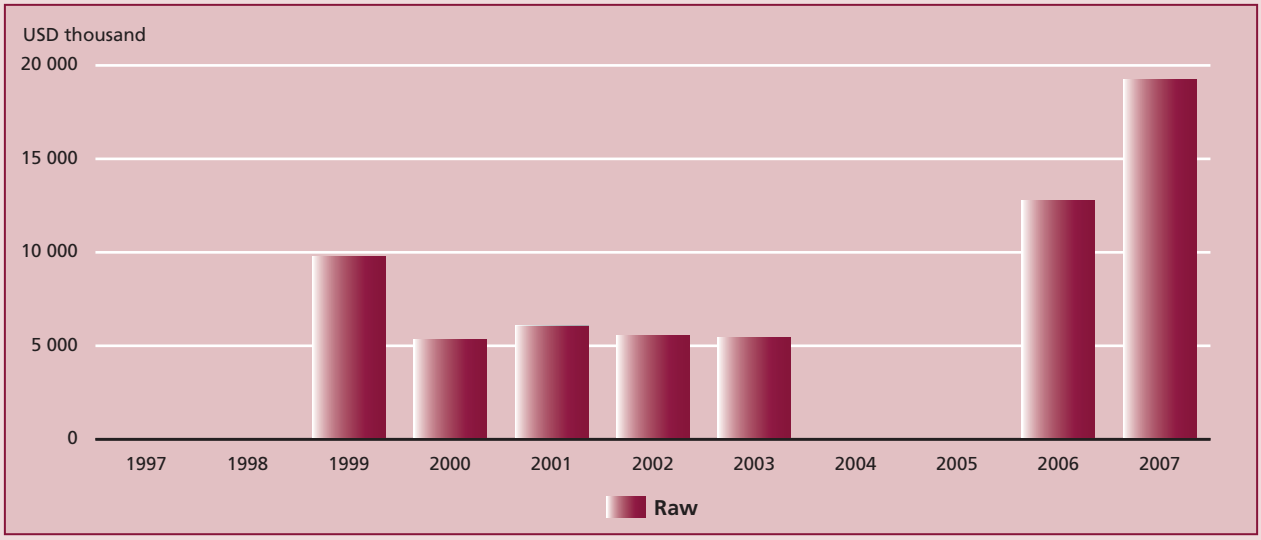
SENEGAL DAIRY IMPORTS (DEFLATED BY CPI, 2005=100)



ALGERIA BOVINE MEAT IMPORTS (DEFLATED BY CPI, 2005-100)



NIGERIA WHEAT IMPORTS (DEFLATED BY CPI, 2005=100)



Source: FAOSTAT, 2011, COMTRADE, 2010

LAND REPARTITION ACCORDING TO ITS SUITABILITY TO RAIN-FED CROP PRODUCTION (% OF TOTAL LAND AREAS)*

	Without constraint	Moderate and slight constraint	Severe constraint
Northern Africa	1.4	6.9	91.7
Eastern Africa	5.1	31.6	63.3
Western Africa	1.3	24.6	74.1
Middle Africa	1.3	20.3	78.4
Southern Africa	2.3	18.7	79

Source: IIASA-FAO (2011)

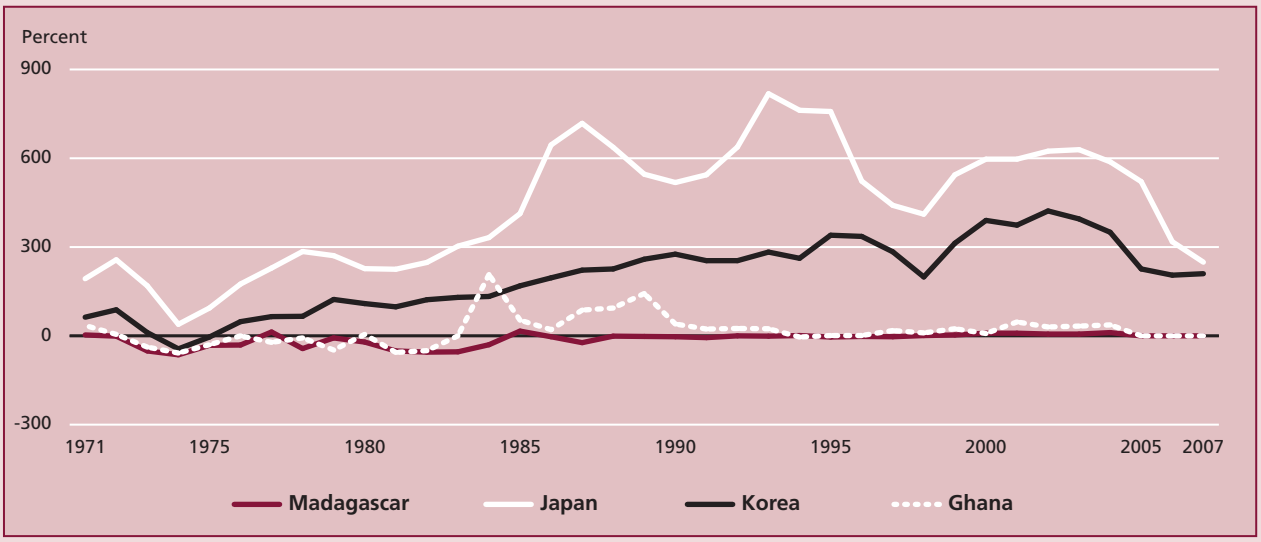
Note: *The classification is based on levels of climate, soil and terrain constraints that characterize the land suitability to rain-fed crop production.

SECONDARY SCHOOL ENROLLMENT (PERCENTAGE)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
World		52.2	52.4	53.1	54.1	55.7	57.4	58.3	58.2	58.8	
Northern Africa											
Algeria					63.8	64.9	66.3				
Egypt, Arab Rep.				79.9	80						
Libya											
Morocco			30.2		33.3	34.5					
Sudan											
Tunisia			67.8	68.8	66.8	64.5					
Eastern Africa											
Burundi											
Comoros											
Djibouti				14	14.6		19.2	21.5			24.4
Eritrea		17.1	19.7	19.9	20.6	21.2	22.7	24.1	25.1	25.1	
Ethiopia		10.7	12.2	12.9	14.2	15.8	17.6	19.9	24		
Kenya			33.3	34.3	35	36.8	39.7	41.5	42.7	44.8	
Madagascar		11.3	11.2	12.1	13.1	13	14.7	16.8	17.4	21.2	
Malawi	25.50	28.8	30.3	27.7	26.8		24.1	23.1	24.1	23.9	
Mauritius	64.20	66.9	68.9	71.1	73.8		79.4	81.5			
Mozambique	2.40	2.7	3.2	3.4	4.3		4.1	7	4.2	2.6	
Rwanda											
Seychelles	99.40	98.5	98.3	98.4	99.9	93.1	93.1	97.1		94.3	
Somalia				9.8							
Tanzania	4.80										25.8
Uganda		7.9	13.2	13.5	15.5	15.1	14.9	15.3	16.70	18.9	
Zambia	16.00	16.4	19.2	20.7	22.9		25.4	28.1		40.9	
Zimbabwe	39.80	40.1	40	40.4	38.2	34.4			37.10		
Middle Africa											
Angola											
Cameroon											
Central African Republic											
Chad		6.8	7.1	7.1	9.5	10.4					
Congo, Dem. Rep.											
Congo, Rep.											
Equatorial Guinea				25.3							
Gabon											
Sao Tome and Principe					29.7	27.1	26.7	32.6		38.1	
Western Africa											
Benin		15.9	15.8	17.1							
Burkina Faso		8.5	8.6	7.9	8.3	9.3	10.2	11	11.8	12.4	14.1
Cape Verde					54.1	55	55	57.5	59.4	60.7	
Cote d'Ivoire		17.7	17.9	18.3	19.8						
Gambia, The		24.6	26.9	28.2	27.9	33.7	36.1	40.1	55.5	38.7	40.1
Ghana		31.5	31.9	30.4	32	33	35.8	36.7	38.9	44.9	
Guinea		12	14.1	16.5	18.6	20	21.4	24.7	27.6	30.1	
Guinea-Bissau			8.7	8.7							
Liberia			17.1								
Mali											
Mauritania				14.6	14.7	15.9	14.1	15.3	15.6	16.8	
Niger		6		5.5	5.7	6.3	7.6	8.6	9.4	9	
Nigeria									27		
Senegal							15.8	17.2	20.4	22.2	
Sierra Leone										22.8	
Togo		19.3	22.1								
Southern Africa											
Botswana	58.7	59.6	60.9	60	60.5	61.3	62.7	55.9			
Lesotho	13.5	17.3	19	20.9	21.4	21.9	22.6	24	23.9		
Namibia	36.6	39.2	42.2	43.1	47.6	43.9	44.3	45.6	48.9	49.6	
South Africa	61.8	62.4	62.3					72.4	73.8	73.4	
Swaziland	35.5	33.1	30.6	30.5	30.6	29	32.7	31.6	27.8	29.2	
Country Groups											
Sub-Saharan Africa		18.8	19.6	20.4	21.4	22.3	23.4	24.2	25.6	26.8	
Middle East & North Africa			59.6	60	60.3	62	66	66.7			
High income		88.2	88.9	88.6	89	90.1	90.1	90.5	90.3	90.3	
High income: OECD		89.5	90.2	89.8	90.1	91.2	91.2	91.8	91.5	91.3	
High income: nonOECD		73	73.6	74.5	75.2	76.4	77	75.5	76.6	78.3	
Low & middle income		47.6	47.8	48.7	49.8	51.5	53.4	54.4	54.3	55	
Upper middle income		67.6	69.1	71.3	72.8	74.1	74.3	74.7	75.4	75.4	
Low income		31.2	32	32.9	33.9	34.6	34.8	35.3	36.6	37.7	

Source: World Bank, 2009, World Development Indicators

NOMINAL RATE OF ASSISTANCE FOR RICE (PERCENTAGE)



Source: Anderson and Valenzuela (2008)

OFFICIAL DEVELOPMENT ASSISTANCE IN AFRICA

	Official development assistance (%GDP)						
	1960-69	1970-79	1980-89	1990-99	2000-05	2006	2007
Northern Africa							
Algeria	8.7	1.2	0.3	0.5	0.4	0.2	0.3
Egypt	2.7	10.1	5.0	5.8	1.4	0.8	0.8
Libya	..	..	..	0.0	0.1	0.1	0.0
Morocco	3.2	2.6	3.6	2.4	1.2	1.6	1.5
Sudan	1.3	3.4	7.0	3.9	3.4	5.6	4.6
Tunisia	8.0	5.0	2.6	1.5	1.3	1.4	0.9
Eastern Africa							
Burundi	4.8	10.0	14.6	19.4	33.2	45.2	47.6
Comoros	..	..	32.7	17.4	9.2	7.5	9.6
Djibouti	..	..	23.4	23.2	11.5	15.4	13.8
Eritrea	..	..	..	21.9	37.9	10.0	11.3
Ethiopia	..	..	5.5	9.7	15.1	12.8	12.5
Kenya	5.1	4.1	7.5	8.3	3.7	4.2	4.7
Madagascar	3.3	3.5	8.4	12.7	13.6	13.6	12.1
Malawi	10.7	9.7	16.0	26.3	20.7	21.6	20.5
Mauritius	..	..	3.5	1.3	0.4	0.3	1.1
Mozambique	..	..	15.0	41.1	26.9	22.6	22.2
Rwanda	7.4	13.0	10.7	29.6	21.1	20.7	20.9
Seychelles	8.5	21.3	10.8	4.2	1.8	1.4	0.3
Somalia	10.6	19.5	50.7	53.6	..	.	.
Tanzania	..	..	20.1	18.7	13.4	12.7	16.7
Uganda	3.5	1.7	6.5	15.7	13.8	15.6	14.5
Zambia	1.5	3.2	11.9	24.4	19.2	13.4	9.2
Zimbabwe	0.2	0.1	3.3	5.9	3.7	.	.
Middle Africa							
Angola	..	..	1.8	5.8	3.5	0.4	0.4
Cameroon	2.8	4.2	2.5	5.0	4.8	9.4	9.3
Central African Republic	6.7	10.1	14.5	13.7	6.9	9.0	10.3
Chad	3.1	7.8	12.5	14.9	9.1	4.5	5.0
Congo, Dem. Rep.	2.7	2.0	4.8	3.8	29.7	23.3	12.2
Congo, Rep.	5.5	6.8	4.6	8.7	5.6	3.4	1.7
Equatorial Guinea	..	4.3	34.9	23.6	0.9	0.3	0.2
Gabon	3.9	3.5	2.1	2.1	0.5	0.3	0.4
Sao Tome and Principe	..	..	..	..	35.4	17.3	24.8

	1960-69	1970-79	1980-89	1990-99	2000-05	2006	2007
Southern Africa							
Botswana	20.8	13.6	8.0	2.4	0.5	0.6	0.8
Lesotho	15.7	17.6	25.7	14.1	7.4	4.7	7.8
Namibia	..	..	1.0	5.3	3.0	1.8	2.4
South Africa	..	..	..	0.3	0.4	0.3	0.3
Swaziland	16.5	6.6	6.2	3.3	1.6	1.3	2.2
Western Africa							
Benin	3.5	6.5	8.9	13.1	9.4	8.1	8.7
Burkina Faso	2.9	8.7	11.7	16.5	13.2	15.1	13.7
Cape Verde	..	..	34.4	26.6	16.0	11.5	11.3
Cote d'Ivoire	2.5	2.4	2.4	7.9	3.0	1.4	0.8
Gambia	8.8	10.5	31.1	18.3	14.1	14.6	11.2
Ghana	1.8	2.7	6.2	9.7	12.3	9.2	7.7
Guinea	..	..	5.2	10.6	6.9	5.0	4.9
Guinea-Bissau	..	20.0	48.1	48.5	34.5	25.9	32.3
Liberia	12.9	4.2	10.2	51.9	24.1	43.8	94.7
Mali	7.1	11.6	20.0	17.7	13.4	14.1	14.9
Mauritania	4.4	19.9	24.8	18.6	19.4	7.1	13.8
Niger	2.3	8.6	13.1	16.0	15.0	14.1	12.8
Nigeria	1.0	0.4	0.3	0.8	1.3	7.8	1.2
Senegal	3.4	6.1	11.7	11.6	8.9	8.8	7.5
Sierra Leone	3.0	2.7	8.7	18.2	34.8	24.2	32.2
Togo	5.3	8.0	12.3	10.8	3.7	3.6	4.8
Country Groups							
Sub-Saharan Africa	2.4	2.2	3.9	5.3	4.8	5.5	4.1
Middle East & North Africa	2.3	3.6	2.1	2.2	1.9	2.4	2.1
World	0.3	0.3	0.3	0.2	0.2	0.2	0.2

Source: World Bank, 2009: World Development Indicators

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...High-income countries in Africa had high net food imports per capita, but they did not have problems paying for their large food imports because they had ample sources of foreign currencies. [...] Conversely, low-income countries imported less food per capita, but their agricultural export revenues, or even sometimes, their total merchandise export revenues, could not cover their relatively small food import bills....

.... [[The] stagnation of per capita net food imports contrasts the steady and sharp increase in total net food imports [...] and confirms that the population increase played an important role in the increase in Africa's import demand for food ...

Much has been said about domestic production not being able to meet domestic demand fully, but the relatively small shares of net food imports in GDP were signs that domestic food production has played a significant role in feeding the growing African population. Still, the weakness of domestic production especially for Sub-Saharan Africa lies mainly in its inability to deal with an eventual sustained increase in per capita consumption. Unless food production per capita increases or unless many surplus areas in the continent are connected to the market, any sharp increase in per capita consumption, because of, say, a sudden increase in income or a dramatic change in dietary pattern in the low income will only be met by an increase in food imports.

ISBN 978-92-5-107088-8

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I2497E/1/11.11