



**INSTITUTE OF AGRICULTURAL
AND FOOD ECONOMICS
NATIONAL RESEARCH INSTITUTE**

Feeding the population of the African continent

Bożena Gulbicka

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**COMPETITIVENESS OF THE POLISH FOOD
ECONOMY UNDER THE CONDITIONS OF
GLOBALIZATION AND EUROPEAN INTEGRATION**

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Assessment of the development conditions and challenges for the agri-food sector in Poland at the background of the global trends within the framework of the research task: *Seeking for new production balance in Poland at the background of the global trends*

Feeding the population is one of the basic socio-economic problems for many countries in Africa. The purpose of the present work is to analyse the key issues related to feeding the population against the background of socio-economic development of regions and countries on the African continent.

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Introduction

Feeding the population is the most fundamental socio-economic problem for many African countries. On the African continent, over 20% of people do not have, at all times, physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

The purpose of the present work is to analyse the key issues related to feeding the population against the background of socio-economic development of regions and countries on the African continent.

There is a close correlation between the socio-economic development of countries, and poverty and undernourishment. In less developed countries, a considerable share of the population has no chance to satisfy their nutritional needs, no access to education and health care. Taking this into consideration, Chapter I (*Socio-economic development of African countries*) presents the development of African regions and countries with the use of composite statistics of human development (Human Development Index) and the basic measures related to the three areas of human life: health, education and income level.

Chapter II (*Feeding the population of the African continent against global indicators*) presents: changes in nutrition in various regions of the world and on the African continent, as well as the problem of undernourishment and hunger indicators. Moreover, it discusses the issue of factors contributing to an increase or decrease in famine and undernourishment of the African population.

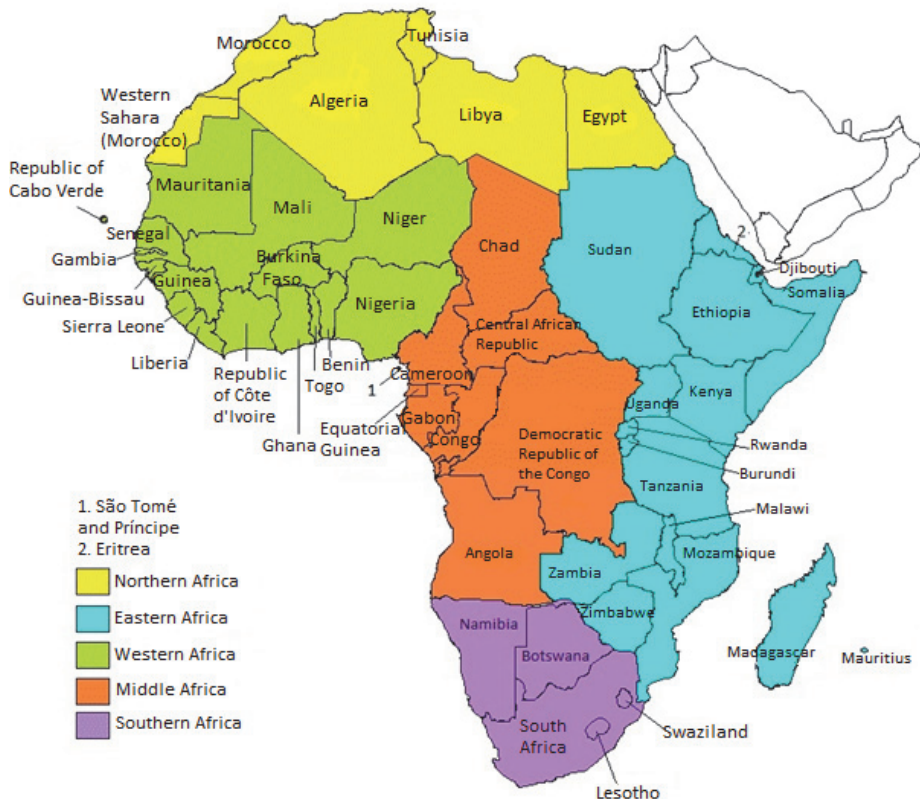
Feeding the population of the African continent depends, above all, on the production level and dynamics of primary agricultural materials and food; therefore, Chapter III (*Food production trends in Africa*) presents natural and other conditions of agricultural development, changes in and diversification of production of primary plant and animal products on the African continent, and food (product) and calorific self-sufficiency.

Chapter IV (*Food consumption on the African continent*) presents the dynamics and diversity of plant and animal product consumption over a twenty-year period. It also describes the patterns of food consumption on the African continent.

The analysis of feeding the population of the African continent was carried out for individual regions and countries. The breakdown into regions of the African continent in the present work is consistent with the UN classification. Countries belonging to geographical regions were identified on the basis of economic indicators and other factors considered in the UN statistics [68].

The breakdown of the African continent into geographical regions is presented on the map below (Map 1)¹.

Map 1. Breakdown of the African continent into geographical regions according to the UN classification



Source: United Nations Statistic Division [68].

The analysis of the population feeding issues uses statistical data developed by the FAO [*Food Balance Sheets, FAO Statistical Yearbook 2012*], the data of the World Bank and the International Monetary Fund, FAO reports: *The State of Food Insecurity in the World 2005, 2011, 2012*; FAO study: *The State of Food and Agriculture 2012*. Reference literature and own works were also used, i.e.: *Bezpieczeństwo żywnościowe krajów rozwijających się, Problemy wyżywienia w krajach rozwijających się* [Food security in developing countries, Feeding issues in developing countries] (published by IERiGŻ-PiB).

¹ In Eastern Africa, no data were available for South Sudan (which gained independence in 2011). In the present study, the entire Sudan was included in Eastern Africa. Northern Africa does not include Northern Sahara, and Western Africa does not include Saint Helena island.

CHAPTER I

SOCIO-ECONOMIC DEVELOPMENT OF AFRICAN COUNTRIES

The purpose of development is to enhance socio-economic achievements, provide free choices to the people and secure personal development of individuals [40]. Therefore, the goal of each socio-economic development is not only to enhance economic achievements, but also to provide opportunities for intellectual development of individuals and to improve the living conditions of people.

The level of economic development determines social development not only at the time of its occurrence, but also in the preceding and following years. In general, the richer a country is, the more money it allocates to the financing of the social sphere (education, health), the extension of social infrastructure and investments whose effects will be visible after some time (investments in human capital). Similarly, the level of social development in a given year is the effect of appropriate investments in human capital in the preceding years, not only in education and health, but also in feeding the population.

1. Demographic characteristics of African countries

Africa is inhabited by over a billion people (2010). In the analysed twenty years, the number of people increased in all African countries, and in 1990–1999, the average annual population growth in Africa was 2.5%, and in the world – 1.5%. In Northern Africa, the annual population growth was 1.7%, and in Sub-Saharan Africa – 2.7%. In 2000–2010, the population growth rate was lower than in the preceding period; in the world it was 1.2% average annual and in Africa – 2.3%, with a lower rate in Northern Africa – annual population growth of 1.6%, and 2.5% in Sub-Saharan Africa.

According to the forecasts of the *Human Development Report 2011*, in 2010–2015 the population of the African continent will grow yet slower than in 2000–2010, namely by 1.4% average annual in Northern Africa, and 2.4% in Sub-Saharan Africa, 0.7% in East Asia and the Pacific, and 1.1% in the world. The lower rate of population growth results, e.g., from a decreased fertility rate.

In 1990–2010, the Total Fertility Rate¹ in the world decreased from 3.5 to 2.4 live births, i.e. by 31.5%; in Northern Africa from 4.9 to 2.2, i.e. by 55%; and in Sub-Saharan Africa from 6.5 to 4.8, i.e. by 26.2%.

¹ Total Fertility Rate (TFR) is the number of live births per woman in her 'childbearing age' (15–49). Replacement fertility rate is 2.10–2.15 births per woman.

In 1990–2010, the Total Fertility Rate in all African countries decreased, with the greatest drop in Southern Africa, e.g. in Botswana – 60.2%, from 6.7 to 2.6 live births. A high fertility rate, i.e. above five children per woman, is still noted in 16 countries of the region (Angola, Chad, Democratic Republic of the Congo, Gabon, Malawi, Rwanda, Somalia, Tanzania, Uganda, Zambia, Burkina Faso, Benin, Liberia, Mali, Niger and Nigeria).

A lower population growth rate is, above all, attributable to greater urbanisation, better education of women, popularisation of the TV and the Internet, encouraging contraception and migrations from areas with severe living conditions. According to studies, urbanisation lowers the Total Fertility Rate. Women in cities are more committed to work; more of them study; they have better access to health care and contraceptives.

Africa is a poorly urbanised continent. Only 40% of the population lives in cities (2010), while the global index is 50.4%. Northern Africa has a considerably higher level of urbanisation, namely 54.1%, with the greatest share of city dwellers in Libya – 78%, and the smallest in Egypt – 43.4%. In Sub-Saharan Africa, only 37.3% of the population lives in cities.

The urbanisation growth rate, i.e. the increase in the share of city inhabitants in the total population of the African continent, amounted to 3.4% in 2000–2010. It ranged from 1.9% in Djibouti to 7.2% in Burkina Faso. These countries are still poorly urbanised and have low level of human development.

2. Human Development Indices

Human development is measured by a number of indices, e.g. the state of health, educational attainments, economic activity, Gross Domestic Product per capita, state contribution to the financing of health care, environmental protection and educational expenses [31]. Due to the large number of indicators, international comparisons are difficult. Therefore, a composite statistic was developed that describes the human development of individual countries. Since 1990, the United Nations Development Programme (UNDP) has used a synthetic measure called the Human Development Index (HDI). It is used as a criterion to rank countries into levels of overall human development in subsequent years. The HDI composite statistic takes into consideration three areas of human life: health, education and income.

Until 2009, four basic statistics were used to calculate the HDI:

- Life Expectancy Index,
- Gross Enrolment Index – makes it possible to observe the flow of pupils through individual stages of education,

- Adult Literacy Rate – these two indicators were merged into one statistic illustrating the knowledge and education of societies,
- Gross Domestic Product per capita calculated at Purchasing Power Parity.

The HDI may be expressed by values in the range of [0,1]. The difference between the HDI calculated for each country and 1.0 shows the gap separating a given country from achieving full human development [34].

According to the HDI values, countries are divided into:

- poorly developed countries, HDI 0.000–0.500 – poor quality of life,
- medium-developed countries, HDI 0.501–0.800 – medium quality of life,
- highly developed countries, HDI 0.801–1.000 – high quality of life [55].

The authors of the 2009 UNDP report divided highly developed countries into two groups – with very high and high human development level, suggesting to call the first group developed countries, and all the other ones, with high, medium and low level of human development – developing countries. Countries were ranked according to the HDI and divided into four quartiles: countries with very high human development – 1st quartile, countries with high human development – 2nd quartile, countries with medium human development – 3rd quartile, and countries with low human development – 4th quartile.

In 2010, the UNDP introduced subsequent changes. The Literacy Index was rejected since, according to the experts, a significant improvement in this respect has been noted. In fact, this claim applies only to developed countries since in developing countries, especially in Africa, illiteracy still persists, especially among women. The Gross Enrolment Index (share of students enrolled in school against the total number of those who qualify for the particular grade level) was replaced by two indices, which include:

- mean years of schooling (of adults aged 25 and more),
- expected years of schooling (number of years of schooling that a child of school entrance age can expect to receive throughout life).

In 2010, the UNDP reports used Gross National Income (GNI) as the statistic measure of economic development which approximates income and consumption instead of Gross Domestic Product (GDP), which has been widely criticised for not taking into account the work carried out by households to provide for own needs (e.g. child care), subsistence farming, informal exchange and grey economy [55, 4].

In 2011, the HDIs of very highly developed countries ranged from 0.943 in Norway to 0.793 in Barbados. The HDIs of highly developed countries ranged from 0.783 in Uruguay to 0.698 in Tunisia, of medium-developed countries from 0.698 in Jordan to 0.522 in Bhutan, and of poorly developed countries from 0.510 in Solomon Islands to 0.286 in the Democratic Republic of the Congo.

Table 1. Human Development Indices (HDI) in the world and in Africa in 2011

Regions and countries	HDI rank	Human Development Index, HDI	Statistic measures determining the Human Development Index			
			Life expectancy at birth in years	Mean years of schooling	Expected years of schooling	Gross National Income per capita in USD*
1	2	3	4	5	6	7
World	-	0.682	69.8	7.4	11.3	10,082
Total Africa	-	0.493	57.4	4.8	9.6	2,616
Northern Africa	-	0.650	73.0	6.2	11.8	5,972
Algeria	96	0.698	73.1	7.0	13.6	7,658
Egypt	113	0.644	73.2	6.4	11.0	5,269
Libya	64	0.760	74.8	7.3	16.6	12,637
Morocco	130	0.582	72.2	4.4	10.3	4,196
Tunisia	94	0.698	74.5	6.5	14.5	7,281
Sub-Saharan Africa	-	0.463	54.4	4.5	9.2	1,966
Middle Africa	-	0.366	50.0	4.0	8.7	1,660
Angola	148	0.486	51.1	4.4	9.1	4,874
Chad	183	0.328	49.6	1.5	7.2	1,105
Democratic Republic of the Congo	187	0.286	48.4	3.5	8.2	280
Gabon	106	0.674	62.7	7.5	13.1	12,249
Equatorial Guinea	136	0.537	51.1	5.4	7.7	17,608
Cameroon	150	0.482	51.6	5.9	10.3	2,031
Congo	137	0.533	57.4	5.9	10.5	3,066
Central African Republic	179	0.343	48.4	3.5	6.6	707
São Tomé and Príncipe	144	0.509	64.7	4.2	10.8	1,792
Eastern Africa	-	0.406	56.0	3.8	8.6	1,174
Burundi	185	0.316	50.4	2.7	10.5	368
Djibouti	165	0.430	57.9	3.8	5.1	2,335
Eritrea	177	0.349	61.6	3.4	4.8	536
Ethiopia	174	0.363	59.3	1.5	8.5	971
Kenya	143	0.509	57.1	7.0	11.0	1,492
Malawi	171	0.400	54.2	4.2	8.9	753
Madagascar	151	0.480	66.7	5.2	10.7	824
Mauritius	77	0.728	73.4	7.2	13.6	12,918
Mozambique	184	0.322	50.2	1.2	9.2	898
Rwanda	165	0.429	55.4	3.3	11.1	1,133
Seychelles	52	0.773	73.6	9.4	13.3	16,729
Sudan	169	0.408	61.5	3.1	4.4	1,894
Tanzania	152	0.466	58.2	5.1	9.1	1,328
Uganda	161	0.446	54.1	4.7	10.8	1,124
Zambia	164	0.430	49.0	6.5	7.9	1,254
Zimbabwe	173	0.376	51.4	7.2	9.9	376
Western Africa	-	0.431	54.1	4.2	8.4	1,656
Benin	167	0.427	56.1	3.3	9.2	1,364
Burkina Faso	181	0.331	55.4	1.3	6.3	1,141
Gambia	168	0.420	58.5	2.8	9.0	1,282
Ghana	135	0.541	64.2	7.1	10.5	1,584

Table 1 (cont.)

Guinea	178	0.340	54.1	1.6	8.6	863
Guinea-Bissau	176	0.353	48.1	2.3	9.1	994
Liberia	182	0.329	56.8	3.9	11.0	265
Mali	175	0.359	51.4	2.0	8.3	1,123
Mauritania	159	0.453	58.6	3.7	8.1	1,859
Niger	186	0.295	54.7	1.4	4.9	641
Nigeria	156	0.459	51.9	5.0	8.9	2,069
Senegal	155	0.459	59.3	4.5	7.5	1,708
Sierra Leone	180	0.336	47.8	2.9	7.2	737
Togo	162	0.435	57.1	5.3	9.6	798
Cabo Verde	133	0.568	74.2	3.5	11.6	3,402
Côte d'Ivoire	170	0.400	55.4	3.3	6.3	1,387
Southern Africa	-	0.611	53.0	8.3	12.8	9,062
Botswana	118	0.633	53.2	8.9	12.2	13,049
Lesotho	160	0.450	48.2	5.9	9.9	1,664
Namibia	120	0.625	62.5	7.4	11.6	6,206
South Africa	123	0.619	52.8	8.5	13.1	9,469
Swaziland	140	0.522	48.7	7.1	10.6	4,484

* At 2005 Purchasing Power Parity

Source: UNDP Human development report 2011, New York Oxford University Press 2011.

2.1. Diversity of development indicators on the African continent

In 2011, the Human Development Index (HDI) for all countries in the world was 0.682; life expectancy – 69.8 years; mean years of schooling – 7.4 years; expected years of schooling – 11.3 years; Gross National Income per capita (at 2005 Purchasing Power Parity) – USD 10,082.

In 2011, the HDI for all African countries was 0.493; life expectancy – 57.4; mean years of schooling – 4.8 years; expected years of schooling – 9.3 years; Gross National Income per capita (at 2005 Purchasing Power Parity) – USD 2,616. Only three African countries belong to the group of countries with high human development. These are Seychelles – HDI of 0.773; Libya – HDI of 0.760; and Mauritius – HDI of 0.728.

Countries with medium level of human development on the African continent include: Tunisia – HDI of 0.698; Algeria – HDI of 0.698; Gabon – HDI of 0.674; Ghana – HDI of 0.541; Equatorial Guinea – HDI of 0.537; Egypt – HDI of 0.644; Botswana – HDI of 0.633; Namibia – HDI of 0.625; South Africa – HDI of 0.619; Morocco – HDI of 0.582; Cabo Verde – HDI of 0.568; Congo – HDI of 0.533.

The remaining African countries are on the far end of the ranking list according to their Human Development Index (HDI). No less than 38 countries belong to the group of countries with low level of development the HDI ranging from 0.509 in Kenya to 0.286 in the Democratic Republic of the Congo.

Human Development Indices (HDI) in Africa in 2011

Democratic Republic of the Congo	0.286	Lesotho	0.450
Niger	0.295	Mauritania	0.453
Burundi	0.316	Nigeria	0.459
Mozambique	0.322	Senegal	0.459
Chad	0.328	Tanzania	0.466
Liberia	0.329	Madagascar	0.480
Burkina Faso	0.331	Cameroon	0.482
Sierra Leone	0.336	Angola	0.486
Guinea	0.340	São Tomé and Príncipe	0.509
Central African Republic	0.343	Kenya	0.509
Eritrea	0.349	Swaziland	0.522
Guinea-Bissau	0.353	Congo	0.533
Mali	0.359	Equatorial Guinea	0.537
Ethiopia	0.363	Ghana	0.541
Zimbabwe	0.376	Cabo Verde	0.568
Malawi	0.400	Morocco	0.582
Côte d'Ivoire	0.400	South Africa	0.619
Sudan	0.408	Namibia	0.625
Gambia	0.420	Botswana	0.633
Benin	0.427	Egypt	0.644
Rwanda	0.429	Gabon	0.674
Djibouti	0.430	Algeria	0.698
Zambia	0.430	Tunisia	0.698
Togo	0.435	Mauritius	0.728
Uganda	0.446	Libya	0.760
		Seychelles	0.773

Source: UNDP Human development report 2011, New York Oxford University Press 2011.

2.2. Dynamics of Human Development Indices

In 1990–2011, the level of human development in most African countries measured with HDI demonstrated an upward trend.

In Sub-Saharan Africa, the average annual HDI growth rate was 0.90%. In this region, the HDI growth rate was much diversified among individual countries. It was negative only in four countries, including:

- Zimbabwe – the HDI decreased from 0.425 in 1990 to 0.376 in 2011, i.e. by 0.58% average annual,
- Swaziland – the HDI decreased from 0.526 in 1990 to 0.522 in 2011, i.e. by 0.03% average annual,
- Lesotho – the HDI decreased from 0.470 in 1990 to 0.450 in 2011, i.e. by 0.02% average annual,
- the Democratic Republic of the Congo – the HDI decreased from 0.289 in 1990 to 0.286 in 2011, i.e. by 0.04% average annual.

In Northern Africa, Human Development Indices in 1990–2011 increased by an average annual ranging from 1.13% in Algeria to 1.52% in Morocco, resulting in an almost twice higher growth rate than in the world (0.66%).

In Middle Africa, a positive HDI growth rate is recorded in Rwanda – 2.97% average annual. A lower, but also relatively high average annual growth rate was noted in Uganda, namely 1.93%, and in Tanzania – 1.12%. After twenty years, the above-mentioned states still belong to the group of countries with a low Human Development Index. The HDI decreased in the Democratic Republic of the Congo.

In Eastern Africa, average annual HDI growth rate in 1990–2011 ranged from 0.52% in Kenya to 2.97% in Rwanda. In 1990–2011, Mauritius achieved a high level of human development with a HDI increase of 0.78% average annual. The HDI decreased in Zimbabwe.

In Western Africa, average annual HDI growth rate was positive in all countries and ranged from 0.80% in Togo to 2.05% in Niger.

In Southern Africa, the HDI decreased in Lesotho and in Swaziland. In other countries, the annual HDI growth rate was positive and started from the value of 0.03% in South Africa.

3. Human health

The basic statistic measure used for international comparisons of societies' health is life expectancy. It expresses the average number of years people at a given age are expected to live. This statistic measure is used to construct a composite statistic of Human Development Index (HDI), which involves life expectancy at birth without a breakdown into males and females.

In the 21st century, the global life expectancy extended, and aging of the population progressed. In Africa, in turn, the share of people over 65 amounted to only 5.9% of the total population, while on the global scale it reached 12%. The African population is young. The share of people aged under 15 was 40.1% in Africa and 26.5% in the world.

In 1990–2009, global life expectancy increased from 51 to 69.8 years. In the entire Africa, it increased to 57.4 years which is not much. In Middle Africa, in Chad it increased by three years to 49.6 years, in the Democratic Republic of the Congo by 4.6 years to 48.4 years, and in the Central African Republic by one year to 48.4 years. What contributed the most to a decrease in life expectancy were armed conflicts that entailed death, famine, lack of medicine against malaria and other diseases, and lack of medical aid.

In most countries of Southern Africa, over the 20 years covered by the analysis life expectancy decreased, mainly due to HIV/AIDS. In Botswana, life expectancy decreased by 6.6 years to 53.2 years, in Lesotho by 9.1 to 48.2 years, in South Africa by 9 years to 52.8 years, and in Swaziland by 8 years to 48.7 years. In Eastern Africa, life expectancy also decreased, in Zambia by 5.4 years

to 49 years, and in Zimbabwe by 8.2 years to 51.4 years. In all of the aforementioned countries, HIV infection has spread.

The highest life expectancy is observed in Northern Africa (from 73.1 years in Algeria to 74.8 years in Libya). Apart from Northern Africa, only Mauritius, Seychelles and Cabo Verde had life expectancy at this level. The lowest life expectancy is observed in Sierra Leone – 47.8 years (Western Africa), i.e. 27 years lower than in Libya.

In most African countries, life expectancy was higher in 2009 than in 1990. But there were also countries where life expectancy shortened in the last 20 years. It was the result of very poor, and sometimes even totally lacking medical care, whose consequence was the prevalence of many diseases, including AIDS, tuberculosis, mosquito-transmitted diseases (malaria), yellow fever and others. Diseases widespread in Africa include viral haemorrhagic fever, dengue, tetanus, typhoid fever and river blindness [50].

In 2011, there were 34 million people living with HIV (adults and children) in the world, which is 15.6% more than in 2001 – 29.4 million. The number of new infections decreased from 3.2 to 2.5 million, i.e. by 21.9%. The region that is most affected by the epidemic is Sub-Saharan Africa. No less than 69% of all people infected with HIV lived in Sub-Saharan Africa, and in 2001 – 71%. In Sub-Saharan Africa, every 20th person is infected with HIV (4.9% of the population). In 2011, there were 34 million people living with HIV, i.e. 69% of them lived in Sub-Saharan Africa.

More than 8 million people with HIV had access to antiretroviral therapy. Yet, 7 million people, qualified to the treatment programme, had no access thereto. Even 72% of eligible children have no access to antiretroviral treatment. A report on AIDS in the world demonstrated that women and girls are in particular danger of becoming infected due to a lack of gender equality and sexual violence [51].

According to the 2012 UNAIDS report, in countries with low or medium income, over 75% of funds allocated to antiretroviral therapy (ARV) originated from international funds in 2009–2011.

In 2011, USD 16.8 billion was allocated to counteracting HIV/AIDS, and by 2015 USD 22–24 billion a year is needed.

According to the 2012 UNAIDS report, tuberculosis is still the main cause of death of people infected with HIV. All people with tuberculosis and HIV should be immediately subject to ARV therapy to decrease the risk of developing an advanced stage of the disease by 65%. In 2011, 48% of people with tuberculosis and HIV benefited from an antiretroviral treatment.

Generally, the disease affects developing countries. The World Health Organization prognoses that if the current trend of incidence is maintained,

ca. 1 billion people will be infected with mycobacterium tuberculosis, and ca. 200 million people will become ill by 2015 [8].

In 2011, 8.7 million of new cases of tuberculosis were recorded, including 0.5 million children and 2.9 million women. In the same year, 1.4 million people died of tuberculosis, 430,000 of which were infected with HIV [28].

The greatest number of new cases of tuberculosis per 100,000 people was recorded in Africa – 262 on average. The indices of new cases of tuberculosis were much higher in: Swaziland – 1,313; South Africa – 993; Namibia and Sierra Leone – 723; Lesotho – 632; Zimbabwe – 603; Djibouti – 602; Gabon – 450; the Central African Republic – 400; Congo – 387; and the Democratic Republic of the Congo – 327. The fewest new cases of tuberculosis were detected in Northern Africa – from 17 cases per 100,000 people in Egypt to 100 cases in Morocco, which is much less than the average for the entire Africa [28].

The World Health Organization has developed the *Stop TB Strategy* to free the world from this disease. The strategy envisages reducing the number of ill people by 2015 by ensuring them high-quality diagnostics, introducing new methods of treating tuberculosis and new pharmaceutical drugs. Funds allocated to counteracting tuberculosis are to originate from the budgets of countries interested in fighting the disease and from international aid [72].

Over 1/4 of the African population is exposed to tropical diseases. These diseases spread owing to hot and humid climate and environmental degradation (in Sub-Saharan Africa, 23% of people live in degraded environment, in Northern Africa – 25%).

According to a WHO report, the transmission of malaria is possible in areas inhabited by 2.1 billion people. For example, in Chad 80% of the population live in areas of high malaria transmission (one and more cases per 1,000 people), in the Democratic Republic of the Congo – 97%, and 100% in Equatorial Guinea, Congo, the Central African Republic, Rwanda, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Sierra Leone, Togo and Zambia [71].

Child mortality is a serious problem on the African continent. Among all diseases, no less than 16% of deaths in children under the age of five are due to malaria [71]. The child mortality rate reflects not only the state of health and food quality, but also the level of socio-economic development of the country. In very highly developed countries, mortality of children under five was a single-digit number. In Sweden, Finland, Luxembourg and Norway, three children per 1,000 live births died, while in the Republic of Ireland only two. But in countries with a low Human Development Index, under-five mortality rates are very high, e.g. in the Democratic Republic of the Congo as many as 173 children out of 1,000 live births die before reaching the age of five.

The number of children dying before the age of five in the world decreased from 12 million in 1990 to 7.6 million in 2010; in other words, in 1990 each day 21,000 children under the age of five died, while in 2010 ca. 12,000. As many as 70% of them die before the age of one. In Sub-Saharan Africa, the risk of a child's death is much greater. The main causes of under-five mortality include: undernourishment – 1/3 of cases; pneumonia – 18%; labour complications – 15% [51].

The decrease in child mortality in the world accelerated from 1.9% a year in 1990–2000 to 2.5% a year in 2000–2010, but it is still insufficient to achieve the fourth Millennium Development Goal. The number of children dying before the age of five per 1,000 live births decreased from 88 in 1990 to 57 in 2010, i.e. by 35%.

The fourth Millennium Development Goal is to reduce the under-five mortality rate by two-thirds between 1990 and 2015. On the global scale, the under-five mortality rate in 1990 was 88 per 1,000 live births, and in 2015 the rate should decrease to 35 deaths per 1,000 live births [51].

In Northern Africa, a decrease in child mortality rate was much greater than the global average, namely 67%, from 82 to 27 cases per 1,000 live births, i.e. by 5.6% a year. Northern Africa achieved the Millennium Goal of 27 death cases per 1,000 live births in 2010 [34, 35].

In Sub-Saharan Africa, progress in reducing the under-five mortality rate was smaller. In 1990–2010, child mortality decreased by 30%, i.e. from 174 cases per 1,000 live births to 121 cases in 2010 (1.8% average annual). In Sub-Saharan Africa, the Millennium Goal – 58 cases per 1,000 live births – will not be achieved by 2015 [51].

In all African countries, the lowest child mortality rate is noted in Northern African countries, from 16 children under the age of five per 1,000 live births in Tunisia to 36 in Morocco and Algeria. In Africa, the highest child mortality rate was in Mali – 178 children under the age of five per 1,000 live births. High rates were also recorded in Sierra Leone – 174; the Democratic Republic of the Congo – 170; and Angola – 161. In all countries, a downward trend in under-five mortality rate was noted. In the last decade, an increasing number of children was immunised against measles, diphtheria, tetanus and pertussis.

According to the data of the World Health Organization, one-eighth of the world's population suffers from thirst and diseases caused by drinking polluted water. Only 3% of them live in Europe, 53% come from Asia and 38% from Africa. Women and children in Africa and Asia cover, on average, 6 km to reach a water intake. They cover this distance with a twenty-litre canister, and the needs of a family are many times greater [35, 47].

Drawing water from dangerous sources entails the risk of infection with parasites and malaria. Digestive system diseases reduce the absorption of nutrients from food and lead to undernourishment. Each village should have a well to protect people against diseases and children against dropping out of school. Schools are often not equipped with sanitation facilities. Lack of hygiene contributes to infections that make studying impossible. Lack of clean water contributes to a greater incidence of various diseases, a limited psycho-physical development of children and their ability to learn. Lack of water to quench thirst and irrigate fields leads to poverty [47].

Access to clean water in Africa in 1990 and 2011 (%)

Country	1990	2011	Country	1990	2011
Somalia	-	30	Burundi	69	74
Democratic Republic of the Congo	43	46	Guinea	51	74
Mozambique	34	47	Liberia	-	74
Madagascar	29	48	Uganda	41	75
Ethiopia	14	49	Benin	57	76
Chad	40	50	Lesotho	80	78
Mauritania	30	50	Zimbabwe	79	80
Niger	35	50	Burkina Faso	44	80
Angola	42	53	Côte d'Ivoire	76	80
Tanzania	55	53	Morocco	73	82
Sudan	67	55	Algeria	94	84
Sierra Leone	37	58	Malawi	42	84
Togo	49	59	Ghana	53	86
Kenya	43	61	Gabon	-	88
Nigeria	47	61	Gambia	75	89
Zambia	49	64	South Africa	83	92
Mali	28	65	Djibouti	75	93
Central African Republic	59	67	Namibia	64	93
Rwanda	62	69	Tunisia	82	96
Congo	-	72	Seychelles	96	96
Guinea-Bissau	36	72	São Tomé and Príncipe	-	97
Swaziland	39	72	Botswana	92	97
Senegal	60	73	Egypt	93	99
Cameroon	49	74	Mauritius	99	100

Source: www.fao.org/economic/ess/ess-fs/ess-fadata/en/ [22].

The best situation in terms of access to clean water is in Northern Africa, where 92% of people have access to it, from 82% in Morocco to 99% in Egypt (98% in Libya, 96% in Tunisia). In Sub-Saharan Africa, 63% of people have access to clean water, from 30% in Somalia to 100% in Mauritania.

In 1990–2011, access to clean water in Africa increased by 17 percentage points (to 67%), in Northern Africa by 4 percentage points (to 92%), and in Sub-Saharan Africa by 15 percentage points (to 63%). In most African countries availability of clean water increased significantly, with the exception

of Sudan – a decrease by 15 percentage points and Tanzania – a decrease by 2 percentage points.

Only 57% of people in Africa had access to sanitation facilities: in Northern Africa – 90%, from 70% in Morocco to 97% in Libya. In Sub-Saharan Africa, only 31% of people had access to sanitation facilities, from 10% in Niger to 91% in Mauritius.

Access to sanitation facilities in 1990 and 2011 in Africa (%)

Country	1990	2011	Country	1990	2011
Niger	4	10	Namibia	24	32
Togo	13	11	Gabon	-	33
Chad	8	12	Central African Republic	11	34
Tanzania	7	12	São Tomé and Príncipe	-	34
Sierra Leone	11	13	Uganda	27	35
Madagascar	8	14	Zimbabwe	41	40
Benin	5	14	Zambia	42	42
Ghana	7	14	Cameroon	47	48
Congo	-	18	Burundi	42	50
Burkina Faso	8	18	Senegal	36	51
Liberia	-	18	Malawi	39	53
Mozambique	9	19	Swaziland	49	57
Guinea	10	19	Angola	29	59
Guinea-Bissau	-	19	Djibouti	62	61
Ethiopia	2	21	Rwanda	32	61
Mali	15	22	Botswana	39	64
Somalia	-	24	Gambia	-	68
Sudan	27	24	Morocco	53	70
Côte d'Ivoire	20	24	South Africa	64	74
Lesotho	-	26	Tunisia	73	90
Mauritania	16	27	Mauritius	89	91
Kenya	25	29	Algeria	89	95
Democratic Republic of the Congo	17	31	Egypt	72	95
Nigeria	38	31	Libya	97	97
			Seychelles	97	97

Source: www.fao.org/economic/ess/ess-fs/ess-fadata/en/.

In 1990–2011, access to sanitation facilities in Africa increased only by 6 percentage points, in Northern Africa by 18 percentage points, and in Sub-Saharan Africa only by 5 percentage points. Access to sanitation facilities increased in all African countries except for Nigeria – a decrease by 7 percentage points (to 31%), Togo – a decrease by 2 percentage points (to 11%), and Sudan – a decrease by 3 percentage points (to 24%).

The capacity to satisfy health care needs is illustrated by the level of annual expenditures on health from all sources per capita. According to the 2011 UNDP report, they amounted to USD 860 in the world, but this level was not

achieved in any African country. The largest sum of money was spent on health in Equatorial Guinea – USD 709 per capita a year; USD 612 in Botswana; and USD 485 in South Africa; and the lowest in: Eritrea – USD 10.1; Ethiopia – USD 14.7; and the Democratic Republic of the Congo – USD 15.6.

Sub-Saharan Africa has very limited resources for health care. Therefore, international non-governmental organisations play a major role in combating HIV/AIDS, tuberculosis and malaria.

4. Education

Investments in human capital, public and private, are the cheapest way of raising the competitiveness of the economy and accelerating economic growth. Investments in human capital rest on four pillars: learning to know, learning to do, learning to live together, and learning to be [9].

Since 2010, educational attainment is specified in the Human Development Index as the mean years of schooling (of a 25-year-old person) and the expected years of schooling (of a 5-year-old child).

The mean number of years of schooling on the African continent per adult was 4.8 (2011), with 6.2 years in Northern Africa and 4.5 years in Sub-Saharan Africa. The expected number of years of schooling on the African continent is twice higher than the mean number of years of schooling. These differences prove that the educational needs are not satisfied and that the current situation should change (Table 1).

In Northern Africa, the mean number of years of schooling ranged from 7.3 in Libya to 4.4 in Morocco. In Western Africa, the mean number of years of schooling was 4.2, ranging from 1.3 years in Burkina Faso to 7.1 in Ghana. In Middle Africa, the mean number of years of schooling was 4.0, ranging from 1.5 years in Chad to 5.9 years in Cameroon and Congo. In Eastern Africa, the mean number of years of schooling was 3.8 years, ranging from 1.3 years in Mozambique to 9.4 years in Seychelles. In Southern Africa, the average number of years of schooling was 8.3, and ranged from 5.9 in Lesotho to 8.9 in Botswana. The mean number of years of schooling in most African countries shows that a considerable number of adults have not even graduated from primary school.

Access to education on the African continent is still limited, which results in illiteracy. In Northern Africa, the largest share of illiterate adults is noted in Morocco – 43.9%, and the smallest in Libya – 11%. In Middle Africa, the largest share of illiterate adults is in Chad – 66.4%, and the smallest in Equatorial Guinea – 6.7%. In Burkina Faso, 74% of adult population are illiterate, and only 15.2% in Cabo Verde (Western Africa).

Mean years of schooling in Africa in 2011

Mozambique	1.2	Nigeria	5.0
Burkina Faso	1.3	Tanzania	5.1
Niger	1.4	Madagascar	5.2
Chad	1.5	Togo	5.3
Ethiopia	1.5	Equatorial Guinea	5.4
Guinea	1.6	Cameroon	5.9
Mali	2.0	Congo	5.9
Guinea-Bissau	2.3	Lesotho	5.9
Burundi	2.7	Egypt	6.4
Gambia	2.8	Tunisia	6.5
Sierra Leone	2.9	Zambia	6.5
Sudan	3.1	Algeria	7.0
Rwanda	3.3	Kenya	7.0
Benin	3.3	Ghana	7.1
Côte d'Ivoire	3.3	Swaziland	7.1
Eritrea	3.4	Mauritius	7.2
Democratic Republic of the Congo	3.5	Zimbabwe	7.2
Central African Republic	3.5	Libya	7.3
Cabo Verde	3.5	Namibia	7.4
Mauritania	3.7	Gabon	7.5
Djibouti	3.8	South Africa	8.5
Liberia	3.9	Botswana	8.9
São Tomé and Príncipe	4.2	Seychelles	9.4
Malawi	4.2		
Morocco	4.4		
Angola	4.4		
Senegal	4.5		
Uganda	4.7		

Source: UNDP Human development report 2011, New York Oxford University Press 2011.

In Eastern Africa, differences between countries as regards the prevalence of illiteracy are also considerable. The largest share of illiterates is observed in Ethiopia – 64%, and the smallest in Zimbabwe – 8.1%. Southern Africa is characterised by insignificant differences in the prevalence of illiteracy among adults. The largest share of illiterates is in Botswana – 15.9%, and the smallest in South Africa – 11%.

A large number of illiterate women are a specific feature of the African continent. It can be explained with a broader issue of gender inequality against the law resulting from the tradition and prevailing religion (Islam) that make women subordinate to men.

The difficulties of the African population in getting education are reflected in considerably lower indicators of secondary education among people aged 25 and over against the global indicators. Secondary education was acquired by 52% of women and 63% of men in the world, and in Sub-Saharan Africa only by ca. 24% and 35%, respectively. The largest share of people with secondary education is in the countries of Southern Africa and Northern Africa. For

example, in South Africa, 72% of men and 69% of women had secondary education, and in Botswana these rates were even higher – 77.5% and 73.5%. In Northern Africa, Egypt is the country with the largest share of people with secondary education – 59% of men, and 43% of women.

Percentage share of working children aged 7–14 in Africa in 2010

Mozambique	1.8	Liberia	37.4
Lesotho	2.6	Equatorial Guinea	37.7
Rwanda	7.5	Kenya	37.7
Egypt	7.9	Uganda	38.2
Botswana	8.0	Togo	38.7
Swaziland	11.2	Democratic Republic of the Congo	39.8
Burundi	11.7	Malawi	40.3
Morocco	13.2	Burkina Faso	42.1
Zimbabwe	14.3	Gambia	43.5
Sierra Leone	14.9	Côte d'Ivoire	45.7
Namibia	15.4	Niger	47.1
Senegal	18.5	Guinea	48.3
Mali	23.0	Ghana	48.9
Madagascar	26.0	Guinea-Bissau	50.5
South Africa	27.7	Ethiopia	56.0
Angola	30.1	Chad	60.4
Congo	30.1	Central African Republic	67.0
Tanzania	31.1	Benin	74.4
Zambia	34.4		

Source: *FAO Statistical Yearbook 2012*.

One of the reasons of a low level of education of people on the African continent is the prevalence of work performed by children aged 7–14. The smallest numbers of children work in Mozambique – 1.8%, and the greatest in Benin – 74.4%.

The greater part of the African countries has limited access to education. These are countries with a low GDP per capita and a high share of working children, who cannot afford to study. They come from very poor families, and their small earnings save the family's budget.

Access to education is demonstrated by the share of public expenditure allocated to education in Gross Domestic Product. In Africa, this share varies a lot, from 1.2% (USD 8.6 per capita) in the Central African Republic to 13% (USD 196 per capita) in Lesotho, while in the world, USD 495 is allocated to education per capita, which represents 4.9% of public expenses in GDP.

Public expenditure on education in Sub-Saharan Africa represented 5.2% of GDP in 2005–2010, which translated into merely USD 109 per capita a year. Far more public funds were allocated to education in Botswana, namely USD

1,009 per capita a year, which represented 8% share in GDP. Botswana is a country with the largest share of adults with secondary education (77%) on the African continent, a relatively small share of illiterates (15.9%), and a significantly higher number of years of schooling than the average – 8.9 years (the highest number is in Seychelles – 9.4 years), and only 8% of working children.

On the global scale, there were 14.1 personal computers per 100 people (2002–2009), while in Northern Africa from 1.1 in Algeria to 9.7 in Tunisia. In Sub-Saharan Africa, the greatest number of computers per 100 people was in Namibia – 23.2; in Seychelles – 21.1; and in Mauritius – 16.7; followed by Cabo Verde – 14.3; Sudan – 10.8; Zimbabwe – 7.6; and Botswana – 6.6. In the remaining countries of Sub-Saharan Africa, this rate ranged from 0.2 in Chad, Guinea-Bissau, Lesotho and Malawi to 4.4 in Mauritania. Apart from Northern Africa, Mauritius and Seychelles – where almost all people have access to electricity – in other countries the share of people with access to electricity ranged from 75% in South Africa to 9% in Uganda and Malawi.

On the global scale, per every 100 people there were 30 Internet users. In Africa rates higher than the global average are noted only in Morocco (49), Seychelles (40.8), and Tunisia (36.6). In Sub-Saharan Africa, there were only 11.3 Internet users per 100 people. Considerably more Internet users were to be found in Mauritius – 28.7; Nigeria – 28.4; Chad – 25.9; Senegal – 16; Rwanda – 13; Uganda – 12.5; and in South Africa – 12.3. The smallest number of Internet users could be found in the Democratic Republic of the Congo and in Niger – only 0.7 users per 100 people.

5. Gross Domestic Product²

Africa is inhabited by almost 15% of the global population, but this continent generates only 4% of the global GDP (at Purchasing Power Parity in USD).

In 2010, the global economy resumed its growth, which globally amounted on average to 3.6%, and 3.1% in 2011. Developed countries developed at the rate of 1.9% in 2011, and developing countries at the rate of 6.0% [53].

The development of African countries was more dynamic than the development of the world economy. The factors that support economic growth in Africa include: demand for African raw materials created by China, India and most developed countries (France, the US), increase in the prices of raw materials on the global markets, inflow of foreign direct investments to the African continent and debt reduction by highly developed countries. Vast reserves of natural

² The Human Development Index (HDI) uses Gross National Income to evaluate the global economic situation of individual countries, yet all indicators that characterise the development of education, health and income diversity are related to the Gross Domestic Product.

resources, for which there is a huge demand on the global markets, made the economic growth of African countries more dynamic. In some countries, almost all revenues were generated by the export of a single product, e.g. crude oil (Angola, Nigeria, Libya, Equatorial Guinea); uranium (Mali and Niger); diamonds (Botswana); or several products: crude oil; certain ores and manganese concentrates (Gabon); raw and processed crude oil; liquefied natural gas (Algeria); crude oil and unprocessed cobalt (Cameroon); copper; copper concentrates (the Democratic Republic of the Congo) [58].

Africa's share in global oil reserves amounts to 9.7% and in gas reserves to 7.8%. Over the last 20 years, the global oil reserves increased by 20.7% and on the African continent by 99.7%, while in the case of gas, these numbers are 38.5% and 65.8%, respectively. The continent also contains rich reserves of uranium (Niger, Mali); iron (Liberia, Sierra Leone, Guinea, Mauritania); manganese (Ghana, Côte d'Ivoire); copper (Mauritania); tin and niobium (Nigeria); bauxite (Guinea, Sierra Leone, Ghana, the Democratic Republic of the Congo); diamonds (Botswana, Liberia, Sierra Leone, Ghana, Guinea, Côte d'Ivoire); phosphorites (Senegal, Togo). Gold, platinum, diamond, chrome, manganese, antimony and uranium reserves in Africa are among the largest in the world. Demand for crude oil, especially generated by China and the African continent itself, is on the rise. No less than 38 African countries import crude oil.

Chinese involvement in Africa increased after 2000, in particular after the establishment of the Forum on China–Africa Collaboration (FOCAC) in 2006. China provided the greatest support for African countries abounding in mineral resources (Angola, Nigeria, Ethiopia and Sudan). Trade exchange between China and Africa is the most intensive in Angola, South Africa, Nigeria, Sudan and Egypt. Mineral resources account for almost 80% of products imported by China from Africa while noble metals and gemstones represent 4% of import from Africa to China. Machinery, transport equipment, textiles, clothing and shoes, as well as plastic products constitute the greatest part of export from China to Africa [17].

In the structure of African export, agricultural products represent 10.8%. Mineral resources account for 65.5% of African export. The share of individual world regions in African export changed in 2008–2010. Its main directions in 2010 were: Europe – 36.2% (2008 – 40.2%); Asia – 24.1% (2008 – 21.0%); North America – 16.8% (2008 – 21.5%); and export within Africa – 12.3% (2008 – 9.4%) [58].

5.1. Gross Domestic Product dynamics

In 2000–2009, the economic growth of the African continent measured with the dynamics of the global GDP growth amounted to 5.2%, in 2010 to 5.0%, in 2011 to 3.4%, and in 2012 to 5.75% (2012 – data from the International Monetary Fund) [19].

The Arab Spring contributed to a fall in GDP dynamics in Northern Africa. In 2011, GDP increased only by 0.5% while in 2010 income from tourism in Tunisia and Egypt decreased by 4.1%. Foreign capital left Libya, Tunisia and Egypt. Morocco, in turn, strengthened its economy; in 2011 its GDP increased by 5.0% in spite of high unemployment rates, and in 2012 by 2.7%.

In 2011, inflation rates rose to the level of 8.5% in 39 African countries, and in 2010 by 7.4% against the preceding year [*African Statistical Yearbook 2012*]. Starting from 2005, inflation rates in Africa were as follows: in 2005 – 7.5%; in 2006 – 5.8%; in 2007 – 7.0%; in 2008 – 10.9%; in 2009 – 9.2%; in 2010 – 7.4%; in 2011 – 8.5%; in 2012 – 9.1% [2].

In Northern Africa, the GDP growth rate was much lower than the average on the African continent and amounted to 4.7% in 2000–2009 since Northern African countries had a steady economy and, therefore, enjoyed 4.1% growth in 2010 and 0.5% in 2011 (Arab Spring). The highest GDP growth in relation to the preceding years was enjoyed by Algeria in 2003–2005: from 6.9% to 5.1% and Egypt in 2006–2008: from 6.8% to 7.3%. In Libya, after GDP growth reaching even 13% in 2003 and 10.3% in 2005 against the preceding year, a decrease in GDP by 59.7% was noted in 2011 (breakdown in crude oil production and export for political reasons), followed by an increase in GDP by 95.5% in 2012. Also in Tunisia, GDP decreased in 2011 by 1.9% against the preceding years, and in 2012 – by 3.6%. In Egypt, GDP increased by merely 1.8% in 2011 and 2.2% in 2012. In both of these countries, income from tourism decreased [2].

In Middle Africa, the average annual GDP growth rate in 2000–2009 was 4.9%. In 2010, the growth rate was 5.7% and in 2011 – 5.1% against the preceding year. In this region, Angola should be noted, whose GDP increased after the end of war due to the production of crude oil. In 2004–2007, its GDP increased annually from 11.2% to 23.2%, and in 2008 by 13.8%. In the next years, its GDP growth rates were much lower, namely 2.4% in 2009; 3.4% in 2010; 3.9% in 2011; and 6.8% in 2012 [1].

In Chad, the country with the lowest Human Development Index (183rd place on the list of 187 countries), a dynamic annual GDP growth was noted in 2001–2004 (from 11.5% to 33.7%), the growth rate of over 8% in 2005 and

2007, 14.6% in 2010, after which the GDP growth rate decreased to 3.6% in 2011 and 5.9% in 2012. The exploitation of crude oil reserves in Equatorial Guinea contributed to a huge increase in GDP – in 2001 even by 67.8%, and in 2002 and 2004 by 20.4% and 32.6%. In 2007 and 2008, the growth rate was also two-digit: 24.0% and 16.1%, respectively, and in 2011 and 2012 it decreased to 7.7% and 5.3%, respectively [1].

In Eastern Africa, the average annual GDP growth rate in 2000–2009 was 6.6%. The annual GDP growth rate in 2010 increased by 7.1% and in 2011 by 6.0% [2]. Among Eastern African countries, Ethiopia and Rwanda stand out in terms of their GDP growth rates. From 2004 to 2008, in Ethiopia the GDP growth rate was two-digit – 13.6% and 10.8%, respectively. Also in 2010 and in 2011, the GDP growth rate was 12.6% and 11.2%, and in 2012 – 8.5%. In Rwanda and Mozambique, the GDP growth rate was lower than in Ethiopia but steady. The highest annual GDP growth rate was observed in Rwanda, in 2002 – 13.3% and in 2008 – 11.1%. In 2011 and 2012, the GDP growth rate was 8.2% and 8.0%, respectively [1].

In Mozambique, the highest annual GDP growth rate was observed in 2001 – 12.3% while in other years it ranged from 9.2% in 2002 to 7.4% in 2012. In Zimbabwe, in turn, from 2001 to 2008 the GDP decreased each year without a break – by 0.2% and 9.9%, respectively (due to unsuccessful economic reforms). Since 2009, the annual GDP in Zimbabwe increased: in 2009 by 6.0%; in 2010 by 9.6%; in 2011 by 10.6%; and in 2012 by 4.4%.

In Western Africa, the average annual GDP growth rate in 2000–2009 was 6.7%. In 2010, the annual GDP increased by 6.9% and in 2011 by 6.3%. In Western African countries, the Nigerian GDP growth rate was higher than average owing to the extraction of crude oil deposits. The highest annual GDP growth rates were noted in 2002 – 21.2%; in 2003 – 10.3%; and in 2004 – 10.6%. In other years, the GDP growth rate was from 7.8% in 2010 to 6.6% in 2012.

In Ghana, the annual GDP growth rate in 2001–2012 ranged from 4.2% in 2001 to 7.1% in 2012. The highest annual GDP growth rates were observed in 2011 – 14.4%; in 2008 – 8.4%; and in 2010 – 8.0%. In Sierra Leone, the GDP growth rate amounted to 18.2% both in 2002 and in 2012. In between those years, the highest GDP increase was observed in 2003 – 9.6%, and in 2004 and 2008 – over 7%. In spite of a relatively strong dynamics of GDP growth (over 7%), Sierra Leone belongs to the group of the least economically developed countries [1, 2, 3].

In Southern Africa, the average annual GDP growth rate in 2000–2009 was 4.7%. In 2010 and 2011, the annual GDP growth rate amounted to 3.5% [1, 2].

South Africa has the most developed economy in this region. The country belongs to the BRICS group (comprising Brazil, Russia, India, China and South Africa). According to the forecasts of Goldman Sachs, by the middle of the 21st century, these countries will be world powers (the group calls for a quick reform of the International Monetary Fund, World Bank and the UN).

The GDP growth in South Africa as compared to the previous year, is moderate – from 2.7% in 2001 to 5.6% in 2006. In 2010 and 2011, it was 3.5% and 2.5%, respectively, and in 2012 also 2.5%. Botswana and Namibia developed at a higher pace. The highest annual GDP growth rate in Botswana was observed in 2002 – 9.0%. In the last three years, the GDP growth rate in this country amounted to 8.1% in 2010; 8.0% in 2011; and 5.6% in 2012. In Namibia, the highest GDP growth rate was in 2004 – 12.3%. In the last three years, the GDP growth rate in this country amounted to 6.0% in 2010; 4.9% in 2011; and 5.0% in 2012. Swaziland is the slowest developing country in this region. Its annual GDP growth rate ranged from 1.2% in 2001 to 3.5% in 2007. In the last three years, its GDP increased by 1.9% in 2010 and by 1.3% in 2011, and decreased by 0.3% in 2012 [2, 3].

African countries by their GDP growth rate in 2012 (%)

Swaziland	-0.3	Togo	5.0
Sudan	-0.6	Namibia	5.0
Mali	-1.5	Equatorial Guinea	5.3
Gambia	1.0	Eritrea	5.5
Madagascar	1.9	Botswana	5.6
Egypt	2.2	Gabon	5.6
Somalia	2.6	Burkina Faso	5.8
Morocco	2.7	Chad	5.9
Guinea-Bissau	2.8	Benin	6.1
Seychelles	2.8	Nigeria	6.6
Central African Republic	3.1	Congo	6.8
Algeria	3.2	Angola	6.8
Mauritius	3.3	Tanzania	6.9
Tunisia	3.6	Ghana	7.1
Senegal	3.8	Democratic Republic of the Congo	7.2
Lesotho	3.8	Zambia	7.3
Guinea	3.9	Mozambique	7.4
Kenya	4.2	Rwanda	8.0
Malawi	4.3	Côte d'Ivoire	8.6
Uganda	4.4	Liberia	8.9
Zimbabwe	4.4	Niger	13.1
Mauritania	4.6	Sierra Leone	18.2
Burundi	4.7	Libya	95.5
Djibouti	4.8		
Cameroon	4.9		
Congo	4.9		

Source: African Statistical Yearbook 2013.

In 2012, the fastest developing countries on the African continent included Sierra Leone, Niger, Liberia, Côte d'Ivoire and Rwanda. The GDP growth rate of 95.5% recorded in Libya in 2012 resulted from a very low level of GDP in 2011 (for political reasons). In 2012, the GDP decreased in Swaziland, Sudan and Mali.

Considerable differences in terms of the level and rate of development can be observed between individual regions and countries on the African continent. Some African countries developed more dynamically than the entire global economy. These included countries abounding with natural resources. The main growth factors included: increased demand for African raw materials, increased prices of raw materials on the global markets, debt reduction by most developed countries, inflow of foreign direct investments and Official Development Assistance.

The primary industry developing in Africa provides work and income. The GDP growth rate of countries relying on raw materials depends on the demand for them and the prices on the global market.

In spite of a considerable economic growth dynamics, Africa has still not overcome the problem of unemployment. In some African countries, unemployment rates were high: in Djibouti – 59.5%; in Mauritania – 33.0%; in Equatorial Guinea – 24.2%; in Ethiopia – 20.5%; in Gabon – 17.8%. In Southern Africa, all countries have high unemployment rates. The highest one was recorded in Namibia – 27.6%; followed by Lesotho – 27.3%; South Africa – 23.8%; Swaziland – 22.5%; and Botswana – 17.6%.

5.2. Differences among African countries in terms of GDP per capita

Gross Domestic Product per capita (at Purchasing Power Parity in USD) is the most frequently used measure to assess socio-economic development of countries. The average GDP in 2011 (at 2005 Purchasing Power Parity) for the whole world was USD 10,103, and in Africa USD 2,778 per capita. In Northern Africa, GDP per capita amounted to USD 6,306, and in Sub-Saharan Africa to USD 2,094 [3].

The list below presents GDP per capita in Africa (USD) in 2011 at 2005 Purchasing Power Parity. It breaks down African countries into 5 groups:

- under USD 1,000 – 14 countries,
- USD 1,001– USD 2,000 – 17 countries,
- USD 2,001– USD 4,000 – 6 countries,
- USD 4,001– USD 9,000 – 7 countries,
- over USD 9,000 – 7 countries.

Gross Domestic Product in Africa in 2011 (USD per capita)^(a)

Democratic Republic of the Congo	329	Senegal	1,737
Liberia	506	São Tomé and Príncipe	1,805
Eritrea	516	Gambia	1,873
Burundi	533	Sudan	1,878
Niger	642	Zimbabwe	1,878
Central African Republic	716	Djibouti	2,087
Sierra Leone	769	Cameroon	2,090
Malawi	805	Nigeria	2,221
Madagascar	853	Mauritania	2,255
Mozambique	861	Cabo Verde	3,616
Togo	914	Congo	3,885
Mali	964	Morocco	4,373
Ethiopia	979	Angola	5,201
Guinea	990	Swaziland	5,349
Rwanda	1,097	Egypt	5,547
Guinea-Bissau	1,097	Namibia	5,986
Burkina Faso	1,149	Algeria	7,643
Uganda	1,188	Tunisia	8,258
Tanzania	1,334	South Africa	9,678
Chad	1,343	Mauritius	12,737
Zambia	1,423	Botswana	12,939
Benin	1,428	Gabon	13,998
Lesotho	1,504	Libya	15,361
Kenya	1,507	Seychelles	23,172
Côte d'Ivoire	1,581	Equatorial Guinea	32,026
Ghana	1,652		

^(a) At 2005 Purchasing Power Parity

Source: UNDP, *Human Development Report 2013*, New York Oxford University Press 2013.

Countries with a high level of GDP per capita, i.e. over USD 9,000 have a low share of agriculture in GDP, ranging from 1.9% in Equatorial Guinea to 3.6% in Mauritius. On the other hand, these countries have a very high share of the primary industry: in Equatorial Guinea even 93.7%; and of primary, secondary and tertiary industry in the remaining countries including: Gabon, Botswana, Mauritius, South Africa and Seychelles. In Gabon, the primary and secondary industries account for 64.4%, agriculture for 4.4% and services for 31.2% of GDP. In Botswana, these shares are 47.7%, 2.6% and 49.8%, respectively. In Mauritius, the primary and secondary industries account for 27.0%, services for 69.4% and agriculture for only 3.6% of GDP. In South Africa, the primary and secondary industries account for 30.4%, services for 67.4% and agriculture for 2.4% of GDP. In Seychelles, services account for no less than 81.2% of GDP (tourism), the primary and secondary industries for only 16.1%, and agriculture for 2.7% of GDP.

5.3. Development potential of African countries

The economic growth of African countries depends on the dynamics of consumption and the dynamics of accumulation – the part of the Gross Domestic Product not allocated to consumption, whose purpose is investment and the creation of reserves.

The share of capital accumulation in GDP (2009) amounted to 41.2% in Algeria, and in other countries it ranged from 2.2% in Zimbabwe to 39.7% in Equatorial Guinea (due to crude oil production and the highest GDP per capita in Africa) [56].

The share of accumulated capital in GDP amounting to 10% and less, was noted in only two countries: Ghana and Zimbabwe. The group of countries with accumulation's share in GDP ranging from 10% to 20% includes: Egypt, South Africa, Angola, Sudan, Sierra Leone, Swaziland, Côte d'Ivoire and the Central African Republic. In most countries, the share of accumulated capital in GDP amounts to 20–30%. This group includes: Tunisia, the Democratic Republic of the Congo, Gabon, Congo, Ethiopia, Kenya, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Sudan, Tanzania, Uganda, Zambia, Benin, Guinea, Mauritania, Senegal, Botswana and Namibia. The share of accumulated capital in GDP ranging from 30% to 40% is noted in Morocco, Chad, Equatorial Guinea, Lesotho and Madagascar [56].

State expenditure on research and development contributes to popularisation of technological development, improvement of manufacturing methods, identification of new reserves and production of new goods. Investment in research and development is increasingly often viewed worldwide as investment in the economy. In Africa, the share of expenditure on research and development is small. In 2005–2010, expenditure on R&D exceeded 1% of GDP only in Tunisia (1.1%), followed by 0.9% of GDP in South Africa. Its share in GDP in other African countries ranged from 0.6% in Gabon to 0.1% in Algeria and Madagascar. A large number of African countries lack statistical data on expenditure on research and development [56].

The Table below presents the amount of foreign direct investment of concerns, individuals and companies on the African continent as percentage share of GDP in 2007–2011.

According to the 2012 UNCTAD report on investments, the value of foreign direct investment in the world increased from USD 1,309.0 billion in 2010 to USD 1,524.4 billion in 2011, i.e. by 16.5%. In 2011, 44.9% of foreign direct investments were made in developing countries, and in 2010 – 47.1%.

Foreign direct investment in Africa in 2007–2011 (% of GDP)

Angola	-3.9	Nigeria	3.1
Burundi	0.0	Sudan	3.1
Cameroon	0.0	Gambia	3.2
Burkina Faso	0.4	Tunisia	3.2
Mauritania	0.4	Central African Republic	3.6
Kenya	0.6	Swaziland	3.7
Rwanda	0.8	Mauritius	4.4
Ethiopia	1.0	Sierra Leone	4.5
Guinea-Bissau	1.1	Uganda	4.7
Gabon	1.3	Equatorial Guinea	4.8
Togo	1.3	Lesotho	5.4
Algeria	1.4	Namibia	7.1
South Africa	1.4	Ghana	7.9
Zimbabwe	1.4	Mozambique	8.6
Mali	1.6	Chad	9.1
Benin	1.7	Djibouti	9.2
Botswana	1.8	Madagascar	9.9
Morocco	1.8	Zambia	10.3
Senegal	1.8	Seychelles	17.4
Côte d'Ivoire	1.8	Niger	17.5
Tanzania	1.9	Democratic Republic of the Congo	22.4
Guinea	2.1	Congo	23.5
Libya	2.2	Liberia	45.8

Source: UNDP, *Human Development Report 2013*, New York Oxford University Press 2013.

In 2011, foreign direct investments on the African continent amounted to USD 42.7 billion, and were by 0.9% (USD 43.1 billion) lower than in the past year. In 2009, foreign direct investments were by USD 10 billion higher than in 2011.

Table 2. Foreign direct investments (USD billion)

	2009	2010	2011
World	1,197.8	1,309.0	1,524.4
Developed regions	606.2	618.6	747.9
Developing regions	519.2	616.7	684.4
Africa	52.6	43.1	42.7
East and Southeast Asia	206.6	294.1	335.5
South Asia	42.4	31.7	38.9
West Asia	66.3	58.2	48.7
Latin America and the Caribbean	149.4	187.4	217.0

Source: UNCTAD, *World Investment Report 2012: Towards a New Generation of Investment Policies*.

African countries participated in the total amount of direct investment to a different extent. Most money was invested in countries with crude oil reserves and other resources sought on the global market.

Table 2 clearly shows that each year, the amount of foreign direct investments in Africa decreases.

African countries are bound by a number of constraints that discourage some investors from locating their capital there (this, however, does not relate to China). These constraints include:

- poor infrastructure (roads, railway, airports, electricity, power supply disturbances, telecommunications network),
- poor banking,
- considerable corruption, unsteady economic policy, in particular as regards taxes, non-transparent law and high inflation,
- high crime rate (terrorism and theft) and social unrest,
- weak regional markets on the African continent,
- low quality of human resources (level of education, diseases, HIV epidemics, malaria, poor health care) [58].

On the other hand, investors who obtained licenses for resource production (often in return for high bribes) pay very low wages to the local people. They also hire children for starvation wages, treating them like servants. Raw materials exploitation often endangers the natural environment and causes its degradation.

Official Development Assistance (ODA) is of considerable importance to African countries. It covers donations and loans administered to developing countries by official government agencies of donor states and international organisations whose objective is to support economic growth and improve the welfare of people in these countries. Loans are considered ODA if they have a grant element of at least 25%. Countries that signed the Millennium Declaration of 2000 are committed to grant aid to developing countries aimed at solving global socio-economic problems. The European Union provides over half of development aid in the world, and the European Commission grants support to over 140 countries. Official Development Assistance on the African continent amounted to USD 42.1 per capita, and in the world – USD 18.8 per capita (in 2010). The minimum value of development assistance granted by members of the Development Assistance Committee (DAC) is 0.2% of GDP.

When calculated per capita, the greatest amount of development assistance was provided to Seychelles (USD 647.7); Liberia (USD 355.3); Congo (USD 324.6); Djibouti (USD 148.8); Equatorial Guinea (USD 120.9); Lesotho (USD 118.0); Namibia (USD 112.0); and Mauritania (USD 108.2). The smallest development assistance per capita was granted to Libya (USD 1.3), Algeria (USD 5.6), Egypt (USD 7.3) and Nigeria (USD 13.0). For instance, in Nigeria, the global development assistance per capita was minor, but amounted to over USD 2 billion in total [2].

Corruption is the enemy of development of African countries. Many African countries have natural resources, which are sold to developed countries.

The obtained income is not allocated to economic growth, agriculture or other important social purposes, but is claimed by the elites. Corrupt representatives of the elite use national funds for their own purposes, while large numbers of people live in extreme poverty, are undernourished and have no means of subsistence. Unskilled, corrupt governments, especially in African countries, have condemned millions of people to hunger and poverty.

In this respect, it is worth quoting J. Galbraith, an outstanding American economist: *Nothing is as important for economic development and the human condition as stable, reliable, competent and honest government. This in important parts of the world is still lacking* [25].

Corruption has a negative impact on entrepreneurship, on the effectiveness of public services and citizen trust in public authorities, which undermines the effectiveness of development assistance. Corruption amounts to 25% of the annual GDP of African countries and hinders the development of these countries.

The World Bank combats corruption by checking how the aid from financial institutions is disbursed. The World Bank has reinforced its supervision over the utilisation of public resources. The World Bank's fight against corruption takes various forms, from the audit of public institutions in Africa to strengthening public tender procedures [7].

Good governance, freedom of media, development of financial capacities of developing countries and support for the role of the civic society are some of the suggested measures against corruption.

Transparency International, founded in 1995, develops the Corruption Perceptions Index (CPI). In 2012, the methodology was changed, and a scale from 0 to 100 was adopted, in which 0 corresponds to the most corrupt country, and 100 to the least corrupt one. In 2012, 75% of countries were awarded less than 50 points. According to Transparency International, such a result calls for a greater transparency of public institutions and for holding people accountable for their actions³.

The Table below presents 51 African countries for which Corruption Perceptions Indices were developed. Only five countries obtained results above 50 points. Seven countries were awarded from 40 to 49 points. Twenty countries obtained between 40 and 30 points. Fifteen countries obtained between 30 and 20 points, and four countries were awarded less than 20 points. The most corrupt countries include Burundi, Chad, Sudan and Somalia (from 19 to 8 points), and

³ Poland was awarded 58 points, Estonia 64 points, Hungary 55 points, Lithuania 54 points, the Czech Republic 49 points, and Latvia 45 points. The least corrupt countries include Germany – 79 points, Denmark, Finland and New Zealand – 90 points each. The most corrupt countries include North Korea and Somalia – 8 points each. www.cba.gov.pl.

the least corrupt countries are Botswana, Cabo Verde, Mauritius and Seychelles (from 65 to 53 points).

Corruption Perceptions Index in Africa in 2012 (points)

Botswana	65	Niger	33
Cabo Verde	60	Egypt	32
Mauritius	57	Madagascar	32
Rwanda	53	Mozambique	31
Seychelles	52	Sierra Leone	31
Namibia	48	Togo	30
Ghana	45	Côte d'Ivoire	29
Lesotho	45	Uganda	29
South Africa	43	Kenya	27
São Tomé and Príncipe	42	Niger	27
Liberia	41	Cameroon	26
Tunisia	41	Central African Republic	26
Burkina Faso	38	Congo	26
Malawi	37	Eritrea	25
Morocco	37	Guinea-Bissau	25
Sudan	37	Guinea	24
Zambia	37	Angola	22
Benin	36	Democratic Republic of the Congo	21
Djibouti	38	Libya	21
Senegal	36	Equatorial Guinea	20
Gabon	35	Zimbabwe	20
Tanzania	35	Burundi	19
Algeria	34	Chad	19
Gambia	34	Sudan	13
Mali	34	Somalia	8
Ethiopia	33		

Source: Transparency International, www.cba.gov.pl, 2012.

6. Inequality in income distribution in African countries

The quality of life depends not only on the amount of Gross Domestic Product, but also on its distribution among various groups of people. The composite statistics used to estimate inequality in income distribution include Gini coefficient and quantile relations.

The Gini coefficient can range from 0 – full equality, to 100 – income concentration. Gini coefficients are high on the African continent, which signifies considerable income concentration in the group of the most affluent people in the following countries: Namibia (74.3); Seychelles (65.8); Botswana (61.0); Angola (58.6); South Africa (57.8); Lesotho (52.5); Swaziland and Zambia (50.7); Cabo Verde (50.4); and Zimbabwe (50.1).

**Relation of income share held by 20% of the most affluent people to
20% of the poorest people in Africa in 2009**

Ethiopia	423.7	Uganda	808.2
Egypt	461.1	Sierra Leone	808.2
Burundi	475.6	Côte d'Ivoire	850.0
Niger	515.7	Madagascar	862.9
Chad	517.8	Ghana	932.7
Togo	557.9	Nigeria	952.9
Guinea-Bissau	591.8	Mozambique	990.4
Benin	658.6	Congo	1,062.0
Tanzania	658.8	Kenya	1,108.3
Malawi	664.3	Gambia	1,109.0
Burkina Faso	672.9	Cabo Verde	1,242.2
Cameroon	689.6	Swaziland	1,242.2
Liberia	703.1	Rwanda	1,385.7
Mali	707.7	Zambia	1,544.4
Guinea	733.3	Central African Republic	1,782.4
Morocco	736.9	Lesotho	1,880.0
Mauritania	737.1	Seychelles	1,881.1
Gabon	739.7	South Africa	2,888.0
Senegal	740.3	Angola	3,095.0
Djibouti	775.0		
Tunisia	788.3		

Source: *FAO Statistical Yearbook 2012*.

The lowest Gini coefficient, lower than 30.0, is noted in Ethiopia (29.5). It is followed by (in increasing order): Egypt (32.1), Burundi (33.3), Niger (34.0), Togo (34.4), Algeria (35.3), Tanzania (37.6), Liberia (38.7), Benin (38.6), Mali, Mauritania and Malawi (39.0).

Quantile relations illustrate disparities in income distribution differently than the Gini coefficient. If people in households are ordered according to the amount of administered income per capita, it turns out that the greatest inequalities in income distribution are in Angola, where the share of income held by 20% of the most affluent people was 31 times higher than the share of income held by 20% of the poorest people; in South Africa 29 times higher; in Seychelles and Lesotho 19 times higher; in Zambia 15 times higher; in Rwanda 14 times higher; in Swaziland 12 times higher; in Gambia and Kenya 11 times higher; in Ghana and Senegal 9.4 times higher. Inequality of income distribution is presented in the table above, in which countries are listed from the smallest inequality of income distribution to the greatest.

7. Poverty on the African continent

Africa's main problem is the significant poverty rate: in 2010 in Sub-Saharan Africa no less than 48.5% of people lived for less than USD 1.25 a day (at Purchasing Power Parity). It is the poverty line adopted by the World Bank.

People living for less than USD 1.25 a day in African countries in 2009 (%)

Seychelles	0.2	Niger	43.1
Egypt	2.0	Guinea	43.3
Morocco	2.5	Lesotho	43.4
Tunisia	2.5	Benin	47.3
Gabon	4.8	Guinea-Bissau	48.8
Algeria	6.8	Namibia	49.1
Cameroon	9.6	Mali	51.4
South Africa	17.4	Sierra Leone	53.4
Djibouti	18.8	Congo	54.1
Kenya	19.7	Angola	54.3
Cabo Verde	21.0	Burkina Faso	56.5
Mauritania	21.2	Democratic Republic of the Congo	59.2
Côte d'Ivoire	23.8	Mozambique	60.0
Uganda	28.7	Chad	61.9
Ghana	30.0	Central African Republic	62.8
Botswana	31.2	Swaziland	62.9
Senegal	33.5	Zambia	64.3
Gambia	34.3	Nigeria	64.4
Togo	38.7	Malawi	67.8
Ethiopia	39.0	Tanzania	67.9
		Madagascar	73.9
		Rwanda	76.8

Source: FAO Statistical Yearbook 2012.

In the last thirty years, the share of people living for less than USD 1.25 a day decreased in developing countries from 50% in 1981 to 21% in 2010. Analyses of extreme poverty carried out by the World Bank showed that over 1.2 billion people suffer from extreme poverty. Sub-Saharan Africa accommodates 1/3 of all extremely poor people in the world. Sub-Saharan Africa is the only region in the world where the number of poor people increased in 1981–2010 from 208 to 414 million. In 1981, extremely poor people in Sub-Saharan Africa represented only 11% of the world's poverty, and now over 1/3 [69].

Along with the increase in income, the depth of extreme poverty decreased in a greater part of the developing countries. In 2010, the average income in the group of extremely poor people in developing countries amounted to 87 cents a day per capita while in 1981 (at 2005 Purchasing Power Parity) it amounted to 74 cents. In Sub-Saharan Africa, the average income of extremely poor people was in 1981 and in 2010 over 60 cents a day (at 2005 Purchasing Power Parity) [69].

Poverty is the least common in Northern Africa, where ca. 2.5% of people suffered extreme poverty. The only exception is Algeria, where 6.8% of people lived for less than USD 1.25 a day. In Sub-Saharan African countries, the lowest share of people suffering from extreme poverty is in Seychelles – 0.2% of people; in Gabon – 4.8%; in Cameroon – 9.6%; and in South Africa – 17.4%; in Kenya – 19.7%; and in Djibouti – 18.8%.

Reducing poverty requires a comprehensive economic development of countries, above all of their processing industry, so that the African countries that produce raw materials may obtain the highest possible profits and create jobs on their own. Without these investments, the industry of the African countries will not be able to compete on the global market, in particular without scientific research and inflow of specialists from various economy areas that would provide comprehensive assistance. The economic effects depend on the prices of raw materials on global markets, which are subject to change, and on the whim of local investors who usually offer very low wages to local people in order to obtain maximum profit.

Africa is currently growing wealthy through the sale of raw materials, above all crude oil, gold and diamonds, chromium, platinum, uranium and coltan (ore composed of niobium and tantalum) used to produce electronic devices. On the other hand, the number of people suffering from extreme poverty in Africa is rising.

CHAPTER II

FEEDING THE POPULATION OF THE AFRICAN CONTINENT AGAINST GLOBAL INDICATORS

Satisfying global food needs depends primarily on the demographics, agricultural production, the entire food management, as well as the purchasing power of people determined by the Gross Domestic Product per capita and the prices of food, other products and services. In individual countries and regions, feeding the population depends, to an increasingly large extent, on the import and export of agri-food products.

A composite statistic used to assess the level of nourishment and changes in time on a global scale and in individual countries and regions is the daily food energy intake per capita.

Guidelines concerning the food energy intake vary. In the present work recommendations presented by W. Michna in the *Encyklopedia Agrobiznesu* [Agribusiness Encyclopaedia] were adopted [45].

On a global scale, five levels of nourishment are identified:

- absolute underconsumption, where the daily net energy intake is under 1,800 kcal per capita,
- relative underconsumption, where the daily net energy intake is 1,800–2,200 kcal per capita,
- recommended consumption, where the daily net energy intake is 2,200–2,800 kcal per capita,
- relative overconsumption, where the daily net energy intake is 2,800–3,000 kcal per capita,
- absolute overconsumption, where the daily net energy intake is over 3,000 kcal per capita¹.

Towards the end of the first decade of the 21st century, global food consumption reached the recommended consumption level (2,200–2,800 kcal per capita a day). The same level was achieved, on average, by Africa and Asia. Other continents, i.e. America, Europe and Oceania achieved the level of absolute overconsumption (over 3,000 kcal per capita a day).

¹ These are net amounts obtained after deducting technological losses resulting from meal preparation and consumption losses (plate waste). When comparing consumption, the food energy value from Food Balance Sheets should be decreased by at least 10–15%. According to a report on food losses, in Sub-Saharan Africa the losses represent 1–2% of the amount of consumed products; therefore, in the case of Africa, the consumption from Food Balance Sheets may be compared directly to the standards presented above. Report *Global Food Loses and Waste*, FAO 2011 [27].

Each continent is characterised by significant regional differences in the level of food consumption. Absolute overconsumption (over 3,000 kcal per capita a day) is recorded in Northern Africa, North America, West Asia, all geographical regions of Europe (Northern, Eastern, Western and Southern Europe) and in Oceania – Australia and New Zealand. Relative overconsumption (2,800–3,000 kcal per capita a day) is noted in Southern Africa, South and Central America, Micronesia and Polynesia. Recommended consumption (2,200–2,800 kcal per capita a day) is observed in Middle and Western Africa, the Caribbean, Central Asia, Southeast Asia, South Asia and Melanesia. Relative underconsumption (1,800–2,200 kcal per capita a day) is present in Eastern Africa. In each geographical region, there are countries representing one of these five levels of nourishment.

1. Changes in nourishment in various regions of the world

In the 1990s, Africa was far behind Asia as regards food availability. The average consumption on the African continent amounted to 2,278 kcal per capita a day, while in Asia – 2,421 kcal. The average daily food consumption per capita in the world was 2,635 kcal.

In 2000, the world consumed 2,725 kcal per capita a day, while the African continent – 2,347 kcal, and Europe – 3,362 kcal. This year, Asia reached 2,606 kcal, thus approaching the global level.

At the end of the first decade of the 21st century, food availability increased to the level of 2,831 kcal per capita a day, reaching a good level of nourishment on the global scale (recommended consumption). Only Asia and Africa (the entire continent) remained below the global level with 2,706 kcal per capita a day (recommended consumption) and 2,560 kcal per capita a day, respectively.

The highest level of nourishment measured by the daily amount of consumed kilocalories per capita among all regions on the African continent was reached by Northern Africa – 3,098 kcal, and the lowest by Eastern Africa – 2,103 kcal per capita a day (2009). The greatest improvement was recorded in Northern Africa, where in 1961 there were 1,947 kcal per capita a day, and in 2009 – 3,098 kcal per capita a day – an increase of 59.2%. Also in Western Africa, calories consumption increased in this period from 1,944 kcal to 2,669 kcal per capita a day, i.e. by 37.2%. In other regions, i.e. in Eastern and Middle Africa, food consumption in 2009 amounted to 2,103 kcal, and 2,227 kcal per capita a day, respectively, which means that against 1961 it increased in Middle Africa by 3.5% and in Eastern Africa by 5.6%.

In America, the level of food consumption increased by 10.2%, reaching 3,205 kcal per capita a day in 2009. The highest level was achieved by North

America – 3,659 kcal (increase of 27.3%), and the lowest by the Caribbean – 2,636 kcal (increase of 33.1%).

Table 3. Food consumption in the world – energy content and animal protein

	Energy content in kcal per capita a day				Animal protein in grams per capita a day			
	1990	2000	2009	2009 1961= 100	1990	2000	2009	2009 1961= 100
World	2,635	2,725	2,831	128.7	25.3	27.9	31.2	184.6
Africa	2,278	2,347	2,560	126.3	13.1	12.5	15.1	138.5
Northern Africa	2,867	2,917	3,098	159.1	16.5	20.0	23.3	215.7
Middle Africa	1,840	1,786	2,227	103.5	14.0	8.2	13.2	141.9
Eastern Africa	1,910	1,945	2,103	105.6	10.8	8.9	10.0	86.2
Western Africa	2,173	2,473	2,669	137.3	9.9	9.7	11.8	153.2
Southern Africa	2,830	2,810	2,914	112.1	26.5	25.4	31.8	138.9
America	2,957	3,152	3,205	125.4	44.7	49.8	52.1	123.5
North America	3,459	3,711	3,659	127.3	68.3	70.7	70.8	113.1
Central America	2,845	2,949	2,974	134.3	26.4	33.9	37.4	233.8
South America	2,579	2,782	2,951	128.1	31.3	39.7	43.7	166.2
The Caribbean	2,393	2,488	2,636	133.1	24.3	21.4	25.0	153.4
Asia	2,421	2,606	2,706	149.9	14.6	21.0	25.2	350.0
Central Asia	-	2,353	2,772	-	-	27.6	33.8	-
East Asia	2,606	2,897	3,000	185.1	18.4	31.5	37.9	601.6
West Asia	3,178	3,027	3,192	129.5	25.6	26.0	29.5	148.2
South Asia	2,233	2,330	2,386	119.9	9.6	10.9	13.2	188.6
Southeast Asia	2,164	2,443	2,657	147.4	13.3	17.1	22.8	278.0
Europe	3,378	3,249	3,362	110.2	58.2	53.6	57.8	145.2
Northern Europe	3,214	3,318	3,385	105.8	56.9	58.1	62.5	115.5
Eastern Europe	3,365	2,993	3,222	103.7	55.0	41.0	50.0	138.9
Western Europe	3,405	3,498	3,535	116.6	67.1	66.2	66.2	132.4
Southern Europe	3,475	3,418	3,403	120.2	56.5	61.4	59.5	220.4
Oceania	3,142	3,010	3,211	106.5	68.0	61.8	61.8	97.6
Australia	3,177	3,014	3,261	105.4	72.0	67.6	66.0	97.9
New Zealand	3,254	3,153	3,172	108.4	66.3	49.3	55.9	89.7
Micronesia	2,587	2,763	2,866	118.2	29.5	34.0	37.4	185.1
Polynesia	2,722	2,775	2,964	133.7	44.8	53.8	58.2	231.9
Melanesia	2,557	2,695	2,797	111.3	30.0	27.1	28.4	156.0

Source: Own work based on Food Balance Sheets, FAO, Rome.

In Europe, the level of food consumption in the analysed period increased by 10.2%, from 3,050 kcal to 3,362 kcal. The highest level on this continent was reached by Western Europe with 3,535 kcal in 2009, and 3,033 kcal in 1961 – an increase by 16.6%. Food consumption calculated in energy units increased significantly, namely by 20.2%, in Southern Europe: from 2,830 kcal to 3,403 kcal per capita a day. In Eastern Europe, food consumption increased by 5.8%, from 3,108 kcal to 3,222 kcal per capita a day.

In Oceania, two countries lead in terms of nourishment – Australia and New Zealand – due to an easy access to food in the entire analysed period. In 1961, Australia consumed 3,093 kcal per capita, and New Zealand – 2,926 kcal.

In 2009, as compared to 1961, the energy intake was by 5.4% higher in Australia (3,261 kcal) and by 8.4% higher in New Zealand (3,172 kcal).

Currently, Sub-Saharan Africa and South Asia experience the greatest problems with feeding the population. These regions have the highest share of undernourished people measured with energy deficiency in an average food ration [60].

Increasingly often, the problem of feeding the global population is viewed from the perspective of not only consumed energy, but also the amount of consumed animal protein. In 2009, the average consumption of animal protein in the world was 31.2 grams per capita a day. This figure resulted from a very low consumption on the African continent – 15.1 grams per capita a day; and in Asia – 25.2 grams per capita a day; and high consumption in America – 52.1 grams, in particular in North America – 70.8 grams; Europe – 57.8 grams, in particular in Western Europe – 66.2 grams; and in Oceania – 61.8 grams.

In 2009, there were huge differences in animal protein consumption in the world – from 3.6 grams per capita a day in Burundi to 77.3 grams in the US. Sufficient animal protein level should amount to ca. 40 grams per capita a day [26].

In spite of numerous obstacles, general nourishment situation has improved over the last twenty years in almost all regions of the world, in particular in Asia. Sub-Saharan Africa and South Asia, however, lagged behind other world regions in terms of improving nourishment with regard to food quality and quantity, and its availability due to poverty. According to nourishment-related analyses, the amount of food produced in the world is sufficient for every person to live a healthy and active life. On average, on a global scale, there are over 2,800 kcal per capita a day, but there are significant inequalities in food availability. One-seventh of the world's population starve and are chronically undernourished. In the 21st century, one of the basic human rights – the right to freedom from hunger – is still not observed in many countries. This right is recognised in the Universal Declaration of Human Rights adopted by the United Nations General Assembly on 10 December 1948 in Paris. Although it is not legally binding, it has influenced many national regulations and the international human rights protection system. Article 25 of the Universal Declaration of Human Rights reads: *Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.*

Starting from the 1970s, each person's right to food has been confirmed at subsequent food summits and in declarations approved by them, in which government representatives take responsibility for feeding the nations,

e.g. *Declaration on Human Rights* (1992) and *Rome Declaration on World Food Security* (1996) [64].

2. Feeding the population of the African continent in 1990–2009

Apart from Northern Africa, the African continent lagged behind other regions of the world in terms of the quantity and quality of food provided to the population.

In 1990–2009, food consumption in Africa translated into energy increased by 12.4%, from 2,278 kcal to 2,560 kcal per capita a day. This level was by 271 kcal per capita a day lower than the mean global consumption.

In Northern Africa, food consumption increased in this period from 2,867 to 3,098 kcal per capita a day, i.e. by 9.2%, and ranged from 3,349 kcal in Egypt to 3,157 kcal per capita a day in Libya. In Northern Africa, as much as 90% of calories originated from plant products.

In Sub-Saharan Africa, the highest level of food consumption in 2009 was observed in Southern Africa: 2,914 kcal per capita a day. It was only 3% higher than in 1990 (2,830 kcal). Plant products provided 85% of consumed calories. The difference in energy intake between the highest consumption noted in South Africa – 3,013 kcal per capita a day, and the lowest consumption recorded in Namibia – 2,151 is considerable and amounts to 866 kcal.

In Western Africa, calories consumption in 1990–2009 increased by 22.3%, from 2,173 kcal to 2,669 kcal per capita a day. Plant products provided as much as 95% of consumed calories (2009). The difference in the energy content in the daily food ration is considerable – as much as 772 kcal. The highest level was reached by Ghana – 2,934 kcal per capita a day, and the lowest by Sierra Leone – 2,162 kcal per capita a day.

In Middle Africa, food consumption translated into energy increased from 1,840 kcal per capita a day in 1990 to 2,227 kcal in 2009, i.e. by 21%. As much as 93% of energy was provided by plant products. The difference between the highest level of consumption observed in Gabon – 2,345 kcal per capita a day, and the lowest observed in Congo – 2,056 kcal per capita a day was 89 kcal. The share of calories originating from plant products was 85.4% in Gabon and 95.4% in Congo.

In Eastern Africa, food consumption increased from 1,910 kcal in 1990 to 2,109 kcal per capita a day in 2009, i.e. by 10.1%. The difference in food consumption between the country with the highest consumption (Mauritius – 2,993 kcal per capita a day) and the lowest consumption (Burundi – 1,604 kcal per capita a day) was 1,389 kcal. The share of calories originating from plant products was 85.4% in Mauritius and 96.9% in Burundi.

**Average daily energy intake in 1990 and 2009 in Africa
(kcal per capita)^(a)**

Country	1990	2009	Country	1990	2009
Burundi	1,893	1,604	Djibouti	1,693	2,419
Eritrea	-	1,640	Seychelles	2,191	2,426
Zambia	2,042	1,879	Cameroon	2,018	2,457
Congo	2,004	2,056	Guinea-Bissau	2,239	2,476
Chad	2,074	2,074	Senegal	2,316	2,479
Angola	1,590	2,079	Niger	2,116	2,489
Kenya	2,010	2,092	Benin	2,214	2,592
Ethiopia	-	2,097	Mali	2,201	2,624
Mozambique	1,828	2,112	Gambia	2,521	2,643
Madagascar	2,266	2,117	Burkina Faso	2,400	2,647
Tanzania	2,157	2,137	Guinea	2,540	2,652
Namibia	2,057	2,151	Côte d'Ivoire	2,489	2,670
Sierra Leone	1,942	2,162	Nigeria	2,180	2,711
Botswana	2,266	2,164	Gabon	2,418	2,745
Central African Republic	1,890	2,181	Mauritania	2,551	2,856
Rwanda	2,191	2,188	Ghana	1,854	2,934
Zimbabwe	2,022	2,219	Mauritius	2,725	2,993
Swaziland	2,338	2,249	South Africa	2,830	3,017
Uganda	2,331	2,260	Libya	3,222	3,157
Liberia	2,072	2,261	Algeria	2,855	3,239
Malawi	1,914	2,318	Morocco	3,073	3,264
Sudan	1,934	2,326	Tunisia	3,124	3,314
Togo	2,161	2,363	Egypt	3,154	3,349
Lesotho	2,325	2,371			

^(a) Order according to year 2009

Source: Own work based on Food Balance Sheets, faostat.fao.org.

The quality of food provided to the population is indicated by the level of animal protein consumption. Africa is characterised by a low consumption of this nutrient, which proves cheap consumption patterns followed on this continent, with a high consumption of plant products and a very low consumption of animal products. The level of animal protein consumption in Middle, Eastern and Western Africa was similar to animal protein consumption in South Asia (13.2 grams per capita a day). Only Southern Africa (31.8 grams) owing to a relatively high consumption of animal protein in South Africa (33.9 grams) approaches East Asian level of consumption – 37.9 grams. The gap related to animal protein consumption between Africa and regions with large surpluses of food production and a higher level of socio-economic development is huge. For example, the average animal protein consumption in North America was 70.8 grams per capita a day, in Western Europe – 66.2 grams and in Oceania – 61.8 grams, while in Africa only 15.6 grams (in 2009).

**Average daily animal protein consumption in 1990 and 2009 in Africa
(grams per capita)^(a)**

Country	1990	2009	Country	1990	2009
Burundi	4.2	3.3	Djibouti	11.2	15.7
Rwanda	3.5	5.2	Ghana	14.2	16.1
Mozambique	3.7	5.3	Swaziland	15.7	17.1
Malawi	4.9	5.5	Kenya	17.9	17.3
Liberia	7.0	6.0	Central African Republic	14.8	17.5
Ethiopia	-	6.3	Senegal	18.7	18.3
Eritrea	-	6.6	Niger	11.8	18.9
Togo	8.4	7.5	Mali	17.4	19.4
Guinea-Bissau	8.7	8.6	Egypt	19.7	21.1
Zambia	10.5	8.7	Morocco	15.1	21.1
Guinea	6.5	8.7	Namibia	19.5	21.5
Burkina Faso	8.7	9.4	Botswana	27.4	23.3
Nigeria	7.0	9.4	Algeria	19.7	23.4
Lesotho	9.8	9.9	Tunisia	18.3	25.5
Tanzania	11.9	10.0	Libya	27.4	27.2
Chad	10.2	10.2	Sudan	20.6	27.8
Sierra Leone	6.9	11.0	South Africa	26.5	33.9
Madagascar	16.3	11.1	Mauritania	33.5	35.0
Benin	8.0	11.1	Seychelles	35.6	36.1
Cameroon	11.9	11.3	Mauritius	27.1	38.5
Uganda	11.2	12.1	Gabon	32.4	42.1
Congo	16.2	12.4			
Côte d'Ivoire	16.3	12.4			
Zimbabwe	9.8	12.5			
Angola	14.9	13.8			
Gambia	12.5	14.5			

^(a) Order according to year 2009

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In 2009, as much as 91.2% of energy in Africa originated from the consumption of plant products, and in 1990 – 91.9%. On the African continent, animal protein consumption increased from 13.1 grams in 1990 to 15.1 grams per capita a day in 2009, i.e. by 15.3%

In 2009, the average consumption of animal protein in the world was 31.2 grams per capita a day and was by 23.3% higher than in 1990 (25.3 grams). People in Africa consume minor amounts of animal protein. In 2009, its consumption was 15.1 grams per capita a day, and in 1990 – 13.1 grams. During almost twenty years, the increase amounted to no more than 15.3%. Animal protein consumption in Africa constituted ca. 50% of global daily consumption per capita.

In Northern Africa, animal protein consumption increased in this period from 16.5 grams to 23.3 grams, i.e. by 41.2%. The highest animal protein consumption in 2009 was observed in Libya – 27.2 grams per capita a day, and the lowest in Egypt and Morocco – 21.1 grams per capita a day.

In Middle Africa, animal protein consumption of 13.2 g in 2009 was by 5.8% lower than in 1990 – 14.0 grams per capita a day. In 2009, the highest animal protein consumption was recorded in Gabon – 42.1 grams (51% of the total protein consumption) and the lowest in Chad – 10.2 grams per capita a day (16% of the total protein consumption).

Also in Eastern Africa, the average animal protein consumption decreased from 10.8 grams in 1990 to 10.0 grams per capita a day in 2009, i.e. by 7.4%. In 2009, the highest animal protein consumption was observed in Mauritius – 38.5 grams, and the lowest in Burundi – 3.6 grams.

In Western Africa, the average animal protein consumption was also low and amounted to 11.8 grams in 2009 and to 9.9 grams per capita a day in 1990. In the discussed period, animal protein consumption increased by 19.2%. In 2009, the highest animal protein consumption was observed in Mauritania – 35.0 grams, and the lowest in Liberia – 6.0 grams.

Southern Africa achieved the highest average animal protein consumption rate of 31.8 grams per capita a day, which was 28% higher than in 1990 (26.5 grams). The highest level of animal protein consumption in this region was observed in South Africa – 33.9 grams, and the lowest in Lesotho – 9.9 grams.

3. Undernourishment in Africa

The Food and Agriculture Organization (FAO) estimated that the number of undernourished people in the world was 870 million (2010–2012), of which 98.5% lived in developing countries [63]. In these countries, the undernourishment of such a huge number of people results from a low level of socio-economic development, lack of access to basic means of subsistence and, in particular lack of potable water, sanitation facilities, health care and basic education.

Countries with insufficient food supplies, whose inhabitants often suffer hunger and undernourishment, have to increase food supplies by increasing their own agricultural production, its efficiency and food reserves. In developing countries, *food security at the level of a household* is of particular importance, i.e. *the availability of food (adequate to the needs of all household members) that can be purchased or produced on one's own without the risk of losing this availability* [36].

The main indicator in FAO's methodology concerning food security, or rather its lack, is the extent of undernourishment, i.e. the share of undernourished people in the population of a country/region/the world. First, the lowest, i.e. minimum energy demand is identified, which serves as food security threshold, in other words as the limit to specify undernourishment in a country, region or in the world. People who do not reach that level are regarded as undernourished [44].

The minimum energy requirement expressed in kilocalories per capita a day is the lowest level of energy intake to maintain health at low physical activity. This minimum, adopted as the threshold of food security, is used to determine the share of undernourished people in a country's population. *People who do not attain this minimum energy requirement are regarded as undernourished.* As the threshold changes, so does the number and share of undernourished people in a country's population.

The minimum energy requirement for each country is calculated as the weighted average for individual sex and age groups. To simplify matters, FAO assumes that this minimum daily energy intake in developing countries is 1,600–2,000 per capita, that is 1,800 kcal on average [61].

The depth of undernourishment, in other words the depth of famine, is measured with the difference between the minimum energy requirement and the average intake expressed in kilocalories per capita a day in the group of undernourished people. Undernourishment is small if energy deficit is under 200 kcal per capita a day and very high if it exceeds 300 kcal per capita a day. The larger the deficit, the greater the health hazards caused by food shortages. In African countries, the greatest energy deficits were observed in Burundi – 390 kcal; Eritrea – 350 kcal; Sierra Leone – 340 kcal; Mozambique – 330 kcal; followed by Liberia, Chad, Ethiopia and Zambia – 320 kcal; and the Central African Republic, Rwanda and Zimbabwe – 300 kcal.

Significant undernourishment hinders economic growth since it depletes the physical and mental capacities to perform work efficiently; therefore, improved nourishment should be treated as production investment [31]. Undernourishment of children leads to physical and mental retardation, in particular to underweight, gauntness, insufficient height and lack of immunity against various diseases.

According to the FAO, as a result of undernourishment, no less than 22% of children under five are underweight (weight below normal for a given height). Countries with a particularly large share of underweight children include: Niger – 40%; Chad – 37%; Burundi – 39%; Eritrea – 35%; Ethiopia – 35%; Madagascar – 37%; Somalia – 39%; Djibouti – 30%; Angola – 28%; the Democratic Republic of the Congo – 28%; Mali – 28%; and Burkina Faso – 26%. Three percent of children under the age of five are underweight in Tunisia, 4% in Egypt and 6% in Libya, Seychelles and Swaziland [56]. In Africa, no less than 64.6% of children under five have anaemia. In Northern Africa, the share of children with anaemia was lower – 46.6%, and in Sub-Saharan Africa higher – 67%. One of the important factors influencing such prevalence of anaemia in African children is the very low level of meat consumption, which contains iron

that is easier absorbed than iron from plants. For example, in South Africa, much more meat is consumed, and only 24.1% of children under the age of five have anaemia whereas in Burkina Faso even 91.5, in Liberia – 86.7% and in the Central African Republic – 84.2% [59]. Due to undernourishment, 11.1% of adult women have a low BMI (under 18), and in Sub-Saharan Africa – 12.6% (from 3.7% in Swaziland to 20.8% in Burkina Faso)².

Percentage of undernourished people in Africa in 1990–92 and 2011–2013

Country	1990–92	2011–13	Country	1990–92	2011–13
Algeria	<5.0	<5.0	Burkina Faso	22.9	25.0
Egypt	<5.0	<5.0	Botswana	25.1	25.7
Libya	<5.0	<5.0	Kenya	34.8	25.8
Tunisia	<5.0	<5.0	Madagascar	24.4	27.2
Ghana	44.4	<5.0	Central African Republic	48.5	28.2
South Africa	<5.0	<5.0	Liberia	29.6	28.6
Morocco	6.7	5.0	Namibia	36.2	29.3
Mauritius	8.6	5.4	Chad	60.1	29.4
Gabon	9.5	5.6	Sierra Leone	42.5	29.4
Benin	22.4	6.1	Rwanda	52.3	29.7
São Tomé and Príncipe	22.9	7.2	Uganda	27.1	30.1
Mali	24.9	7.3	Zimbabwe	43.6	30.5
Nigeria	21.3	7.3	Congo	42.4	33.0
Mauritania	12.9	7.8	Tanzania	28.8	33.0
Seychelles	16.5	8.3	Swaziland	15.8	35.8
Guinea-Bissau	21.8	10.1	Mozambique	57.8	36.8
Cameroon	38.3	13.3	Ethiopia	-	37.1
Niger	35.5	13.9	Sudan	41.9	38.9
Guinea	18.2	15.2	Zambia	33.8	43.1
Togo	34.8	15.5	Eritrea	-	61.3
Lesotho	17.0	15.7	Burundi	44.4	67.3
Gambia	18.2	16.0			
Malawi	45.2	20.0			
Djibouti	70.2	20.5			
Côte d'Ivoire	13.3	20.5			
Senegal	22.0	21.6			
Angola	63.2	24.4			

Source: www.fao.org/economic/ess/ess-fs/ess-fadata/en/.

Due to malnutrition, and above all overconsumption of food, more and more people, also in Africa, are overweight. In Africa, these were 13.5% of women and 6.5% of men, with 36.1% of women and 17.2% of men suffering from overweight and obesity in Northern Africa. In Sub-Saharan Africa, there were no more than 9.2% of adult women and 4.4% of adult men suffering from

² BMI (Body Mass Index), which helps to estimate the state of nutrition, is a measure of relative weight in kg/m². BMI under 18.5 = chronic energy deficiency, BMI over 25 = overweight and obesity [14].

overweight and obesity (e.g. in Ethiopia 1.6% of women and 0.9% of men, and in Namibia 42.8% of women and 23.2% of men).

In 2011–13, 21.2% of the population in Africa was undernourished [22]. In Northern Africa, there were less than 5% of undernourished people while in Sub-Saharan Africa – 24.8%. In 1990–92 and 2011–13, the share of undernourished people in Africa decreased by 6.1 percentage points and in Sub-Saharan Africa by 7.9 percentage points while the number of undernourished people in Africa increased in 1990–92 and 2011–13 from 177.6 million to 226.4 million, i.e. by 27.4%. In Sub-Saharan Africa, their number increased from 173.1 million to 222.7 million, i.e. by 28.6%, and in Northern Africa it remained at the level of 4.6 million.

In Eastern Africa, the largest share of undernourished people was in Burundi – 67.3%, and the smallest in Mauritius – 4.3%. In Middle Africa, the largest share of undernourished people was in Congo – 33%, and the smallest in Gabon – 5.6%. In Western Africa, the population of Sierra Leone was at the greatest risk of undernourishment – 29.4%, and of Ghana at the smallest risk – less than 5%. In Southern Africa, the largest share of undernourished people was noted in Namibia – 29.3%, and the smallest in South Africa – less than 5%. The case of Botswana is worth noticing. This country belongs to the group of countries with a high level of GDP per capita (almost USD 13,000), but had no less than 25.7% of undernourished people. This situation results from huge inequalities in income distribution, whose considerable share is in the hands of the most affluent people.

Between 1990–92 and 2011–13, the share of undernourished people decreased in Angola, Chad, Cameroon, Djibouti, Ghana, Guinea-Bissau, Mali, Niger, Nigeria and Togo. The income of people usually increased owing to the produced mineral resources. In Burundi, Tanzania, Zambia, Burkina Faso and Swaziland, in turn, the share of undernourished people increased between 1990–92 and 2011–13.

The first Millennium Development Goal adopted at the 2000 Millennium Summit in New York is to halve, between 1990 and 2015, the proportion of undernourished people in the population of the world, regions and countries. According to the Millennium Development Goal, the share of undernourished people in the total African population should not exceed 13.7%. Taking into consideration the current trends of decrease in the share of undernourished people in the population, neither Africa as a continent, nor Sub-Saharan Africa will achieve the First Millennium Development Goal by 2015.

People in Sub-Saharan Africa suffer from food deficits even at the time of falls in food prices on the global markets. This results from poor food transport

opportunities due to the lack of foreign currencies and a low level of development of own agriculture. Also donors and financial institutions pay more attention to other fields of socio-economic life, above all, own profits from the production of mineral resources. Those interested in the development of agriculture, primarily rural areas, do not have enough political influence to make governments allocate more money to agriculture, including grants and loans for rural areas.

Feeding the people in Sub-Saharan Africa is subject to considerable unpredictable risks. Natural factors (climate, natural disasters, including floods and droughts), pest spread, plant and animal diseases and potable water shortages lead to a considerable food deficit that could not be overcome through import due to limited funds. Food shortages may be more severe due to a number of other causes. Among them, of particular significance are political factors (international conflicts and tribal disputes), social factors (epidemics among people, lack of health care, low level of education, illiteracy, especially among women), economic factors (low GDP per capita, inequality in income distribution, inflation, low Purchasing Power Parity and other factors such as gender inequality or corruption) [32]. Many African countries have natural resources (crude oil, gemstones, gold and others), but the proceeds from their extraction are rarely allocated to agriculture and country development.

In Sub-Saharan Africa in the last twenty years, the number of starving and undernourished people increased. Those who starve have no power to translate their nutritional needs into effective demand because they lack purchasing power and cannot produce food. In African countries, many small agricultural producers do not participate in the market, they have not enough money to develop farms, and the food they produce is insufficient to satisfy the nutritional needs even at a minimum level.

An increasing group of economists believe that eradication of undernourishment in developing countries depends on the development of agriculture. It is stressed that the countries that have achieved a high level of socio-economic development started with high yields of cereals per hectare and used relatively much yield-enhancing agents per hectare. The countries with *very low cereal yields in 1980–2000 had decreased economic growth rates*. They fell in the poverty trap.

The poverty trap is a phenomenon related mainly to agriculture – small farmers are the victims of an increase in the number of people and the stagnation or decrease in the level of food production per capita [54]. On the global scale, this problem concerns broad strata of both urban and rural population. The most vulnerable groups include landless peasants, agricultural workers, farmers managing infertile land and small plots, urban poor without work, older people and families with low income, and a large number of children.

Food prices are the main indicator of households' access to food. After several decades when food prices increased or decreased moderately, the 2007–2008 and 2010–2011 periods witnessed dramatic rises. Due to the surge of food prices, the number of starving people increased. For example in Kenya, from 1990–1992 to 2006–2008, the number of undernourished people increased from 8.5 million to 10.7 million, and by 2011–2013 to 11.0 million. The number of undernourished people in Uganda increased even more: from 5.0 million to 9.2 million and in the last year of the comparison to 15.7 million. Also in other African countries, such as Burkina Faso, Burundi, Côte d'Ivoire, Madagascar or Swaziland, the number of undernourished people doubled.

The surge of prices resulted not only from smaller yields and higher production costs, but also from the use of agricultural products for biofuel production (maize, soya, oil palm, rape and even manioc), as well as from speculative operations of the financial sector. The increase in biofuel production, which is subsidised in the EU Member States and in the US, reduces the world's food supplies. Financial markets are increasingly responsible for the rise in food prices. Greater transparency on food product markets is needed to explain their responsibility for soaring food prices.

In this situation, it is necessary to review the biofuel production policy and to evaluate its impact on the food and animal fodder market, and the changes in land use. In particular in the US and the European Union, it is necessary to balance potential benefits arising from biofuel production and its negative effects for the food and animal fodder market, while taking into consideration subsidies to biofuel production. Subsidies should be reduced to avoid the conflicts between the use of agricultural products for food and non-food purposes.

According to research, 50% of starving people live in small farms. An improvement in their economic situation entails investments in agriculture, adjustment of agricultural production to soil and climate conditions and enhancement of rural infrastructure.

After a dramatic increase in food prices, poor countries were receiving more aid in the form of certified seeds, fertilisers and other means of production for poor farmers to produce more food for their families and for sale. Small farms have also been acknowledged as food source. No less than 79 countries asked FAO for help for this group of agricultural holdings. In the declaration adopted unanimously by FAO High-Level Conference of 5 June 2008, it was stated that: *it is necessary to restore the rank of agriculture and food security as the most important issues in global development and as the key element in an international programme to eradicate poverty and undernourishment.*

For the first time in the last 25 years, it were the soaring food prices that motivated a programme to revive the agricultural sector. The governments of the countries with food shortages were obliged to make public investments to support private investments in agriculture and to help protect economically weaker groups of people against hunger [49].

In response to the food crisis, the World Bank created a new fund for rapid aid for most needing countries in the amount of USD 1.2 billion. The fund is earmarked for feeding starving children, breastfeeding mothers, infants and small children, for provision of dietary supplements for pregnant women, as well as seeds and fertilisers [69]. Also the world's most affluent countries (G8) committed to support Africa in its efforts to eradicate hunger, by allocating funds for agriculture modernisation on this continent.

FAO cooperates with the group of the wealthiest countries and with international communities. It is necessary to collect USD 30 billion a year for agricultural development in order to double food production by 2050 to feed over 9 billion people of the world, including 2.1 billion people in Africa [69].

Agricultural production growth rate has to be higher than the population growth rate to enable satisfying nutritional needs of people. Currently, Sub-Saharan Africa is the main and the largest area of food deficits. The European Union kept its commitment concerning the size of Official Development Assistance (ODA) in the amount of 0.56% of Gross National Income (GNI) until 2010 and 0.7% of GNI until 2015 in accordance with the Council Conclusion of 20 June 2008 confirmed in the Regulation (EC) No 1337/2008 of the European Parliament and of the Council of 16 December 2008 establishing a facility for rapid response to soaring food prices in developing countries. The European Union committed to provide financing for agricultural inputs and private investments in agriculture.

CHAPTER III

FOOD PRODUCTION TRENDS IN AFRICA

Food production in amounts sufficient to satisfy the nutritional needs of an increasing population of the African continent still presents a problem. Africa has remained behind other regions of the world in terms of extending food resources required to satisfy the nutritional needs of an increasing number of people. As opposed to other regions of the world, the number of undernourished people on the African continent has increased.

In most African countries, agriculture is an important branch of the economy since it significantly contributes to the Gross Domestic Product, and also due to the undeveloped processing industry, poor development of tourism and other services. On the African continent, agriculture accounted for ca. 30% of the Gross Domestic Product.

Share of agriculture in GDP in Africa in 2010 (%)

Equatorial Guinea	1.9	Tanzania	23.4
Libya	2.2	Madagascar	25.2
Botswana	2.6	Kenya	28.0
Seychelles	2.7	Cameroon	28.1
South Africa	3.4	Uganda	28.3
Mauritius	3.6	Zambia	29.9
Congo	3.8	Mozambique	30.9
Djibouti	3.8	Malawi	31.6
Gabon	4.4	Sudan	33.0
Namibia	7.7	Burkina Faso	33.2
Tunisia	8.1	Rwanda	34.9
Lesotho	8.6	Nigeria	35.2
Algeria	9.0	Burundi	36.0
Swaziland	9.4	Benin	36.1
Angola	10.1	Mali	40.7
Egypt	14.0	Niger	42.1
Morocco	15.4	Guinea-Bissau	42.5
Mauritania	17.1	Côte d'Ivoire	44.3
Senegal	17.4	Togo	45.7
Eritrea	17.7	Ethiopia	46.7
Zimbabwe	17.8	Central African Republic	54.3
Chad	19.4	Somalia	60.2
Ghana	21.0	Sierra Leone	61.3
Guinea	22.5	Liberia	73.3
Democratic Republic of the Congo	22.9		

Source: African Statistical Yearbook 2012.

In 18 countries, the share of agriculture in GDP per capita was larger than the average for Africa and ranged from 30.9% in Mozambique to 73.3% in Liberia. A large share of agriculture is connected to a low GDP per capita. For example, in Liberia it was USD 506. The smallest share of agriculture in GDP was observed in Equatorial Guinea – 1.9%. It is the country with the highest GDP per capita in Africa – USD 32,026.

The role of agriculture in providing means of subsistence is huge since 60% of people in Africa live off agriculture (agricultural population). The largest share of agricultural population is in Burkina Faso – 92.1%, and the smallest in Libya – 3.0%.

**Share of agricultural population in the total population in Africa
in 2010 (%)**

Libya	3.0	Sierra Leone	60.0
Mauritius	8.0	Liberia	62.0
South Africa	9.8	Central African Republic	63.2
Cabo Verde	16.9	Zambia	63.2
Tunisia	20.6	Equatorial Guinea	64.3
Algeria	20.9	Somalia	65.6
Nigeria	24.9	Chad	65.7
Gabon	25.7	Angola	69.2
Morocco	25.9	Madagascar	70.1
Egypt	27.9	Senegal	70.2
Swaziland	28.8	Kenya	70.6
Congo	31.9	Malawi	72.9
Côte d'Ivoire	37.9	Tanzania	73.3
Lesotho	38.9	Uganda	73.5
Cameroon	40.9	Seychelles	73.6
Namibia	41.0	Eritrea	73.8
Botswana	42.1	Djibouti	74.0
Benin	44.3	Mali	74.9
Mauritania	50.3	Mozambique	76.0
Sudan	51.5	Gambia	76.0
Togo	53.4	Ethiopia	77.3
Ghana	53.8	Guinea-Bissau	79.3
Zimbabwe	56.3	Guinea	79.8
Democratic Republic of the Congo	57.2	Niger	82.9
		Burundi	89.2
		Rwanda	89.4
		Burkina Faso	92.1

Source: FAO Statistical Yearbook 2012.

1. Factors influencing agricultural development

African countries are characterised by a low or medium level of socio-economic development. Agriculture is usually poorly developed, inefficient, and its modernisation is hindered by the lack of own financial means (many poor people) and no credit options due to unregulated ownership rights. This problem concerns especially women, who increasingly often run agricultural holdings. Governments of African states did little for agriculture, leaving it to its own means. It was not until the crisis of 2007–08 that more attention was paid to agriculture by the authorities of African countries, as well as economically developed countries and international non-governmental organisations as part of the aid they provided.

A considerable part of farms cultivate land that does not exceed one hectare, which does not suffice to feed a family given low soil fertility. Lack of modern farming methods, low level of mechanisation, water shortages and natural disasters contribute to periodic food shortages. Apart from small, under-invested subsistence farms, which represent the majority of agricultural holdings in Africa, plantation agriculture has developed that produces the following plants for export: cocoa, banana, citrus fruit, coffee, tea, oil palm and flowers (e.g. in Kenya and Ethiopia). Intensive farming in large plantations producing for export has developed mainly in South Africa.

The development of agriculture depends on numerous factors. In poorly economically developed countries, its performance is mostly determined by the natural environment and the labour resources in agriculture.

1.1. Soil and climatic conditions of agricultural development

The key natural factors determining agricultural effectiveness include: agro-climate, water conditions and soil conditions. *Agro-climate is the entirety of long-term weather conditions in a given area influencing the growth of plants and animals.* The main agro-climate factors include: insolation, temperature, precipitation and the length of the growing period [21].

In Africa, the growing period is very favourable. On the majority of the continent, plants grow all year round. Only in the mountains does the temperature fall below 5°C. Considerable insolation and high temperature provide good conditions for plant production. Unfavourable factors include unequal precipitation distribution throughout the year, which contributes to the creation of too dry and too humid areas.

Africa is located on both sides of the Equator; therefore, the distribution of climatic zones is symmetrical. The zone from humid equatorial climate (hot and

wet throughout the year) to dry subequatorial climate with a short wet season is located in the middle part of the continent. The Gulf of Guinea is particularly humid with the annual precipitation total of 3,000 mm. The least precipitation is noted in deserts. These include: the Sahara, the Namib and the Kalahari. Annual precipitation in major parts of the Sahara does not exceed 20 mm, and in the Namib 15 mm. Maximum temperatures in the Sahara and on the Red Sea coasts reach 50°C and more. In most parts of Africa, the development of agriculture is generally determined by the annual precipitation and the ability to store rainwater and keep the soil humid in countries located in the dry zone.

In the subtropical climate, precipitation is not sufficient for agriculture. It is necessary to irrigate cropland located in the subtropical climate. Irrigating crops increases cereal yields by 20–60%, root crops by 50–100% and vegetables by 100–200%. Irrigating semi-arid areas and constructing storage ponds increases water reserves and air humidity in a given area [21].

Soil quality in Africa is very much diversified. It mostly includes infertile soil; hence, obtaining greater yields requires fertilising and irrigating. In most African countries, the yields are very small, with the exception of Northern Africa (Egypt) and Southern Africa (South Africa).

The African continent is diversified in terms of the types of cultivated plants, which depend on the soil and climatic conditions, applied irrigation and fertilisation methods.

Wheat is the most important cereal in the world. It is cultivated mainly in the warm temperate climate, subtropical climate and wet tropical climate. Wheat requires good soil, fertilisers and irrigation. In Africa, wheat plantations are located in Northern Africa, mainly in Egypt, which is one of the world's most important wheat producers. Egypt obtains high yields with considerable fertilisation – 500 and more kg/ha, and with 100% irrigation of cropland. In Southern Africa (South Africa), wheat is also produced, but with considerably lower use of fertilisers.

Maize is cultivated mostly in Eastern and Southern Africa and in Egypt, and in smaller amounts in all regions of the African continent.

Millet and sorghum may be cultivated in severe climatic conditions (not much precipitation, high temperature) and on poor soils. In Africa, these are important consumption cereals. The main millet producers in Africa include: Nigeria, Niger, Mali, Burkina Faso, Uganda, Senegal, Sudan and Ethiopia. The main sorghum producers include: Nigeria, Sudan, Ethiopia and Burkina Faso.

Rice is also cultivated in Africa. It is a type of rice that requires less water than the Asian variety. Rice plantations are located in Northern Africa (Egypt) and Western Africa (Guinea, Liberia, Mali, Côte d'Ivoire) and in Madagascar.

Tuber and root crop cultivation is typical of the African continent. Manioc is cultivated in tropical and subtropical countries. This plant gives high yields and is resistant to unfavourable climatic and soil conditions.

Manioc (cassava) grows on dry, poor quality soils, where other crops are unsuccessful. Manioc is a highly calorific plant. It contains starch, plant-based protein, vitamins A, C and iron. Manioc is mostly cultivated in Eastern Africa (Malawi, Mozambique, Rwanda, Uganda, Tanzania, Madagascar), in Middle Africa (Angola, Congo, Cameroon, the Central African Republic) and in Western Africa (Benin, Ghana, Nigeria, Liberia and Togo). Tuber roots of 5-10 kg are eaten cooked or dried because they are poisonous when raw.

Potatoes are cultivated in all geographical regions of Africa, though in smaller amounts. Most potatoes are produced in Northern Africa (where manioc is not cultivated at all), in some countries of Eastern Africa (Malawi, Rwanda) and in Southern Africa (South Africa and Lesotho). Most sweet potatoes are produced in Eastern Africa (Burundi, Rwanda, Mozambique, Uganda, Madagascar) and in Western Africa (Guinea, Mauritania, Nigeria).

Vegetable production is minor in Africa. Vegetables are cultivated mostly in Northern Africa, and in other regions only in allotments.

Different kinds of fruit are cultivated in different parts of Africa. In Northern Africa, citrus fruit are produced: oranges, tangerines and lemons, mostly in Egypt, Morocco and Algeria. In other regions of Africa, except for Southern Africa, citrus plantations are present but to a lesser extent. In South Africa, the production of oranges and tangerines is exceptionally high. Bananas are produced in the largest amounts in Eastern Africa, in particular in Tanzania, followed by Northern Africa: Egypt and Morocco. Bananas are less common than plantains (bananas that can be processed), in particular in Eastern Africa (Rwanda, Uganda, Tanzania) and in Western Africa (Ghana, Guinea, Nigeria, Côte d'Ivoire). Apples are produced only in Northern Africa (except for Libya) and in South Africa. Pineapples are produced mainly in Northern Africa and in Western Africa (Nigeria, Benin, Senegal). The main producer of dates is Northern Africa, and in other regions they are produced only in a few countries, e.g. Sudan, Niger, Mauritania or Namibia. Grapes are produced mainly in Northern Africa and in South Africa.

In Africa, sugar cane is cultivated to produce sugar. The main cane producers in Southern Africa include South Africa and Swaziland, and in Northern Africa – Egypt and Morocco. In Eastern Africa, sugar cane is produced in larger amounts in Mauritius, Kenya and Swaziland.

Africa is an important producer of oil crops. Peanuts are most prominent among them. Their main plantations are located in Western Africa: in Nigeria,

Senegal, Ghana and Guinea, and in Eastern Africa in Sudan and Kenya. Smaller amounts of peanuts are cultivated in the remaining regions of Africa.

Oil palm is commonly cultivated on the western coast of Africa, from Gambia to Angola. Its main producers are Nigeria and the Democratic Republic of the Congo, which supply half of the crops. Oil is refined on site and sold mainly abroad.

Coconut, just like oil palm, is cultivated in Western Africa in the equatorial zone, and it is characterised by a high fat content.

Olives are produced in Northern Africa (mainly Morocco, Tunisia and Algeria). Sesame is cultivated in Eastern Africa, mainly in Tanzania, Sudan and Uganda, as well as in Northern African countries. Sunflower is cultivated in Eastern Africa: in Sudan and Tanzania, and in Southern Africa: in South Africa and, to a small extent, in Botswana.

The African continent is famous for its cocoa plantations; no less than 66% of the world's production of cocoa beans originates from Africa. Cocoa requires hot and humid climate. The greatest amounts of cocoa beans are produced in Western Africa (Côte d'Ivoire, Ghana, Nigeria, Sierra Leone) and in Middle Africa, only in Cameroon.

Coffee (12% of the global output) is cultivated in a hot zone, in the mountainous part of the tropical belt. *Coffea arabica* is cultivated in Eastern Africa, mainly in Ethiopia, Uganda, Tanzania and, to a lesser extent, in Kenya, Madagascar and Rwanda; in Middle Africa in Cameroon; and in Western Africa in Côte d'Ivoire, Guinea and Sierra Leone.

Tea is the most universally consumed stimulant in the world. In Africa, it is mainly cultivated in Kenya and, to a lesser extent, in Malawi, Uganda, Tanzania, Rwanda and Zimbabwe. Rooibos tea originates from Southern Africa (South Africa) and is cultivated for own needs.

Africa is famous for its production of spices, mainly vanilla and cloves cultivated in Madagascar. Ginger is cultivated in Western Africa (Sierra Leone). Pepper is cultivated in tropical and subtropical climate (Tanzania, the Democratic Republic of the Congo). Other cultivated spices include: caraway, coriander, anise, thyme, marjoram and rosemary.

Due to limited fodder reserves, animal production develops slowly. The most popular animals include: cattle, sheep, goats and camels.

In Africa, cattle are mostly herded, on natural pastures in Sudan, South Africa, Nigeria, Ethiopia, Kenya and Uganda, and on areas of wet savannahs (Kenya, Middle Nigeria, Ethiopian Highlands). In other parts of Africa, cattle are bred for draft purposes due to a low mechanisation of agriculture.

In equatorial zones with high air humidity pests spread. Buffaloes and zebus are best adapted to this plague. In the tropical zone, cattle breeding is hindered by tsetse flies.

Pig breeding in African countries is insignificant due to religious constraints. Islam bans pig meat consumption (pigs are viewed as impure). Pigs are bred in pens and fed with self-produced fodder and food waste.

In dry regions with few grass plants, goats and camels are bred, as well as certain sheep species. Goats are often bred in household farms since they require less fodder. The greatest headage of goats in Africa is in Nigeria and Sudan. One-humped (dromedary) camels are bred mainly in Northern Africa and in some other countries: Somalia, Sudan, Ethiopia, Niger, Burkina Faso, Mauritania, Chad and Mali. Camels, mules and donkeys are bred as draft and pack animals.

The most popular poultry species include: ducks, geese, turkeys and ostriches. Poultry – mainly chickens and ostriches – is bred at large farms in South Africa and, to a very small extent, in other countries.

In coastal regions and near great rivers, fishery plays a major role. Africa experiences increasing difficulties with fishing. The resources in some fishing grounds are thinned, in particular near the coast of Somalia and Kenya (wasteful exploitation of resources by countries holding concessions – from the West and Far East, and fish piracy). Already at the turn of the 21st century, there were not enough fish for the local fishers, who in consequence engaged in piracy. Currently, rich fishing grounds are only found in the south of Africa.

1.2. Land use

Agricultural land covered 39.2% of the total area of the African continent (37.6% of the world). Of this share, permanent cropland covered 1.0%, meadows and pastures – 30.6%, and arable land – 7.6%, (in the world – 10.6%).

In 2009, there was 0.20 ha of arable land per capita in Africa, just like in the rest of the world. In Northern Africa, arable land constitutes only 3.8% of the total surface due to limited access to water and a large area covered by the Sahara Desert, where crops may be cultivated only in oases. The greatest share of arable land is in Morocco – 18.0% and in Tunisia – 17.4%, and the smallest in Libya – only 1.0%. In Northern Africa, there was only 0.10 ha of arable land per capita, with only 0.04 ha per capita in Egypt and 0.28 ha in Libya.

In Sub-Saharan Africa, arable land covered 8.5% of the total area. This share ranged from 1.3% in Gabon – Middle Africa, to 12.6% in Cameroon. There was 0.10 ha of arable land per capita in the Democratic Republic of the Congo and 0.45 ha in the Central African Republic. In Sub-Saharan Africa, the share of arable land in the total area was 8.5%, with 0.20 ha of arable land per capita.

In Middle Africa, the share of arable land in the total area ranged from 1.3% in Gabon to 12.1% in Cameroon. The amount of arable land per capita ranged from 0.10 ha in the Democratic Republic of the Congo to 0.43 ha in the Central African Republic.

In Eastern Africa, there were also discrepancies in the share of arable land in the total area. In small countries with high population density, the share of arable land in the total area was in 2009: 52.7% in Rwanda, 42.9% in Mauritius and 35% in Burundi. In the Somali Peninsula – in Djibouti, arable land constituted only 0.1% of the total area, in Somalia – 1.6%, and in Ethiopia – 13.9%. The amount of arable land per capita in Eastern Africa ranged from 0.01 ha in Seychelles to 0.47 ha in Sudan.

In Western Africa, there were also discrepancies in the share of arable land in the total area. In Gambia, arable land covers 40% of the total area, in Senegal – 37.3%, in Niger – 11.8%, in Côte d'Ivoire – 8.8%, in Mali – 5.2%, and in Liberia – 4.2%. In Niger, there was as much as 1 ha of arable land per capita while in Liberia only 0.10 ha.

Arable land in Africa in 2009 (per capita in ha)

Djibouti	0.00	Algeria	0.21
Seychelles	0.01	Angola	0.22
Egypt	0.04	Gabon	0.22
Mauritius	0.07	Mozambique	0.22
Democratic Republic of the Congo	0.10	Nigeria	0.22
Liberia	0.10	Tanzania	0.23
Burundi	0.11	Gambia	0.24
Somalia	0.11	Morocco	0.25
Mauritania	0.12	Malawi	0.25
Congo	0.13	Tunisia	0.26
Rwanda	0.13	Zambia	0.26
Botswana	0.13	Libya	0.28
Eritrea	0.14	Benin	0.28
Kenya	0.14	Guinea	0.29
Côte d'Ivoire	0.14	South Africa	0.29
Madagascar	0.15	Cameroon	0.31
Lesotho	0.16	Senegal	0.32
Ethiopia	0.17	Zimbabwe	0.34
Swaziland	0.17	Namibia	0.36
Ghana	0.18	Burkina Faso	0.37
Equatorial Guinea	0.19	Chad	0.39
Sierra Leone	0.19	Mali	0.43
Uganda	0.20	Central African Republic	0.45
Guinea-Bissau	0.20	Sudan	0.47
		Niger	1.00

Source: FAO Statistical Yearbook 2012, Rome 2012.

In Southern Africa, there are significant differences in land use structure. In Botswana, arable land covered 0.4% of the total area of the country, in Namibia – 1.0%, in South Africa – 1.8%, and in Lesotho – 11.0%. The amount of arable land per capita ranged from 0.36 ha in Namibia to 0.13 ha in Botswana.

In 1970–2009, a downward trend in the area of arable land per capita was noted on the African continent, like in the rest of the world. In Africa, arable land on average decreased faster than in the world by 1.8% and 1.5%, respectively.

The average annual decrease in the area of arable land was (1.0%) greater in Northern Africa than in Sub-Saharan Africa (1.6%).

In African countries, the area of arable land per capita decreased the fastest in Botswana – by 3.8% average annual, and the slowest in Burkina Faso and Ghana – by 0.1%. Only in two African countries, the area of arable land per capita increased in 1970–2009: in Mali by 1.0% and in Sierra Leone by 0.5% average annual [FAO, *Statistical Yearbook 2012*].

1.3. Crops, artificial fertilisers and irrigation

The crop yield reflects the agriculture of regions and countries. The crop yields produced in the world differ due to soil and climatic conditions, input of yield-enhancing agents and used varieties. The lowest cereal yields are harvested on the African continent – 1,240 kg/ha, and the highest in Europe – 4,752 kg/ha, North America – 4,519 kg/ha, and in Asia – 3,296 kg/ha [FAO *Statistical Yearbook 2012*].

If land productivity in Africa increased even to 2/3 of the Asian level, food shortages in African countries would not be as acute as they are today. Poor yields result e.g. from the use of the same cultivation technology for centuries. Farmers apply non-enhanced cultivation technologies, and land is more and more impoverished. Most of them do not apply any fertilisers or just small amounts thereof. Traditional cultivation techniques are insufficient to reduce hunger and poverty. Only the introduction of improved seeds, artificial fertilisers and pesticides, and a better use of water would allow for increasing agricultural productivity in this region. Asia may serve as a good example since owing to food aid and the so-called green revolution financed by rich countries it has considerable achievements in agricultural production. The introduction of improved seeds benefited Asian farmers, even though it did not completely eradicate hunger.

In 2010, cereal yields in Africa ranged from 373 kg/ha in Namibia to 10,000 kg/ha in Mauritius. Very high cereal yields are produced in Egypt – 6,541 kg/ha owing to considerable fertilisation and irrigation. Also South Africa bears high yields – 4,162 kg/ha. In no less than 13 African countries, cereal yields are under 1,000 kg/ha due to lack of irrigation and a limited amount of

artificial fertilisers and manure (poorly developed animal husbandry). In Sub-Saharan Africa, ca. 14 kg of artificial fertilisers are used per 1 ha of arable land. The African continent is characterised by a diversified level of artificial fertilisation of arable land, ranging from 0.4 kg/ha in Niger to 502.8 in Egypt. In Niger, the Democratic Republic of the Congo and Guinea, not even one kilogramme of fertiliser is used per hectare of arable land. From 1 to 2 kg of artificial fertilisers per hectare of arable land were used in five countries (Togo, Angola, Rwanda, Burundi and Namibia).

Yield improvement is related to the use of fertilisers and plant protection products. Common decrease in soil quality and its erosion pose a potential threat to agriculture's production capacities. Erosion is a natural phenomenon, but if it proceeds at a higher rate than soil reconstruction, land becomes less fertile. Over a half of arable land in the world is subject to erosion. In regions suffering from drought and excessive density of people or animals, as well as in many other regions (e.g. in the African Sahel) the already small amounts of arable land have been transforming into dry pastures and deserts. For over 20 years, this region has been subject to the effects of droughts and desertification.

Cereal yields in Africa in 2010 (kg/ha)

Namibia	373	Benin	1,402
Somalia	432	Guinea	1,409
Sudan	452	Nigeria	1,413
Niger	490	Morocco	1,548
Eritrea	536	Sierra Leone	1,554
Angola	644	Guinea-Bissau	1,555
Libya	662	Algeria	1,568
Zimbabwe	752	Uganda	1,608
Democratic Republic of the Congo	772	Kenya	1,613
Chad	775	Mali	1,615
Central African Republic	785	Ethiopia	1,674
Lesotho	909	Tunisia	1,702
Mauritania	946	Cameroon	1,711
Mozambique	1,006	Côte d'Ivoire	1,717
Burkina Faso	1,054	Gabon	1,782
Djibouti	1,111	Ghana	1,814
Gambia	1,127	Rwanda	1,930
Liberia	1,179	Malawi	2,206
Togo	1,187	Zambia	2,547
Senegal	1,197	Madagascar	2,987
Swaziland	1,226	South Africa	4,162
Tanzania	1,333	Egypt	6,541
Burundi	1,346	Mauritius	10,000

Source: *The World Bank* (www.worldbank.org).

Artificial fertilisers' consumption in Africa in 2009 (kg/ha of arable land)

Niger	0.4	Algeria	7.8
Democratic Republic of the Congo	0.5	Tanzania	8.7
Guinea	0.6	Burkina Faso	9.1
Togo	1.0	Gabon	12.0
Angola	1.1	Côte d'Ivoire	15.9
Rwanda	1.1	Ethiopia	17.7
Burundi	1.6	Ghana	20.3
Namibia	1.6	Zambia	27.3
Uganda	2.1	Zimbabwe	28.0
Nigeria	2.1	Malawi	28.5
Madagascar	2.7	Kenya	32.4
Eritrea	2.8	Libya	40.3
Congo	4.6	Morocco	41.0
Senegal	4.9	Tunisia	43.5
Benin	6.5	South Africa	49.2
Cameroon	6.7	Seychelles	52.0
Gambia	6.8	Mauritius	209.4
Mali	7.6	Egypt	502.8

Source: *worldbank.org*, 2012.

1.4. Fixed assets in agriculture

Intensive methods in agriculture cause a significantly higher water consumption than traditional methods, which leads to lowering the level of groundwater.

Investments in irrigation are a chance for the development of agriculture in Africa. They are very expensive, and many African countries cannot afford them without Official Development Assistance.

In 2009–2011, only 6.5% (in the world – 22.7%) of arable land was equipped with irrigation facilities in Africa; in Northern Africa – 21.3%, in Sub-Saharan Africa – 3.6%.

In Egypt and in São Tomé and Príncipe, 100% of arable land is equipped with irrigation facilities while in the Central African Republic only 0.1%. The introduction of irrigation facilities all across Africa will enable farmers to achieve double or even triple crop in a year. The irrigation of arable land will make it possible to cultivate vegetables in the dry season and to limit losses during floods (storage ponds).

Within a short time, it could be possible to increase food production by means of distributing fertilisers, fodder or vouchers for their purchase to small farms or subsidising the prices of means of production. The economic situation of small farms may be improved by investments in neglected areas, such as infrastructure extension in relation to irrigation facilities and roads.

**Arable land equipped with irrigation facilities
in Africa in 2009–2011 (%)**

Central African Republic	0.1	Burundi	2.5
Democratic Republic of the Congo	0.2	Côte d'Ivoire	2.5
Uganda	0.2	Sierra Leone	2.7
Togo	0.3	Eritrea	3.0
Congo	0.4	Senegal	3.1
Cameroon	0.5	Guinea	3.3
Benin	0.5	Mali	3.7
Burkina Faso	0.5	Zimbabwe	4.2
Niger	0.5	Zambia	4.5
Chad	0.7	Algeria	7.6
Ghana	0.7	Guinea-Bissau	8.5
Liberia	0.7	Sudan	10.0
Botswana	0.7	Mauritania	10.5
Rwanda	0.8	South Africa	12.6
Nigeria	0.8	Tunisia	16.3
Lesotho	0.9	Somalia	18.2
Namibia	1.0	Morocco	18.5
Gambia	1.1	Mauritius	25.8
Gabon	1.2	Libya	26.9
Tanzania	1.6	Swaziland	28.6
Kenya	1.9	Seychelles	30.0
Angola	2.1	Madagascar	31.0
Ethiopia	2.1	Djibouti	50.0
Malawi	2.1	Egypt	100.0
Mozambique	2.3	São Tomé and Príncipe	100.0

Source: www.fao.org/economic/ess/ess-fs/ess-fadata/en/.

African agriculture is generally very much fragmented and poorly equipped with fixed assets, apart from plantation farming in South Africa. The value of fixed assets per agricultural worker in Sub-Saharan Africa was USD 2,248 in 2007 (in 2005 prices), and was by 3% lower than in 1990 (USD 2,425). Equipment of agricultural holdings with fixed assets in Sub-Saharan Africa was much diversified. The value of fixed assets per worker ranged from USD 355 in Seychelles and USD 362 in the Democratic Republic of the Congo to USD 33,178 in South Africa. In Northern Africa, the value of fixed assets per worker ranged from USD 4,548 in Algeria to USD 90,229 in Libya.

African agriculture generally makes use of the work of people and animals. Machines are mainly imported and, due to their price, unavailable to most of agricultural holdings. The share of machinery and equipment in the value of fixed assets in Africa was 4.4% (in the world – 19.1%). In Northern Africa, agricultural machinery and equipment represented 6.4% of the total value of fixed assets, from 3.3% in Morocco to 14.3% in Algeria. In Sub-Saharan Africa, the share of machinery and equipment in the value of fixed assets was 4.0%, and ranged from 0.1% in Djibouti, Swaziland and Seychelles to 9.3% in Mozambique.

**Value of fixed assets in agriculture per worker in USD
in Africa in 2007**

Seychelles	355	Eritrea	2,348
Democratic Republic of the Congo	362	Chad	2,468
Burundi	477	Madagascar	2,652
Rwanda	495	Côte d'Ivoire	2,669
Mozambique	592	Zimbabwe	2,842
Gambia	664	Senegal	2,988
Malawi	680	Lesotho	2,998
Liberia	753	Niger	3,371
Uganda	842	Guinea-Bissau	4,176
Congo	1,209	Mali	4,395
Angola	1,212	Algeria	4,548
Ghana	1,249	Nigeria	4,870
Tanzania	1,372	Mauritius	5,046
Togo	1,417	Egypt	5,429
Kenya	1,463	Somalia	5,663
Guinea	1,466	Swaziland	5,824
Burkina Faso	1,610	Botswana	6,151
Ethiopia	1,649	Mauritania	6,240
Sierra Leone	1,716	Sudan	7,002
Benin	1,881	Morocco	8,185
Zambia	1,970	Namibia	10,088
Central African Republic	2,012	Tunisia	12,611
Cameroon	2,055	South Africa	33,178
Equatorial Guinea	2,152	Libya	90,229
Gabon	2,235		

Source: *FAO, The State of Food and Agriculture 2012.*

1.5. Employment in agriculture

The employment structure changes along with the economic development of countries. In poorly developed countries, most people work in agriculture, forestry and fishery. Due to industrial development people move from agriculture to industry. Services also develop. Along with an increase in the income of individuals, the demand for commercial, educational, medical, banking, telecommunications and tourism services increases.

Africa is diversified in terms of employment in agriculture. People working in agriculture in Northern Africa represent ca. 30% of workers, from 19.7% in Libya to 40.9% in Morocco. In Sub-Saharan Africa, people employed in agriculture constitute over a half of workers on the African continent, from 5.1% in Angola and South Africa to 92.2% in Burundi.

The significance of women's work in agriculture increases on the global scale. Among all of those economically active, women working in agriculture constitute ca. 43% in the world, from 20% in Latin America to 50% in Eastern Asia and Sub-Saharan Africa.

Employment in agriculture in Africa in 2010 (% of total workers)

Angola	5.1	Kenya	61.1
South Africa	5.1	Cameroon	61.3
Mauritius	8.7	Gambia	64.7
Libya	19.7	Zimbabwe	64.8
Algeria	20.7	Uganda	65.6
Gabon	24.2	Mali	66.0
Tunisia	25.8	Sierra Leone	68.5
Botswana	29.9	Zambia	72.2
Egypt	31.6	Lesotho	72.3
Senegal	33.7	Guinea	76.0
Congo	35.4	Equatorial Guinea	76.3
Morocco	40.9	Tanzania	76.5
Benin	42.7	Rwanda	78.8
Nigeria	44.6	Ethiopia	79.3
Liberia	48.9	Madagascar	80.4
Togo	54.1	Mozambique	80.5
Niger	56.9	Chad	83.0
Ghana	57.2	Burkina Faso	84.8
		Burundi	92.2

Source: FAO Statistical Yearbook 2012.

Economically active women working in agriculture in Africa as % of all economically active women in 2010

Mauritius	25.0	Kenya	48.6
South Africa	29.6	Democratic Republic of the Congo	48.8
Tunisia	32.8	Uganda	49.5
Côte d'Ivoire	36.2	Guinea	49.7
Niger	36.6	Central African Republic	49.9
Mali	37.7	São Tomé and Príncipe	50.0
Benin	39.6	Seychelles	51.7
Nigeria	39.7	Algeria	52.7
Egypt	40.3	Zimbabwe	53.3
Togo	41.3	Gambia	53.3
Cabo Verde	42.4	Madagascar	53.5
Eritrea	43.6	Mauritania	53.9
Equatorial Guinea	43.7	Swaziland	54.3
Ghana	44.3	Angola	55.0
Liberia	44.5	Tanzania	55.0
Namibia	44.6	Burundi	56.0
Ethiopia	45.5	Congo	56.5
Guinea-Bissau	45.5	Chad	56.9
Gabon	45.6	Botswana	56.9
Somalia	45.9	Rwanda	57.0
Djibouti	46.5	Malawi	59.2
Zambia	46.5	Sierra Leone	61.7
Cameroon	47.3	Mozambique	65.2
Senegal	47.4	Lesotho	67.3
Morocco	47.7	Libya	69.9
Burkina Faso	47.7		

Source: The State of Food and Agriculture 2012.

On the African continent, economically active women working in agriculture constituted from 25% in Mauritius to ca. 70% in Libya. An increasing number of men work outside a farm, leaving farm work to women.

According to various analyses, due to a lack of complementary inputs, work efficiency is lower at farms run by women. Many of those differences to the disadvantage of women result from the law and customs observed in African countries. For example, in Burkina Faso, women's farms produced 30% lower yields than men's farms even though they cultivated the same crops [66]. In Kenya, the value of production from 1 ha was by 8% higher at farms run by men. When women used the same means as men, productivity of their farms increased by 22%. It is highly probable that educated women use new technologies to a greater extent than educated men [67].

Although men and women struggle with the same natural constraints, they do not have equal access to various means of production. In many countries women have no right to land and education. They have restricted access to technology, infrastructure, capital and credit. This disparity is reflected in different productivity to the disadvantage of women and agricultural production, and hence to feeding families.

1.6. Agricultural productivity

In 2010, agricultural productivity, measured by value added per worker, in 65% of African countries was under USD 1,000 and ranged from USD 106 in Eritrea to USD 7,355 in Mauritius. Countries with the highest agricultural productivity also include South Africa, Nigeria, Tunisia, Cabo Verde, Morocco and Algeria.

Agricultural productivity in African countries, also those with the highest productivity rates, is ten times lower than in highly developed countries. For example, the value added per agricultural worker was USD 61,000 in Finland, USD 60,400 in the Netherlands and USD 60,000 in Canada (worldbank.org/indicator).

Increase in agricultural productivity in Africa is related to increased inputs on agriculture, e.g. on yield-enhancing agents, appropriate plant varieties adjusted to soil and climatic conditions, in particular to frequent droughts, and on storage facilities, investments in irrigation and fixed assets that make work in agriculture more effective and help to reduce employment in this sector.

Agriculture value added in Africa in 2010 (USD per worker)

Eritrea	106	Central African Republic	769
Burundi	120	Angola	780
Malawi	186	Seychelles	780
Guinea	201	Mali	845
Uganda	217	Sierra Leone	848
Zimbabwe	224	Botswana	922
Ethiopia	235	Benin	1,041
Mozambique	273	Mauritania	1,053
Democratic Republic of the Congo	278	Sudan	1,175
Rwanda	289	Chad	1,285
Tanzania	295	Swaziland	1,329
Burkina Faso	334	Egypt	2,234
Kenya	365	Gabon	2,359
Gambia	367	Algeria	3,385
Lesotho	392	Morocco	3,780
Senegal	411	Cabo Verde	3,785
Togo	544	Tunisia	3,879
Zambia	564	Nigeria	4,063
Guinea-Bissau	623	South Africa	5,510
Congo	634	Mauritius	7,355
Liberia	670		

Source: worldbank.org/indicator/.

In general, income generated by agricultural holdings is low and insufficient to support families, which leads to decreasing inputs on agriculture that improve land and labour productivity. Given the above, the governments of African countries, especially in Sub-Saharan Africa, should allocate more budgetary resources to agriculture.

Data concerning public expenditure on agriculture are available for few African countries. In its study *The State of Food and Agriculture 2012*, the FAO provides this information only for 14 African countries [59]. Expenditures per worker were as follows: in Ghana – USD 10; in Malawi – USD 17; in Uganda – USD 23; in Kenya – USD 34; in Nigeria – USD 41; in Zambia – USD 109; in Lesotho – USD 142; in Morocco – USD 231; in Egypt – USD 452; in Botswana – USD 750; in Swaziland – USD 857; in Tunisia – USD 1,367; and in Mauritius – USD 1,550. Agricultural development was prioritised in Sub-Saharan Africa only in Mauritius, Botswana and Swaziland while in other countries of this region it was neglected in spite of a huge demand for food.

Public expenditure on research and development in agriculture is of particular importance for agricultural development on the African continent.

**Public expenditure on research and development in agriculture in Africa
in 2010 (% of GDP)**

Niger	0.17	Rwanda	0.53
Guinea	0.18	Côte d'Ivoire	0.54
Gabon	0.20	Benin	0.57
Ethiopia	0.27	Mali	0.57
Madagascar	0.27	Malawi	0.68
Sudan	0.27	Congo	0.85
Zambia	0.29	Senegal	0.87
Sierra Leone	0.31	Mauritania	1.16
Mozambique	0.38	Uganda	1.24
Nigeria	0.42	Kenya	1.30
Burkina Faso	0.43	Burundi	1.78
Eritrea	0.45	South Africa	2.02
Togo	0.47	Namibia	2.03
Tanzania	0.50	Mauritius	3.92
Gambia	0.50	Botswana	4.32

Source: *The State of Food and Agriculture 2012*.

If these works were carried out to satisfy the needs of African agriculture, they could provide new plant varieties adjusted to soil and climatic conditions, livestock crossbreeds and new land cultivation technologies. Owing to these works, agricultural productivity could increase. Yet, according to the available data, not much money is allocated to research and development in agriculture. In 2010, these expenditures ranged from 0.17% of GDP in Niger to 4.32% of GDP in Botswana. A high share of this expenditure in GDP was also characteristic of Mauritius – 3.92%, Namibia – 2.03% and South Africa – 2.02%.

Given the above, African countries have to count on agricultural aid under Official Development Assistance provided to Africa by most developed countries and international non-governmental organisations.

1.7. Official Development Assistance for agriculture

The assistance provided by developed countries and international non-governmental organisations is crucial for agricultural development of African countries. Official Development Assistance for agriculture in Sub-Saharan Africa increased in 2000–2010 from USD 1,488 million to USD 2,957 million (at 2005 Purchasing Power Parity), i.e. by 92%. This increase was highly influenced by the 2007–08 agricultural crisis and the change in the preferences of provided official assistance for African countries. The significance of national agriculture for the reduction in poverty and undernourishment on the African continent was acknowledged, in particular the significance of production at small farms.

There are considerable differences between African countries in the level of obtained development assistance for agriculture. In 2013, relatively high

assistance in USD million at 2005 Purchasing Power Parity was provided to the following countries: Kenya (323); Senegal (245); Mali (223); Ethiopia (222); Uganda (198); Morocco (161); Sudan (145); Egypt (133); Ghana (126); the Democratic Republic of the Congo (100); Burundi (96); Côte d'Ivoire (93); Zimbabwe (81); and Rwanda (68). In spite of considerable needs, Official Development Assistance for agriculture was minor (in USD million at 2005 Purchasing Power Parity) in: Guinea-Bissau (10); Chad (9); Guinea (8); the Central African Republic (3); Congo (1); and Somalia (1).

Official Development Assistance for agriculture in % of total development assistance in Africa in 2010

Libya	0.1	Ethiopia	7.3
Congo	0.1	Rwanda	7.5
Lesotho	0.1	Sudan	7.5
Somalia	0.3	Togo	7.6
Tunisia	0.6	Ghana	8.1
Botswana	0.6	Niger	8.1
Djibouti	0.8	Guinea-Bissau	8.3
Central African Republic	1.2	Malawi	8.6
Chad	1.8	Morocco	8.7
South Africa	1.9	Burkina Faso	8.7
Seychelles	2.0	São Tomé and Príncipe	9.0
Liberia	2.6	Gambia	9.1
Democratic Republic of the Congo	3.1	Cameroon	9.4
Algeria	3.2	Kenya	10.6
Mauritania	3.5	Uganda	10.8
Benin	3.6	Côte d'Ivoire	12.8
Mozambique	3.7	Eritrea	13.6
Namibia	4.0	Gabon	15.4
Tanzania	4.7	Zimbabwe	15.5
Zambia	4.9	Sierra Leone	16.7
Swaziland	5.0	Burundi	19.2
Nigeria	5.5	Senegal	19.7
Egypt	6.0	Mali	24.9
Guinea	6.0		
Angola	6.1		
Madagascar	6.5		

Source: *The State of Food and Agriculture 2012*.

Development assistance for agriculture in Africa changed under many respects in various countries over the 2000–2010 period. An increase in the share of agriculture was noted in: Algeria, Morocco, Angola, the Democratic Republic of the Congo, Gabon, Cameroon, Burundi, Eritrea, Ethiopia, Kenya, Malawi, Mozambique, Sudan, Uganda, Zambia, Zimbabwe, Gambia, Guinea, Guinea-Bissau, Mali, Nigeria, Senegal, Sierra Leone, Togo and Côte d'Ivoire. In the other African countries, the share of development assistance for

agriculture in the total Official Development Assistance decreased [*The State of Food and Agricultural 2012*].

In seven countries, namely in Libya, Congo, Lesotho, Somalia, Tunisia, Botswana and Djibouti, the Official Development Assistance for agriculture constitutes less than 1% of the total Official Development Assistance for these countries. Only in Mali, as much as 25% of the total development assistance was allocated to agriculture, and in Burundi and Senegal – over 19%.

2. Output of agricultural produce and food on the African continent against the global indicators

The output of plant and animal products should increase at a higher rate than the population growth rate. This leads to a greater availability of food in the world and in respective regions.

Cereal grains are the basic product that satisfies the food needs of people around the world. Cereal output has systematically increased owing to greater yields from a unit of arable land and the popularisation of modern agrotechnology (new cereal varieties, intensive fertilisation, plant protection, irrigation). In 1990–2009, the cereal output in the world increased from 1,771.6 to 2,251.6 million tonnes, i.e. by 27%, and the cereal output in Africa increased from 87.8 to 146.2 million tonnes, i.e. by 66.5%. In 1990–2009, the cereal output in the world increased at the rate of 1.3%, just like the cereal output in Africa. Cereal output in Africa in 1990 accounted for 5.0% of cereal output in the world, and in 2009 for 6.5%, while the African population represented 11.5% and 14.1% of the world's population, respectively.

The most popular of all cereals produced in the world is maize – 36.3% (816.7 million tonnes); followed by wheat – 30.2% (680.1 million tonnes); rice – 20.2% (455.7 million tonnes); barley – 6.5% (147.4 million tonnes); sorghum – 2.5% (55.8 million tonnes); millet – 1.2% (26.0 million tonnes); oats – 1.0% (23.2 million tonnes); and rye – 0.8% (18.3 million tonnes).

As for cereals produced in Africa in 2009 (146.2 million tonnes) maize was also the most popular – 39.5% (57.7 million tonnes); it was followed by wheat – 17.8% (26.1 million tonnes); sorghum – 15.0% (22.0 million tonnes); rice – 10.4% (15.2 million tonnes); millet – 10.1% (14.7 million tonnes); and barley – 4.0% (5.8 million tonnes).

In 1990–2009, the global consumption of cereals for food increased by 24.7%, from 783.4 to 976.7 million tonnes. The consumption of cereals for fodder increased by 14.3%, from 652.8 to 746.2 million tonnes. In Africa, the dynamics of growth in the consumption of cereals for food and fodder was much higher than on average in the world. In 1990–2009, cereal consumption for food in Africa

increased from 85.8 million tonnes to 141.0 million tonnes, i.e. by 64.4%, and for fodder from 17.2 million tonnes to 30.8 million tonnes, i.e. by 78.7%.

Net import of cereals in Africa increased in this period 2.1 times, from 24.8 million tonnes to 51.9 million tonnes in 2009, and calculated into net import of cereals per capita in Africa increased in the same period from 41 kg to 55.7 kg, i.e. by 35.9%.

In 2009, the output of root crops on the African continent amounted to 200.1 million tonnes and more than doubled in comparison with 1990 (1990 – 91.5 million tonnes). In the same period, the world output of root crops increased by 26% (from 571.9 to 720.4 million tonnes). In 2009, the output of root crops in Africa represented 27.8% of the global output, and in 1990 – 16%. The output of root crops in 1990–2009 increased by 0.2% average annual in the world, and by 4.2% in Africa.

In 1990–2009, the output of sugar in the world increased from 139.1 to 188.5 million tonnes, i.e. by 35.5%. In the same period, the output of sugar in Africa increased by 32.5%, i.e. from 7.7 to 10.2 million tonnes in 2009, and its share in the output of sugar increased from 5.4% to 5.5%. The average annual sugar output growth rate was 1.6% in the world and 1.5% in Africa.

In 1990–2009, the output of leguminous crops in the world increased from 59.0 to 63.1 million tonnes, i.e. by 6.9%, and in Africa from 7.0 to 12.1 million tonnes, i.e. by 72.6%. The output of leguminous crops in Africa increased at the rate of 2.9% and in the world by 0.4% average annual. The output of leguminous crops in Africa in 2009 represented 19.1% of the global output, and in 1990 – 11.8%.

The output of oil crops in the world in 1990–2009 increased from 272.6 to 489.8 million tonnes, i.e. by 79.9%, and in Africa from 12.5 to 22.2 million tonnes, i.e. by 76.2%, representing 4.5% of the global output in 2009, and 4.6% in 1990. The output of oil crops in the world increased at the rate of 3.1% a year, and in Africa by 3.0%.

The output of vegetable fats in the world increased in 1990–2009 from 63.9 to 144.2 million tonnes, i.e. 2.3 times, and in Africa from 4.2 to 7.1 million tonnes, i.e. by 69.0%, and represented 4.9% of the global output in 2009, and in 1990 – 6.6%. The output of vegetable fats increased by 4.4% average annual in the world, and by 2.8% in Africa.

The output of vegetables on the African continent was 65.5 million tonnes in 2009, and was by 98.2% higher than in 1990 (33.1 million tonnes). In this period, the global output of vegetables increased 2.2 times, i.e. from 459.2 to 1,009.4 million tonnes. Vegetables produced in Africa in 2009 constituted 6.5%

of the global output, and in 1990 – 7.2%. The output of vegetables increased at the rate of 4.2% a year, and in Africa by 3.7% a year.

**Table 4. Output in 1990 and 2009 in the world and in Africa
(thousand tonnes)**

	Years	World	Africa					
			Total	Northern	Middle	Eastern	Western	Southern
Population	1990	5,219,140	600,391	145,966	34,896	194,912	182,524	42,093
	2009	6,656,860	932,610	205,407	58,567	314,832	296,511	57,293
Cereals	1990	1,773,310	87,808	23,498	1,743	22,970	27,538	12,060
	2009	2,251,610	246,217	41,554	5,305	40,542	43,936	14,880
Root and tuber crops	1990	571,861	91,534	4,130	7,117	31,027	47,577	1,681
	2009	720,407	200,056	9,335	23,588	51,691	112,992	2,450
Sugar	1990	139,102	7,695	1,978	205	2,538	396	2,579
	2009	188,513	10,211	3,063	381	3,298	434	3,034
Leguminous crops	1990	58,963	7,047	1,083	163	3,498	2,107	196
	2009	63,121	12,086	1,117	840	2,522	4,338	123
Oil crops	1990	272,647	12,571	2,956	695	2,865	5,055	1,001
	2009	489,785	22,221	4,735	1,154	4,894	9,965	1,473
Vegetable oils	1990	63,974	4,220	615	336	454	2,419	396
	2009	144,162	7,108	963	464	739	4,448	493
Vegetables	1990	459,251	33,078	17,270	1,033	4,671	8,057	2,046
	2009	1,008,380	65,568	37,457	2,668	9,060	13,883	2,500
Fruit	1990	348,604	44,855	9,258	2,855	18,118	10,696	3,928
	2009	593,351	78,346	21,055	4,735	26,435	19,945	6,176
Meat in total	1990	178,684	8,514	2,315	500	2,274	1,807	1,618
	2009	284,925	15,222	4,698	766	3,507	3,357	2,894
Animal fats	1990	31,949	398	154	15	99	52	77
	2009	35,463	688	292	23	203	102	69
Eggs	1990	37,395	1,536	574	24	262	459	217
	2009	67,983	2,593	929	27	326	849	461
Milk	1990	540,449	21,131	8,088	534	8,043	1,734	2,732
	2009	697,839	38,752	18,476	720	12,666	3,485	3,405
Fish and seafood	1990	96,514	4,986	1,118	359	1,247	1,460	802
	2009	142,901	7,850	2,252	600	1,655	2,254	1,089

Source: Own work based on Food Balance Sheets, faostat.fao.org.

The output of fruit on the African continent was 78.3 million tonnes in 2009 and was by 74.4% higher than in 1990 (44.9 million tonnes). In this period, the output of fruit in the world increased by 72.7%, i.e. from 343.6 million tonnes to 593.4 million tonnes. Fruit produced in Africa in 2009 constituted 13.1% of the global output, and in 1990 – 7.6%. The output of fruit in the world increased at the rate of 2.8% average annual, and in Africa at the rate of 3.0%.

The output of meat in the world increased in 1990–2009 from 178.5 to 284.9 million tonnes, i.e. by 59.7%. In the same period, the output of meat on the African continent increased from 8.5 to 15.2 million tonnes, i.e. by 78.8%, representing 4.8% of meat output in the world in 1990, and 9.3% in 2009. The output of meat in the world increased at the rate of 2.5% average annual,

and in Africa at the rate of 3.1%. The most popular meat in the world is pork – 106.3 million tonnes, i.e. 37.2% of local poultry output.

The output of animal fats in the world increased from 18.9 million tonnes in 1990 to 35.5 million tonnes in 2009, i.e. by 87.8%. In this period, the output of animal fats in Africa increased by 72.9%, namely from 0.4 to 0.7 million tonnes and in 2009 represented ca. 2% of the global output, and in 1990 – 2.1%. In this period, the output of animal fats in the world increased at the rate of 3.4%, and in Africa at the rate of 2.9%.

The global output of eggs increased in 1990–2009 from 18.9 to 35.5 million tonnes, i.e. by 87.8%. The output of eggs on the African continent increased by 68.8%, from 1.5 to 2.6 million tonnes. Egg production in Africa represented 7.3% of the global output in 2009, and 7.9% in 1990. The egg output in the world increased in this period at the rate of 3.2% average annual, and in Africa at the rate of 2.8%.

In 1990, 540.4 million tonnes of milk was produced in the world, and in 2009 – 697.8 million tonnes, i.e. 29.1% more. In the same period, the output of milk in Africa increased by 83.9%, from 21.1 to 38.8 million tonnes, representing 5.6% of its global output in 2009, and 3.9% in 1990. The output of milk in the world increased at the rate of 1.4% a year, and in Africa twice as quickly, i.e. by 3.2% average annual.

The catch of fish and seafood in the world increased in 1990–2009 from 96.5 to 142.9 million tonnes, i.e. by 48.1%. In this period, it increased in Africa by 57.4%, from 4.9 to 7.9 million tonnes, representing 5.5% of the global catch in 2009, and 5.1% in 1990. Fish catch increased on average by 2.1% a year in the world, and by 2.4% in Africa.

The average annual population growth rate in the world was lower than the sugar, oil crops, vegetable fats, vegetables, fruit, meat, animal fats, eggs, milk, fish and seafood growth rates. The root crops and leguminous crops growth rates were, in turn, lower than the population growth rate, and the output of cereals was at a similar level.

The primary agricultural products' growth rate on the African continent was higher than the population growth rate with the exception of sugar.

In individual regions of Africa, the average annual population growth rate and animal and plant products' growth rate in 1990–2009 was diversified.

Table 5. Average population growth rate and plant and animal output growth rate in 1990–2009 in the world and in Africa (%)

	World	Africa					
		Total	Northern	Middle	Eastern	Western	Southern
Population	1.3	2.3	1.8	2.8	2.6	2.6	1.6
Cereals	1.3	2.7	3.0	6.0	3.0	2.5	1.1
Root crops	1.2	4.2	4.4	6.5	2.7	4.7	2.0
Sugar	1.6	1.5	2.3	3.3	1.4	0.5	0.9
Leguminous crops	0.4	2.9	0.2	9.0	-1.7	3.9	-2.4
Oil crops	3.1	3.0	2.5	2.7	2.8	3.6	2.1
Vegetable fats	4.4	2.8	2.4	5.7	2.6	3.3	1.1
Vegetables	4.2	3.7	4.2	5.1	3.5	2.9	1.1
Fruit	2.8	3.0	4.4	2.7	2.0	3.3	2.4
Meat in total	2.5	3.1	3.8	2.3	2.3	3.3	3.1
Animal fats	3.4	2.9	3.4	2.3	3.9	3.6	-0.6
Eggs	3.2	2.8	2.6	0.6	1.2	3.3	4.0
Milk	1.4	3.2	4.4	1.6	2.4	3.7	1.2
Fish and seafood	2.1	2.4	3.8	2.7	1.5	2.3	1.4

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In Northern Africa, the population growth rate was 1.8%. The output of plant and animal products increased at a higher rate than the population growth rate in this region (with the exception of leguminous crops – 0.2%). In Middle Africa, the average annual population growth rate was 2.8%. The output of oil crops, fruit, total meat, animal fats, eggs, milk, fish and seafood increased slower than the population. The output of cereals, root crops, sugar, vegetable fats and vegetables increased by a quicker average annual than the population.

In Eastern Africa, population growth rate was 2.6%, with a higher growth rate of cereals, root crops, vegetables and animal fats. A lower growth rate characterised the output of sugar, fruit, meat, eggs, milk, fish and seafood, and the output of leguminous crops decreased in the analysed period.

In Western Africa, population grew at the rate of 2.6% average annual (just like in Eastern Africa). A higher growth rate characterised the output of root crops, leguminous crops, oil crops, vegetable fats, vegetables, fruit, meat, animal fats, eggs and milk. A lower growth rate characterised the output of cereals, fish and seafood.

In Southern Africa, the average annual population growth rate was 1.6%. The output of root crops, oil crops, fruit, total meat, and eggs increased faster than the population. A lower growth rate characterised the output of cereals, sugar, vegetable fats, vegetables, milk, fish and seafood. In the analysed period, the output of leguminous crops and animal fats decreased.

3. Changes in food production on the African continent

The capacity to feed a population is reflected by the amount of food production per capita and food import.

3.1. Food production and import

In 2000–2009, food production per capita on the African continent increased by 0.6% average annual. This rate was lower than the world average, which amounted to 1.1% [*FAO Statistical Yearbook 2012*]. In no less than 23 African countries, food production per capita decreased, with the greatest decrease in Seychelles – 6.8%, and in Burundi – 5.6% average annual, and the smallest decrease in Equatorial Guinea, Senegal and Côte d’Ivoire. In 25 African countries, food production per capita increased in the analysed period, with the greatest average annual increase in Angola – 5.0% and the smallest in South Africa – 0.4%.

Average annual food production growth rate per capita in Africa in 2000–2009 (%)

Seychelles	-6.8	South Africa	0.4
Burundi	-5.6	Central African Republic	0.5
Democratic Republic of the Congo	-3.2	Swaziland	0.6
Zimbabwe	-2.2	Benin	0.7
Lesotho	-1.9	Togo	0.8
Uganda	-1.7	Zambia	0.9
Somalia	-1.5	Chad	1.0
Mozambique	-1.3	Congo	1.0
Eritrea	-1.2	Cameroon	1.2
Liberia	-1.2	Guinea	1.2
Nigeria	-1.2	Tunisia	1.3
Namibia	-1.2	Burkina Faso	1.3
Libya	-0.9	Egypt	1.5
Gambia	-0.8	Kenya	1.5
Mauritania	-0.7	Rwanda	1.7
Guinea-Bissau	-0.6	Botswana	1.8
Gabon	-0.5	Ghana	2.1
Mauritius	-0.4	Tanzania	2.4
Djibouti	-0.3	Ethiopia	3.2
Madagascar	-0.3	Niger	3.2
Equatorial Guinea	-0.1	Mali	4.2
Senegal	-0.1	Sierra Leone	4.2
Côte d’Ivoire	-0.1	Algeria	4.4
Malawi	0.0	Morocco	4.4
		Angola	5.0

Source: *FAO Statistical Yearbook 2012*.

Food import supplements domestic production. The average food import in Africa amounted to USD 58.5 per capita in 2010, and increased in 2000–2010 by 10.8% average annual. In Northern Africa, food import per capita amounted to USD 150.7 a year, and increased in 2000–2010 by 9.3% average annual. In Sub-Saharan Africa, food import in 2010 amounted to USD 40.6 per capita a year and increased in 2000–2010 by 11.9% average annual [*FAO Statistical Yearbook 2012*].

In some African countries, the value of food import per capita was minor, even though the food needs in these countries are not satisfied; for example, in Liberia food import per capita in 2010 amounted to no more than USD 3.6 (average annual increase of only 1.7%) and in the Democratic Republic of the Congo – USD 10.8 per capita (average annual increase of 10.1%). Food import was the greatest in Seychelles – USD 2,145.8 per capita (average annual increase of 18.7%). In 2010, Mauritius imported food to the value of USD 682.1 per capita (average annual increase of 14.6%). Import is especially important in the countries where food production decreased. These included in particular: Burundi, the Democratic Republic of the Congo, Uganda, Somalia, Mozambique, Eritrea, Liberia and Senegal.

Food import in Africa in 2010 (per capita in USD)

Liberia	3.6	Cameroon	60.4
Democratic Republic of the Congo	10.8	Zimbabwe	62.4
Malawi	11.2	Somalia	64.8
Burundi	12.1	Ghana	66.0
Ethiopia	12.5	Benin	73.2
Burkina Faso	15.7	Côte d'Ivoire	78.5
Uganda	15.9	South Africa	81.3
Central African Republic	16.3	Senegal	82.5
Tanzania	16.9	Egypt	119.8
Zambia	17.8	Angola	120.1
Madagascar	19.3	Lesotho	121.0
Mozambique	21.7	Djibouti	121.5
Rwanda	23.1	Morocco	127.9
Guinea	24.6	Mauritania	158.5
Chad	26.2	Tunisia	172.1
Mali	26.5	Namibia	172.6
Sierra Leone	28.9	Congo	178.4
Niger	30.4	Algeria	221.7
Sudan	33.9	Libya	241.0
Togo	34.0	Gabon	276.4
Nigeria	36.4	Botswana	287.9
Kenya	36.8	Equatorial Guinea	289.3
Eritrea	42.7	Swaziland	338.4
Guinea-Bissau	44.2	Mauritius	682.1
Gambia	55.5	Seychelles	2,145.8

Source: *FAO Statistical Yearbook 2012*.

3.2. Changes in the production of primary agricultural products

On the African continent, cereal production per capita increased at the rate of 0.4% a year while in the world it insignificantly decreased. Wheat production in Africa increased while in the world it decreased. The rice production growth rate in Africa was higher than in the world (0.9% as compared to 0.02%). Barley production decreased in the world and in Africa, and maize production increased, more so in the world (by 1.5% a year) than on the African continent (by 0.1% a year). Millet production decreased in the world and on the African continent while sorghum production increased in Africa.

Table 6. Average annual production growth rate in kg per capita in Africa in 2000–2009 (%)

	World	Africa					
		Total	Northern	Middle	Eastern	Western	Southern
Cereals	-0.02	0.4	1.2	3.2	0.5	-0.1	-0.5
wheat	-0.5	1.1	1.8	6.0	2.0	-3.6	-1.0
rice	0.2	0.9	1.2	0.6	0.9	0.7	-
barley	-2.2	-1.6	-1.9	-	0.3	-	-2.5
maize	1.5	0.1	0.4	4.8	-0.3	0.5	-0.3
millet	-1.8	-0.6	9.0	1.3	-0.2	-1.2	-3.9
sorghum	-1.3	0.9	3.6	0.9	1.1	-0.1	-2.9
Root and tuber crops	0.1	1.8	2.5	3.6	0.5	2.0	0.4
manioc	1.3	1.4	-	4.1	1.0	1.7	-
potatoes	-0.2	2.5	2.5	11.3	2.7	9.5	0.5
sweet potatoes	-2.2	2.6	6.2	3.3	0.9	9.0	-0.4
yam	2.9	1.9	0.0	0.8	0.4	1.7	-
Sugar	0.3	-0.8	0.5	0.5	-1.1	-2.0	-0.8
Leguminous crops	-0.9	0.5	-1.6	6.0	-4.2	1.2	-4.2
Oil crops	1.8	0.7	0.7	-0.1	-0.3	1.0	0.4
Vegetable oils	3.1	0.4	0.6	-1.0	0.0	0.6	-0.5
Vegetables	2.9	1.3	2.3	2.3	1.0	0.3	-0.6
Fruit	1.6	0.6	2.6	-0.1	0.5	0.7	0.8
Meat in total	1.2	0.7	1.9	-0.5	-0.3	0.7	1.5
beef	-0.4	0.4	1.7	-0.5	-0.1	0.8	-0.6
mutton and goat meat	0.6	0.4	1.3	0.6	-1.9	2.0	-1.4
pig meat	0.9	1.5	-	-1.6	2.0	1.0	3.0
poultry meat	3.2	2.0	3.2	-0.5	-0.4	0.3	3.4
Animal fats	-0.7	0.0	1.3	0.0	1.0	0.0	-2.1
Eggs	1.9	0.4	0.8	-1.8	-1.4	0.6	2.3
Milk	0.1	0.9	2.6	-1.1	-0.1	1.1	-0.5
Fish and seafood	0.8	0.1	1.9	-0.1	-1.1	-0.3	-0.0

Source: Own work based on Food Balance Sheets, *faostat.fao.org*.

Root crop production per capita increased in Africa more than in the world, in particular manioc and yam production. Potato and sweet potato production, in turn, decreased on a global scale and increased in Middle Africa.

Sugar production per capita increased in the world, and decreased in Africa; leguminous crop production per capita decreased in the world and

increased in Africa; oil crop, vegetable oil, vegetable and fruit production increased in the world at a higher rate than in Africa.

Meat production per capita increased in the world faster than in Africa (1.8% against 0.7%). Beef production had a negative growth rate in the world, and a positive growth rate in Africa. The production of mutton, goat, pig and poultry meat increased both in the world and in Africa. Animal fat production had a negative growth rate in the world and remained stable in Africa.

Egg, milk and fish production per capita increased both in the world and on the African continent.

The following general conclusions can be drawn from the analysis of the changes in the production of primary animal and plant food products per capita in 1990–2009 in individual regions of the African continent:

- In Northern Africa, the production of animal products and most plant products increased, with the exception of barley and leguminous crops.
- In Middle Africa, the production of plant products increased, with the exception of oil crops, vegetable oils and fruit, whose output decreased. The production of animal products also decreased, with the exception of mutton and goat meat.
- In Eastern Africa, the production of maize, millet, sugar and leguminous crops decreased, and the production of other plant products increased. The production of animal products, in turn, decreased, with the exception of pig meat and animal fats, whose production increased.
- In Western Africa, the output of wheat, millet, sorghum and sugar decreased, as did the catches of fish and seafood. The production of other products increased.
- In Southern Africa, the production of most plant and animal products decreased. In the analysed period, the production of sorghum, potatoes, oil crops, vegetables, fruit, pig meat, poultry meat and eggs increased.

4. Diversification of production of agricultural produce and food on the African continent

Individual regions of the African continent differ in terms of the size and structure of agricultural production, which depend on soil and climatic conditions, inputs on production (fertilisers, irrigation and machinery) and their population.

4.1. Plant products

In 2009, cereals production in Africa amounted to 156.8 kg per capita (338.2 kg in the world). The largest amount of cereals was produced in Southern Africa – 259.7 kg per capita a year, and the smallest in Middle Africa – 90.6 kg per capita a year. The difference in cereal production between these regions is no less than 169.1 kg per capita.

Cereal production in Africa in 2009 (kg/person a year)

Djibouti	0.0	Cameroon	104.0
Mauritius	0.9	Ghana	104.0
Congo	6.1	Sierra Leone	107.0
Cabo Verde	14.2	Guinea-Bissau	108.5
São Tomé and Príncipe	18.4	Mozambique	108.8
Gabon	21.0	Tanzania	120.7
Botswana	28.3	Nigeria	128.5
Burundi	33.5	Sudan	130.5
Libya	34.5	Senegal	140.6
Lesotho	34.9	Algeria	150.3
Eritrea	44.5	Gambia	169.4
Mauritania	45.6	Benin	169.5
Namibia	50.0	Zambia	171.6
Liberia	50.8	Madagascar	172.3
Swaziland	53.1	Togo	173.0
Central African Republic	55.1	Chad	182.0
Angola	55.2	Ethiopia	190.8
Rwanda	59.5	Guinea	221.3
Côte d'Ivoire	60.3	Morocco	222.4
Kenya	73.1	Burkina Faso	222.5
Zimbabwe	73.7	Niger	230.0
Uganda	85.0	Tunisia	249.4
		Malawi	260.6
		Egypt	262.4
		South Africa	293.0
		Mali	381.3

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In Southern Africa, maize represents no less than 82.2% of cereal production, and wheat – 13.3%. In the countries of this region, the largest amount of cereals was produced in South Africa – 293.0 kg per capita, and the smallest in Botswana – 28.3 kg. In this region, the largest amounts of maize and wheat were produced in South Africa – 242.2, and 39.4 kg per capita a year, respectively. The largest amount of sorghum was produced in Botswana – 19.2 kg per capita a year, and the largest amount of millet in Namibia – 16.5 kg.

In Middle Africa, cereals production in 2009 amounted to only 90.6 kg per capita. The most popular cereals cultivated in this region included maize (50.4%), followed by sorghum (23.5%) and millet (12.4%). The greatest amount of cereals per capita was produced in Chad – 182.0 kg, with 30% of sorghum, 29% of millet and 10.5% of maize. The smallest amount of cereals was produced in Congo – only 6.1 kg per capita (maize and millet). In Angola, 55.2 kg of cereals per capita was produced with maize constituting as much as 95%. Maize prevailed also in Cameroon – 65% of the total cereal production.

**Table 7. Production of plant products in Africa in 2009
(kg/person a year)**

	World	Africa					
		Total	Northern	Middle	Eastern	Western	Southern
Cereals	338.2	156.8	202.3	90.6	128.8	148.2	259.7
wheat	102.2	28.0	98.6	0.3	12.0	0.2	34.5
rice	68.5	16.3	18.2	2.9	14.2	23.1	0.0
barley	22.1	6.2	17.9	-	6.1	0.0	3.8
maize	122.7	61.9	38.8	45.7	63.5	50.0	213.6
millet	4.0	15.8	3.1	11.2	5.9	38.8	0.8
sorghum	8.4	23.5	24.3	21.4	16.7	34.4	5.7
Root and tuber crops	108.2	214.5	45.4	402.8	174.2	381.1	42.8
manioc	33.0	112.7	0.1	305.6	90.6	197.8	-
potatoes	49.8	21.4	41.2	17.5	23.9	3.4	34.4
sweet potatoes	15.3	15.4	2.8	22.4	27.9	12.4	1.2
yam	7.1	48.7	0.7	22.8	1.4	146.5	-
Sugar	28.3	10.9	14.9	6.5	10.5	1.5	53.0
Leguminous crops	9.5	12.9	5.4	14.3	8.0	14.6	2.1
Oil crops	73.6	23.8	23.1	19.7	15.5	33.6	25.7
Vegetable oils	21.7	7.6	4.7	7.9	2.3	15.0	8.6
Vegetables	151.5	70.3	182.4	45.6	28.8	46.8	43.6
Fruit	89.1	84.0	102.5	80.8	84.0	67.3	107.8

Source: Own work based on Food Balance Sheets, *faostat.fao.org*.

Cereals production in Western Africa amounted to 148.2 kg per capita a year. The most popular cereal was maize – 34%, followed by sorghum – 33%, millet – 26%, and rice – 15.6%. The greatest amount of cereals per capita is produced in Mali – 381.3 kg. What should be noted is the poorly diversified cereal production in this country: maize – 26.4%; sorghum – 25.8%; millet – 24.4%; and rice – 22.9%. The smallest cereal producers include: Cabo Verde – 14.2 kg per capita a year (only maize); Mauritania – 45.6 kg (sorghum – 61%, rice – 23%); and Liberia – 50.5 kg (100% of maize); followed by Côte d’Ivoire – 60.3 kg (54.6% – maize and 36.5% – rice). Western Africa is characterised by a relatively high sorghum production. This cereal was produced in the greatest amounts in Mali (98.3 kg); Burkina Faso (95.2 kg); Sudan (98.7 kg); Niger (49.4 kg); Togo (40.3 kg); and Nigeria (34.1 kg).

In 2009, cereal production in Eastern Africa amounted to 128.8 kg per capita. The most popular cereal was maize (49.3%), followed by sorghum (13%) and barley (11%). The greatest amount of cereals per capita was produced in Malawi – 260.6 kg (with 95.2% of maize). Relatively high cereal production was noted in Ethiopia – 190.5 kg per capita a year and in Zambia – 171.6 kg. The smallest amount of cereals was produced in Mauritius – 0.9 kg per capita a year. In most Eastern African countries, the most popular cereal was maize, e.g. in Kenya it constituted even 84.5%; in Mauritius – 89%; in Mozambique – 78%; in Zambia – 86%; and in Zimbabwe – 76%.

Plant production in Northern Africa is possible owing to irrigation. In Egypt and Tunisia, 100% of arable land is irrigated, in Morocco – 98%, in Algeria – 80%, and in Libya – 67%. In Northern Africa, average cereal production amounted to 202.3 kg per capita a year. The most popular cereal was wheat – 48.6%, followed by maize – 19.2%, sorghum – 12%, rice – 9%, and millet – 8.8%. In Northern Africa, the greatest amounts of wheat per capita are produced in Morocco – 201.4 kg, followed by Tunisia – 159.6 kg, Egypt – 106.9 kg, and Algeria – 84.5 kg. Only in Libya, wheat production amounted to only 16.8 kg per capita, which constitutes half of the cereal production in this country. Conditions for wheat production, especially in Egypt, were favourable owing to irrigation and considerable fertilisation (500–700 kg per 1 ha of arable land). Egypt has the highest wheat yield in Africa – 5.6 tonnes/ha (2011) [56]. It was much higher than in the case of other main wheat producers in Africa: South Africa – 2.6 tonnes/ha; Tunisia – 1.9 tonnes/ha; Morocco – 1.7 tonnes/ha; and Algeria – 1.6 tonnes/ha. Cereal production in Egypt amounted to 262.4 kg per capita a year, with wheat representing 40.7% of the total production. The second place in Northern Africa is taken by maize – 38.3 kg per capita a year. The greatest amount of maize is produced in Egypt – 96.4 kg per capita.

In 2009, root crop production per capita amounted to 214.5 kg in Africa and 108.2 kg in the world. In Middle and Western Africa, root crops are fundamental for feeding people. The greatest amount of root crops per capita was produced in Middle Africa – 402.8 kg. Root crop production in this region ranged from 67 kg in Chad to 788.6 in Angola. Manioc was the most popular tuber crop, representing 76% of the total root crop production in this region. Small amounts of sweet potatoes (batatas), potatoes and yams are also produced. The greatest amount of yams was produced in Gabon – 115 kg per capita, and the greatest amounts of manioc, potatoes and sweet potatoes in Angola – 691.4 kg, 44.4 kg and 53.6 kg, respectively.

In Western Africa, root crop production per capita was also considerable – 381.1 kg. In the countries of this region, the largest amount of root crops per capita was produced by Ghana – 824.2 kg, of which 513.4 kg was manioc and 278.6 kg was yam. Also Benin is characterised by a considerable root crop production – 748 kg per capita, of which 464.5 was manioc and 275.5 was yam. Nigeria also produces large amounts of root crops – 479.1 kg per capita. The most popular root crops are manioc – 49.7%, and yam – 39.4%. Côte d'Ivoire produces 398 kg per capita of root crops, with 69% of yam and 29% of manioc.

Root crop production in Africa in 2009 (kg/person a year)

Seychelles	0.0	Sierra Leone	74.6
Mauritania	2.1	Guinea-Bissau	74.8
Gambia	4.2	Algeria	75.4
Burkina Faso	10.5	Ethiopia	90.1
Niger	12.7	Zambia	108.7
Eritrea	14.1	Namibia	131.1
Sudan	16.1	Burundi	134.0
Mauritius	16.3	Guinea	139.0
Zimbabwe	21.3	Liberia	146.0
Cabo Verde	26.4	Tanzania	184.6
Mali	26.7	São Tomé and Príncipe	245.4
Senegal	28.2	Uganda	266.7
Madagascar	28.4	Central African Republic	271.9
Tunisia	31.3	Togo	275.2
South Africa	38.8	Cameroon	276.0
Lesotho	39.1	Mozambique	289.6
Morocco	39.4	Congo	311.6
Botswana	44.4	Gabon	330.2
Swaziland	47.1	Côte d'Ivoire	398.0
Libya	49.7	Rwanda	413.2
Egypt	51.9	Nigeria	479.1
Kenya	55.2	Malawi	502.1
Chad	67.0	Benin	748.0
		Angola	788.6
		Ghana	824.2

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In many Western African countries, root crop production per capita reached a very low level. These countries include: Mauritania (2.1 kg), Gambia (4.2 kg), Burkina Faso (10.5 kg), Niger (12.7 kg), Cabo Verde (26.4 kg) and Senegal (28.2 kg). These countries are usually characterised by above-average cereal production per capita.

In Eastern Africa, differences among countries in the level of root crop production per capita are significant. The highest level of output per capita was produced in Malawi – 502.1 kg, and the lowest in Eritrea – 14.1 kg – the difference amounted to 488 kg per capita. Root crop production in Rwanda (413.2 kg), Mozambique (289.6 kg) and in Uganda (266.7 kg) was far above the average for Eastern Africa (174.2 kg). The most popular root crop in Eastern Africa is manioc – 52%, followed by sweet potatoes – 16.0%, and potatoes – 13.9%. For example, in Malawi, manioc represents 53% of root crop production, and potatoes – 47%, while in Rwanda manioc accounts for 47.4%, potatoes for 30.2% and sweet potatoes for 18.8%.

In Southern Africa, root crop production is insignificant for feeding the population. There were 42.8 kg of root crops per capita a year, of which potatoes constituted 81.1%, and sweet potatoes – 2.8%. Only in Namibia did root crop

production per capita amount to 131.1 kg, and in other countries it ranged from 38.8 kg per capita in South Africa to 47.1 kg in Swaziland.

In Northern Africa, potatoes are the most popular, and the differences between countries are minor, with the average potato production per capita in this region amounting to 41.2 kg. The highest level is yielded in Algeria – 75.4 kg, and the lowest in Tunisia – 31.3 kg.

Taking the entire African continent into account, the highest level of manioc production is recorded in Angola – 691.4 kg per capita, followed by Ghana – 513.4 kg, and Benin – 464.5 kg. The largest amounts of potatoes were produced in Malawi – 237.4 kg, and in Rwanda – 124.8 kg, and the largest amounts of sweet potatoes in Uganda – 85.5 kg and in Rwanda – 77.7 kg per capita a year. Yam production per capita is very high in Côte d'Ivoire – 274.6 kg, Ghana – 242.5 kg, Nigeria – 188.3 kg, and in Gabon – 115 kg.

In 2009, sugar (cane sugar) production per capita amounted to 10.9 kg a year in Africa and 28.3 kg a year in the world. Differences between regions in sugar production were significant – from 1.5 kg per capita in Middle Africa to 53 kg in Southern Africa. In other regions, the average sugar production per capita was as follows: in Northern Africa – 14.5 kg, in Eastern Africa – 10.5 kg, in Middle Africa – 6.5 kg.

In Northern Africa, sugar production ranged from 0.1 kg per capita in Algeria to 23.2 kg in Egypt. Middle Africa is also characterised by low sugar production in all countries. The highest was observed in Congo – 18.5 kg per capita, and the lowest in Chad – 3.7 kg. In Eastern Africa, sugar production was much diversified – from 1.8 kg per capita in Burundi to 361.5 kg in Mauritius. In Western Africa, sugar production was very low in all countries. In Nigeria, it amounted to only 0.3 kg per capita, and in Côte d'Ivoire, where it was the highest, to 7.8 kg. Lesotho and Namibia did not produce sugar at all while Swaziland produced 564.2 kg per capita a year.

In 2009, the production of leguminous crops, bean in particular, amounted on the African continent to 13 kg per capita. The countries producing the smallest amounts of leguminous crops per capita included Ghana – 0.6 kg, Liberia – 0.8 kg, Botswana – 1.5 kg, Gambia – 1.8 kg, Algeria – 1.8 kg, South Africa – 1.8 kg, Congo – 2.3 kg, Swaziland – 2.6 kg, and Zimbabwe – 3.0 kg. The countries producing the largest amount of leguminous crops per capita include Tunisia in Northern Africa – 10.2 kg, and Cameroon in Middle Africa – 22.3 kg. In Eastern Africa, leguminous crop production is diversified. It ranged from 2.3 kg per capita in Djibouti to 34.9 kg in Rwanda. High production rates were also achieved in Malawi – 33.9 kg, and in Burundi – 29.7 kg.

Vegetable oil production per capita in Africa amounted to 7.6 kg in 2009. In Eastern Africa, 2.3 kg of oils were produced per capita a year. Annual oil production per capita was the smallest in Rwanda – 0.6 kg, and the greatest in Sudan – 6 kg. The highest rate of oil production was observed in Western Africa – 15 kg per capita a year. In this region, the greatest oil production was recorded in Côte d’Ivoire – 22.1 kg per capita, and the smallest in Niger – only 1.5 kg of oils per capita. The average oil production in Southern Africa amounted to 8.6 kg per capita a year. The largest amount of oils was produced in South Africa – 9.8 kg per capita, and the smallest in Namibia – 0.4 kg. In Middle Africa, 7.9 kg of oils per capita were produced, with the largest amounts produced in São Tomé and Príncipe – 24.5 kg, and the smallest in Chad – 3.4 kg. In Northern Africa, annual oil production amounted to 4.7 kg per capita and ranged from 2.3 kg in Libya to 20.6 kg in Tunisia.

In 2009, vegetable production in Africa amounted to 70.3 kg per capita. In 2009, the largest amount of vegetables was produced in Northern Africa – 182.4 kg per capita, and the smallest in Eastern Africa – 28.8 kg.

Vegetable production in Africa in 2009 (kg/person a year)

Mauritania	1.2	Congo	30.7
Gambia	5.4	Zambia	34.1
Mozambique	9.1	Cabo Verde	34.6
Eritrea	9.2	Seychelles	34.9
Swaziland	9.4	Djibouti	36.7
Chad	9.6	Tanzania	39.9
Lesotho	13.0	Rwanda	40.8
Botswana	13.1	Guinea	42.1
Burkina Faso	13.6	Benin	46.3
Zimbabwe	14.8	South Africa	47.8
Angola	16.0	Niger	50.4
Guinea-Bissau	17.5	Sierra Leone	50.5
Madagascar	17.8	Kenya	53.0
Togo	19.3	Burundi	54.1
Ethiopia	20.2	Senegal	55.3
Liberia	21.6	Mauritius	55.7
Malawi	22.2	Nigeria	56.7
Central African Republic	22.9	São Tomé and Príncipe	61.3
Namibia	25.0	Mali	64.0
Ghana	26.2	Sudan	69.7
Gabon	26.4	Cameroon	104.1
Côte d’Ivoire	28.9	Algeria	130.1
Uganda	29.7	Libya	143.9
		Morocco	165.6
		Tunisia	263.4
		Egypt	264.4

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In Northern Africa, the largest amounts of vegetables were produced in Egypt – 264.4 kg; not much less in Tunisia – 263.4 kg, and the least in Algeria – 130.1 per capita a year. Eastern Africa, produced only 28.8 kg per capita a year, from 9.1 kg in Mozambique to 55.7 kg in Mauritius. Vegetable production in Middle Africa amounted to 45.6 kg per capita a year. The largest amounts of vegetables were produced in Cameroon – 104.1 kg per capita a year, and the smallest in Chad – 9.6 kg. The average vegetable production rate in Western Africa was 46.8 kg per capita, with 64.0 kg in Mali (the highest rate in this region) and only 1.2 kg in Mauritania (the lowest rate). In Southern Africa, the average vegetable production per capita a year was 43.6 kg and ranged from 9.4 kg in Swaziland to 47.8 kg in South Africa.

Fruit production in Africa in 2009 (kg/person a year)

Eritrea	1.0	Madagascar	50.1
Botswana	3.0	Congo	59.4
Djibouti	3.4	Central African Republic	59.5
Gambia	5.4	Libya	59.9
Burkina Faso	6.3	Guinea-Bissau	62.7
Mauritania	6.8	Sudan	64.3
Lesotho	7.0	Nigeria	66.4
Zambia	8.7	Malawi	68.5
Ethiopia	9.7	Kenya	73.4
Togo	10.0	Algeria	85.5
Chad	10.8	Swaziland	85.6
Mozambique	15.8	Tanzania	104.2
Ghana	16.2	Morocco	108.1
Senegal	16.8	Côte d'Ivoire	110.4
Namibia	16.9	Tunisia	117.8
Niger	17.5	South Africa	120.9
Mauritius	18.6	Guinea	125.8
Zimbabwe	20.2	Egypt	129.4
Seychelles	23.3	Cameroon	166.7
Mali	25.9	Gabon	210.4
Angola	31.3	Burundi	222.0
Sierra Leone	40.1	São Tomé and Príncipe	227.0
Cabo Verde	42.7	Rwanda	310.5
Benin	44.9	Uganda	313.8
Liberia	49.5		

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In 2009, fruit production per capita in Africa amounted to 84.0 kg. In 2009, the largest amount of fruit per capita was produced in Southern Africa – 107.8 kg, and the smallest in Western Africa – 67.3 kg per capita a year. The average annual fruit production rate per capita in Northern Africa was 102.5 kg and ranged from 59.9 kg in Libya to 129.4 kg per capita in Egypt. The average for Middle Africa was 80.8 kg of fruit per capita a year, with the largest fruit production in São Tomé and Príncipe – 227 kg, followed by

the Democratic Republic of Congo – 210.4 kg. The lowest production was recorded in Chad – 10.8 kg per capita a year.

In Eastern Africa, there are significant differences between countries as regards fruit production per capita a year, ranging from 1.0 kg in Eritrea to 313.8 kg per capita a year in Uganda. Considerably higher fruit production than the average for this region – 84.0 kg per capita a year – was recorded in Rwanda – 310.5 kg and in Burundi – 222 kg. The smallest fruit producers in Eastern Africa include: Djibouti – 3.4 kg, Zambia – 8.7 kg, and Ethiopia – 9.7 kg per capita a year. Fruit production in Western Africa amounted to 67.3 kg per capita a year. The difference between the largest production recorded in Guinea – 125.8 kg, and the smallest recorded in Gambia – 5.4 kg, was 120 kg. Côte d'Ivoire is also characterised by considerable fruit production, namely 110.4 kg per capita a year. Not much fruit was produced in Burkina Faso – 5.4 kg, and in Mauritania – 6.8 kg per capita a year. The average for Southern Africa was 107.8 kg per capita, with the largest amount of fruit produced in South Africa – 120.9 kg a year, and the smallest in Botswana – 3.0 kg, and Lesotho – 7.0 kg per capita a year.

The structure of fruit production on the African continent according to fruit species is diversified. The most popular are plantains (bananas suitable for processing) – 32.4%, which represented 72% of their global output. The production of plantains in Africa reached 25.4 million tonnes, and the output of fruit – 78.3 million tonnes. The major plantain producers among African countries include: Uganda – 9.5 million tonnes; Ghana – 3.6 million tonnes; Rwanda – 3 million tonnes; Nigeria – 2.9 million tonnes; Cameroon – 2 million tonnes; and Côte d'Ivoire – 1.5 million tonnes.

Banana production in Africa amounted to 12.4 million tonnes. The major producers include: Tanzania – 3.2 million tonnes; Egypt – 1.1 million tonnes; Cameroon – 1 million tonnes; Uganda – 0.6 million tonnes; Kenya – 0.8 million tonnes; and Tanzania – 0.7 million tonnes.

In Africa, 10.6% of produced fruit are oranges and tangerines. Their major producers include: Libya – 3.2 million tonnes; South Africa – 1.5 million tonnes; Morocco – 1.4 million tonnes; and Ghana – 0.5 million tonnes. South Africa is the largest apple producer – 0.8 million tonnes, followed by Egypt – 0.5 million tonnes and Morocco – 0.4 million tonnes. Most pineapples are produced in Western Africa – 1.4 million tonnes, especially in Nigeria – 0.9 million tonnes. Dates are produced in Northern Africa – 2.7 million tonnes (40% of global output), mostly in Egypt – 1.3 million tonnes, and in Algeria – 0.6 million tonnes.

The overall grape output in Africa totalling 4.2 million tonnes accounts for 6.1% of the global output (67.8 million tonnes). The largest grape producers are Egypt – 1.4 million tonnes, and South Africa – 1.7 million tonnes.

Spice production in Africa (788,000 tonnes) represents 10.5% of the global output (7,526,000 tonnes). The most popular spice is allspice – 464,000 tonnes, i.e. 15.5% of the global output of this spice (3,003,000 tonnes). Its major producers include: Ethiopia – 116,000 tonnes; Ghana – 78,000 tonnes; Nigeria – 45,000 tonnes; and Egypt – 40,000 tonnes. In Africa, not much pepper is produced – only 19,000 tonnes, i.e. 4.2% of the global output (456,000 tonnes). In Eastern Africa, 13,000 tonnes of pepper were produced, i.e. 68.4% of the total pepper production in Africa (Madagascar, Rwanda and Uganda). In Western Africa, 6,000 tonnes of pepper were produced, i.e. 31.6% of production in Africa (mostly in Ghana and in Niger). In the world, 108,000 tonnes of clove were produced, of which 21,000 tonnes in Africa, i.e. 19.4%, all of it produced in Eastern Africa: 10,000 tonnes in Madagascar, 8,000 tonnes in Tanzania, and 1,000 tonnes in Kenya.

Spice production in Africa does not satisfy the total demand of this continent, since 131,000 tonnes of spices were imported and 108,000 tonnes were exported. Only cloves were intended mainly for export, and the production of other spices had to be supplemented with import to satisfy the domestic needs.

The production of stimulants, namely coffee, cocoa beans and tea on the African continent amounted to 4,165,000 tonnes, which represented 24.1% of the global output (17,307,000 tonnes).

Almost 65% of the global cocoa bean production originates from Africa (4,092,000 tonnes). Its major producer is Western Africa, which produced 2,380,000 tonnes of cocoa beans – 89.8% of the total cocoa bean production in Africa (2,650,000 tonnes). The main producer of cocoa beans is Côte d'Ivoire – 1,223,000 tonnes, i.e. 46.2% of the total cocoa bean production on the African continent, and 30% of the global output. The second largest cocoa bean producer in Africa is Ghana – 662,000 tonnes, i.e. 25% of cocoa bean production in Africa. In Nigeria, 370,000 tonnes of cocoa beans were produced and in Cameroon (Middle Africa) – 236,000 tonnes.

Coffee production in Africa in the amount of 990,000 tonnes represents 12.0% of the global output (8,230,000 tonnes). The largest amounts of coffee are produced in Eastern Africa (716,000 tonnes), in particular in Ethiopia (265,000 tonnes), and Uganda (196,000 tonnes). In Western Africa, coffee production amounted to 216,000 tonnes, and the main coffee producer in this region is Côte d'Ivoire (143,000 tonnes).

Tea production in Africa amounted to 525,000 tonnes, which represented 10.5% of the global output (4,995,000 tonnes). Tea is produced in Eastern Africa (516,000 tonnes), in particular in Kenya (317,000 tonnes). In other countries of the region, tea production is insignificant.

4.2. Animal products

The African continent is characterised by a low animal production, especially in comparison to global indicators. Animal products contribute far less to feeding the population in Africa than in other regions of the world.

In 2009, meat production per capita amounted to 16.3 kg in Africa and 42.8 kg in the world. In the world, pig meat represented 37.4% of the total meat production, poultry meat – 32.9%, beef and veal – 9.9%, mutton and goat meat – 4.7%. Most popular meat types on the African continent are beef and veal – 37.4%, followed by poultry – 28.8%, mutton and goat – 13.2%, and pig meat – 7.4%.

Table 8. Production of animal products in Africa in 2009 (kg/person)

	World	Africa					
		Total	Northern	Middle	Eastern	Western	Southern
Meat in total	42.8	16.3	22.9	13.1	11.1	11.3	50.5
beef and veal	9.9	6.1	7.7	6.4	5.7	3.5	15.2
mutton and goat meat	2.0	2.8	4.6	1.8	1.4	2.9	3.6
pig meat	16.0	1.2	0.0	1.1	1.3	1.2	5.8
poultry meat	14.1	4.7	9.2	1.0	1.4	1.8	24.7
Animal fats	5.3	0.7	1.4	0.4	0.6	0.3	1.2
Eggs	10.2	2.8	4.5	0.5	1.0	2.8	8.0
Milk	104.8	41.5	89.9	12.3	40.2	11.7	59.4
Fish and seafood	21.5	8.4	11.0	10.2	5.2	7.6	19.0

Source: Own work based on Food Balance Sheets, *faostat.fao.org*.

The largest amount of meat is produced in Southern Africa – 50.5 kg per capita a year (2009). There are considerable differences in meat production between countries in this region. The largest amount of meat was produced in South Africa – 54.1 kg per capita, and the smallest in Lesotho – 13.0 kg. In Southern Africa, the most popular meat type was poultry – 24.7 kg (48.9%), and the least popular was mutton and goat meat – 3.6 kg per capita a year (7.1%).

In Eastern Africa, no more than 11.1 kg of meat were produced per capita a year. Half of it was beef, 14.4% – mutton and goat meat, 11.7% – pig meat. The largest amount of meat in this region was produced in Mauritius – 37.2 kg (of which 91.7% was poultry meat), and the smallest amount in Burundi – 5.2 kg per capita a year.

In Western Africa, meat production per capita a year was only 11.3 kg (with 31% of beef and 26% of mutton and goat meat). The largest amounts of meat produced in the region were recorded in Mauritania – 26.9 kg, and the smallest in Gambia – 5.4 kg. Most beef in this region was produced in Niger – 14.7 kg per capita, mutton and goat meat in Mauritania – 11.1 kg, pig meat in Guinea-Bissau – 8.8 kg, poultry meat in Togo – 4.4 kg per capita a year.

Meat production in Africa in 2009 (kg/person a year)

Burundi	5.2	Chad	13.0
Gambia	5.4	Lesotho	13.0
São Tomé and Príncipe	6.1	Madagascar	14.7
Sierra Leone	6.3	Burkina Faso	14.8
Rwanda	6.5	Senegal	15.0
Mozambique	6.9	Guinea-Bissau	15.5
Benin	7.3	Djibouti	16.1
Liberia	7.6	Kenya	16.8
Eritrea	7.7	Algeria	17.2
Guinea	8.0	Sudan	19.1
Malawi	8.2	Zimbabwe	20.0
Ethiopia	8.6	Mali	22.2
Angola	8.7	Gabon	22.3
Nigeria	8.8	Swaziland	22.3
Ghana	9.5	Cabo Verde	22.4
Tanzania	9.6	Egypt	23.7
Togo	9.8	Tunisia	25.5
Uganda	11.0	Niger	25.6
Congo	11.2	Mauritania	26.9
Seychelles	11.6	Libya	28.9
Zambia	12.3	Morocco	30.1
Côte d'Ivoire	12.4	Namibia	33.5
Cameroon	12.6	Central African Republic	33.6
		Botswana	36.8
		Mauritius	37.2
		South Africa	54.1

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In Middle Africa, meat production per capita amounted to 13.1 kg (48.9% of which was beef). The largest amount of meat was produced in the Central African Republic – 33.6 kg and the smallest in São Tomé and Príncipe – 6.1 kg. The largest amount of beef in this region was produced in the Central African Republic – 19.5 kg per capita, mutton and goat meat – 3.9 kg, and pig meat – 3.2 kg also in the Central African Republic, and poultry meat – 6.1 kg in São Tomé and Príncipe.

In Northern Africa, 22.9 kg of meat per capita were produced (poultry meat – 40% and beef – 33.6%). The largest amount of meat was produced in Morocco – 30.1 kg per capita, and the smallest in Algeria – 17.2 kg. In this region, the greatest amounts of poultry meat were produced in Morocco (20 kg) and beef in Egypt (10.8 kg). Pig meat production in Northern Africa is almost non-existent.

The African continent is characterised by a low production of animal fats – only 0.7 kg per capita a year (2009). In all regions of Africa, animal fat production was low and ranged from 1.2 kg per capita a year in Southern Africa to 0.3 kg in Western Africa. The highest animal fat production in all African countries was recorded in Seychelles – 11.6 kg (fish fats), Namibia and Botswana – 4.0 kg, and in Morocco – 2 kg per capita a year, and in all the other countries animal fat production was under 1 kg a year.

Milk production in Africa in 2009 (kg/person a year)

Seychelles	0.0	Ethiopia	20.8
Congo	0.3	Chad	24.3
Liberia	0.3	Madagascar	27.6
Gabon	1.4	Eritrea	27.7
Ghana	1.6	Zimbabwe	31.2
Côte d'Ivoire	1.6	Swaziland	33.4
Togo	1.7	Uganda	35.7
Malawi	2.8	Libya	36.4
Mauritius	3.1	Tanzania	39.3
Nigeria	3.1	Cabo Verde	44.7
Mozambique	3.3	Namibia	50.0
Sierra Leone	3.7	Botswana	58.5
Benin	4.4	Morocco	59.7
Burundi	5.4	Mali	61.3
Gambia	5.4	South Africa	62.4
Zambia	6.8	Niger	64.0
Angola	8.5	Algeria	64.2
Cameroon	11.2	Egypt	70.4
Guinea	13.1	Tunisia	104.3
Senegal	13.4	Kenya	107.9
Guinea-Bissau	15.5	Mauritania	119.9
Burkina Faso	15.8	Sudan	174.8
Lesotho	15.8		
Djibouti	17.2		
Rwanda	17.2		
Central African Republic	17.8		

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In 2009, milk production per capita in Africa amounted to 41.5 kg. In Northern Africa, average milk production amounted to 89.9 kg per capita, and ranged from 36.4 kg in Libya to 104.3 kg in Tunisia. In Southern Africa, average milk production per capita was 59.4 kg, with the highest in South Africa – 62.4 kg, and the lowest in Lesotho – 15.8 kg. In Eastern Africa, milk production in 2009 amounted to 40.2 kg per capita, with the largest amounts produced in Sudan – 174.8 kg per capita a year, and the smallest in Mauritius – 3.1 kg. In Middle Africa, milk production amounted to 12 kg per capita, and ranged from 0.3 kg in Congo to 24.3 kg in Chad. In Western Africa, milk production was even smaller – 11.7 kg per capita, and ranged from 0.3 kg in Liberia to 119.9 kg in Mauritania.

In 2009, egg production in Africa amounted to only 2.8 kg per capita. Most eggs were produced in Southern Africa – 8.0 kg per capita a year. In this region, egg production ranged from 9.0 kg per capita a year in South Africa to 0.9 kg in Lesotho and Swaziland. In Northern Africa, average egg production amounted to 4.8 kg per capita a year and ranged from 4.2 kg in Egypt to 9.9 kg in Morocco. Average egg production in Western Africa amounted to 2.8 kg per capita a year and ranged from 0.6 kg in Gambia to 3.2 kg in Burkina Faso. In

Eastern Africa, average egg production was 1 kg per capita a year. The production of eggs was the largest in Seychelles – 11.6 kg and the smallest in Rwanda – 0.3 kg per capita a year. In Middle Africa, average egg production was 0.5 kg per capita a year. In this region, the greatest amount of eggs was produced in São Tomé and Príncipe – 6.1 kg per capita, and the smallest in Angola – 0.2 kg.

Fish and seafood catches in Africa amounted to 8.4 kg per capita. They were considerably higher in Southern Africa, where they amounted to 19.0 kg per capita a year. Only one country in this region has a significant amount of fish caught, namely Namibia – 185.5 kg per capita a year, while South Africa has only 13.5 kg. In Northern Africa, fish and seafood catches amounted to 11.0 kg per capita a year, with the highest catches in Morocco – 27.9 kg, and the lowest in Algeria – 4.4 kg. In Middle Africa, the average catch was 10.2 per capita a year, with the highest catches in Gabon – 26.4 kg, and the lowest in Chad – only 0.3 kg per capita a year. In Eastern Africa, there were only 5.2 kg of fish per capita with huge differences between countries. In Seychelles, 76.7 kg of fish per capita a year were caught while in Ethiopia only 0.2 kg. In Western Africa, the average fish catch per capita a year was 7.6 kg and ranged from 0.6 kg in Burkina Faso to 59.5 kg in Mauritania.

Fish and seafood catches in Africa in 2009 (kg per capita a year)

Djibouti	0.0	Mauritius	6.2
Botswana	0.0	Mozambique	6.5
Lesotho	0.0	Mali	6.8
Swaziland	0.0	Cameroon	7.2
Ethiopia	0.2	Madagascar	7.9
Chad	0.3	Tanzania	7.9
Eritrea	0.4	Guinea	10.2
Burkina Faso	0.6	Tunisia	10.3
Zimbabwe	1.0	Egypt	12.6
Rwanda	1.3	Ghana	13.5
Burundi	1.7	South Africa	13.5
Sudan	1.7	Angola	14.7
Côte d'Ivoire	1.7	Congo	15.2
Niger	2.0	Uganda	17.0
Central African Republic	3.5	São Tomé and Príncipe	24.5
Kenya	3.5	Sierra Leone	25.3
Benin	3.5	Gambia	26.2
Guinea-Bissau	4.0	Gabon	26.4
Liberia	4.2	Morocco	27.9
Togo	4.2	Senegal	34.9
Algeria	4.4	Cabo Verde	36.6
Malawi	4.7	Mauritania	59.8
Nigeria	4.9	Namibia	185.5
Libya	5.1	Seychelles	767.4
Zambia	5.5		

Source: Own work based on Food Balance Sheets, faostat.fao.org.

5. Feeding the African population in the context of food self-sufficiency

Feeding is connected not only to nutrition, i.e. the amount and kind of consumed food products, but also to the food production and supply system. The demand for agricultural raw materials is determined not only by the consumption of agricultural products intended for human consumption, but also products intended for other purposes, such as agricultural production (animal fodder, seeds for sowing), processing (but not for human consumption), losses and other uses, e.g. for consumption by tourists.

Food self-sufficiency is assessed by means of a measure applied by the Food and Agriculture Organization (FAO) according to the method provided by FAO Economic and Social Development Department in explanations to the Food Balance Sheets.

$$\text{self-sufficiency ratio} = \frac{\text{production} \times 100}{\text{production} + \text{imports} - \text{exports}}$$

Ratios are calculated for individual commodities, groups of commodities of similar nutritional values and for the aggregate of all commodities, e.g. in the form of energy content [5].

Self-sufficiency rate expressed in percentages specifies the ratio of national production to the national consumption of agricultural products, i.e. raw materials and processed goods translated into raw materials: cereals and cereal products translated into cereals, vegetables, fruit, potatoes, milk (together with dairy products as milk equivalent without butter), eggs, fish (live weight) and food products (meat, animal fats, vegetable fats, sugar). The higher the ratio, the greater the self-sufficiency.

5.1. Plant products

On the African continent, there are considerable shortages of plant products. The production of all cereals amounted to 246.2 million tonnes (2009) and was not enough to satisfy all needs: consumption, production and other purposes. Cereal shortage amounted to almost 52 million tonnes, i.e. 21.1% of cereal output in Africa.

In individual regions of the African continent, food self-sufficiency ratios for cereals range from 60% in Northern Africa to 90.1% in Southern Africa with the average of 73.8% for the entire continent.

From among all cereals produced on the African continent, greatest shortages concerned wheat – 29.4 million tonnes, and substantially smaller: barley – 1.7 million tonnes; sorghum – 1.4 million tonnes; and millet – 0.7 million tonnes.

The self-sufficiency ratio was highest for millet – 99.5%; followed by sorghum – 94.0%; maize – 81.8%; barley – 71.3%; rice – 70.7%; and wheat – 47.0%.

In Northern Africa, full self-sufficiency would require 16.5 million tonnes more of wheat, 10.3 million tonnes more of maize, 0.37 million tonnes more of sorghum, and 0.66 million tonnes more of barley. The average self-sufficiency ratio for cereals in Northern Africa was 60.0%. With the output of 41.6 million tonnes, 27.7 million tonnes more were required. The self-sufficiency ratio ranged from 43.1% for maize and 55.5% for wheat to 84.8% for barley, 92.1% for millet, 93.1% for sorghum, and 113.8% for rice (surplus of 0.5 million tonnes).

Table 9. Food self-sufficiency ratios in Africa in 2009 (%)

	Africa					
	Total	Northern	Middle	Eastern	Western	Southern
Cereals	73.8	60.0	65.9	77.9	83.7	90.1
wheat	47.0	55.0	1.1	37.6	1.7?	57.4
rice	70.7	113.8	20.8	79.4	62.2	0.3
barley	77.3	84.8		89.6	0.4	42.8
maize	81.8	43.1	90.0	87.1	97.5	111.9
millet	99.5	92.1	99.5	99.9	100.0	85.2
sorghum	94.0	93.1	94.6	85.8	99.7	82.7
Root crops	99.7	99.4	99.3	99.7	99.9	93.2
manioc	99.8	122.2	100.0	99.7	100.0	-
potatoes	98.0	99.2	98.6	99.3	84.9	95.4
sweet potatoes	100.1	101.6	100.0	100.0	100.0	104.8
yam	100.0	100.0	100.0	100.0	100.0	-
Sugar	65.7	48.6	51.3	92.0	15.5	139.9
Leguminous crops	94.6	67.2	96.3	104.3	99.5	46.9
Oil crops	97.9	67.2	96.3	108.9	101.8	46.9
Vegetable oils	57.5	36.1	65.9	29.5	84.2	41.2
Vegetables	98.9	100.9	95.6	103.9	92.4	96.4
Fruit	105.3	105.7	104.8	101.5	100.2	170.9
Meat in total	92.8	94.7	69.7	98.1	91.5	93.4
beef	95.3	86.7	92.8	99.0	97.5	104.2
mutton and goat meat	99.1	99.6	95.4	100.2	99.2	96.7
pig meat	85.2	100.0	46.4	98.3	92.7	91.7
poultry meat	85.4	98.5	21.6	91.3	68.8	87.1
Animal fats	64.2	76.2	60.5	82.5	32.4	75.8
Eggs	98.5	98.5	62.8	99.1	98.9	100.2
Milk	85.3	82.3	79.1	36.8	65.4	93.8
Fish and seafood	80.6	100.3	73.7	106.9	49.0	186.8

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In Middle Africa, cereal output amounted to 5.3 million tonnes, and shortages in cereal production in this region amounted to 2.7 million tonnes; wheat production amounted to 0.16 million tonnes, and 1.4 million tonnes more was required. The demand for wheat was 90 times greater than the production rate. No less than 0.6 million tonnes more of rice, 0.3 million tonnes more of maize, 0.07 million tonnes of sorghum and 0.003 million tonnes of millet were

required. The self-sufficiency ratio for cereals in Middle Africa was 65.9%. It was the lowest for wheat – 1.1% (not much wheat is produced), followed by 20.5% for rice. Self-sufficiency ratios were much higher for maize – 90.0%, sorghum – 94.6% and millet – 99.5%.

In Eastern Africa, the output of cereals was 40.5 million tonnes, with 11.5 million tonnes of shortage for all cereals. This region produces the greatest amounts of maize – 20 million tonnes – yet almost 3 million tonnes more were required for self-sufficiency, 1.2 million tonnes of rice, 0.8 million tonnes of sorghum and 0.2 million tonnes of barley. The greatest shortages concerned wheat – no less than 6.2 million tonnes. The general self-sufficiency ratio for cereals was 77.9%. The highest self-sufficiency ratio concerned millet – 99.9%, followed by barley – 89.6%, maize – 87.1%, sorghum – 85.8%, rice – 79.4% and wheat – 37.6%.

In Western Africa, 43.9 million tonnes of cereals were produced, and 8.6 million tonnes more were required to satisfy the needs. The general self-sufficiency ratio for cereals was 83.7%. This region produces the greatest amounts of maize – 14.8 million tonnes, yet 0.4 million tonnes more was required for total self-sufficiency. Millet represented $\frac{1}{4}$ of the total cereal production, followed closely by sorghum (10.2 million tonnes). These two cereals are supplemented to a slight extent with import, and their self-sufficiency ratios were almost 100%. Rice production shortages amounted to 4.2 million tonnes, and the self-sufficiency ratio was 62.2%. In Western Africa, a small amount of wheat is produced (64,000 tonnes), while 3.7 million tonnes more are used. The self-sufficiency ratio for cereals was only 1.7%.

When compared to other regions of the African continent, Southern Africa has the highest cereals self-sufficiency ratio – 91.6%. With the cereals output of 14.9 million tonnes, their import amounted to 1.4 million tonnes. The greatest amounts of import characterise wheat – 1.5 million tonnes, with the production of less than 2 million tonnes. The wheat self-sufficiency ratio in this region amounted to only 57.4%. Rice production in this region is insignificant. Rice self-sufficiency ratio was 0.3%.

Southern Africa is a net exporter of maize (1.3 million tonnes); with the output of 12.2 million tonnes the self-sufficiency ratio was 111.9%, and in the case of sorghum – 110.4% with the production of 329,000 tonnes and net export of 31,000 tonnes. Barley self-sufficiency was 42.9% with the output of 217,000 tonnes and net import of 290,000 tonnes.

Table 10. Shortages (+) and surpluses (-) in the production of primary agricultural products in 2009 in the context of regional consumption on the African continent (thousand tonnes)

	Africa					
	Total	Northern	Middle	Eastern	Western	Southern
Cereals	+51,922	+27,718	+2,747	+11,532	+8,555	+1,369
wheat	+29,391	+16,542	+1,429	+6,248	+3,709	+1,468
rice	+6,308	-453	+653	+1,160	+4,163	+785
maize	+12,863	+10,310	+297	+2,974	+380	-1,298
sorghum	+1,399	+372	+72	+860	+26	-31
millet	+71	+55	+3	+1	+5	+8
barley	+1,715	+660	-	+225	+249	+290
Root and tuber crops	+580	+55	+16	+142	+168	+180
manioc	+167	-2	+1	+92	-11	+87
sweet potatoes	-13	-9	+1	-2	-	-3
potatoes	+410	+69	+14	+56	+177	+94
yam	+3	-	-	-	+3	-
Sugar	+5,320	+3,236	+362	+222	+2,364	-865
Leguminous crops	+685	+544	+32	-103	+20	+139
Oil crops	+409	+965	+11	-426	-179	+38
Vegetable oils	+5,249	+1,704	+240	+1,766	+835	+704
Vegetables	+700	-316	+125	-344	+1,137	+94
Fruit	-3,937	-1,127	-219	+11	-40	-2,562
Meat in total	+1,175	+274	+392	+67	+309	+211
beef	+281	+242	+29	+19	+27	-35
mutton and goat meat	+23	+4	+5	-1	+7	+7
pig meat	+138	-	+75	+7	+27	+29
poultry meat	+745	+28	+221	+43	+244	+210
Animal fats	+384	+91	+15	+43	+212	+22
Eggs	+41	+14	+16	+3	+9	-1
Milk	+6,650	+3,972	+190	+421	+1,841	+226
Fish and seafood	+1,944	-6	+214	-107	+2,349	-507

shortages (+) imports > exports

surpluses (-) exports > imports

Source: Own work based on Food Balance Sheets, Rome 2012.

The self-sufficiency ratios for root and tuber crops are very high since these crops are usually not transported over long distances, and they are used on site or close to the production site. On the entire African continent, the self-sufficiency ratio for root crops was 99.7%, with the output of 200.1 million tonnes and net import of 0.5 million tonnes. Manioc shortages amounted to 0.2 million tonnes and potato shortages to 0.4 million tonnes with net export of 0.1 million tonnes of sweet potatoes (from Northern, Eastern and Southern Africa). Self-sufficiency ratios for root crops are close to 100% and ranged from 99.9% in Western Africa to 93.2% in Southern Africa.

The self-sufficiency ratio for leguminous crops on the African continent was 97.9% with the output of 12.1 million tonnes and net import of 0.9 million tonnes. The highest self-sufficiency ratio for leguminous crops was recorded in

Eastern Africa – 104.3%, with the output of 2.5 million tonnes and net export of 0.1 million tonnes. The lowest self-sufficiency ratio for leguminous crops is 46.9%, with the output of 123,000 tonnes and net import of 129,000 tonnes. A low self-sufficiency ratio for leguminous crops is also observed in Northern Africa – 67.2% with the output of 1.1 million tonnes and net import of 0.5 million tonnes. In other regions, i.e. Western Africa and Middle Africa, self-sufficiency ratios for leguminous crops were 99.5% and 96.3%, respectively.

The self-sufficiency ratio for vegetable oils in Africa was 57.5%, with the output of 7.1 million tonnes and net import of 5.2 million tonnes. In all regions of the African continent, the output of oils was lower than required. The highest output of oils was recorded in Western Africa – 4.4 million tonnes, with net import of 0.8 million tonnes, and self-sufficiency ratio of 84.2%. The lowest self-sufficiency ratio of vegetable oils was recorded in Eastern Africa – 29.5%, with a shortage of 1.7 million tonnes of oil, and vegetable oil output of 0.7 million tonnes. In Northern Africa, the self-sufficiency ratio for vegetable oils was 36.1%, with the output of 0.96 million tonnes and net import of 1.7 million tonnes. In Middle Africa, 240,000 tonnes more of oils were required; the output was 464,000 tonnes and the self-sufficiency ratio – 65.9%.

Sugar (cane sugar) output on the African continent was 10.2 million tonnes. Yet, 5.3 million tonnes of sugar were required to satisfy the demand – the self-sufficiency ratio for the entire continent was 65.7%. Only Southern Africa had sugar surpluses exceeding the demand – self-sufficiency ratio of 129.9% with the sugar output of 3.0 million tonnes, and surplus of 0.9 million tonnes above the demand. In all other regions, there is not enough sugar produced to satisfy the demand. The greatest shortage is observed in Northern Africa – 3.2 million tonnes; self-sufficiency ratio – 48.6%. The lowest self-sufficiency ratio is observed in Western Africa – 15.5%; there was a shortage of 2.3 million tonnes of sugar, with the output of 0.4 million tonnes, i.e. almost 85% of consumption had to originate from import.

The self-sufficiency ratio for vegetables in Africa was 98.9%, with the output of 65.6 million tonnes and minor net import of 0.7 million tonnes. In Northern Africa and Eastern Africa, there are insignificant vegetable surpluses exceeding the demand by 0.3 million tonnes. The self-sufficiency ratios in these regions amounted to 100.9% and 103.9%, respectively. Vegetable shortages amounted to 128,000 tonnes in Middle Africa; 1,137,000 tonnes in Western Africa; and 94,000 tonnes in Southern Africa. These were minor vegetable shortages in relation to the demand. The self-sufficiency ratios amounted to: 95.5% in Eastern Africa, 96.4% in Southern Africa and 92.4% in Western Africa.

On the African continent, with the exception of Eastern Africa, fruit self-sufficiency ratios were higher than 100% and ranged from 170.9% in Southern Africa to 100.2% in Western Africa. The total fruit self-sufficiency ratio on the entire African continent was 105.3% with the output of 78.3 million tonnes and production surplus exceeding the demand by 3.9 million tonnes.

The greatest fruit surpluses were recorded in Southern Africa. They amounted to 2.6 million tonnes, with the output of 6.2 million tonnes and self-sufficiency ratio of 170.9%. In Northern Africa, fruit surpluses amounted to 1.1 million tonnes with the output of 21.1 million tonnes and self-sufficiency ratio of 105.7%.

In Middle Africa, the fruit self-sufficiency ratio was 104.8% with the output of 4.7 million tonnes and production surplus exceeding the demand by 0.2 million tonnes. A considerably lower fruit self-sufficiency ratio was observed in Western Africa – 100.2%, with the output of 20 million tonnes and a slight surplus of 40,000 tonnes. Eastern Africa is almost self-sufficient as regards fruit production with a self-sufficiency ratio of 99.9% and shortage of 11,000 tonnes, with fruit output of 26.4 million tonnes.

The above analysis proves that the African continent has considerable shortages of plant products in relation to the demand.

5.2. Animal products

In spite of a very low consumption of meat and meat products, Africa suffers from shortages of own production of all animal products in relation to the demand.

The meat self-sufficiency ratio of 92.8% shows that meat shortages on the African continent amounted to 1.2 million tonnes with meat output of 15.2 million tonnes. The highest self-sufficiency ratio concerns mutton and goat meat – 99.1% with the output of 2.6 million tonnes and (net) shortage of only 23,000 tonnes. The beef self-sufficiency ratio was 95.3% with beef output of 5.6 million tonnes and shortage of 0.3 million tonnes. The poultry meat self-sufficiency ratio is lower – 85.4% with the output of 4.3 million tonnes and the shortage of 745,000 tonnes. The pig meat self-sufficiency ratio is similar – 85.2% with the output of 1.1 million tonnes and the shortage of 138,000 tonnes.

In Northern Africa, hardly any pig meat is produced due to religious constraints, and the output of 1,000 tonnes was intended for domestic use (100% self-sufficiency). The total meat self-sufficiency ratio in Northern Africa amounted to 94.7%, with the output of 4.7 million tonnes. There was a shortage of 0.2 million tonnes of beef, with the output of 1.6 million tonnes (86.7% self-sufficiency). The poultry meat self-sufficiency ratio is higher – 98.5% with the output of 1.9 million tonnes and the shortage of 28,000 tonnes.

The meat self-sufficiency ratio in Middle Africa was 69.7%, with the output of 766,000 tonnes and the shortage of 332,000 tonnes. Self-sufficiency ratio of different meat kinds ranged from 21.6% for poultry meat and 46.4% for pig meat to 92.8% for beef meat and 95.4% for mutton and goat meat. The greatest shortages concerned poultry meat. Its output amounted to 61,000 tonnes with 221,000 tonnes more required.

In Eastern Africa, self-sufficiency ratios for all types of meat are relatively high – from 91.3% for poultry meat to 100.2% for mutton and goat meat – with the mean ratio for all types of meat amounting to 98.1%. In Eastern Africa, the output of meat was 3.5 million tonnes, and its shortage amounted to 67,000 tonnes. Meat surplus of 1,000 tonnes concerned mutton and goat meat, with the output of 516,000 tonnes and the self-sufficiency ratio of 100.2%.

The meat self-sufficiency ratio in Western Africa amounted to 91.5%, with the output of 3.4 million tonnes and shortage of 309,000 tonnes. The lowest self-sufficiency ratio concerned poultry meat – 68.8%, with the output of 0.5 million tonnes and shortage of 0.2 million tonnes; and the highest self-sufficiency ratio concerned mutton and goat meat – 99.2%, with 1,000 tonnes of shortages and the output of 846,000 tonnes.

In Southern Africa, the meat self-sufficiency ratio was 93.4%, with the output of 2.9 million tonnes and the shortage of 205,000 tonnes. The highest self-sufficiency ratio concerns beef – 104.21%, with the output of 868,000 tonnes and surplus exceeding the domestic consumption by 35,000 tonnes. The lowest self-sufficiency ratio concerns poultry meat – 87.1%, with the output of 1.4 million tonnes and 0.2 million tonnes more required to achieve full self-sufficiency.

In Africa, animal fat shortages amounted to 384,000 tonnes, with the output of 688,000 tonnes and self-sufficiency ratio of 64.2%. In terms of individual regions, the lowest self-sufficiency ratio was observed in Western Africa – 32.4%, with the output of 102,000 tonnes, and the shortage of 212,000 tonnes. The highest fats self-sufficiency ratio was observed in Eastern Africa – 82.5%, with the output of 203,000 tonnes and the shortage of 43,000 tonnes. In Middle Africa, the self-sufficiency ratio was 60.5%, with the output of 23,000 tonnes and the shortage of 15,000 tonnes. In Northern Africa, the animal fats self-sufficiency ratio was 76.2%, with the output of 292,000 tonnes and the shortage of 91,000 tonnes. In Southern Africa, the animal fats self-sufficiency ratio was 75.8%, with the output of 69,000 tonnes and the shortage of 22,000 tonnes.

The output of milk on the African continent was 38.8 million tonnes, while 6.7 million tonnes more were required for full self-sufficiency, and the milk self-sufficiency ratio was 85.3%. Milk self-sufficiency ratios ranged from 36.8% in Eastern Africa to 93.8% in Southern Africa. In Southern Africa, the

output was 3.4 million tonnes and the shortage – 0.2 million tonnes. In Northern Africa, milk self-sufficiency amounted to 82.3%, with the output of 18.5 million tonnes and the shortage of 3.97 million tonnes. In Middle Africa, 720,000 tonnes of milk were produced, 190,000 tonnes more were required, and the self-sufficiency ratio was 79.1%.

The egg output in Africa was 2.6 million tonnes, with 40,000 tonnes more required, and the self-sufficiency ratio of 98.5%. The highest egg self-sufficiency ratio – 100.2% was noted in Southern Africa, with the output of 461,000 tonnes of eggs and a surplus of 1,000 tonnes. The lowest self-sufficiency ratio was recorded in Middle Africa – 62.8%, where the egg output amounted to 27,000 tonnes and their shortage to 16,000 tonnes. In Western Africa, the egg self-sufficiency ratio was 98.9%, with the output of 849,000 tonnes and the shortage of 9,000 tonnes. In Eastern Africa, the self-sufficiency ratio was 99.1%, with the output of 326,000 tonnes and the shortage of 3,000 tonnes. In Northern Africa, the self-sufficiency ratio of eggs was 98.5%, with the output of 929,000 tonnes and the shortage of 14,000 tonnes.

Fish and seafood catches in Africa amounted to 7.9 million tonnes, while almost 2 million tonnes more were required for full self-sufficiency, and the self-sufficiency ratio was 80.6%. The fish and seafood self-sufficiency ratio ranged from 49% in Western Africa to 186.8% in Southern Africa. In Western Africa, fish catches amounted to 2.3 million tonnes, and self-sufficiency to 49%. In Southern Africa, fish catches amounted to 1.1 million tonnes, and the surplus to 0.6 million tonnes above the demand (186.6% self-sufficiency). The surplus of caught fish in Eastern Africa amounted to 107,000 tonnes, with the output of 1.7 million tonnes and self-sufficiency of 106.9%. Northern Africa was self-sufficient as regards fish catches, with a self-sufficiency ratio of 100.3%. Fish catches in Middle Africa amounted to 600,000 tonnes and were 214,000 tonnes lower than the demand (self-sufficiency ratio of 73.7%).

5.3. Composite food (calorific) self-sufficiency ratio

The composite food self-sufficiency ratio is an aggregate of all primary agricultural food products after conversion to a primary form translated into energy (calorific) value of production, export and import of these products.

Table 11 presents aggregate food (calorific) self-sufficiency ratios for the African continent in total, and for Northern Africa and Sub-Saharan Africa, and individual countries that belonged to these regions in 1970–2009.

In 1970, the calorific self-sufficiency ratio of the entire African continent was 102.1% and decreased by 0.6% average annual in 1970–2009, reaching 82.2% in 2009. In the same period in Northern Africa, this ratio was 76.1% in

2009 as a result of a downward trend in 1970–2009 amounting to 1.3% a year. The self-sufficiency ratio decreased from 90.1% in 1970 to 76.1% in 2009. The highest self-sufficiency ratio in Northern Africa in 1970 was noted in Morocco – 93.3%, and decreased in 1970–2009 by 1.0% a year, reaching 76.1% in 2009. In 2009, the self-sufficiency ratio in Egypt amounting to 82.7% was the highest among all countries of the region. In 1970–2009, self-sufficiency in Egypt decreased at the rate of 0.3% average annual.

Table 11. Food (calorific) self-sufficiency ratios in 1970–2009 (%)

	1970	1980	1990	2000	2009	Average annual growth rate, 1970–2009
Developing regions	99.7	96.8	98.3	96.4	94.8	-0.4
Total Africa	102.1	88.3	86.6	82.1	82.2	-0.6
Northern Africa	90.1	63.8	66.0	66.8	76.1	-1.3
Sub-Saharan Africa	104.4	95.7	96.2	92.0	87.3	-0.6
Asia	98.0	97.0	98.7	96.9	94.3	0.3
Central Asia	-	-	-	113.8	100.2	-
East Asia	99.5	98.2	101.7	99.7	97.0	-0.1
West Asia	86.8	89.0	82.4	87.6	83.2	-
South Asia	96.9	95.5	95.7	93.4	90.6	-0.2
South America and the Caribbean	107.8	104.0	104.9	102.6	112.5	0.2
Oceania	117.7	116.9	134.2	138.8	136.9	0.8
Developed regions	106.4	119.0	118.1	112.2	114.0	1.8
North America	126.0	161.2	135.3	132.1	129.0	0.1
Asia and Oceania	232.1	178.7	266.7	272.0	204.0	-0.2
Europe	91.3	87.3	93.5	96.7	101.2	0.3

Source: *FAO Statistical Yearbook 2012, FAO Rome 2012.*

In Sub-Saharan Africa, the average annual rate of decrease in the food self-sufficiency ratios was 0.6%, from 104.4% in 1970 to 87.3% in 2009. In 1970, half of the countries in Sub-Saharan Africa reached self-sufficiency exceeding 100% (25 out of 48 countries) and in 2009 only four. These include Swaziland (120.1%), Côte d'Ivoire (109.2%), Guinea-Bissau (104.8%) and Zambia (100.5%).

In 1970–2009, food (calorific) self-sufficiency ratios increased by 0.6% a year in Zambia, and by 0.1% in Côte d'Ivoire. Food self-sufficiency expressed with the calorific self-sufficiency ratio decreased most in:

- Gambia – by 2.5% average annual (self-sufficiency ratio of 146.2% in 1970 and 53.5% in 2009),
- Swaziland – by 2.2% average annual (self-sufficiency ratios of 120.1% and 28.4%, respectively),

- Zimbabwe – by 2.1% average annual (self-sufficiency ratios of 124% and 53.8%, respectively),
- Equatorial Guinea – by 1.9% average annual (self-sufficiency ratios of 148.0% and 69.4% respectively),
- Somali – by 1.4% average annual (self-sufficiency ratios of 92.1% and 52.4%, respectively).

Over the 40 years, the African continent was becoming less and less self-sufficient in terms of food. The factors that have contributed to this situation include: unsuccessful agricultural reforms, low fertiliser consumption (land erosion and starvation), frequent natural disasters, armed conflicts and tribal disputes, and above all, the economic policy that failed to prioritise agriculture even though its performance determined the execution of other economic and social projects, especially satisfaction of the nutritional needs of the African population, their health and labour efficiency.

CHAPTER IV

FOOD CONSUMPTION ON THE AFRICAN CONTINENT

The analysis of food consumption in Africa covers an almost twenty-year period, namely 1990–2009. Food consumption is presented on the basis of food balance sheets developed by the Food and Agriculture Organization (FAO).

1. Changes in the consumption of food products

In individual geographic regions of Africa, different changes were observed in the consumption of primary food products of plant and animal origin. The following general conclusions can be drawn from the analysis:

- In Northern Africa, the consumption of cereal products decreased by 0.1% average annual, with 0.2% decrease in wheat and 2.7% in barley, and 0.1% increase in maize and 0.6% in rice. The consumption of root crops increased by 2.7% average annual, vegetables by 1.9%, fruit by 2.8%, sugar by 1.6%, and the consumption of leguminous crops and vegetable fats decreased by 0.7% and 0.5%, respectively. As regards animal products, the overall consumption of meat increased by 1.2% average annual, with 2.9% increase in the consumption of poultry meat, 0.6% increase in beef and veal, and a decrease in the consumption of mutton and goat meat. The consumption of animal fats also increased, by 1.8% average annual, eggs by 0.9%, milk by 1.2%, fish and seafood by 2.2%.
- In Middle Africa, the consumption of cereal products increased by 1.9% average annual, with 3.2% increase in wheat, 2.5% increase in rice, 1.9% increase in maize and 0.4% increase in sorghum and a decrease in barley consumption by 1.5%. The consumption of root crops increased by 0.4% average annual, leguminous crops by 4.7%, vegetables by 2.4%, sugar by 1.6%, vegetable fats by 0.1%, and the consumption of fruit decreased by 0.4%. As regards animal products, the total consumption of meat increased by 0.7% average annual, in particular the consumption of poultry meat – by 5.3%, pig meat – by 1.5%, mutton and goat meat – by 0.6%, while the consumption of beef and veal decreased by 0.8%, as did the consumption of eggs – by 2.3%, fish and seafood – by 0.4%.
- In Eastern Africa, the consumption of cereal products in total increased by 0.6% average annual, with a 2.4% increase in wheat consumption, 1.4% in rice consumption, 0.1% in millet consumption and 0.7% in sorghum consumption, while the consumption of barley and maize decreased by 0.8% and 0.2%, respectively. Root crop consumption decreased by 0.2% average annual and leguminous crop consumption by 3.5%, while the consumption of

sugar increased by 1.4%, vegetables by 1.0%, fruit by 0.5% and vegetable fats by 1.9%. Total meat consumption decreased by 0.2% average annual, with an increase in pig meat consumption of 2.0% and poultry meat consumption of 0.3%, and a decrease in mutton and goat meat consumption of 1.4% average annual. The consumption of animal fats decreased by 1.8%, eggs by 1.1%, fish and seafood by 1.6% average annual.

Table 12. Average annual growth rate of the consumption of primary food products in kg per capita a year in 1990–2009 in Africa (%)

	World	Africa					
		Total	Northern	Middle	Eastern	Western	Southern
Cereal products	-0.1	0.3	-0.1	1.9	0.6	0.6	0.2
wheat	-0.1	0.3	-0.2	3.2	2.4	4.6	0.4
rice	-0.1	1.3	0.6	2.5	1.4	0.9	3.5
barley	-2.3	-2.7	-2.7	-1.5	-0.8	-	0.0
maize	0.7	0.2	1.0	1.9	-0.2	0.2	-0.1
millet	-1.8	-0.2	-	-0.2	0.1	-0.6	-1.7
sorghum	-1.0	1.1	0.0	0.0	0.7	0.5	-1.0
Root and tuber crops	0.3	1.0	2.7	0.4	-0.2	1.5	0.6
Sugar	-0.2	0.5	0.2	1.6	1.4	2.7	-0.9
Leguminous crops	0.4	1.1	-0.7	4.7	-3.5	1.5	0.0
Vegetable oils	1.1	0.7	-0.5	0.1	1.9	1.1	2.2
Vegetables	2.8	1.4	1.9	2.4	1.0	0.7	-0.4
Fruit	2.0	1.1	2.8	-0.4	0.5	0.9	-0.6
Meat in total	1.2	0.9	1.2	0.7	-0.2	0.9	1.8
beef	-0.4	0.2	0.6	-0.8	0.0	0.5	-0.6
mutton and goat meat	0.6	0.4	-0.2	0.6	-1.4	2.0	-1.1
pig meat	1.0	2.4	-	1.5	2.0	1.0	3.4
poultry meat	3.0	2.7	2.9	5.3	0.3	2.0	3.9
Animal fats	-0.6	-1.2	8.8	0.0	-1.8	-1.5	-7.3
Eggs	1.8	0.2	0.9	0.0	-1.1	0.7	2.4
Milk	0.6	0.7	1.2	-2.3	0.0	1.2	-0.3
Fish and seafood	1.6	0.5	2.2	-0.4	-1.6	-0.6	-1.2

Source: Own work based on Food Balance Sheets, faostat.fao.org.

- In Western Africa, the consumption of cereal products increased by 0.6% average annual, with higher growth rates of wheat (4.6%) and rice (0.9%) consumption, and a lower growth rate for maize (0.2%) consumption. The consumption of millet and sorghum decreased on average by 0.6% and 0.5% a year, respectively. The average annual consumption of other plant products increased by: sugar – 2.7%; leguminous crops – 1.5%; vegetable fats – 1.1%; fruit – 0.9%; vegetables – 0.7%; root and tuber crops – 0.6%. As regards animal products, the consumption of meat in total increased by 0.9% average annual, with 2.0% increase in the consumption of mutton, goat and poultry meat, 1.0% increase in pig meat, 0.7% increase in eggs, 1.2% increase in milk, and a decrease in animal fat consumption of 1.5% and fish and seafood of 0.6% average annual.

- In Southern Africa, the consumption of cereal products increased by 0.2% a year, with 0.4% increase in wheat consumption and 3.5% increase in rice consumption, and 0.1% decrease in maize consumption, 1.7% in millet consumption and 1.0% in sorghum consumption. The average annual consumption of root crops increased by 0.6%, vegetable fats by 2.2%, and the consumption of fruit and vegetables decreased by 0.6% and 0.4%, respectively. As regards animal products, the consumption of meat in total increased by 1.8% average annual, with 2.4% increase in the consumption of pig meat, 2.9% increase in poultry meat, 0.6% decrease in beef and veal, and a decrease in the consumption of mutton and goat meat of 1.1%. Egg consumption increased too, by 2.4% average annual. The consumption of animal fats decreased by 7.3%, fish and seafood by 1.2% and milk by 0.3% average annual.

2. Variety in food consumption

The analysis of variety in the consumption of primary plant and animal products was carried out on the basis of data derived from Food Balance Sheets developed by FAO for 2009 (most recent available data).

2.1. Consumption of plant products

The average cereal consumption (per grain) amounted in Africa to 151.2 kg per capita and was higher than the global average (146.7 kg) by merely 3.1%.

As regards the consumption of cereal products, Northern Africa is the leader with 228.5 kg per capita. The most popular cereal is wheat. In this region, the largest amount of cereal products was consumed in Egypt – 247.8 kg and the smallest in Libya – 205.9 kg. Large amounts of cereal products were consumed also in Southern Africa, with 177.4 kg per capita, yet the most popular cereal here is maize. Lesotho had the highest consumption of cereal products in this region with 216 kg per capita, and Botswana the lowest with 106.5 kg per capita.

In other African regions, the consumption of cereal products was much lower, in particular in Middle Africa with only 102.6 kg per capita and in Eastern Africa with 116.6 kg per capita. The structure of cereal consumption differs in these two regions. In Middle Africa, the highest consumption of cereal products was recorded in Chad – 154.8 kg and the lowest in Congo – 62.6 kg and in Central African Republic – 62.7 kg. In Eastern Africa, the consumption of cereal products was highest in Mauritius – 159.2 kg per capita and lowest in Burundi – 34.7 kg per capita a year. In Malawi, with the total consumption of 148.9 kg per capita, maize accounted for 90.0% of cereal products.

**African countries according to the consumption of cereal products in 2009
(kg per capita)**

Burundi	34.9	Swaziland	134.7
Rwanda	49.3	Togo	135.6
Congo	62.6	Guinea	142.0
Uganda	62.6	Nigeria	142.6
Central African Republic	62.7	Guinea-Bissau	146.2
Angola	77.7	Malawi	148.9
Ghana	87.9	Eritrea	149.2
Tanzania	104.7	Ethiopia	151.1
São Tomé and Príncipe	105.6	Djibouti	154.3
Mozambique	106.3	Chad	154.8
Botswana	106.5	Zimbabwe	155.7
Côte d'Ivoire	109.3	Mauritius	159.2
Gabon	111.4	Mauritania	161.5
Cameroon	113.4	Senegal	168.5
Kenya	113.8	South Africa	182.3
Benin	113.9	Gambia	193.7
Liberia	114.7	Libya	205.9
Sierra Leone	115.0	Mali	209.4
Namibia	115.1	Tunisia	214.3
Cabo Verde	125.2	Niger	216.3
Seychelles	126.9	Lesotho	216.7
Sudan	127.4	Burkina Faso	228.8
Zambia	128.9	Algeria	230.2
Madagascar	130.7	Morocco	244.4

Source: Own work based on Food Balance Sheets, faostat.fao.org.

In Western Africa, the consumption of cereal products amounted to 147.4 kg per capita. The lowest consumption of cereal products in this region was recorded in Ghana – 87.9 kg per capita (with 31% of rice, 30% of maize and 20% of wheat). The highest consumption of cereal products was recorded in Burkina Faso – 228.8 kg.

The level of root crops consumption in Africa amounting to 123.6 kg per capita a year is over twice as high as the global average (61.1 kg).

Root crop consumption is much diversified: from 35.1 kg per capita in Southern Africa to 192.1 kg in Western Africa. High root crop consumption is also noted in Middle Africa – 178.9 kg per capita. In Eastern Africa, root crop consumption amounted to 121.2 kg. Root crop consumption is low in Southern Africa – 35.1 kg per capita. Also in Northern Africa, root crops are of minor significance in feeding the population – 46.3 kg.

**African countries according to the consumption of root crops in 2009
(kg per capita)**

Gambia	7.7	Guinea-Bissau	69.8
Djibouti	9.3	Sierra Leone	74.1
Burkina Faso	9.9	Zambia	102.7
Mauritania	11.4	Namibia	115.0
Niger	12.4	Guinea	123.5
Eritrea	13.3	Liberia	144.6
Sudan	14.3	Cameroon	160.1
Zimbabwe	20.4	Madagascar	161.2
Mauritius	21.7	Tanzania	161.7
Mali	22.7	São Tomé and Príncipe	164.8
Senegal	25.9	Burundi	172.1
South Africa	30.6	Malawi	179.1
Tunisia	31.8	Gabon	180.1
Morocco	33.9	Uganda	183.5
Egypt	37.9	Togo	205.2
Seychelles	38.9	Nigeria	220.3
Lesotho	39.3	Angola	232.7
Botswana	44.4	Mozambique	250.1
Libya	47.0	Central African Republic	251.4
Cabo Verde	47.8	Congo	279.4
Swaziland	48.1	Rwanda	283.5
Kenya	48.7	Côte d'Ivoire	292.6
Chad	55.7	Benin	308.6
Algeria	67.3	Ghana	421.3
Ethiopia	68.3		

Source: Own work based on Food Balance Sheets, faostat.fao.org.

From among the countries of the African continent, particularly high root crop consumption per capita was noted in Ghana – 421.3 kg and the lowest in Gambia – 7.7 kg.

The average sugar consumption in Africa amounting to 15.8 kg per capita a year was by 67% lower than the global average (23.5 kg). It was higher in Northern Africa – 35.5 kg per capita, with the highest in Morocco – 41.7 kg and the lowest in Egypt – 23.1 kg per capita. Sugar consumption in Southern Africa amounted to 30 kg per capita, with the highest in Swaziland – 31.5 kg and the lowest in Lesotho – only 15.9 kg.

Very low consumption was recorded in Western Africa – 10.3 kg per capita a year, from 4.5 kg per capita a year in Burkina Faso to 34.1 kg in Mauritania. In Eastern Africa, average sugar consumption was low, too – 10.7 kg per capita a year. Average sugar consumption was also low in Middle Africa, where it amounted to 12.2 kg per capita and ranged from 7.7 kg per capita in Chad to 17.3 kg in Angola.

Leguminous crop consumption in Africa amounted to 10.5 kg per capita a year and was by 59% higher than the global average (6.6 kg). The lowest leguminous crop consumption was observed in Southern Africa – only 3.9 kg per capita a year, and the highest in Northern Africa – 12.8 kg per capita a year. In Middle Africa, leguminous crop consumption amounted to 11.3 kg per capita. In Western Africa, the average consumption amounted to 9.0 kg. Also in Eastern Africa, the average leguminous crop consumption was low and amounted to 6.6 kg per capita.

**African countries according to vegetable consumption in 2009
(kg per capita)**

Mozambique	8.6	Gabon	41.1
Chad	8.7	South Africa	42.9
Eritrea	9.4	Guinea	43.7
Burkina Faso	13.4	Niger	44.0
Zimbabwe	14.2	Namibia	44.0
Ethiopia	15.6	Sierra Leone	47.7
Madagascar	15.9	Benin	47.8
Swaziland	16.9	Kenya	48.3
Guinea-Bissau	17.2	Burundi	49.1
Lesotho	18.5	Nigeria	52.2
Angola	18.8	Djibouti	54.7
Malawi	20.2	Cabo Verde	56.0
Liberia	21.6	Sudan	61.8
Togo	22.3	Mali	63.1
Central African Republic	22.5	Senegal	65.7
Uganda	26.9	São Tomé and Príncipe	68.1
Botswana	30.3	Mauritius	74.1
Gambia	30.6	Seychelles	74.2
Zambia	30.7	Cameroon	100.7
Congo	30.9	Algeria	126.0
Mauritania	31.7	Morocco	131.2
Ghana	32.3	Tunisia	222.6
Côte d'Ivoire	33.5	Egypt	232.9
Tanzania	34.4	Libya	252.9
Rwanda	39.0		

Source: Own work based on Food Balance Sheets, faostat.fao.org.

Vegetable oil consumption in Africa amounted to 9.0 kg per capita a year and was by over 20% lower than the global average (11.5 kg). The highest vegetable oil consumption on the African continent was noted in Southern Africa – 12.9 kg per capita, and ranged from 0.9 kg in Lesotho to 14.0 kg in South Africa. In Western Africa, vegetable oil consumption amounted to 12.6 kg per capita. The lowest consumption was recorded in Niger – 3.9 kg, and the highest in Senegal – 16.8 per capita a year. In Northern Africa, vegetable oil consumption

amounted to 10.4 kg per capita a year, with the highest in Libya – 18.0 kg and the lowest in Egypt – 4.8 kg per capita. In Middle Africa, the average oil consumption was lower and amounted to only 7.9 kg per capita a year, ranging from 3.7 kg in Chad to 13.1 kg in Central African Republic. Vegetable oil consumption was also low – in Eastern Africa it amounted to 5.4 kg per capita, with the lowest in Eritrea – 1.7 kg, and the highest in Mauritius – 17.4 kg per capita.

**African countries according to fruit consumption in 2009
(kg per capita)**

Eritrea	0.9	Mauritius	52.6
Burkina Faso	5.7	Guinea-Bissau	52.9
Gambia	7.6	Congo	54.9
Ethiopia	9.4	Sudan	56.0
Togo	9.5	Nigeria	60.5
Chad	9.6	Malawi	61.2
Zambia	10.0	Kenya	62.6
Mauritania	13.5	Seychelles	69.3
Mozambique	15.1	Libya	69.4
Lesotho	16.6	Swaziland	71.6
Zimbabwe	16.9	Côte d'Ivoire	74.2
Senegal	17.5	Tanzania	77.1
Niger	18.1	Cabo Verde	86.4
Namibia	18.1	Morocco	87.7
Djibouti	20.0	Algeria	91.2
Mali	27.0	Tunisia	92.8
Angola	28.1	Egypt	101.6
South Africa	34.8	Cameroon	106.9
Sierra Leone	36.6	Guinea	107.9
Madagascar	42.4	Burundi	138.2
Benin	43.4	Gabon	148.0
Central African Republic	43.7	Rwanda	156.5
Liberia	45.9	Uganda	156.9
Botswana	47.0	Ghana	166.8
		São Tomé and Príncipe	191.6

Source: Own work based on Food Balance Sheets, faostat.fao.org.

The average vegetable consumption in Africa amounted to 64.6 kg. It was over two times lower than the global average (131.8 kg). The highest vegetable consumption was observed in Northern Africa and amounted to 193.1 kg per capita. In this region, the smallest amounts of vegetables were consumed in Algeria – 126.0 kg per capita, and the largest in Libya – 252.9 kg. Other regions on the African continent are characterised by very low vegetable consumption.

Low vegetable consumption was observed in Western Africa – only 25.5 kg per capita a year, from 8.6 kg per capita a year in Mozambique to 74.2 kg in Seychelles. The lowest vegetable consumption was recorded in

Eritrea – 9.4 kg per capita. In Western Africa, vegetable consumption amounted to 46.0 kg per capita and ranged from 13.4 kg in Burkina Faso to 65.7 kg in Senegal. Average vegetable consumption in Middle Africa amounted to 45.5 kg per capita a year, with only 8.7 kg consumed in Chad and 100.7 kg in Cameroon. In Southern Africa, the average vegetable consumption amounted to 40.4 kg per capita a year. The smallest amount of vegetables in this region was consumed in Swaziland – 16.9 kg, and the largest in Namibia – 44.0 kg.

Fruit consumption in Africa – 62.3 kg per capita was by 15% lower than the global average (72.9 kg). The highest average fruit consumption was noted in Northern Africa – 86.8 kg per capita a year and ranged from 69.4 kg in Libya to 101.6 kg in Egypt. The lowest average fruit consumption was recorded in Southern Africa – only 34.6 kg per capita a year. The largest amount of fruit was consumed in Swaziland – 71.6 kg per capita, and the smallest in Lesotho – 16.6 kg.

In Eastern Africa, the average fruit consumption amounted to 54.6 kg per capita. In Eritrea, fruit consumption amounted to only 10.9 kg per capita, and in Rwanda to 156.5 kg. It was not much higher in Western Africa. The average fruit consumption amounted there to 60.0 kg per capita a year, with the highest in Ghana – 166.8 kg per capita and the lowest in Burkina Faso – 5.7 kg. Fruit consumption in Middle Africa amounted to 56.9 kg per capita and was the highest in Gabon – 148.9 kg and the lowest in Chad – 9.6 kg per capita. Fruit consumption was also high in Cameroon – 106.9 kg per capita a year.

2.2. Consumption of animal products

The consumption of animal products on the African continent is insignificant for feeding the population and is very low. Only in a few countries is the consumption of animal products higher than the global average.

Average global meat consumption amounted to 41.9 kg per capita a year, and in Africa only to 17.6 kg. Only in Southern Africa was the average meat consumption three times higher than the average and amounted to 54.1 kg per capita. In the meat consumption structure, poultry meat accounted for 52.5% and beef for 26.8% of the total meat consumption. In Northern Africa, meat consumption in the amount of 26.0 kg per capita a year was two times lower than in Southern Africa. The structure of meat consumption in this region was similar to Southern Africa: poultry meat accounted for 53% and beef for 27%. In Middle Africa, the average meat consumption amounted to 18.8 kg per capita a year, with 36.7% of beef and 25.5% of poultry meat. The average meat consumption in Western Africa was lower than in Middle Africa and amounted to only 12.4 kg per capita a year (with 29% of beef, 23.3% of mutton and goat meat, and 21% of poultry meat). The average meat consumption in Eastern Africa was

very low – 11.3 kg per capita a year (with 51% of beef, 14% of mutton and goat meat and 14% of poultry meat).

On the African continent, the highest meat consumption, exceeding the average global consumption, was recorded in the following countries: Gabon, South Africa, Mauritius and Cabo Verde.

Beef consumption in Africa amounted to 6.4 kg per capita a year. The largest amount of beef per capita a year, over 10 kg, was consumed in Central African Republic, Swaziland, South Africa, Niger, Djibouti, Egypt and Kenya.

The average consumption of mutton and goat meat was 2.8 kg per capita a year. The largest amount of meat was consumed in Mauritania (11.2 kg) and in Sudan (8.0 kg). Insignificant amounts of mutton and goat meat, less than 1 kg per capita a year, were consumed in Angola, Zambia, Côte d'Ivoire, Liberia, Sierra Leone, Burundi and Congo.

**African countries by meat consumption in 2009
(kg per capita)**

Burundi	5.2	Kenya	16.7
Rwanda	6.5	Lesotho	18.3
Sierra Leone	7.3	Sudan	19.1
Eritrea	7.7	Algeria	19.5
Mozambique	7.8	Benin	20.9
Gambia	8.1	Zimbabwe	21.3
Malawi	8.3	Mali	22.2
Ethiopia	8.5	Angola	22.4
Guinea	8.6	Djibouti	23.7
Nigeria	8.8	Egypt	25.6
Tanzania	9.6	Niger	25.6
Liberia	10.4	Tunisia	25.9
Uganda	11.0	Botswana	26.2
Togo	11.7	Swaziland	26.9
Zambia	12.3	Namibia	28.3
Cameroon	12.7	Mauritania	29.7
Chad	13.0	Morocco	30.1
Côte d'Ivoire	13.3	Libya	33.5
Congo	13.4	Central African Republic	33.5
Ghana	13.9	Seychelles	35.6
Madagascar	14.7	Cabo Verde	46.1
Burkina Faso	14.8	Mauritius	49.4
Senegal	15.8	South Africa	58.6
Guinea-Bissau	16.2	Gabon	66.4
São Tomé and Príncipe	16.5		

Source: Own work based on Food Balance Sheets, faostat.fao.org.

Not much pig meat is consumed on the African continent, i.e. only 1.4 kg per capita a year (due to religious constraints). The highest pig meat consumption was recorded in Cabo Verde (22.1 kg) and in Seychelles (10.4 kg).

The average poultry meat consumption in Africa was 5.5 kg per capita a year. The highest poultry meat consumption was recorded in Gabon (39.1 kg), Mauritius (35.2 kg) and in the South Africa (32.0 kg).

The African continent is characterised by a very low animal fat consumption – 0.8 kg per capita a year, with 3.3 kg per capita in the world. The highest animal fat consumption was noted in Northern Africa – 1.0 kg per capita a year. In other African regions, it was lower and amounted to 0.5 kg in Middle Africa and Eastern Africa, 0.4 kg in Southern Africa and 0.3 kg in Western Africa. Relatively high animal fat consumption per capita was noted on the African continent in Cabo Verde (5.2 kg).

The average egg consumption amounted to 2.3 kg per capita a year in Africa and 8.9 kg in the world. In Africa, there were significant differences in egg consumption between regions, with the highest consumption in Southern Africa – 6.1 kg. In Northern Africa, the average egg consumption amounted to 6.0 kg per capita a year. In Middle Africa, the average egg consumption was very low and amounted to 0.6 kg per capita a year. Also in Eastern Africa egg consumption was low and amounted to 0.9 kg per capita. In Western Africa, egg consumption was similar to the average for that continent and amounted to 2.8 kg per capita a year.

In African countries, the highest egg consumption is recorded in Seychelles (9.6 kg) and in Libya (9.4 kg).

The average milk consumption in Africa was 43.9 kg, while in the world it was on average twice as high (87.3 kg). In Northern Africa, 88.7 kg of milk was consumed per capita. In other regions, milk consumption was lower than in Northern Africa and ranged from 14.8 kg per capita a year in Middle Africa to 55.4 kg in Southern Africa. In Eastern Africa, the average milk consumption amounted to 36.9 kg per capita and in Western Africa to only 17.2 kg.

Taking all African countries into consideration, milk consumption of over 100 kg per capita a year was recorded in the following countries: Sudan, Mauritania, Algeria, Côte d'Ivoire, Morocco and Tunisia.

Fish and seafood consumption in Africa amounted to 9.5 kg (live weight) per capita, while in the world it was almost twice as high (18.5 kg). The highest average consumption was noted in Western Africa – 13.8 kg, and the lowest in Eastern Africa – 4.6 kg per capita. In other regions, fish consumption per capita amounted to 13.0 kg in Middle Africa, 10.5 kg in Northern Africa and 7.2 kg in Southern Africa.

On the African continent, relatively high fish consumption, exceeding 15 kg per capita a year, is recorded in Seychelles, Gabon, Ghana, Gambia, São Tomé and Príncipe, Sierra Leone, Senegal, Mauritius and Congo.

3. Food consumption patterns on the African continent

Analyses of differences in the consumption of primary food products and its dynamics in 1990–2009 showed that characteristic features of food consumption patterns were developed in all geographical regions of the African continent. Each geographical region is characterised by a *different food consumption pattern, which shall be understood as a repeatable food consumption structure in terms of the type and amount of food* [22]. Natural conditions (soil, climate, access to water reservoirs), which determine the specialisation of agricultural production and fishery development, have a large impact on these patterns.

The analysis of consumption of primary plant and animal products was based on the available statistical data developed by the FAO for 2009 [*Food Balance Sheets*].

Food habits and customs influence the maintenance of the current food consumption structure also at times of shortages of domestic agricultural production which is supplemented with imported goods. This is possible when countries have the funds to purchase food on the global market.

In 2010, Northern Africa imported food for USD 150.7 per capita, while the average food import per capita in Africa amounted to USD 58.5. In the same year, Sub-Saharan Africa imported food for only USD 40.6 per capita in spite of considerable needs.

Very high consumption of cereal products (per cereal grain), above all, of wheat and, to a lesser extent, of other cereals, is a characteristic feature of the food consumption pattern in Northern Africa. On the other hand, small amounts of root crops are consumed in Northern Africa. In comparison with other regions, sugar, vegetable, fruit, vegetable oil, poultry, mutton and goat meat, milk and egg consumption is high there. In the structure of consumed food, the share of energy from animal products was 11.2% (346 kcal per capita a day).

The food consumption pattern in Southern Africa is also characterised by a high consumption of cereal products, in particular maize. Wheat consumption is high, but lower than in Northern Africa. Vegetable oil and sugar consumption is very high, and tuber crop (potato), vegetable and fruit consumption is minor. Poultry, beef and veal, as well as egg consumption is high, as well. In the structure of consumed food, the share of energy from animal products was 15.2% (443 kcal per capita a day).

The food consumption pattern in Western Africa is characterised by a very high consumption of root crops, in particular of manioc and yam. As regards cereals, sorghum and millet, their consumption is high in comparison to other regions. The consumption of other products, namely sugar, fruit, vegetables and vegetable oils, as well as meat, eggs and milk, is very low. Fish consumption, in turn, is high in comparison to Southern and Eastern Africa. In the structure of consumed food, the share of energy from animal products was only 4.9% (131 kcal per capita a day).

The food consumption pattern in Middle Africa is characterised by a high consumption of root crops, in particular manioc, with a low consumption of cereal products. Vegetable, vegetable oil and fruit consumption is low. This food consumption pattern is characterised by low consumption of animal products, in particular eggs, milk, poultry meat, and relatively high fish consumption. In the structure of consumed food, the share of energy from animal products was 7.0% (155 kcal per capita a day).

On the global scale, the share of animal products in the energy intake was 17.7% (501 kcal per capita a day), and on the African continent – 8.1% (207 kcal per capita a day). This comparison indicates a huge gap between the African countries and other countries worldwide in terms of food quality.

Table 13. Consumption of primary food products in the world and in Africa in 1990–2009 (kg per capita a year)

	Year	World	Africa					
			Total	Northern	Middle	Eastern	Western	Southern
Cereal products	1990	150.1	142.9	235.0	71.8	105.0	131.2	171.2
	2009	146.7	151.2	228.5	102.6	116.6	147.4	177.4
wheat	1990	67.6	47.0	188.3	13.4	14.4	8.1	53.5
	2009	66.0	49.7	180.9	24.3	22.6	19.0	57.5
rice	1990	54.4	16.5	10.0	9.3	11.0	28.7	7.2
	2009	53.3	21.1	11.2	14.9	14.4	34.2	13.8
barley	1990	1.4	5.0	20.5	1.2	4.2	0.0	0.1
	2009	0.9	3.0	12.2	0.9	3.6	0.0	0.1
maize	1990	14.9	40.8	18.7	20.1	55.6	26.9	103.1
	2009	17.1	42.0	22.5	28.6	53.2	28.2	100.9
millet	1990	4.7	14.2	0.0	8.9	4.0	38.8	1.1
	2009	3.3	13.6	0.0	8.5	4.1	34.5	0.8
sorghum	1990	4.6	16.9	1.4	17.4	10.0	27.8	3.4
	2009	3.8	18.5	1.4	17.5	11.4	30.8	2.8
Root and tuber crops	1990	57.5	101.7	26.5	166.6	125.2	143.6	31.6
	2009	61.1	123.6	43.6	178.9	121.2	192.1	35.1
Sugar	1990	24.3	14.5	28.5	9.1	8.2	6.2	35.4
	2009	23.5	15.8	33.1	12.2	10.7	10.3	30.0
Leguminous crops	1990	6.1	8.5	7.0	4.7	13.0	6.8	3.9
	2009	6.6	10.5	6.1	11.3	6.6	9.0	3.9
Vegetable fats	1990	9.3	7.9	10.1	7.8	3.8	10.3	8.5
	2009	11.5	9.0	12.8	7.9	5.4	12.6	12.9
Vegetables	1990	78.2	49.8	106.4	29.1	21.1	40.6	43.5
	2009	131.8	64.6	193.1	45.5	25.5	46.0	40.4
Fruit	1990	49.6	50.4	51.9	61.6	49.7	50.5	39.0
	2009	72.9	62.3	88.5	56.9	54.6	60.0	34.6
Meat in total	1990	33.7	14.8	20.9	16.4	11.7	10.4	38.7
	2009	41.9	17.6	26.0	18.8	11.3	12.4	54.1
beef	1990	4.4	6.2	6.3	8.1	5.8	3.3	16.4
	2009	9.6	6.4	7.1	6.9	5.8	3.6	14.5
mutton and goat meat	1990	21.1	2.6	5.2	1.6	3.1	2.0	4.7
	2009	1.9	2.8	5.0	1.8	1.6	2.9	3.8
pig meat	1990	3.3	0.9	0.0	1.8	0.9	1.0	3.3
	2009	15.8	1.4	0.0	2.4	1.3	1.2	6.2
poultry meat	1990	3.6	3.4	8.0	1.8	1.5	1.8	13.7
	2009	13.6	5.5	13.8	4.8	1.6	2.6	28.4
Animal fats	1990	3.7	1.0	0.2	0.5	0.7	0.4	1.7
	2009	3.3	0.8	1.0	0.5	0.5	0.3	0.4
Eggs	1990	6.4	2.2	5.1	0.6	1.1	2.2	3.9
	2009	8.9	2.3	6.0	0.6	0.9	2.5	6.1
Milk	1990	77.4	38.1	70.4	23.2	36.8	13.8	59.2
	2009	87.3	43.9	88.7	14.8	36.9	17.2	55.4
Fish and seafood	1990	13.6	8.7	7.0	14.1	6.2	12.2	9.0
	2009	18.5	9.5	10.5	13.0	4.6	13.8	7.2

Source: Food Balance Sheets, faostat.fao.org.

Summary and conclusions

1. For decades, Africa was characterised by slow economic growth. It was not until the first decade of the 21st century that it has started developing quicker than other regions of the world. Africa is currently growing wealthy through the sale of raw materials, above all, crude oil, gold and diamonds, chromium, platinum, uranium, coltan and other metal ores. Yet, the Gross Domestic Product of the African continent represents only 4% of the world's GDP. On the other hand, the number of people suffering from extreme poverty and undernourishment in Africa is on the rise.
2. The greater part of African countries belongs to a group of countries with a low level of the Human Development Index. People suffer from diseases, such as AIDS, tuberculosis, malaria and other tropical diseases, in spite of progress made in combat against them. The African continent cannot develop due to limited access to education, especially among women (illiteracy) and girls. Their exclusion from education is related above all to the binding social standards. Employment of children aged 7–14 hinders primary school graduation.
3. In spite of a higher rate of economic growth in Africa than in other regions of the world, 50% of people in Sub-Saharan Africa still suffer from extreme poverty, and almost 25% starve and are undernourished. In Northern Africa, only 2.5% of people live in extreme poverty, and less than 5% of people are undernourished.
4. Poverty and undernourishment are due not only to food shortages but also to inequalities in wealth distribution. Many countries with a low level of the Human Development Index have natural resources, which are sold to developed and developing countries (China, India). The generated income is not allocated to economic growth, agriculture and other important social purposes, but is claimed by corrupt elites. Many credits granted to African countries have not been utilised in accordance with their intended use. Unskilled, corrupt governments in African countries have condemned millions of people to hunger and poverty. Corruption is the enemy of development.
5. In African countries, a considerable share of population has no chance to satisfy their nutritional needs, no access to education and health care. Poor people do not have sufficient means to purchase required food and cannot produce it themselves. The most vulnerable groups in terms of undernourishment and poverty include landless peasants, agricultural workers, farmers managing infertile land and small plots, urban poor without work, older people and families with low income and a large number of children. The lower the socio-economic development of a country, the larger the share of undernourished population.
6. In countries covered by the globalisation process, poverty and undernourishment have significantly decreased. These include African countries that grow

wealthy owing to the sale of mineral resources and have considerable food reserves originating from own production, e.g. South Africa.

7. Only a few countries in Africa do not struggle with hunger and undernourishment. These include: Algeria, Egypt, Libya, Morocco, Tunisia, Gabon, Ghana, South Africa, São Tomé and Príncipe, Mauritius, Seychelles and Nigeria. In other African countries, food shortages and considerable shares of starving and undernourished population present a significant problem.
8. The key reasons for poverty and undernourishment of the population in many African countries include: low agricultural production resulting from inefficiency of small farms that predominate in the land structure; unfavourable soil and climatic conditions; insufficient water reserves; limited access to means of production, in particular to better quality soil (soil erosion), yield-enhancing agents and irrigation facilities; insufficient land cultivation skills, which relates to lack of education (even primary); natural disasters; international armed conflicts and tribal wars (land abandonment and migration); lack of connections between farms and the market; difficulties with obtaining a credit (unregulated ownership rights); no jobs beyond agriculture in the countryside and in cities; low Purchasing Power Parity of rural and urban population; spread of infectious diseases and diseases resulting from undernourishment; insufficient external aid, public and individual funds allocated to investments in agriculture.
9. Governments of African states did little for agriculture, leaving it to its own means. It was only during the 2007-08 and 2010-11 crisis that more attention was paid to agriculture. Economically developed countries and international non-governmental organisations grant more assistance to agriculture, in particular to increased agricultural production at small farms, whose role in feeding the population on the African continent was underestimated.
10. Investments in agriculture are necessary – this concerns not only fixed assets, but also means for scientific research, new technologies and human investments in education and health, which requires improving nutrition. Human resources should be better provided with fixed assets (land, irrigation facilities, machinery, livestock and permanent cropland), in particular in Sub-Saharan Africa.
11. Greater interest of African governments in agricultural problems is needed, which would be manifested in a greater share of funds allocated to agricultural development in the budget of these countries. African countries, especially those with low income and food shortages, will not cope with all social and economic problems on their own. They need the assistance of developed countries and international non-governmental organisations in the field of economics, organisation, technology and education, especially comprehensive aid of specialists in these fields.
12. Developed countries should decrease the protectionist attitude towards their own agriculture, which will improve the conditions of trade exchange and access of African countries to global markets. Agricultural holdings in these countries, in turn, have to be more flexible as regards adjustments to market requirements

(quantity and type of production, observance of sanitation standards, in particular concerning biological and chemical contamination).

13. The African continent is becoming less and less self-sufficient in terms of food. The factors that have contributed to this situation include: unsuccessful agricultural reforms, low fertiliser consumption (land erosion and starvation), frequent natural disasters, armed conflicts and tribal disputes, and above all the economic policy that failed to prioritise agriculture even though its performance determined the execution of other economic and social projects, in particular those satisfying the nutritional needs of the African population. Feeding the population depends to an increasing extent on import, hence on the prices on the global market. Their increase results not only from poor crops, but also from the allocation of agricultural raw materials to biofuels and from speculations involving the financial capital.
14. The level and quality of feeding the population on the African continent are determined by the performance of plant production, and to a lesser extent on animal production, with the exception of Southern Africa. The quantity and quality of food supplies on the African continent, especially in Sub-Saharan Africa, are much lower than in other geographical regions of the world. Above all, the consumption of meat and other animal products is very low.
15. The requirements that need to be met to improve the physical and economic access to food include:
 - increasing agricultural production due to more intensive management (greater consumption of plant protection products and artificial fertilisers, certified seeds, more efficient plant and animal species, machinery in agricultural holdings), promotion of backyard allotments and crops adjusted to soil and climatic conditions of countries suffering hunger;
 - popularising relevant technologies:
 - labour-intensive technologies that increase demand for labour,
 - technologies for marginal lands (usually managed by the poorest people),
 - technologies of plant cultivation resistant to pests, diseases and drought;
 - developing fishery – in certain regions, unexploited fish reserves are still present in oceans; aquaculture may also be developed;
 - facilitating access to land (agricultural reform) and other means of production;
 - organising agricultural institutions that facilitate obtaining credits and introducing new technologies;
 - improving rural municipal infrastructure (roads, means of communication, transport and storage);
 - increasing access to potable water;
 - improving the irrigation system and encouraging water saving;
 - improving contacts between agricultural holdings and the market;
 - improving the Purchasing Power Parity by increasing the number of non-agricultural jobs, educating in non-agricultural professions, popularising

- public works and developing technical and social infrastructure (in education and health care), providing small loans for starting up small businesses;
- increasing access to schools and health care through the development of related infrastructure and allocating more funds for these purposes in the budgets of African countries instead of for arms;
 - introducing a countryside and agriculture development strategy based on the principle ‘help yourself’ consisting in cooperation between the central government and local communities to modernise agriculture and invest in human capital (education and health care);
 - more efficient organisation of food aid in critical situations; speed and fair distribution are of key importance;
 - ruthless combat against corruption, taxing profit on foreign capital producing mineral resources in order to increase the funds in the national budget and decrease the discrepancies in access to income and food.
16. The aid of developed countries, international non-governmental organisations and African organisations is crucial to prepare a socio-economic development strategy for each African country and to take measures to combat undernourishment, according to the principle: ‘let’s help those in need in a way to teach them how to help themselves’. This is a new approach towards aid for developing countries. In the case of natural disasters and man-made disasters, above all in the event of internal conflicts, food aid is necessary, and developed countries and intergovernmental organisations have to provide such aid. Countries and regions that suffer hunger the most have to obtain food and development assistance. FAO has applied a new approach towards food aid – the World Food Programme is to simultaneously support agriculture, education and health care.
17. According to the analysis, there are two ways of improving permanent access to food required for all people on the African continent to live a healthy and active life, namely:
- development of agriculture and other production-related sectors, as well as technical and social infrastructure, that is economic development of countries and facilitated access to education and health care,
 - assistance provided by developed countries and international non-governmental organisations enabling socio-economic development of African countries and food aid for poor people and those suffering from hunger.

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