KSE | Center for Food and Land Use Research

AGRICULTURAL LANDSCAPE OF AFRICA: EXPLORING COOPERATION OPPORTUNITIES WITH UKRAINE

NORTH AFRICA

Pavlo Martyshev
Hryhorii Stolnikovych
Igor Piddubnyi

2023

The designations employed and the presentation of material in this information product do not imply the expression of any opinion of Kyiv School of Economics Center for Food and Land Use Research (KSE Agrocenter). The views expressed in this information product are those of the author(s) and do not reflect the views or policies of KSE Agrocenter.

Users wishing to reuse material from this work that is attributed to a third party, such as tables, figures, or images, are responsible for determining whether permission is needed for that reuse and for obtaining permission from the copyright holder. The risk of claims resulting from infringement of any third party-owned component in the work rests solely with the user.

KSE Agrocenter information products are available at https://agrocenter.kse.ua and at telegram channel t.me/kseagrocenter

KSE Agrocenter

**Center for Food
and Land Use Research
at Kyiv School of Economics**

KSE | Center for Food and Land Use Research

TABLE OF CONTENT

TABLE OF CONTENT 3
INTRODUCTION 4
EXECUTIVE SUMMARY: COOPERATION OPTIONS 5
1. EGYPT 7
1.1. FOOD SECURITY 7
1.2. AGRI-FOOD TRADE 14
1.3. LOCAL AGRICULTURAL SECTOR 17
1.4. CHALLENGES IN AGRICULTURE 23
1.5. AGRICULTURAL POLICY OVERVIEW 23
1.6. EGYPT: SUMMARY 30
2. ALGERIA 33
2.1. FOOD SECURITY 33
2.2. AGRI-FOOD TRADE 38
2.3. LOCAL AGRICULTURAL SECTOR 40
2.4. CHALLENGES IN AGRICULTURE 44
2.5. AGRICULTURAL POLICY OVERVIEW 45
2.6. ALGERIA: SUMMARY 48
3. MOROCCO 50
3.1. FOOD SECURITY 50
3.2. AGRI-FOOD TRADE 56
3.3. LOCAL AGRICULTURAL SECTOR 57
3.4. CHALLENGES IN AGRICULTURE 61
3.5. AGRICULTURAL POLICY OVERVIEW 62
3.6. MOROCCO: SUMMARY 65
REFERENCES 67

INTRODUCTION

The report is aimed to outline the directions of partnership between Ukraine and North African countries in the agri-food sector. The importance of such bilateral relations is increasing amidst the current military risks in the Black Sea region threatening food security in the MENA region.

In this report, we analyze three most-populated countries in North Africa (Egypt, Algeria, and Morocco) to reveal their potential partnership with Ukraine in agricultural and food processing industries. There are several key elements of the report revealing such potential. First, we present the results of the online seminar «The African countries and Ukraine partnership: mutually beneficial cooperation with Northern Africa» organized by the Center for Food and Land Use Research at the Kyiv School of Economics (KSE Agrocenter) on November 28, 2023. The seminar allowed to outline the major streams of cooperation between Ukraine and North African countries in agriculture. Second, we analyse food security profile of the observed countries, compare local undernourishment level with regional benchmarks. This analysis is followed by the overview of local UN World Food Programme operations intended to strengthen local food security.

Third, we examine agri-food trade patterns and countries' dependence on imported food. Fourth, the overview of local agricultural sector is conducted to understand the potential of increasing local food self-sufficiency. This chapter is followed by the overview of current challenges for local agriculture. Fifth, we analyse the national agricultural policy and how it evolved over the last years. For all observed countries, we summarize the current situation in agriculture sector and provide SWOT analysis of local agriculture.

EXECUTIVE SUMMARY: COOPERATION OPTIONS

In recent years, the number of undernourished people has been gradually increasing in North African countries. In 2019-2021, about 15 million people in the region suffered from hunger. Average food energy supply in the region has remained relatively stable since 2012; for some states, such as Egypt, it has declined, as about half of the rural population remains below the national poverty line. All North African countries face problems of malnutrition, as a large proportion of calories come from nutrient-poor grain-based food. Also, the local population consumes an insufficient amount of protein. The World Food Program's operations in North Africa are focused mainly on poor rural populations and refugees, aiming to fill gaps in national food policies.

North African countries remain net importers of food, mainly focusing on the purchase of grain. National governments are trying to increase the level of food self-sufficiency by stimulating domestic agricultural production. Indeed, agriculture remains an important part of the national economies of Egypt, Algeria and Morocco (about 11%). Recent decades have been marked by the active development of local agriculture; however, the main growth was observed in products that are suitable for the local climate (in particular, fruits). Opportunities to increase grain production remain limited due to high levels of desertification, water scarcity, inadequate irrigation and production technologies, poor infrastructure, intensive urbanization, and inconsistent agricultural policies. Among the countries studied, Egypt shows the greatest progress in irrigation; despite this, the Nile's water supply is threatened by water-use policies in upstream countries.

Although government support to the agricultural sector has had a positive impact on local food production, agricultural productivity in North Africa remains below the potential levels for a number of reasons. First, state monopoly and excessive regulation of the sector limited market transparency and competition in some sectors. A prime example of this is the Central Administration for Seed Production (CASP) in Egypt, which administratively regulates the seed market through market access and pricing. Second, government support is based mainly on direct subsidies, which provide weak incentives for increasing economic efficiency. For example, nitrogen fertilizer subsidies provided by the Egyptian government lead to excessive fertilization by wheat producers, which is economically inefficient and harmful to the environment. Another case in point is the pro-cyclicality of agricultural subsidies in Algeria, where farmers receive support during periods of high prices for the country's exported crude oil. This distorts the market mechanism and creates excessive incentives for the production of certain goods. Third, underfunding of scientific institutions and extension services leads to low adaptability of technologies in the agricultural sector.

In the near future, food security in the region will be threatened by a number of factors, such as climate change, population growth, influx of refugees, political instability, urbanization. At the same time, the availability of food can be improved by intensification of local agriculture in several directions: implementation of land reclamation policy, modernization of the irrigation system, transfer of technologies in agriculture, reconstruction of agricultural extension services. The demand for agricultural technology opens the way for extensive cooperation between North Africa and leading producers of agricultural products such as Ukraine.

The options for partnership between Ukraine and North Africa in agriculture were discussed on the seminar «The African countries and Ukraine partnership: mutually beneficial cooperation with Northern Africa» organized by the Center for Food and Land Use Research at the Kyiv School of Economics (KSE Agrocenter) on November 28, 2023. The speakers were representatives of Ukrainian and African research institutions and economists from Food and Agriculture Organization of the United Nations (FAO). The seminar allowed to generalize the core streams for partnership between Ukraine and North Africa in agri-food sector (Figure 1).

Figure 1. Options of partnership between Ukraine and North Africa in agri-food sector

Source: Created by authors (based on the discussion results)

1. EGYPT

1.1. FOOD SECURITY

Egypt is the most populated country in North Africa. Since 2000, the total population increased by 57% from 70 to 110 mln people (Figure 2). Population growth was faster compared to the whole North Africa region.

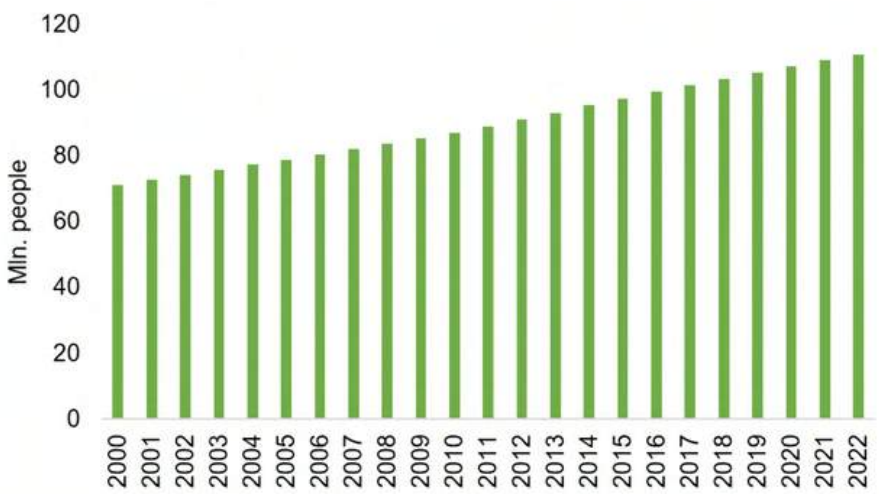


Figure 2. Total population in Egypt

Source: World Bank

Meanwhile, GDP per capita in Egypt was below the benchmarks in the neighboring countries, which are less populated and more oil-rich (Figure 3).

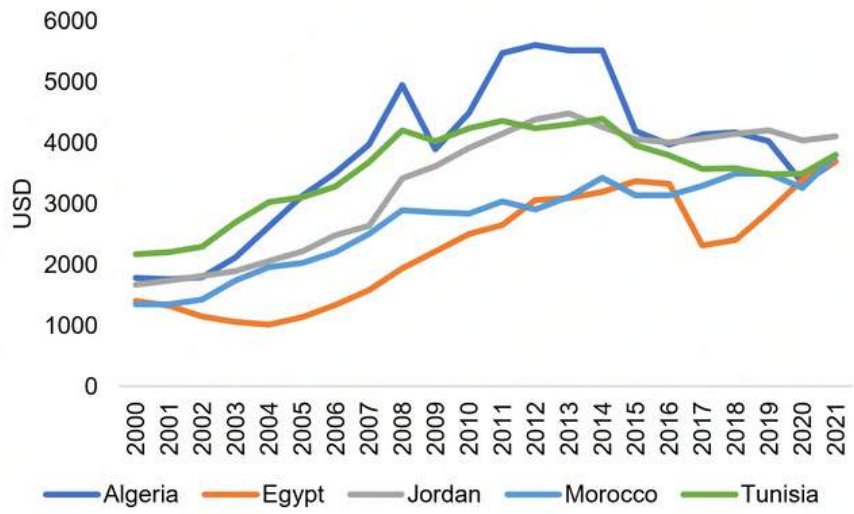


Figure 3. GDP per capita

Source: World Bank

In the 2000-s, the share of undernourished population in Egypt was below the average level in the North Africa region. But during the last years, the difference between these two indicators narrowed; in the 2019-2021 period, the share in Egypt was 5,1% versus 6,1% in North Africa (Figure 4).

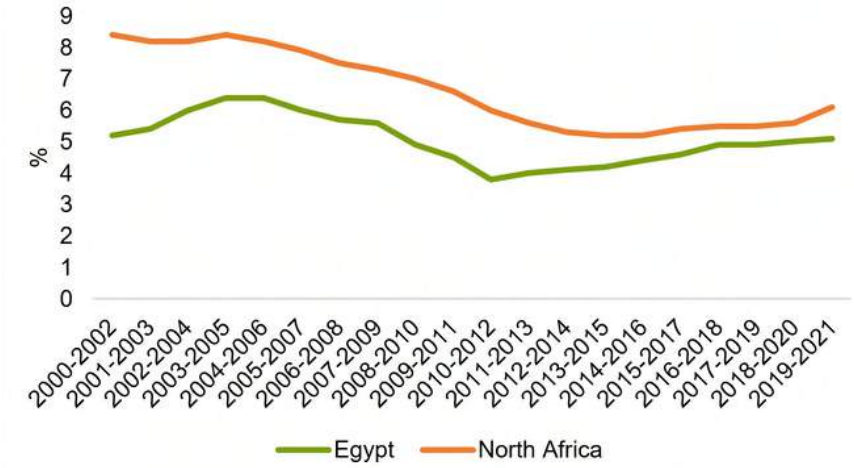
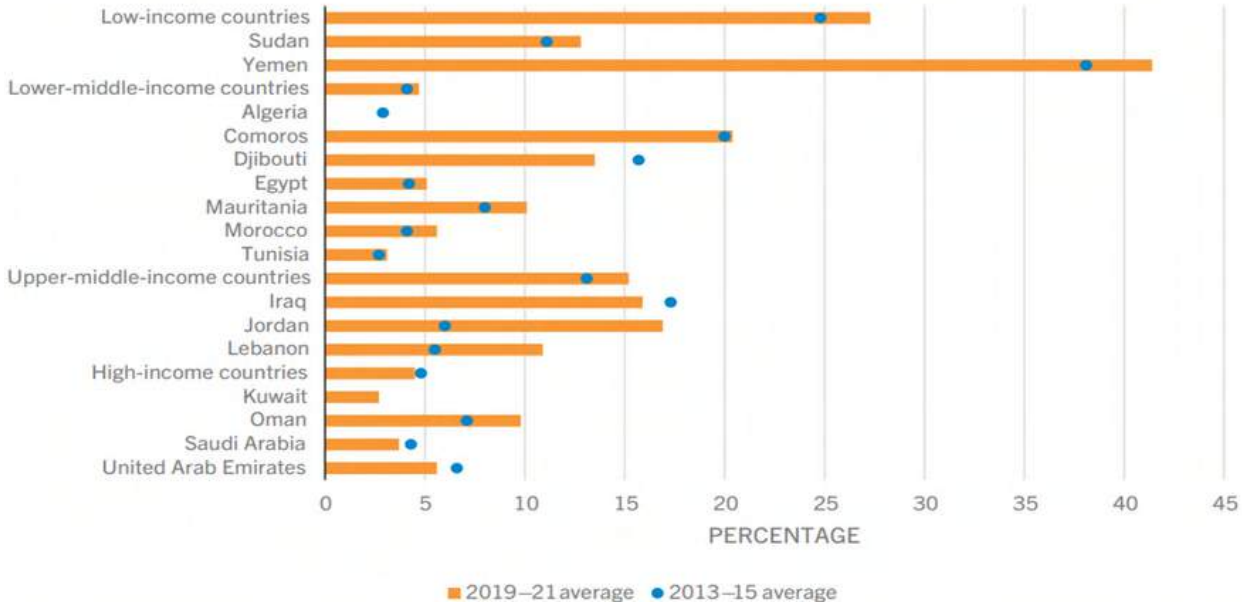


Figure 4. The share of undernourished population

Source: FAOSTAT

As cross-country comparison shows, Egypt has a moderate undernourishment rate compared to the other lower-middle-income countries; this rate has not changed much from the 2013-2015 period (Figure 5).

Figure 5. Prevalence of undernourishment in the Arab states by country



Source: FAO, IFAD, UNICEF, WFP, WHO & UNESCWA. (2023). Near East and North Africa – Regional Overview of Food Security and Nutrition

Despite moderate shares of undernourished population in Egypt, this country takes up more than 30% of the whole undernourished population in North Africa (Figure 6). This is explained by the high population level in the country; as of 2022, around 43% of the North Africa population were from Egypt.

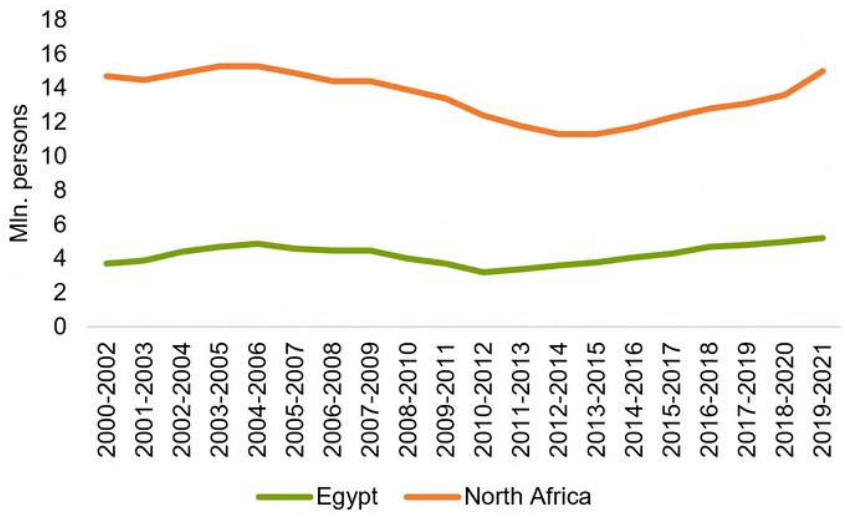


Figure 6. The number of undernourished persons

Source: FAOSTAT

Dietary energy supply in Egypt peaked in the 2010-2012 period reaching 3464 Kcal per person per day; afterwards, it gradually declined amidst the growing population (Figure 7). In the 2019-2021, this indicator was 3306 Kcal per person per day versus 3220 Kcal per person per day in the whole North African region.

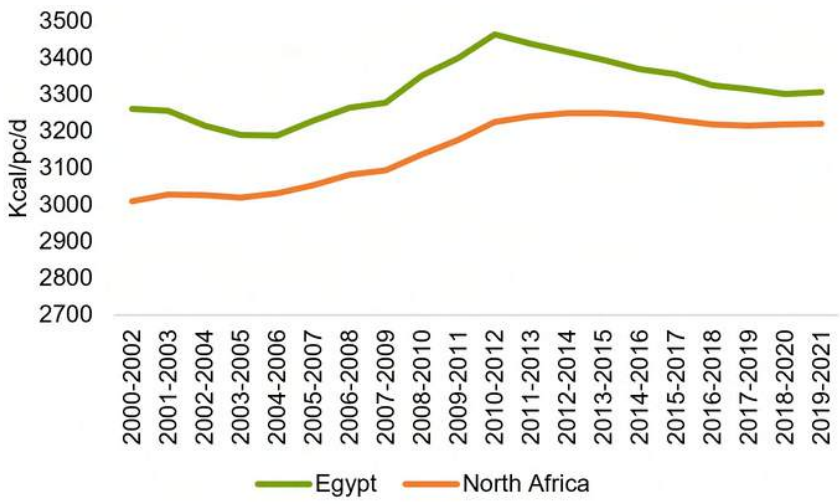


Figure 7. Dietary energy supply

Source: FAOSTAT

The average dietary energy supply adequacy was 143% in the 2019-2021 versus 139% in North Africa (Figure 8).

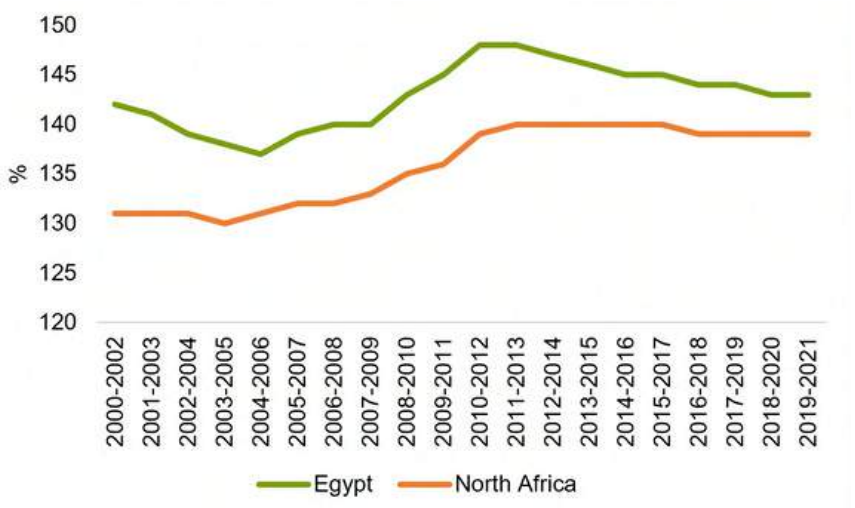


Figure 8. Average dietary energy supply adequacy

Source: FAOSTAT

The share of dietary energy supply derived from cereals, roots and tubers was above the regional benchmarks: 66% versus 58% (Figure 9). This means that Egyptians have a less diversified diet compared to the total North Africa population.

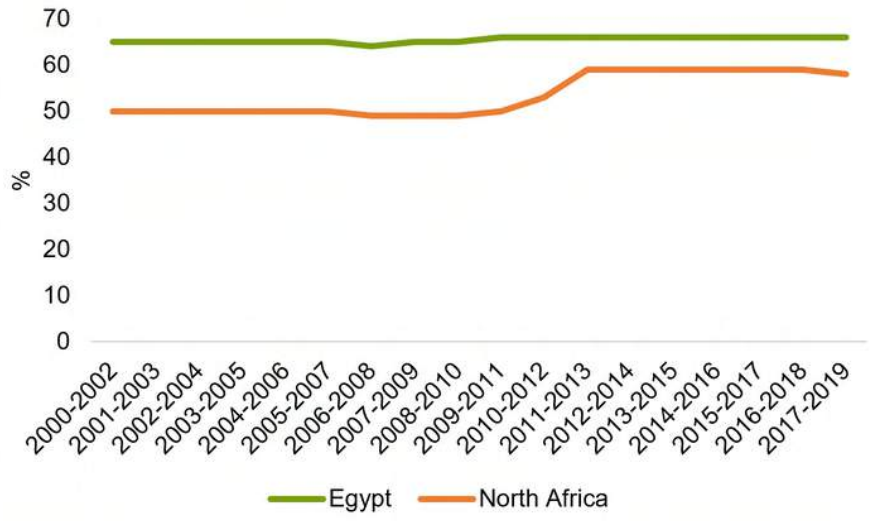


Figure 9. Share of dietary energy supply derived from cereals, roots and tubers

Source: FAOSTAT

The average protein supply in the country was relatively stable over the last two decades (Figure 10), while the animal protein supply has grown (Figure 11).

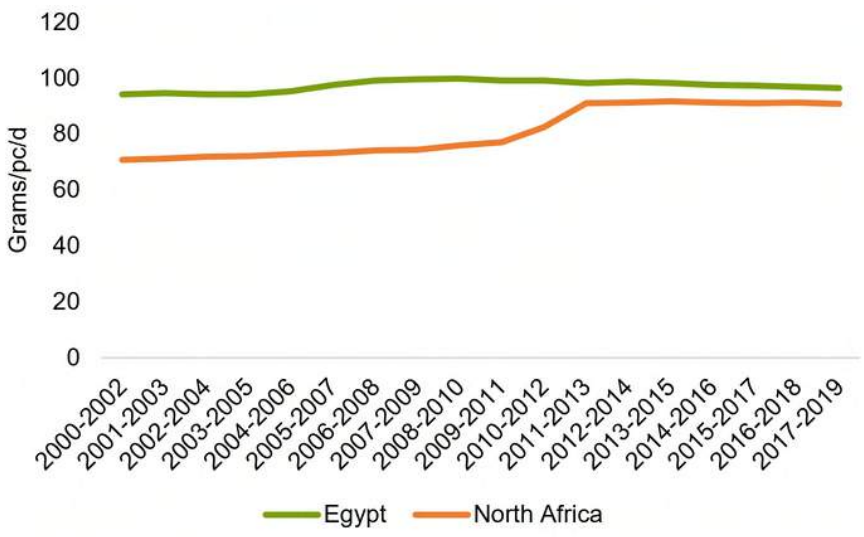


Figure 10. Average protein supply

Source: FAOSTAT

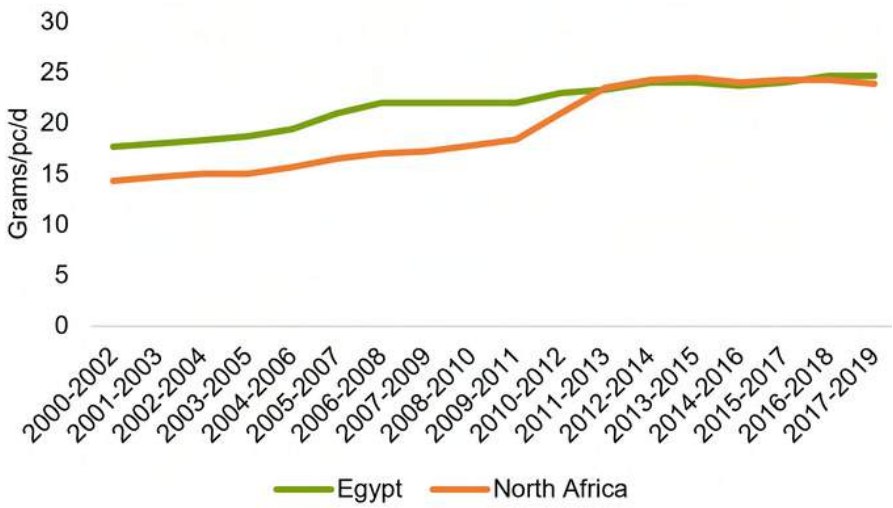


Figure 11. Average animal protein supply

Source: FAOSTAT

Per capita food supply variability was close to the average level in the North Africa region over the last years (Figure 12).

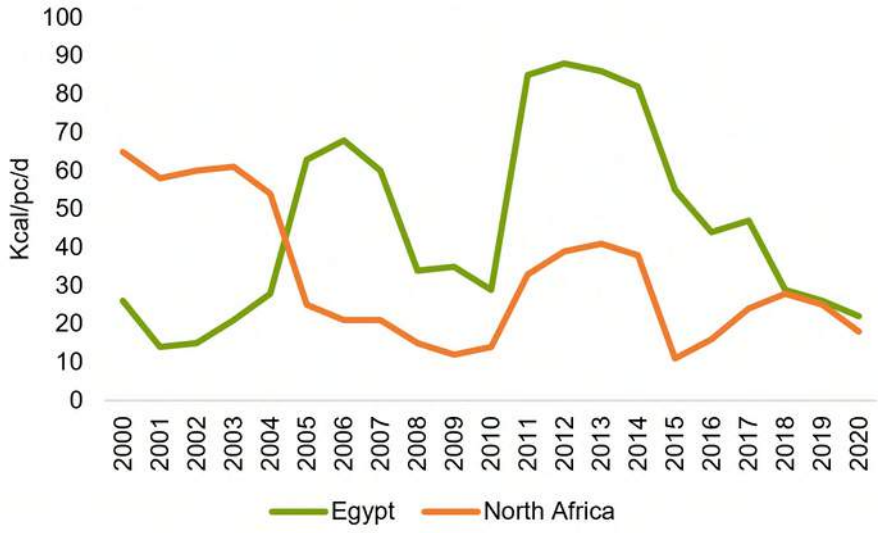


Figure 12. Per capita food supply variability

Source: FAOSTAT

Given the high population and moderate undernourishment level, World Food Programme activity in Egypt is quite diversified; it is targeted both to local population and refugees. As of December 2022, there were an estimated 289 000 refugees in Egypt, including 146 000 Syrian refugees (UNHCR, December 2022). The structure of the WFP budget for the country is described in **Table 1.**

Table 1. WFP support programms in Egypt in 2020

Strategic Outcome	Activity	Expenditures, mln. USD	Share in total expenditures, %
Food-insecure and most vulnerable children and families in targeted areas of Egypt have access to food all year round.	Provide livelihood and capacity strengthening activities for urban and rural communities, especially adolescent youth.	0.8	2
	Support and complement the Government's social protection programmes to ensure that the food and nutritional needs of school children are met.	6	13
Food insecure refugees, displaced populations and host communities in Egypt have access to adequate food all year round.	Provide refugees, displaced populations and host communities with food and nutrition assistance and activities that build resilience.	31.4	67
Targeted populations in Egypt have improved nutritional status by 2030.	Support and complement the Government's programmes in nutritionally vulnerable communities (with a focus on pregnant and lactating women and children aged 6-23 months), and support related activities.	2.9	6
Vulnerable smallholder farmer and Bedouin communities in targeted governorates of Egypt have resilient livelihoods by 2030	Provide support to vulnerable smallholder farmers and Bedouin communities to improve their resilience through technology transfer, market access training, diversification of livelihoods and the creation and rehabilitation of assets.	4.6	10

Table 1. WFP support programms in Egypt in 2020

Strategic Outcome	Activity	Expenditures, mln. USD	Share in total expenditures, %
The Government of Egypt has enhanced capacity to target and assist vulnerable populations, and share its experience with selected countries to achieve Zero Hunger by 2030	Provide institutional capacity strengthening to the Government and develop innovative solutions to enhance social protection and resilience building programmes and systems.	0.7	2
	Facilitate regional and international knowledge and technology exchange among countries to achieve common development goals.	0.02	0
Total		46.42	100

Source: https://www.wfp.org/countries/egypt

1.2. AGRI-FOOD TRADE

Egypt is the leading importer of agricultural products in the North Africa region. Nevertheless, the monetary volume of imports showed just marginal increase over the last decade and did not follow the trend of food inflation (Figure 13). This means that physical volumes of imports have been gradually declining. The main categories of food imports were grains, oilseeds, meat and fish products.

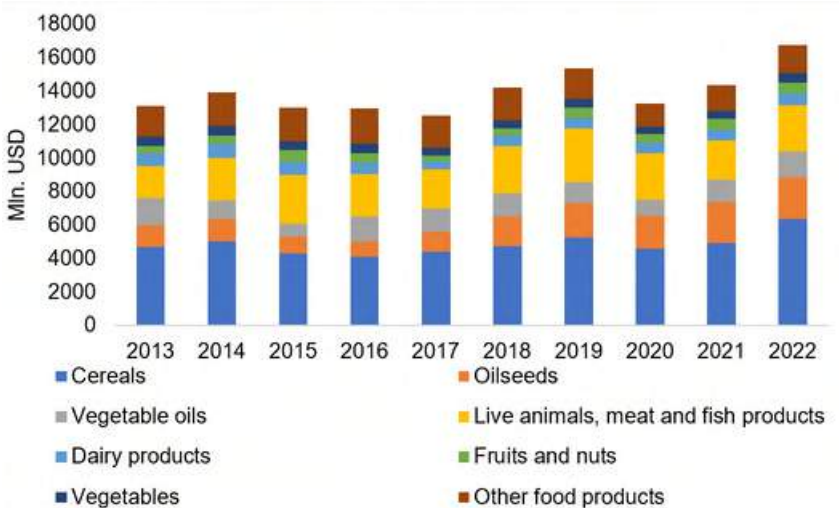


Figure 13. Product structure of food imports to Egypt

Source: ITC Trade Map

Food exports from the country also showed a minor increase (Figure 14). The main exporting categories are fruits, nuts, and vegetables.

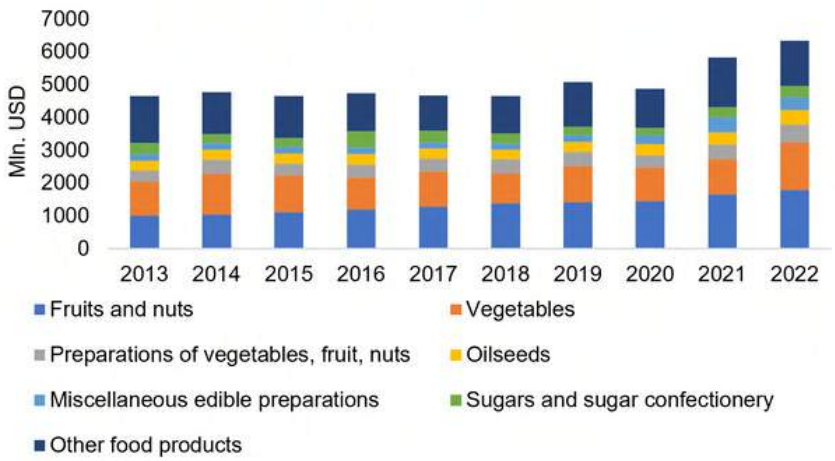


Figure 14. Product structure of food exports from Egypt

Source: ITC Trade Map

The geographical structure of food imports to Egypt is quite diversified (Figure 15). The main exporters are Brazil, the Russian Federation, and the USA.

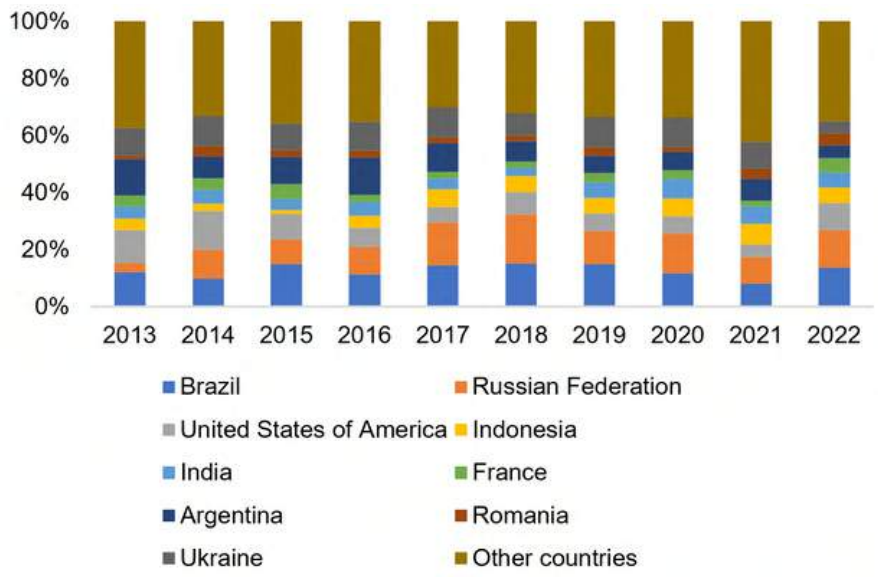


Figure 15. Geographical structure of food imports to Egypt

Source: ITC Trade Map

The main destinations for Egyptian food exports are Saudi Arabia, Russian Federation, and United Arab Emirates (Figure 16).

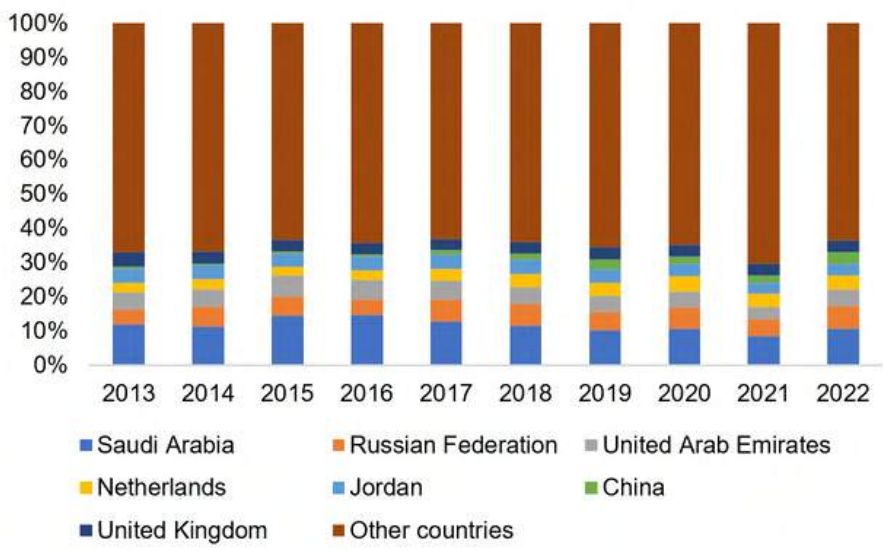


Figure 16. Geographical structure of food exports from Egypt

Source: ITC Trade Map

Agricultural exports from Ukraine to Egypt consist mostly of cereals (around 90%). Another important food category was vegetable oils (Figure 17).

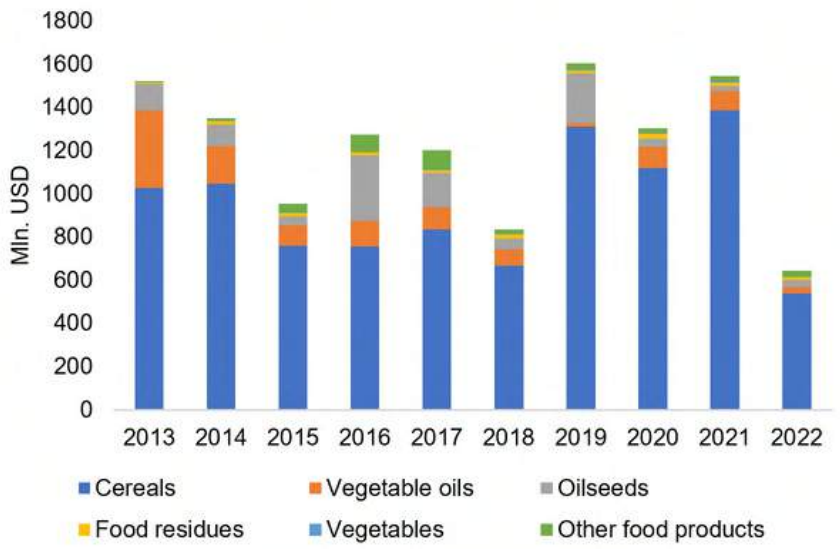


Figure 17. Agri-food exports from Ukraine to Egypt

Source: ITC Trade Map

As for the exports from Egypt to Ukraine, they are based mostly on fruits and nuts, in particular, fresh or dried citruses (Figure 18).

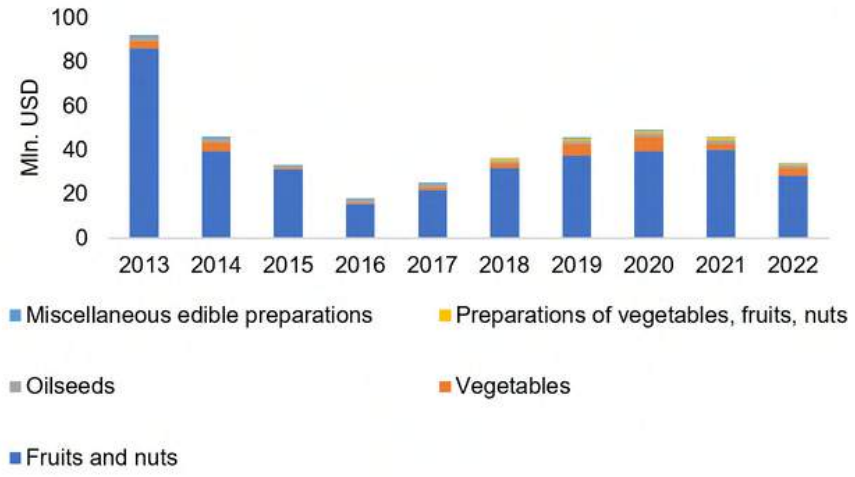


Figure 18. Agri-food exports from Egypt to Ukraine

Source: ITC Trade Map

1.3. LOCAL AGRICULTURAL SECTOR

Roughly 95% of Egypt's territory consists of desert, thus being uninhabited and unavailable for agricultural use. At the same time, the local population is growing rapidly, implying a strong increase in food needs. Generally, agriculture remains an important part of the Egyptian economy, contributing 11% of the GDP, as of 2020.

After the slight decrease in 2012, following the Arab Spring, share of agricultural production in Egyptian GDP remained relatively unchanged over the last decade, fluctuating within the 11-12% interval. Share of agriculture in national employment structure has been gradually decreasing over the period of 2008-2021, dropping from 31.7% in 2008 to 19.8% in 2021 (Figure 19).

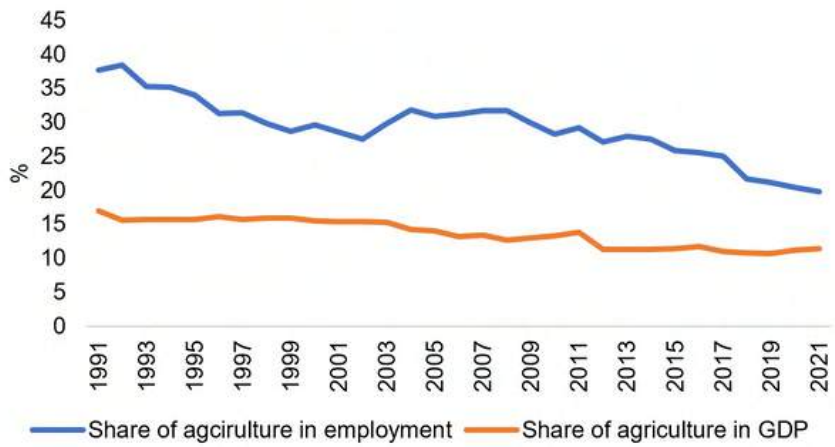


Figure 19. Share of agriculture in GDP and employment

Source: World Bank Database

Monetary value of agricultural goods produced has been growing rapidly in the 2000s. Growth slowed down in the 2010s, taking turns with periods of production decrease in 2010, 2013, 2016, and 2018 (Figure 20).

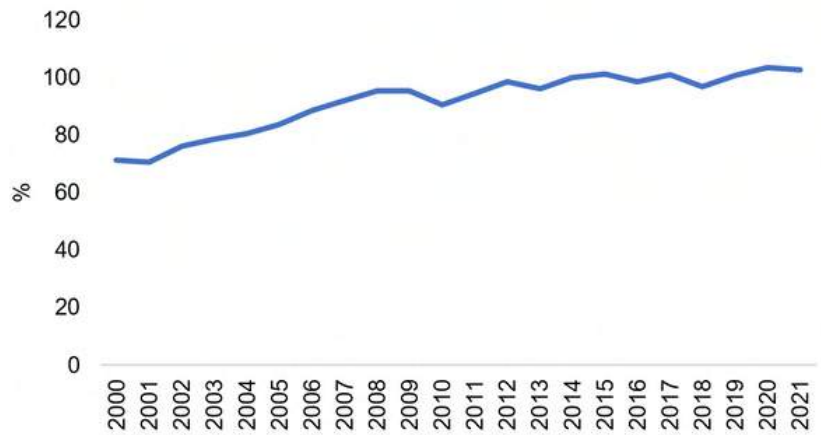


Figure 20. Agricultural production value index, constant 2014-2016 USD

Source: FAOSTAT

Main crops produced in Egypt are sugar beet, sugar cane and wheat. In 2021, the sugar beet had a production amount of 15 million tons, followed by sugar cane, wheat and corn, with a harvest of 12.4, 9.0 and 7.5 million tons, respectively. Another significant sub-sector of Egyptian agriculture is production of fruits and vegetables, with potatoes and

tomatoes being the leading products, with a production amount of 6.9 and 6.2 million tons in 2021, followed by apples, oranges, dates, grapes, bananas, onions, and olives and tangerines.

Amounts produced of the 5 most-produced crops in 2001-2021 are presented on Figure 21.

The dynamics of fruit production is presented on Figure 22.

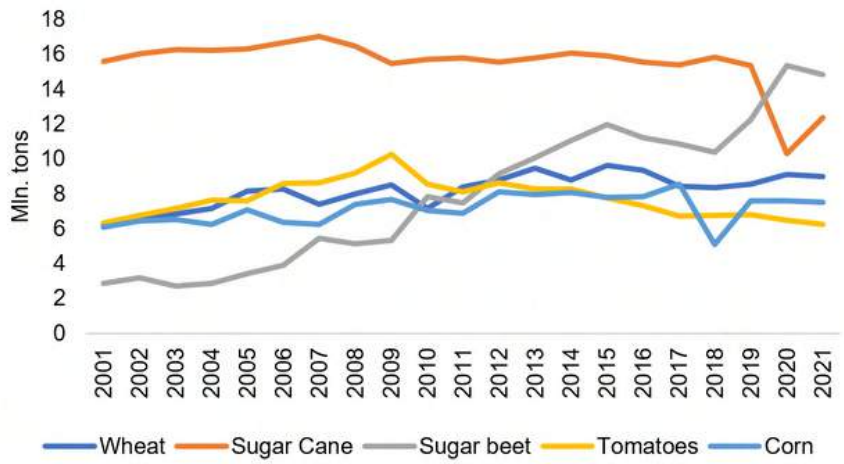


Figure 21. Production amounts of the 5 most-produced crops

Source: FAOSTAT

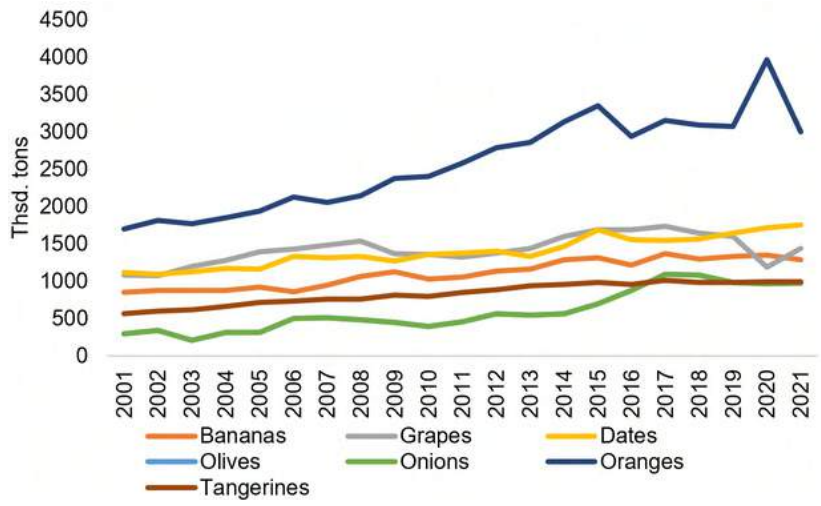


Figure 22. Production amounts of fruits and vegetables

Source: FAOSTAT

In the recent decades, production of sugar beet has been growing rapidly. It increased by more than 5 times over the span of 2001-2021, making the sugar beet the leading crop produced in Egypt. At the same time, production of sugar cane remained relatively stable, only with a slight decline in 2019-2020. Potato, wheat and corn production has been growing, but to a lesser extent than sugar beet.

Among the fruits and vegetables, the most notable are oranges and onions, production of which increased by 200% and 500%, respectively. Bananas, grapes, dates, olives and tangerines production has been growing slowly in the past 20 years.

Land Use and Irrigation

As of 2020, roughly 40 thousand square kilometers of land were used for agricultural production, which is approximately 4% of the total Egypt's area. Amount of land used for agricultural purposes has been increasing since 1990, with a 50% growth over the span of 30 years (Figure 23).

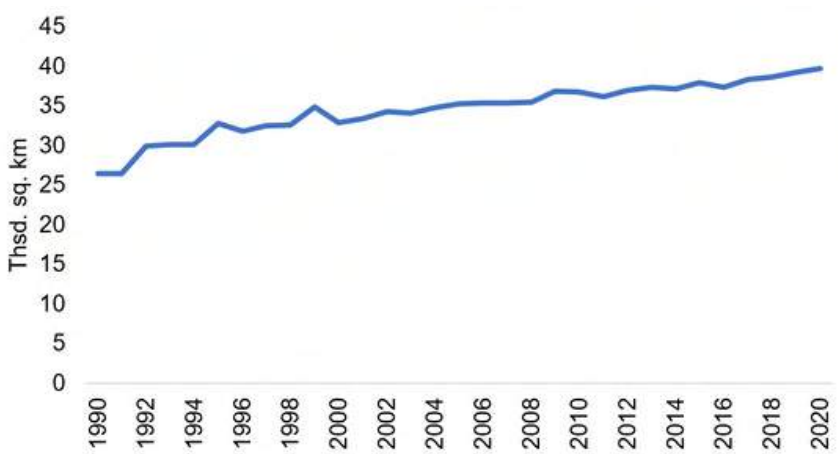


Figure 23. Agricultural land in Egypt

Source: World Bank Database

As of 2014, total irrigated area in Egypt was 3.6 million hectares, covering 98% of the cultivated area. 76% of it uses surface irrigation, and 24% is equipped for pressurized irrigation (sprinkler or localized). Compared to 2002, the share of area with surface irrigation decreased by 14 percentage points, as more land is being equipped for pressurized irrigation.

Extraction of water from ground sources is concentrated in desert oases, on the Sinai peninsula and the New Valley Governorate (FAO, 2016). 3 million hectares are as well equipped for draining, which is 88% of cultivated land.

Wheat production uses the most land among the crops produced (1.4 million hectares as of 2021). It is followed by corn and rice (1 and 0.5 million hectares, respectively). Sugar beet and cane, which are leading in the production amounts, occupied in 2021 only 190 and 128 thousand hectares. Crop structure of the land use did not change significantly in the past 20 years. Amount of land under wheat, corn, rice, sugar beet and sugar cane increased, as the total area of agricultural land in the country increased. The only significant change is the decrease of areas under seed cotton: 307 thousand hectares in 2021 to 90 thousand in 2021 (FAOSTAT, 2021).

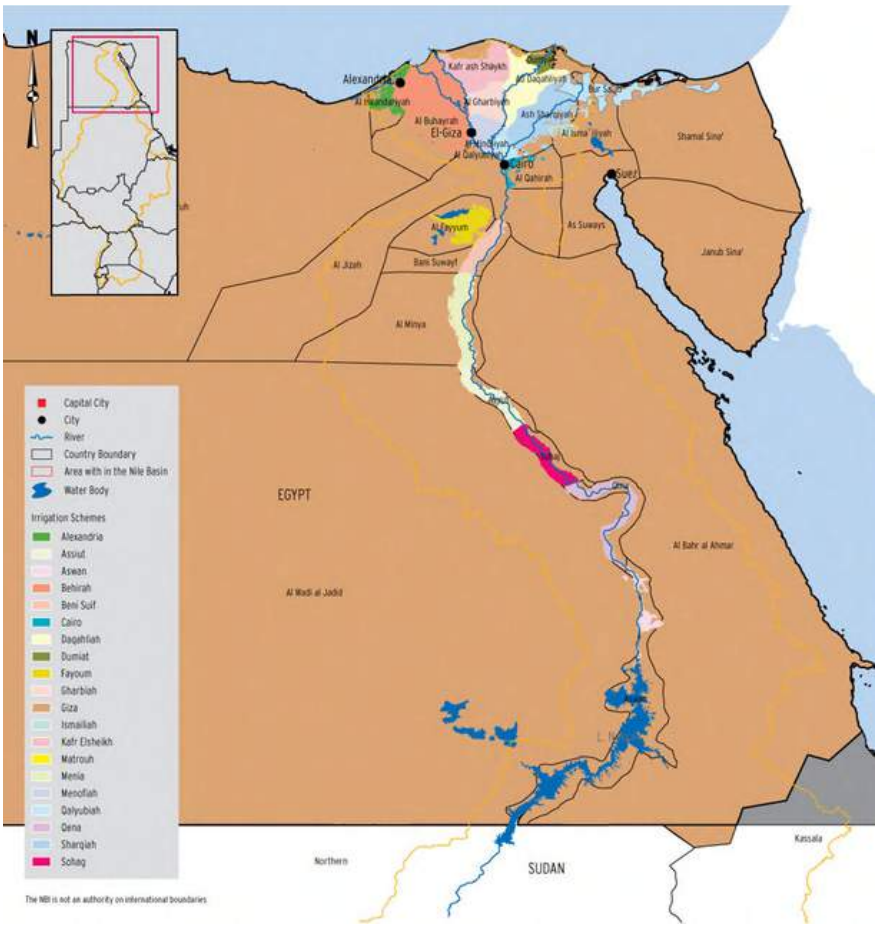


Figure 24. Map of irrigated lands in Egypt

Source: Nile Basin Initiative. Water Resources Atlas

Livestock production

Chicken eggs are the leading livestock commodity produced in Egypt, with 10737 million eggs produced in 2021. It is followed by cow and buffalo milk, which production value in 2021 was 3.7 and 1.6 million tons, respectively. Among the meat produced, the most notable are chicken, cattle and buffalo meat (Figure 25). In 2021, production amounts of them were 2.2, 0.4, and 0.2 million tons, respectively. Main processed livestock products are skim cow milk, buffalo and cow milk cheese, and buffalo and cow milk butter (672, 238, 144, 64, 33 thousand tons produced in 2021, respectively). Primary non-food livestock commodity produced is wool, 11.9 thousand tons in 2021.

Over the span of the past 20 years, the structure of livestock commodities produced did not change significantly, only increasing in quantity. A gradual shift from buffalo towards cows is observed, as in 2021 cattle meat production amount was 97% of that of buffalo, in 2021 it has risen up to 212%. Similarly, cow milk gradually displaces buffalo milk.

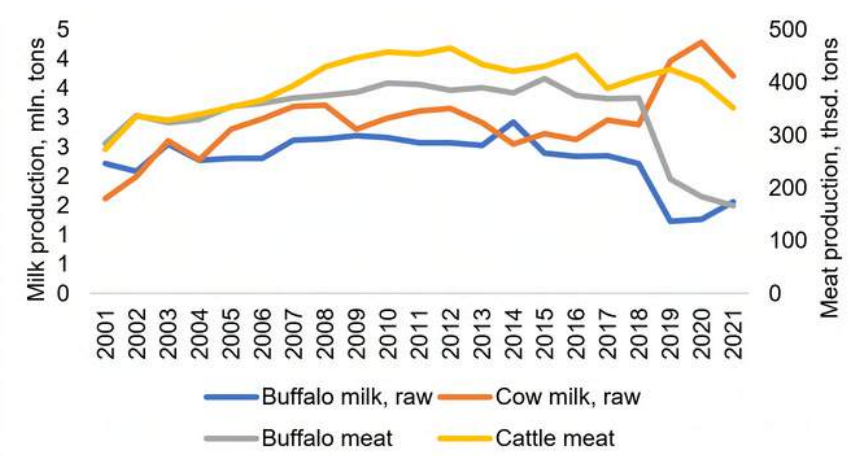


Figure 25. Buffalo and cattle primary products production

Source: FAOSTAT

Latest reliable total herd numbers are available for 2018. In 2019, Egyptian Ministry of Agriculture and Land Reclamation changed the methodology of total herd numbers calculation, which is based on the number of vaccinated animals. New numbers were released in 2021, and Omar (2022) argues that the new records represent only 50 to 60 percent of the total herd number, and previous estimates based on feed sales are more reliable.

Quantity of sheep, goats, buffalo and cattle remained relatively unchanged throughout 2001-2018 (Figure 26). Number of donkeys, which are used primarily for transport or service purposes have been decreasing throughout the 2 past decades, as they are being replaced by modern machinery.

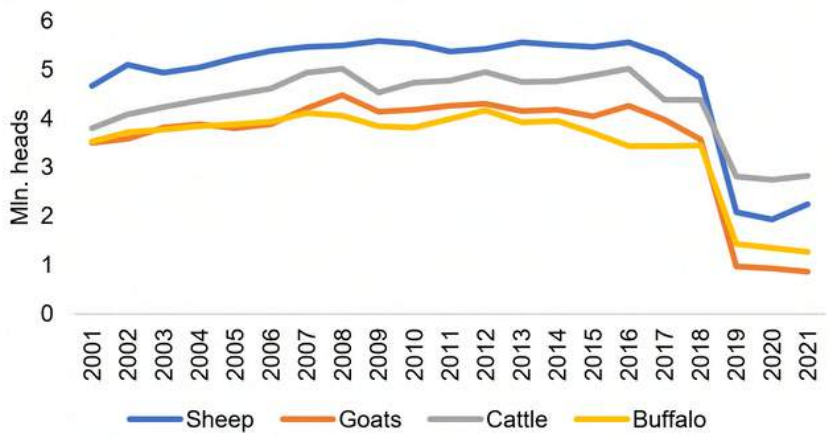


Figure 26. Livestock numbers

Source: FAOSTAT

Note: observed sharp decline in number of sheep, goats, cattle and buffalo in 2019 is caused by the change in data collection methodology.

Processing sector

The primary commodity in the food processing sector is sugar, with 2.9 million tons produced in 2020, including both cane and beet sugar. Molasses, a side product of sugar production, is the second most-produced output of the processing sector, with 880

thousand tons produced. Sugar is followed by the milk processing subsector. Skim milk, cheese and butter are the primary products (672, 562, and 96 thousand tons produced in 2020). Structure of commodities produced did not change significantly over the period of 2000-2020. The only exception is sugar and molasses, which doubled in production due to increased raw sugar cane and beet production.

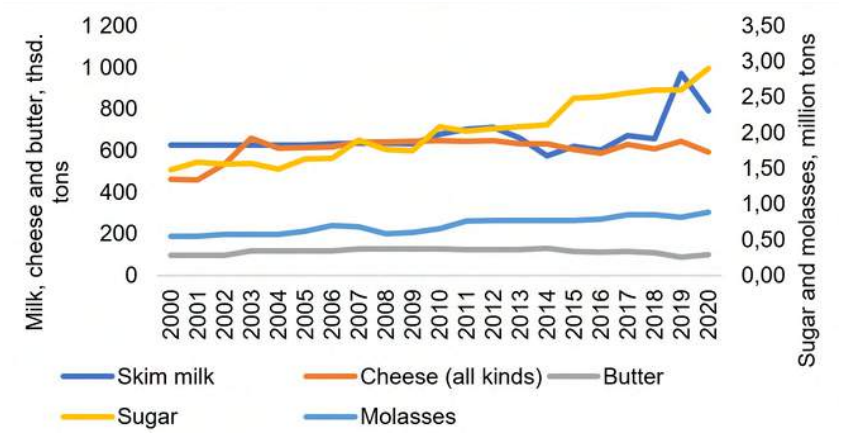


Figure 27. Production of processing sector primary commodities in 2000-2020

Source: FAOSTAT

As of 2019, the added value created by the food processing sector amounted to 3.32% of the GDP. Share of the sector in GDP dropped in late 2000s – early 2010s, then returned to the growing trend (Figure 28).

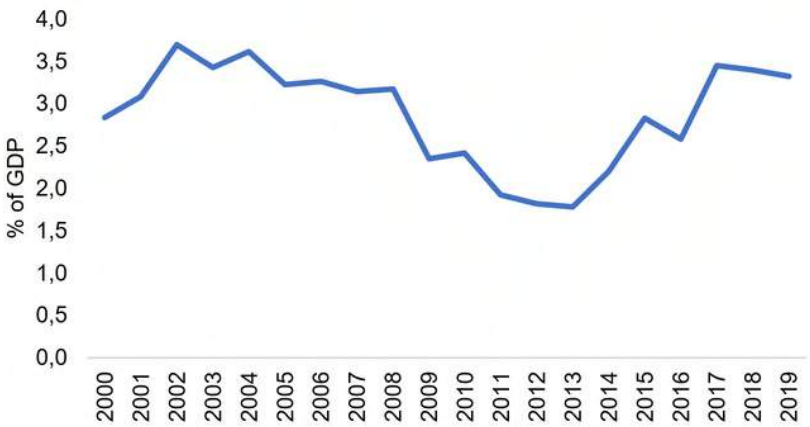


Figure 28. Food, beverages and tobacco production, value added as % of GDP

Source: own calculations based on World Bank Database data

The main factor that Egyptian food processors are taking advantage of is its geographical location in the center of the MENA region. Within the 500 kilometers range from the borders, Egypt has access to markets with 340 million consumers (Al-Habbal and Belliard, 2018). On the other hand, the processing industry faces two major challenges on the domestic market. First is the competition from the processed food imports, primarily originating from the European Union. Egypt's free trade agreement with the EU increased the inflow of processed food into the country. The second challenge is the lack of food ingredients for processing on the domestic market. Egypt's agricultural production primarily focuses on staple commodities, such as wheat or sugar cane/beet. Thus, production of varied processed food commodities often requires imported ingredients. Complex and non-transparent import requirements somewhat hold back the development of the sector.

1.4. CHALLENGES IN AGRICULTURE

The main challenge for Egyptian agriculture is the **scarcity and degradation of land.** Only 4% of Egypt's territory is available for agricultural use. They are mostly concentrated along the Nile river, in the Nile delta or on the Sinai Peninsula, where the majority of the population lives. Thus, civil construction and sprawling caused by urbanization slowly takes up lands previously used by farmers. At the same time, natural factors such as wind erosion, water logging and salinization (in the Nile delta) are contributing to degradation of land and require constant effort for reclamation.

The second challenge is **land fragmentation.** Given the scarce agricultural land resources, the government decided to hold back farmers from expanding their cultivated areas. Strict land ownership limits until the late 1990s and progressive property tax on land in the 21st century caused 80% of the total landowners to own agricultural lands less than 5 feddans (approx. 2.1 hectares) (Shalaby et. al, 2011). Besides that, costly extension services are not accessible for small farmers with low revenues, so the old and traditional cultivation methods are still in practice, resulting in lower yields and farmers' incomes.

Water shortage is one more problem which Egyptian agriculture is facing. Given scarce water resources in the region, dependence on the Nile river as the main source for irrigation makes Egypt vulnerable in face of water use decisions of upstream countries. On the other hand, wasteful and inefficient usage partly caused by free-of-charge water provision is only contributing to the severity of the problem.

Poverty is predominantly a rural phenomenon in Egypt, as around 70% of those below the poverty line live in rural areas. According to the World Bank 2017 data, 31% of the rural population is living below the national poverty line. Poverty is a complex factor holding back agriculture from development, as it decreases access to education, promotes **migration of both skilled and unskilled workers towards urban areas**, at the same time making agriculture an unappealing sector to work in. On the other hand, **infrastructure in rural regions is poor** as well, as muddy pathways prevail in the suburbs and villages, making the life and work more difficult.

1.5. AGRICULTURAL POLICY OVERVIEW

In the 1990s, the Egyptian government **launched the Economic Reform and Structural Adjustment Program**, which was aimed to shift from state-controlled to market economy. Two major agricultural policy reform projects were implemented, both aimed to decrease government involvement in the sector. First, **Agricultural Production and Credit Project (1987-1995)** included reduction of input subsidies, removal of controls on land allotments and prices, as well as lifting existing marketing restrictions. Following **Agricultural Policy Reform Program** paved the way for the privatization of state-owned agricultural first and reorganized them into holding companies. Beside these two programs, mandatory crop rotations were lifted. These policies shaped the framework of Egyptian agricultural policy as it exists for now.

Despite the shift towards the market economy, the Egyptian government still plays an important role in the agricultural sector. Key element of farmers' interaction with the government is the **agricultural cooperatives**, which were formed in 1952 in order to control distribution of production inputs. Cooperatives were restructured in 1992, shifting their role towards distribution of market information, but the previous functions were not abandoned completely.

Government monopoly still plays an important role in the distribution of seeds. Their prices are set by the government and are distributed by **Central Administration for Seed Production (CASP)** through cooperatives. CASP is as well responsible for seeds processing, storage and registration. Until 1999 the government held the monopoly of pesticides provision. Now, private pesticide companies have to acquire a license to operate.

Government monopoly on production and provision of fertilizers was lifted in 1991, and the policy focus shifted towards the privatization of fertilizer factories. However, most of them remained under government control as joint private-public companies. Key supplier of fertilizers is state-owned **The Principal Bank for Development and Agricultural Credit (PBDAC)** (renamed Egyptian Agriculture Bank in 2016) and agricultural cooperatives. Since 1992, private companies were allowed to supply fertilizers to farmers, but only within the quotas, set by the government. Due to supply shortages, in the late 1990s PBDAC's quota was increased significantly and fluctuated around 50% of all supplied fertilizers in the country throughout the 2000s-2010s.

Fertilizer factories are forced to supply the abovementioned quotas to PBDAC at an artificially low price. It is possible because these factories mostly remained under government control as joint companies or were not privatized completely. PBDAC sells the fertilizer to agricultural cooperatives, which, in turn, sell it to farmers, in amount limited by the farmers' sown areas and crops produced. The system operates poorly, due to problems with distribution, lack of supervision and low fixed amounts of fertilizer available for purchase for each farmer. As a result, a **black market of fertilizer** operates in parallel.

Financing of research and extension services, which were previously provided by the government, have been reduced significantly in the 90s as a part of market deregulation reform project. **Agricultural Research Center**, which is the principal agency within the Agricultural Ministry has been reported to be «severely underfinanced», as of 2015, according to Stads (2015). Agricultural research and development expenditures were only 0.4% of agricultural GDP, which is more than two times lower than the 1% target recommended by the UN. In 2002 a law regarding intellectual property was approved, which created an incentive for private companies to take part in seed testing and new varieties development.

One more key aspect of the Egyptian agricultural policy is **price setting** and **government procurement** of crops. **The General Agency for the Supply of Commodities (GASC)** is a main authority responsible for the procurement and price setting. Farmers are allowed to sell their products to both GASC and private traders. Procurement price set by the government is above the world price to encourage domestic production.

The main crop for procurement is wheat. Egypt's domestic production does not satisfy even half of the domestic demand, thus making Egypt dependent on imports and

vulnerable in face of crises on the market. Other commodities included in the procurement program are corn, rice, sugar and vegetable oils.

Current policies and their impacts

Food subsidies

The Egyptian government is subsidizing bread production along the whole supply chain, as well as few other key products. It purchases the majority of the domestically produced wheat from farmers, at prices set above the global market prices. At the same time, the government is the largest importer of wheat, and owns inland storage facilities and mills. Wheat is processed into flour and sold to bread producers at subsidized prices. Bread subsidies are provided for consumers as well. McGill (2015) argued that the system is cost inefficient due to physical losses and incentives for corruption at all stages. Nevertheless, this policy remains one of the key elements of the overall social protection mechanism, making up almost 2.5% of the Egyptian GDP. As of 2014, farm-gate price support constituted 35.5% of the value of total wheat produced (Konandreas and Mermigkas, 2014).

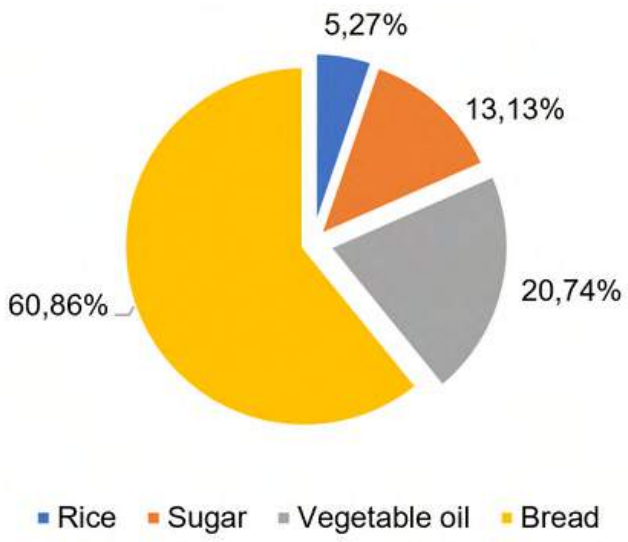


Figure 29. Proportion of subsidies spent on four key products, 2013

Source: Tellioglu, I., Konandreas, P. (2017). Agricultural Policies, Trade and Sustainable Development in Egypt. FAO/ICTSD

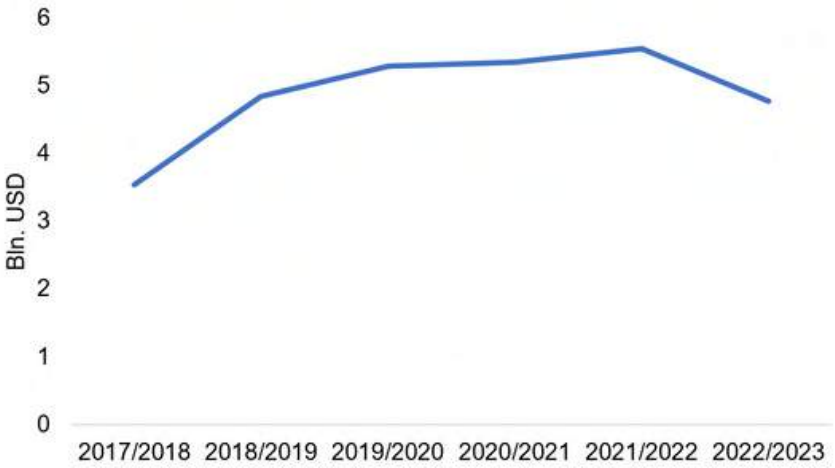


Figure 30. Expenditures on food commodities price subsidies, 2017-2022

Source: Central Agency for Public Mobilization and Statistics of Egypt

By prioritizing wheat, as the main agricultural commodity consumed domestically, the government aims to increase the self-sufficiency and get rid of imports dependence. Although production is growing, it struggles to keep up with the growing consumption. Self-sufficiency of wheat has decreased from 62% in 2007 to 43% in 2017 (Figure 31). Similarly, an ambitious target of 92% self-sufficiency by 2030, set for corn production, seems to be unachievable.

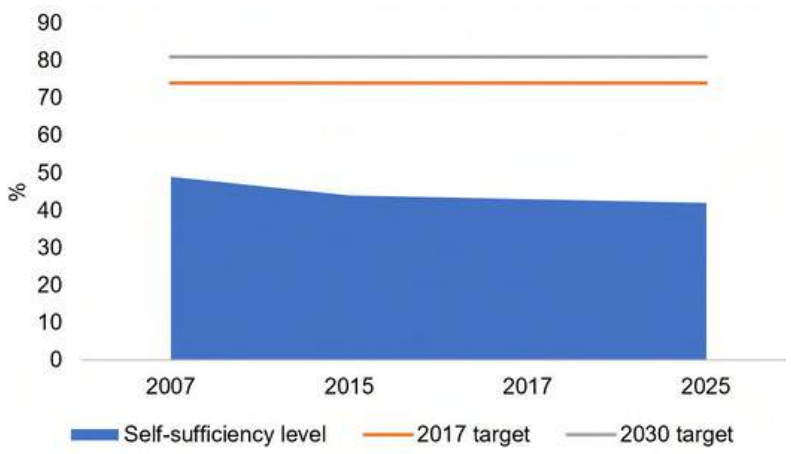


Figure 31. Current and projected wheat self-sufficiency levels and government targets

Source: Egyptian Ministry of agriculture and land reclamation for target levels, FAO AMIS Database for 2007-2017 levels, OECS/FAO Outlook 2016-20025 for 2025 projected value

Besides, the Agricultural Research Center of the Ministry of Agriculture and Land Reclamation announced a **wheat varietal policy** before planting which suits each geographical region in terms of climate, water, and land resources. The use of these new practices, the spread of new high-yielding varieties, and the use of the raised bed planting method (instead of the old method of planting in basins) have made the largest contributions to increased yield (USDA, 2023).

Organized grain exchange

In November 2022, the **Egyptian Commodity Exchange Egycomex** was launched. On this platform, the General Authority for Supply Commodities (GASC) offers wheat for the private milling sector to purchase. Wheat quantities are offered for sale twice a week. As of April 2023, more than 350 companies are registered on the exchange platform, and more than 420,000 have been sold to private sector mills since the launch of the exchange took place (USDA, 2023). In April 2023, the exchange started trading yellow corn.

Land fragmentation policy

Due to the scarcity of agricultural land, fragmentation has been a priority for the Egyptian government since the 1950s to ensure accessibility of land. Government created incentives not to accumulate large land plots in hands of one owner. Currently a **progressive property tax** is implemented. Land taxes increase in proportion with the size of land owned. Additionally, small farmers with an owned area less than 2 feddans (around 0.84 hectares) are exempt from property taxes completely. As of 2004, majority of farmers (73-82%) in Lower, Middle and Upper Egypt regions owned less than 3 feddans of land (around 1.26 hectares), whereas in Metropolitan and Border regions 51-56% of farmers owned more than 5 feddans (about 2.1 hectares) and were classified as «large farms» in Agricultural farm income survey.

Fragmentation of agricultural land is recognized as an impediment to agricultural development in SADS 2030. Increased farm sizes will promote economies of scale, increasing per-unit economic benefits, including land and water use and making extension services more accessible.

Land reclamation

Expanding land by reclaiming it from desert areas is one more way to extend agricultural production in Egypt. Over the last 20 years, the biggest land reclamation initiative was the New Valley Project. With a 90 billion USD government investment, it allowed to reclaim 230 thousand feddans (approx. 96.6 thousand hectares) of land in 2006/2007 and additional 100 thousand feddans (approx. 42.0 thousand hectares) in 2007/2009. Desert land is converted to agricultural mainly by introducing water to those areas through irrigation. It requires further increased efforts to manage the soil characteristics and fertility, as desert areas are mainly sandy and calcareous. Although the New Valley Project allow to reclaim a significant amount of land, its contribution to production and self-sufficiency targets set by the government was quite low, as the most newly reclaimed land was rented to foreign investors, who do not have an obligation to sell their products on the local market.

Water use policies

As of 2010, Egypt's total water withdrawal was 78 billion cubic meters, 86% of which were used by agriculture. According to FAO AQUASTAT data, availability of total renewable fresh water in Egypt decreased from 2050 m3 per capita yearly in 1958-1962 to approx. 600 m3 per capita yearly in 2013-2017. Thus, water conservation and increasing efficiency of its use in agriculture is a one more priority of the Egyptian government. The problems with conservation and rationalized use arise from the fact that water for agricultural use is provided for free by the government, as a form of **indirect subsidy.**

Current enacted policy regarding water use is the **Modernized On-Farm Irrigation Project**, which is a governmental mega-project. It implies developing underground water sources outside of the natural flow of the Nile to irrigate 1.5 million feddans (approx. 630 thousand hectares) of new lands and has not been completed yet.
The problem with Egyptian water use is the fact that it is completely dependent on «external» water. Approximately 97% of the water consumed comes from the Nile river, which originates outside Egypt's borders. Egypt makes efforts to ensure its water security by negotiating with the upstream Nile countries and making agreements on water use.

Fertilizer subsidies

In addition to the abovementioned procurement of wheat and other key crops, and provision of water free of charge, the Egyptian government **provides nitrogen fertilizer subsidies** to farmers. It is done in two ways: by subsidizing natural gas used for nitrogen fertilizer production; and by selling nitrogen fertilizer produced by state-owned factories to agricultural cooperatives at a fixed price below the market level. According to Kurdi (2020), the cost for the government of production of a ton of nitrogen fertilizer is around 85 USD, with an estimated total cost of more than 114 million USD in 2017 (Sweed, 2019).

Nitrogen fertilizer subsidy is perceived as part of government's plan to promote wheat cultivation, as wheat production uses more nitrogen that other types of fertilizer, compared to competing crops. Kurdi (2020) reports that in the interviews with farmers and ministry experts it was confirmed that cooperatives, which distribute subsidized fertilizer, tend to prioritize farmers cultivating wheat, although it is not stated explicitly. In the same analysis, it was found that the generous subsidies provided by the government lead to overapplication of nitrogen fertilizers. It creates incentives for farmers to deviate from the agronomically recommended fertilizer usage practices. Given that agronomic

recommendations are associated with the maximum yield gains, this may imply that farmers are occurring additional costs with little gain in yields. Overapplication is not only inefficient from economic perspective, but as well could be unsustainable and harmful for the environment.

Agricultural loans

Until 2016, PBDAC has been providing subsidized plant production (1-year) and investment loans (primarily for livestock production and orchard investments) at the fixed rates of 5.5% and 12.5%, respectively. In 2016 PBDAC was restructured and renamed to Egyptian Agriculture Bank (EAB). Agricultural loans policy has changed, decreasing credit access for farmers. Interest rates were not fixed anymore, and determined based on current Central Bank policies interest rates at competing banks, and size of Agricultural Ministry subsidy, which varies each year. According to data by the Egyptian Statistical division, published by Yehia (2022), average size of loan in kind decreased from 65 million USD in 2009-2015 to 1.3 million USD in 2016-2020. Similarly, average size of loan in cash decreased from 14 to 1.2 million USD over the same periods.

Total amount of agriculture investment loans decreased after the previously mentioned change in policy in 2016, but returned to growing trend after 2018 (Figure 32).

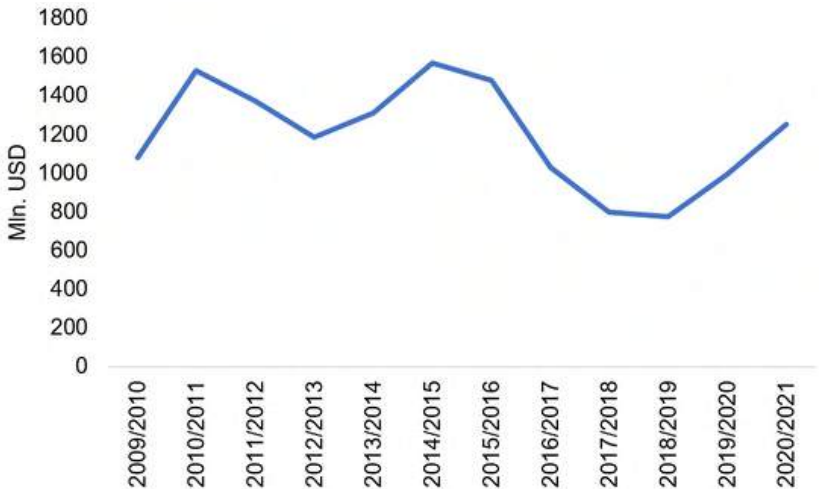


Figure 32. Total agricultural investment loans issued by the Egyptian Agriculture Bank, 2009-2020

Source: Central Agency for Public Mobilization and Statistics of Egypt

Economic policy and impact on poverty

Poverty is a growing concern in Egypt. Reducing poverty has been targeted by the Egyptian government by providing various subsidies, in-kind support payments and indirect social benefits. Total spending on these programs increased from 20 billion EGP in 2002/2003 to 325 billion EGP in 2017/2018 (approx. 4.32 and 18.20 billion USD, respectively). Despite the increased spending, the share of population under the national poverty line increased from 16.7% in 1999/2000 to 32.5% in 2017/2018 (World Bank, 2020).

Poverty is mostly concentrated in Upper Egypt, especially its rural part, with 52% of its population under the national poverty line, as of 2017/2018. Poverty in Upper Egypt, despite being higher than the country's average, did not change significantly over the last decade. In rural Lower Egypt the poverty rate increased from 17% to 27% over the period of 2010-2018.

The latest detailed data on poverty geographic and demographic breakdown is available from the 2015 household income, expenditure, and consumption survey (HIEC). As of 2015, the share of population living under the national poverty line in the rural areas was

36%, while in the urban areas this amount was significantly lower – 17%, with the national average of 28%. In geographic dimension, poverty is concentrated in the Upper Egypt, with 57% of its population living below the national poverty line. Basically, half of the poor in Egypt reside in the Upper Rural region, yet its share in poverty far exceeds its population share of 25%. The Lower Egypt governorates Qena, Minya, Assyut, and Sohag were the poorest, as of 2015, with 58%, 57%, 66%, and 66% of their population living under the poverty line, respectively. In the rural areas of these regions, poverty rate ranges from 63% up to 73% (World Bank, 2019).

Table 2. Prevalence of poverty by region in Egypt, 2015

Metro-politan	Urban Lower	Rural Lower	Urban Upper	Rural Upper	Urban Borders	Rural Borders
15.1%	9.7%	19.7%	27.4%	56.7%	19.3%	29.0%

Source: CAPMAS, 2015 Household income, expenditures and consumption survey

Governorates with higher poverty rates are found to be associated with higher shares of workers in the agricultural sector (while there remains a clear distinction between the Upper and Lower Egypt governorates), higher shares of workers without a contract, a higher share of unpaid workers and a lower share of workers subscribed to the social insurance.

In-kind transfer program includes staple baladi bread and ration cards (cooking oil, sugar and rice), fossil fuel subsidies. Food support programs were found to be mal-targeting due to geographical mismatch. Although most of the poor are concentrated in rural areas, sale outlets of baladi bread and ration card commodities are usually located in urban areas. Thus, the urban population gets approx. 70% of the total food subsidies provided by the government. Fossil fuel subsidy program was not targeting a specific group and was reduced drastically after the Arab spring, according to the World Bank requirement, from 7% of GDP in 2013 to 0.5% in 2019 (ESMAP, 2017).

Besides that, a cash transfer program «Solidarity and Dignity» was started in 2015 by the Ministry of Social Solidarity (MSS). It consisted of two components, one was targeting poor households with kids and provided a monthly payment of 325-625 EGP (42-81 USD) with a condition of school and health awareness sessions attendance. Second component was provision of unconditional 350 EGP (46 USD) payments to households with old or disabled persons. To receive the transfers households are required to self-assign and receive approval from the MSS. The problem with the program was its black-box targeting method, as no official documentation was published about how households are selected. According to Breisinger et. al (2018), only 20% of the poorest quintile received these payments.

Consumer price inflation is among the primary poverty aggravating factors. In 2000-2022 its annual rate was mostly within the 7%-15% range, with two peaks in 2008 and 2017, when it reached 18.3% and 29.5%, respectively. High rates of inflation are fueled by Egyptian pound depreciation, which exchange rate increased from 5.6 EGP per USD in

2010 to 19.6 EGP per USD in 2022. As Egypt relies heavily on food commodities import, pound depreciation was reflected significantly on consumer prices. Besides that, inflation caused real weekly wages (in constant 2010 EGP) to decrease from 439 to 295 EGP over the period of 2010-2021. Similarly, average annual household expenditures dropped from 22.3 thsd. EGP in 2010 to 20.4 thsd. in 2020 (in constant 2010 EGP).

1.6. EGYPT: SUMMARY

As the most populated country in North Africa, Egypt face food insecurity. In 2020, one third of the population was under the national poverty line; for the rural population, this share is above 50%. Despite moderate shares of undernourished population in Egypt (5%), this country takes up more than 30% of the whole undernourished population in the North Africa. Dietary energy supply in Egypt has been gradually declining since 2012. In 2020, the share of dietary energy supply derived from cereals, roots and tubers was above the regional benchmarks: 66% versus 58%. As for the World Food Programme activity in Egypt, it is targeted to local population and refugees.

Egypt is the leading agricultural importer in North Africa. Nevertheless, the physical volumes of imports have been gradually declining. This partially explains the worsening food security situation over the last decade. The main categories of food imports were grains, oilseeds, meat and fish products. And the main trading partners are Brazil, Russia, and the USA. Agricultural exports from Ukraine to Egypt consists mostly of cereals (around 90%). Another important food category was vegetable oils.

Roughly 95% of Egypt's territory consists of desert, thus being uninhabited and unavailable for agricultural use. At the same time, local population is growing rapidly and is the highest in North Africa, implying rapidly increasing food needs. Agriculture remains an important part of the Egyptian economy, contributing 11% of the GDP, as of 2020. Main crops produced in Egypt are sugar beet, sugar cane, and wheat. Another significant sub-sector of Egyptian agriculture is production of fruits and vegetables with potatoes and tomatoes being the leading products. As of 2020, roughly 40 thousand square kilometers of land were used for agricultural production, which is approximately 4% of the total Egypt's area. Amount of land used for agricultural purposes has been increasing since 1990, with a 50% growth over the span of 30 years. As of 2014, total irrigated area in Egypt was 3.6 million hectares, covering 98% of the cultivated area.

Primary commodity of the food processing sector is sugar (both cane and beet). Molasses, a side product of sugar production, is the second most-produced output of the processing sector. Sugar is followed by the milk processing subsector. The main factor that Egyptian food processors are taking advantage of is its geographical location in the center of the MENA region. Within the 500 kilometers range from the borders, Egypt has access to markets with 340 million consumers. On the other hand, processing industry faces two major challenges in the domestic market. First is the competition from the processed food imports, primarily originating from the European Union. Egypt's free trade agreement with the EU increased the inflow of processed food into the country. The second challenge being the lack of food ingredients for processing on the domestic market. Egypt's agricultural production primarily focuses on staple commodities, such as wheat or sugar cane/beet.

The main challenge for Egyptian agriculture is the scarcity and degradation of land. Only 4% of Egypt's territory is available for agricultural use. Water shortage is one more problem which Egyptian agriculture is facing. Given scarce water resources in the region, dependence on the Nile River as the main source for irrigation makes Egypt vulnerable in face of water use decisions of upstream countries. Poverty is predominantly a rural phenomenon in Egypt, as around 70% of those below the poverty line live in rural areas. Poverty is a complex factor holding back agriculture from development, as it decreases access to education, promotes migration of both skilled and unskilled workers towards urban areas, at the same time making agriculture an unappealing sector to work in. On the other hand, infrastructure in rural regions is poor as well, as muddy pathways prevail in the suburbs and villages, making the life and work more difficult.

Despite the shift towards the market economy, the Egyptian government still plays an important role in the agricultural sector. In particular, seed prices are set by the government and are distributed by Central Administration for Seed Production (CASP) through cooperatives. CASP is as well responsible for seeds processing, storage and registration. Distribution of fertilizers is also closely regulated by the government. Financing of research and extension services, which were previously provided by the government, have been reduced significantly in the 90s as a part of market deregulation reform project. Agricultural Research Center, which is the principal agency within the Agricultural Ministry has been reported to be «severely underfinanced» as of 2015.

One more key aspect of the Egyptian agricultural policy is price setting and government procurement of crops. The General Agency for the Supply of Commodities is a main authority responsible for the procurement and price setting. Farmers are allowed to sell their products to both GASC and private traders. Procurement price set by the government is above the world price to encourage domestic production. Main crop which is prioritized is wheat. Other crops and commodities included in the procurement program are corn, rice, sugar, and vegetable oils. The major current agricultural policies in Egypt are: food subsidies, land fragmentation policy, land reclamation, water use policies, fertilizer subsidies, agricultural loans. Besides, the Egyptian government organizes targeted food programs to alleviate the poverty, especially in rural areas.
The overview of agri-food sector development and agricultural policy in Egypt allows to perform SWOT analysis for the sector (Table 3).

Table 3. SWOT analysis of Egyptian agriculture

Strengths	Weaknesses
1. The recovered domestic production of staple foods. 2. Diversified food imports structure; established mechanism of procurement of agricultural commodities (via GASC tenders). 3. Increased food self-sufficiency over the last decade.	1. Excessive state regulations in upstream sectors (seeds, pesticides, fertilizers). 2. Slow technological progress because of slack state support of innovations and low access to extension services. 3. Weak scale effect in agriculture due to the land fragmentation policy.

Table 3. SWOT analysis of Egyptian agriculture

Opportunities	Threats
1. The development of irrigation system and diversification of water sources within the existing «Modernized On-Farm Irrigation Project». 2. Increasing market efficiency via the further development of Egycomex. 3. Boost of agricultural productivity via state stimulations of innovations and selection (in particular, wheat varietal policy). 4. Re-targeting food programmes mostly to rural population.	1. Low Nile water level due to the water use policies of the upstream country (Ethiopia). 2. Further inflow of refugees to the country. 3. Fragile macroeconomic situation. 4. Stagnation of local agriculture amidst the ongoing urbanization process.

Source: Created by authors

2. ALGERIA

2.1. FOOD SECURITY

Algeria is a large and fast-growing country in North Africa. Total population of the country trended upwards over the last two decades and increased by 50% to around 45 mln people in 2021 (Figure 33), which is slightly above the population growth in the whole North Africa region (Worldometers, 2023).

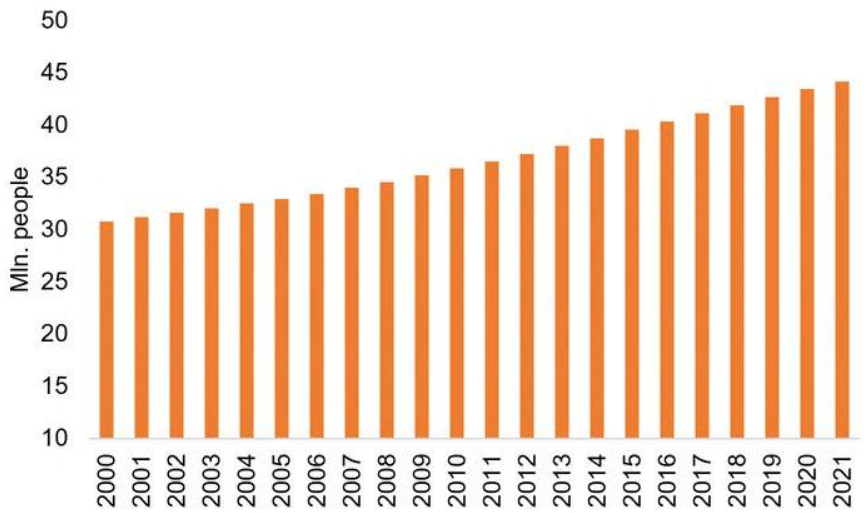


Figure 33. Total population in Algeria

Source: World Bank

From the macroeconomic perspective, Algeria has similar GDP per capita as other North African countries (Figure 34). Since 2014, its economy has stagnated.

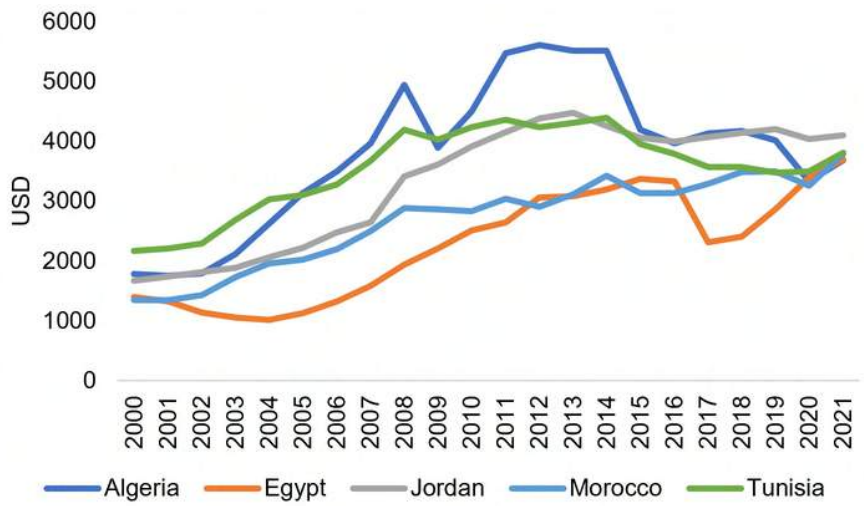


Figure 34. GDP per capita

Source: World Bank

Despite the moderate level of economic development, Algeria has a relatively high level of food security compared to other North African countries. Since 2000, the share of undernourished people in Algeria declined faster compared to the whole region (Figure 35). In the 2019-2021, less than 2.5% of Algerian population was food insecure; for North Africa this level was around 6%.

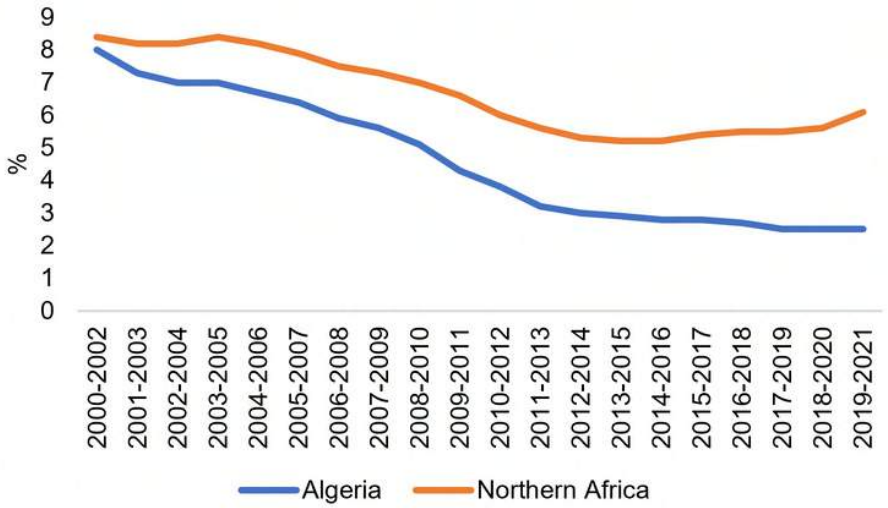
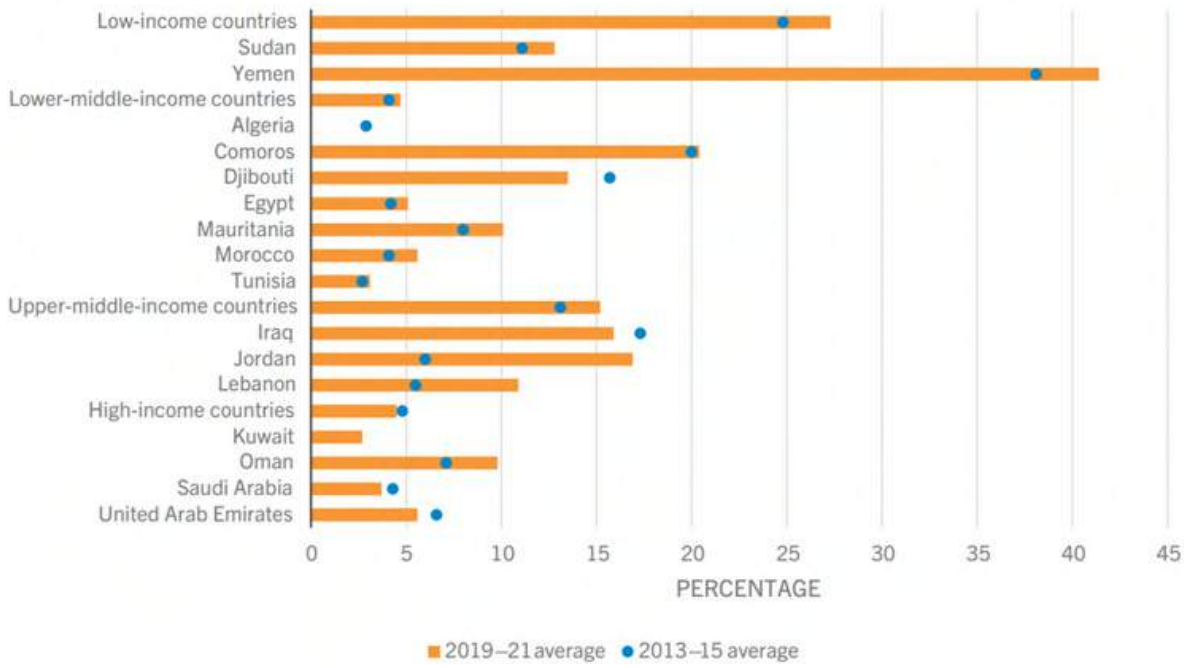


Figure 35. The share of undernourished population

Source: FAOSTAT

The cross-country overview shows that in the 2013-2015 period, Algeria already had the one other highest levels of food security in the MENA region (after Tunisia and Kuwait). But in the 2019-2021 period, Algeria was the most food secure state in the region (Figure 36). Interestingly, Algeria is classified as a lower-middle-income country in the region, but it has much lower food insecurity level than some high-income countries in the region. This could imply that macroeconomic factors could be not the major driver of food security in the Arab states.

Figure 36. Prevalence of undernourishment in the Arab states by country



Source: FAO, IFAD, UNICEF, WFP, WHO & UNESCWA. (2023). Near East and North Africa – Regional Overview of Food Security and Nutrition: Trade as an Enabler for Food Security and Nutrition.

The number of undernourished persons in Algeria declined over the last two decades. In the 2016-2018 periods, this number was 1.1 million persons versus 12.8 million persons in the whole North Africa (Figure 37).

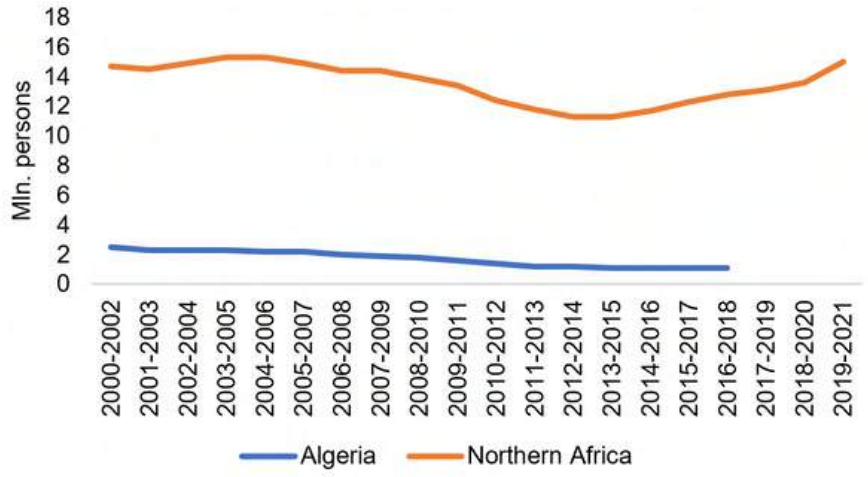


Figure 37. The number of undernourished persons

Source: FAOSTAT

Strengthening of local food security is explained by the firm growth of dietary energy supply (Figure 38). In the 2019-2021 period, the average calory intake in the country was 3490 kcal/person/day versus 3220 kcal/pc/day in North Africa.

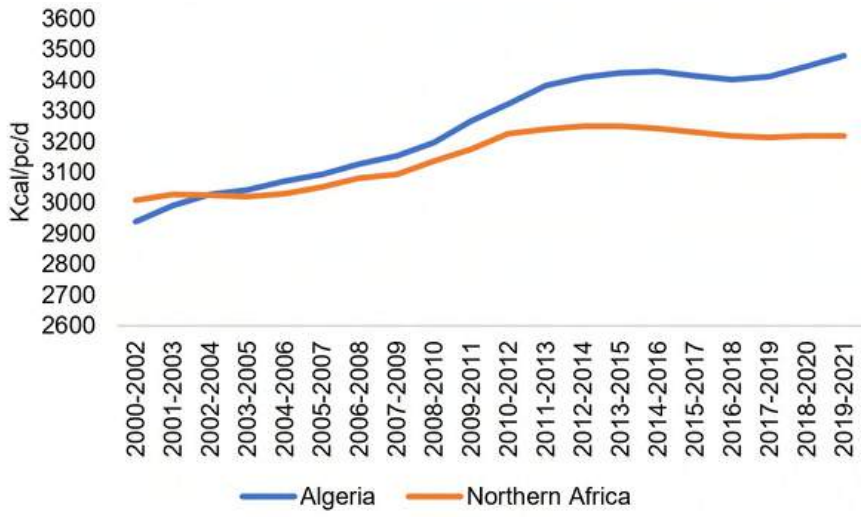


Figure 38. Dietary energy supply

Source: FAOSTAT

While the absolute level of calories intake can be misinterpreted, the **average dietary energy supply adequacy** indicator expresses the dietary energy supply as a percentage of the average dietary energy requirement. As Figure 39 shows, this indicator was the same for Algeria and North Africa in 2006 (at 132%); afterwards, it increased faster for Algeria, reaching 153% in the 2019-2021 period (139% in North Africa). This means that energy requirments in Algeria are well-covered, however, such an indicator does not account for the inequality in the level of calories consumption.

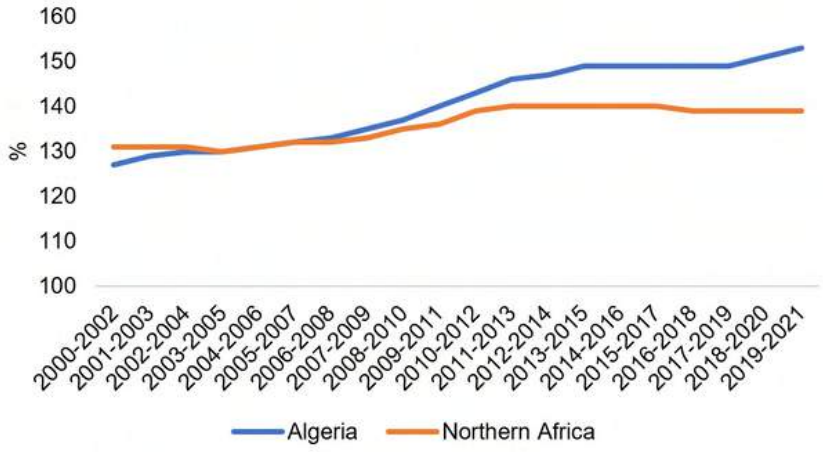


Figure 39. Average dietary energy supply adequacy

Source: FAOSTAT

To assess the share of nutrient-rich food in the diet, the **share of dietary energy supply derived from cereals, roots and tubers** can be considered (Figure 40). Before 2010, this proportion in Algeria was relatively high at around 60% versus 50% in North Africa. Then the sutuation changed; in the 2017-2019 period the indicator for Algeria declined to 50% while for North Africa it increased to 58%. This means that Algerians have a more diversified diet than the rest of population in North Africa.

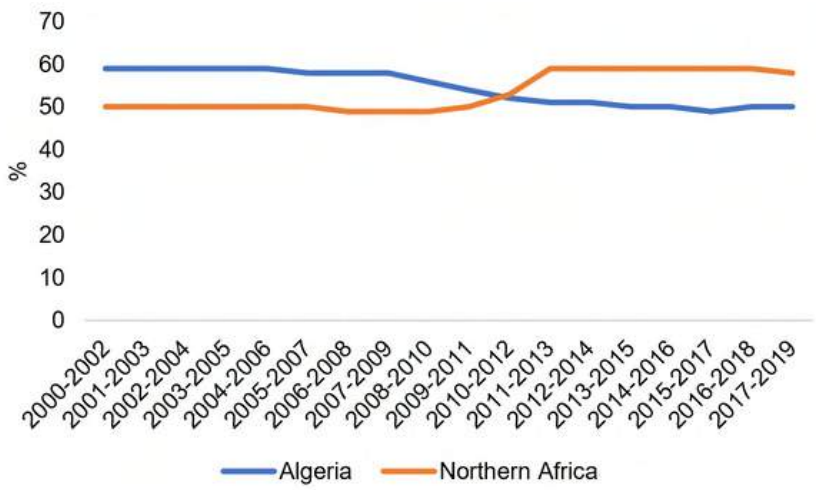


Figure 40. Share of dietary energy supply derived from cereals, roots and tubers

Source: FAOSTAT

Algeria is relatively successful in coping food insecurity compared to the other Arab countries. In the 2013-15 period, around 3% of the population was undernourished; this proportion declined to less than 2.5% in the 2019-2021 period.

As for **protein supply**, Algeria had the advantage over the rest of North Africa in the 2000-s. However, this advantage deteriorated for all types of protein (Figure 41) and for animal protein in particular (Figure 42).

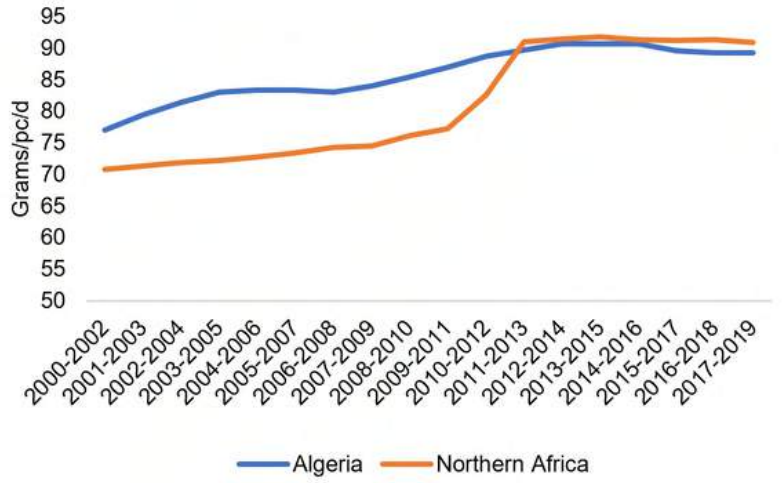


Figure 41. Average protein supply

Source: FAOSTAT

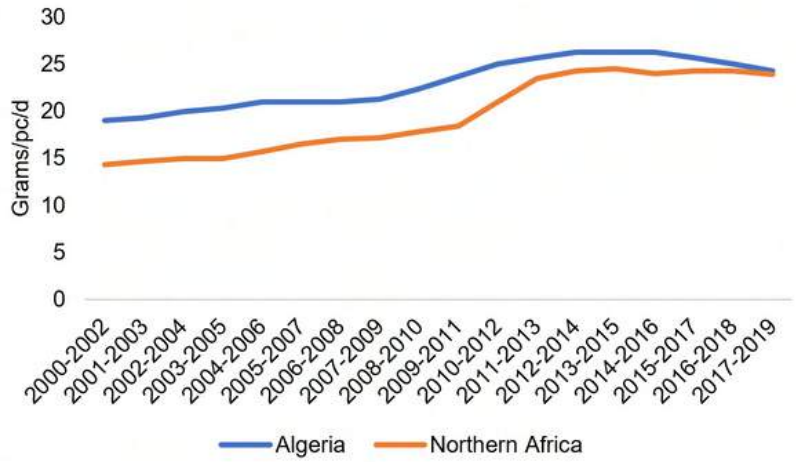


Figure 42. Average animal protein supply

Source: FAOSTAT

The stability of food supply in reflected by **per capita food supply variability** that measures annual fluctuations in the per capita food supply (kcal), represented as the standard deviation over the previous five years per capita food supply (INDDEX, 2023). In 2020, the indicators for Algeria was higher than in the whole of North Africa (42 and 18 kcal/cap/day respectively). However, this gap was around ten times below the gap in dietary energy supply. This means that such food supply instability did not affect the diet of the Algerian population.

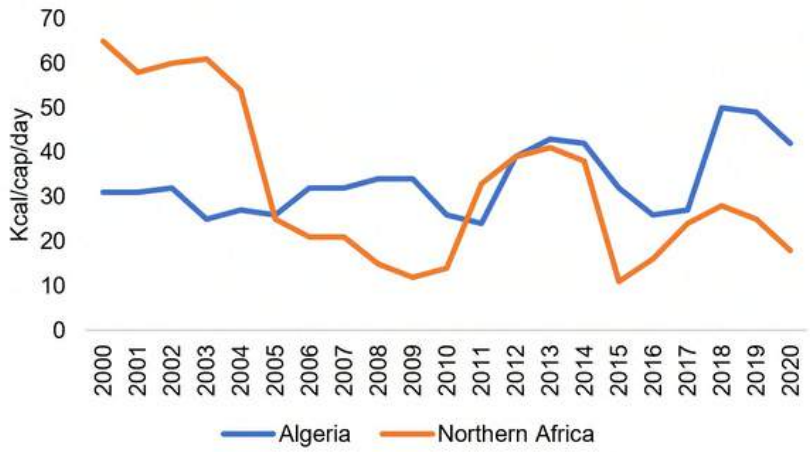


Figure 43. Per capita food supply variability

Source: FAOSTAT

The **operational activity of WFP in Algeria** is targeted to Sahrawi refugees which are located in camps in the south-western part of the country. Total population of the refugees was about 90,000 in 2022 (ReliefWeb, 2023); as of 2018, only 12% of the refugee population was food secure. The structure of WFP support is presented in Table 4.

Table 4. WFP support programms in Algeria in 2020

Activity	Expenditures, mln. USD	Share in total expenditures, %
1. Provide Sahrawi refugees in Tindouf with complementary livelihood opportunities that benefit women and men equitably	0.6	4
2. Provide nutrition-sensitive school meals	1.8	11
3. Provide general food assistance to targeted food-insecure refugees	11.9	72
4. Provide children aged 6-59 months and pregnant and lactating women and girls with assistance for the treatment and prevention of moderate acute malnutrition	2.2	13
Total	16.5	100

Source: https://www.wfp.org/countries/algeria

2.2. AGRI-FOOD TRADE

The relatively high level of food security in Algeria is largely based on agricultural imports, although the government is focused on increasing food self-sufficiency of the country. Indeed, the monetary value of food imports mostly declined in the 2014-2022 despite strong food inflation since 2020 (Figure 44). Cereals are the main part of local agri-food imports. The second major import category is processed food products.

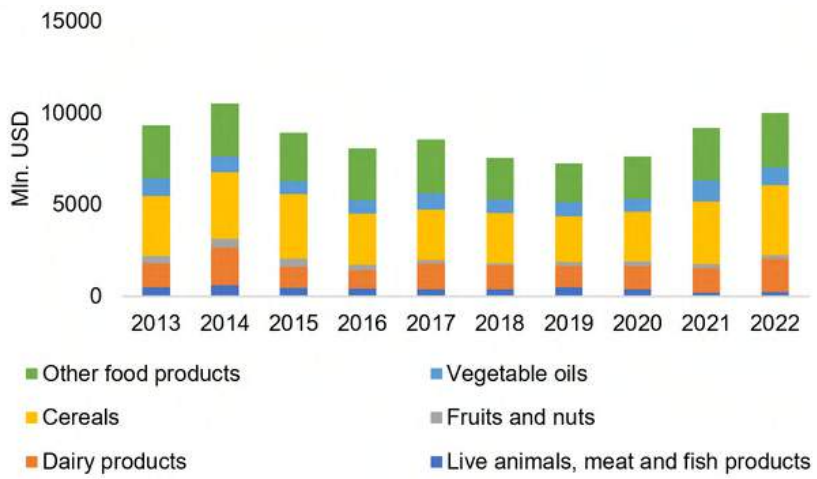


Figure 44. Product structure of food imports in Algeria

Source: ITC Trade Map

Meanwhile, the monetary value of food exports increased over the last decade (Figure 45). Two major groups of exporting products are sugar confectionery, fruits and nuts. On average, food export value is about 20 times below imports value.

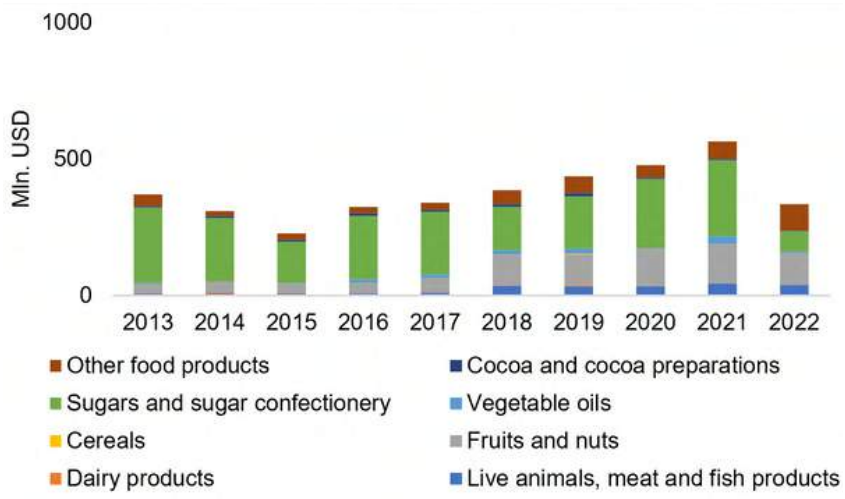


Figure 45. Product structure of food exports in Algeria

Source: ITC Trade Map

As for trade partners, the share of key exporters of agricultural products to Algeria was relatively stable over the last decade (Figure 46). This indicates that potential for diversification of food imports was almost unrealized during this period. The main exporters are Brazil, France, Argentina.

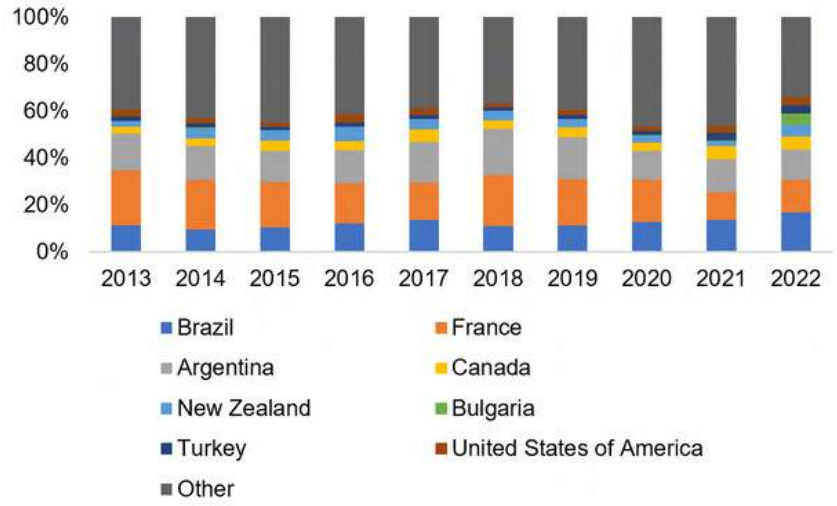


Figure 46. Geographical structure of food imports in Algeria

Source: ITC Trade Map

Meanwhile, food exports becomes more specialized; the share of major importers of Algerian food products exceeded 80% in 2022 (Figure 47). These importers are France, Jordan, Morocco, Spain, Netherlands, and other countries. The geographical specialization of food exports points that exporters face issues with entering new markets.

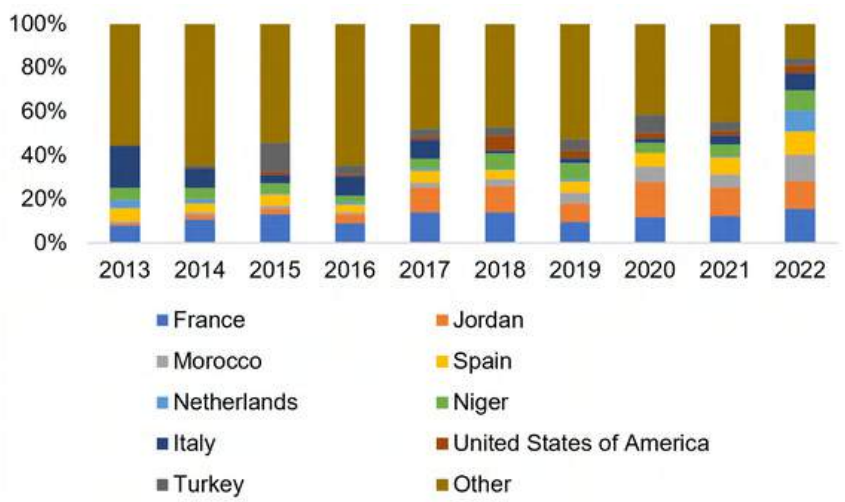


Figure 47. Geographical structure of food exports in Algeria

Source: ITC Trade Map

Food trade between Ukraine and Algeria is unilateral since Algeria does not export food products to Ukraine. At the same time, Algeria buys Ukrainian cereals (Figure 48). Note that Ukraine has lost Algerian vegetable oils market over the last years.

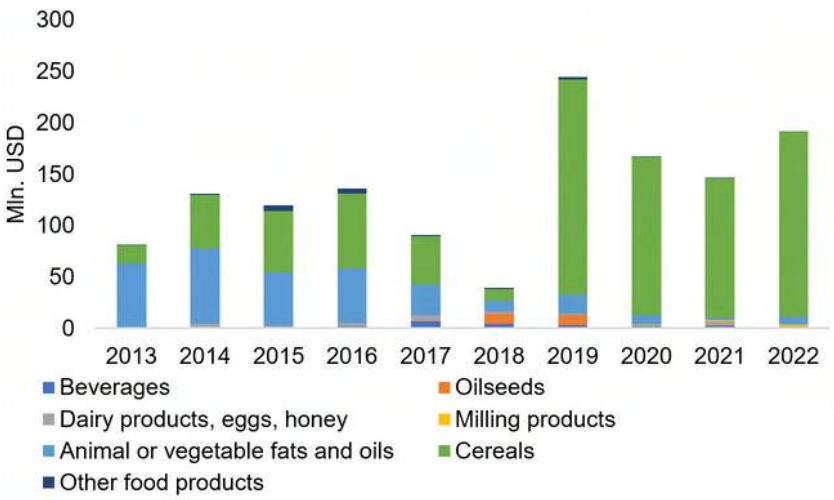


Figure 48. Food exports from Ukraine to Algeria

Source: ITC Trade Map

2.3. LOCAL AGRICULTURAL SECTOR

Share of agricultural production in Algerian GDP has been increasing throughout the last decade. After a period of stagnation in the mid-2000s, it increased from 7% of GDP in 2008 to 12% in 2021 (Figure 49). At the same time, urbanization processes in the 2000s caused the share of agriculture in the national employment structure to decrease rapidly. It dropped from 23% of the employed population working in agriculture in 1999 to only 9% in 2014. After 2014, it remained relatively unchanged.

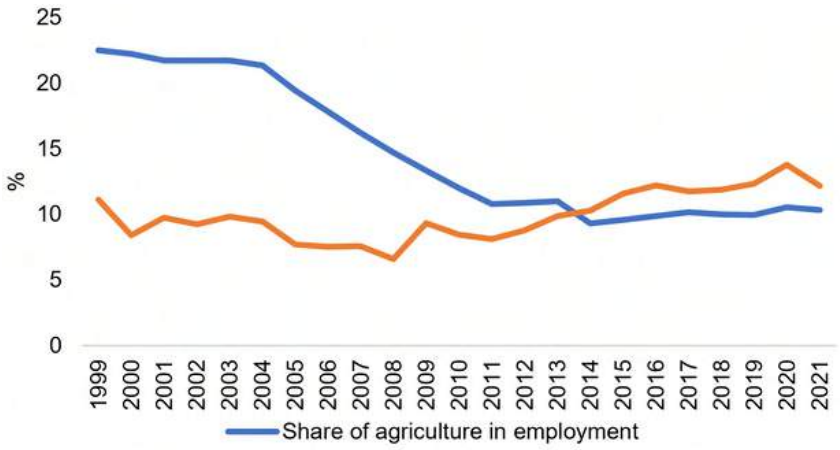


Figure 49. Share of agriculture in GDP and employment in Algeria

Source: World Bank Database

In monetary terms, agricultural production has been growing throughout 2000-2021, with the only exception in times of 2007-2008 financial crisis and Covid-19 pandemic in 2020-2021. As of 2021, monetary value of agricultural production constituted 259% of the level as of 2000 (Figure 50).

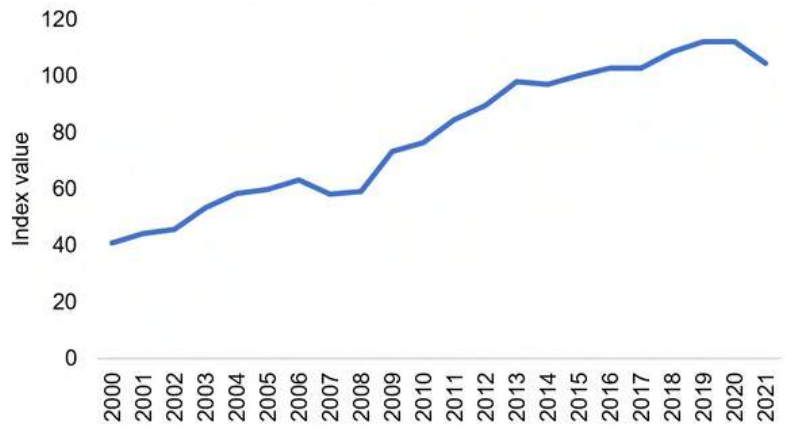


Figure 50. Agricultural production value index in Algeria, constant 2014-2016 USD. Baseline: 2014-2016 average

Source: FAOSTAT

Crop production

Main crop produced in Algeria is potatoes, with 4.4 million tons produced in 2021 (Figure 50). Wheat is the second most-produced crop. In 2021, its harvest was roughly 2.2 million tons. Beside those, Algeria is a significant producer of fruits and vegetables, with watermelons leading the production in terms of quantity (2.1 million tons in 2021). It is followed by onions, tomatoes, dates, oranges and olives with harvests of 1.7, 1.6, 1.2, 1.1, 0.7 million tons in 2021, respectively. Amounts produced of the 5 most-produced crops in 2001-2021 are presented on Figure 51.

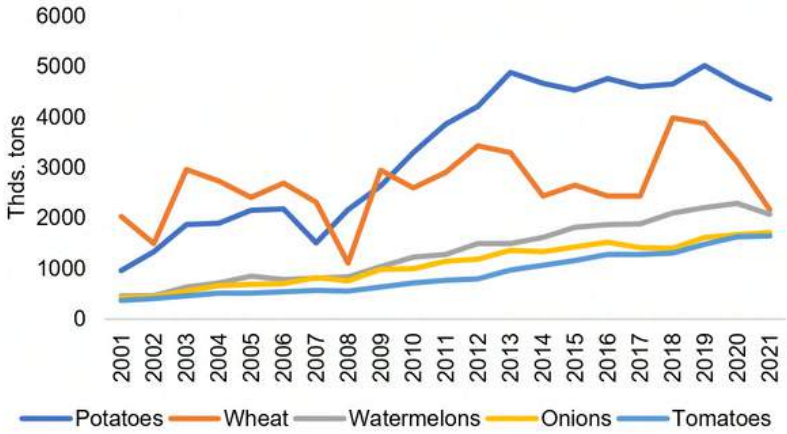


Figure 51. Production amounts of the 5 most-produced crops in Algeria

Source: FAOSTAT

Over the period of 2001-2021, harvests of most key crops have been gradually increasing, except for wheat. Production of potatoes, watermelons, and oranges increased by more than 4 times. Production of barley peaked in late 2000s, reaching a harvest of 2.2 million tons and has been decreasing in the 2010s, down to 0.55 thousand tons in 2021.

Land use and sown areas

As of 2020, roughly 413 thousand square kilometers of land were used for agricultural production, which is approximately 17% of the total Algeria's area. Amount of land used for agricultural purposes has been increasing since the late 1980s, with the most rapid growth in 1993-2005, and remaining relatively unchanged after that period (Figure 52).

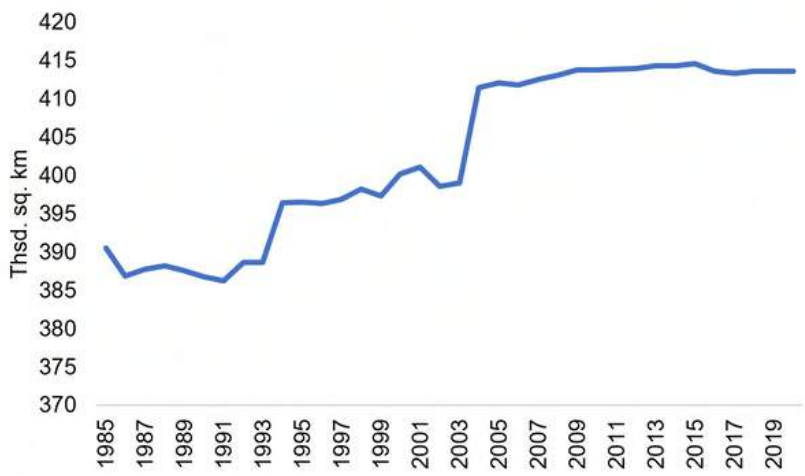


Figure 52. Agricultural land in Algeria

Source: World Bank Database

As of 2019, total area equipped for irrigation in Algeria was equal to 11.7 thousand sq. km, with 87% of this area being actually irrigated. Approximately 58% of this area uses surface irrigation, and 42% is equipped for pressurized irrigation (sprinkler or localized). As compared to 2002, irrigated area increased by 2.3 times. Surface irrigation contributed to this growth the most, increasing from 14.5 thousand sq. km up to 68.7. Area of land equipped for pressurized irrigation increased from 36.9 thousand sq. km up to 49.0 (FAO, 2019).

Extraction of water from ground sources is concentrated in desert oases in the southern part of the country, in Sahara and Algerois-Hodna-Soumam hydro-geographic regions. 61 thousand hectares of land are as well equipped for draining, which is only 13.4% of the total irrigated land.

Livestock

Chicken egg and meat, cattle milk and meat are the leading livestock commodities produced in Algeria. As of 2021, 6410 million eggs were produced, which is equal to approx. 350 thousand tons. Milk production is dominated by cow milk (2.4 million tons in 2021), although sheep and goat milk is produced as well (525 and 314 thousand tons in 2021, respectively). Main meat types produced are poultry, beef and lamb (236, 105 and 165 thousand tons, respectively).

Over the span of the past 20 years, the number of eggs produced increased by 3 times, while milk production has grown by 50%. Production of lamb increased by 110%.

Production amount of other commodities remained relatively unchanged or increased only slightly (Figure 53).

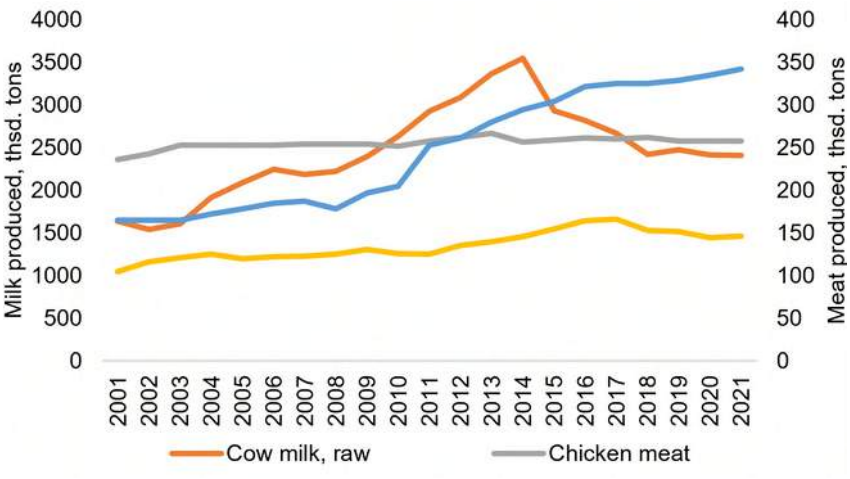


Figure 53. Livestock commodities produced in Algeria

Source: FAOSTAT

Chickens are the most widespread animal in the Algerian livestock sector, with 137 million heads, as of 2021 (Figure 54). It is followed by sheep, goats and cattle, with the quantity of 31.1, 5 and 1.7 million heads. Throughout the period of 2001-2021, the number of goats and cattle remained relatively unchanged. Number of chickens has been growing gradually, from 110 million heads up to 137. Increase in the sheep stock is the most significant, with an 80% growth over the span of 10 years.

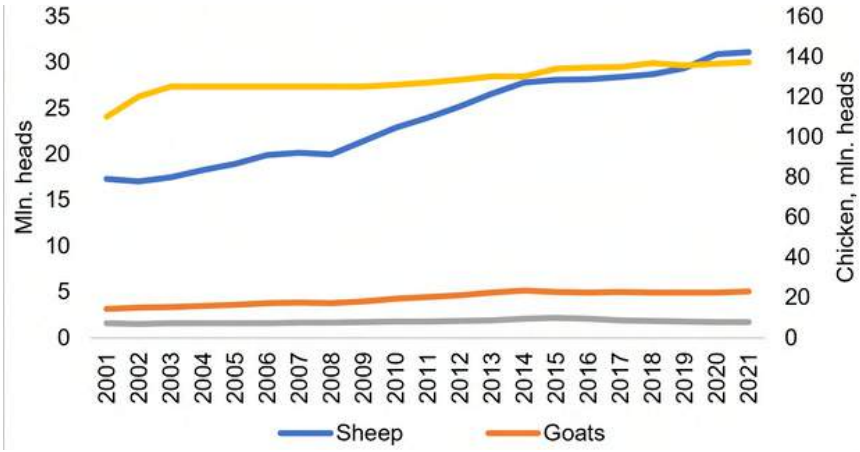


Figure 54. Livestock population, 2001-2021

Source: FAOSTAT

Processing sector

Main processing sub-sector is flour production. There are around 430 mills operating in Algeria and, despite privatization efforts of the past decades, most of them are owned by a state-owned company ERIAD. Flour production is followed by the vegetable oils, as of 2020, the amount of olive, soybeans, groundnut, and rapeseed oils produced was 113.6, 101.7, 30.4, and 7.6 thousand tons, respectively (Figure 55). Soybeans oil is a relatively new processed commodity produced in Algeria. According to FAO data, it was not produced before 2017. Besides that, beer and wine are produced in Algeria. In 2020, 135 thousand tons of barley beer were produced. Wine production peaked in 2006 with 105 thousand tons produced and has been decreasing, reaching a level of 19 thousand tons produced in 2018. Among the processed livestock commodities, skim

milk is leading, with 95 thousand tons produced in 2020. Except for wine and soybeans oil, no significant changes occurred in the structure of processed commodities produced in Algeria.

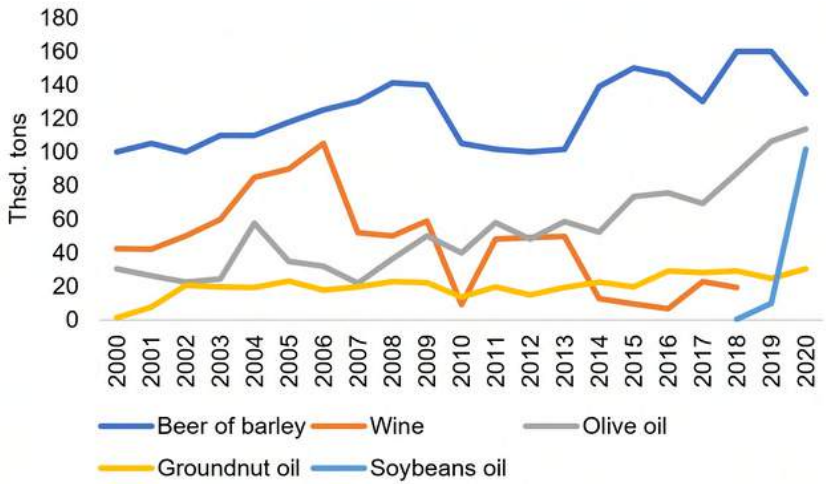


Figure 55. Amount of processed food commodities produced in Algeria in 2000-2020

Source: FAOSTAT

As of 2017, the value added created by the food, beverages and tobacco manufacturing sector amounted to 2.5% of the GDP (Figure 56). No consistent data is available to assess the long-term dynamics. However, over the period of 2011-2017, sector's share in Algerian GDP increased by 0.6 percentage points.

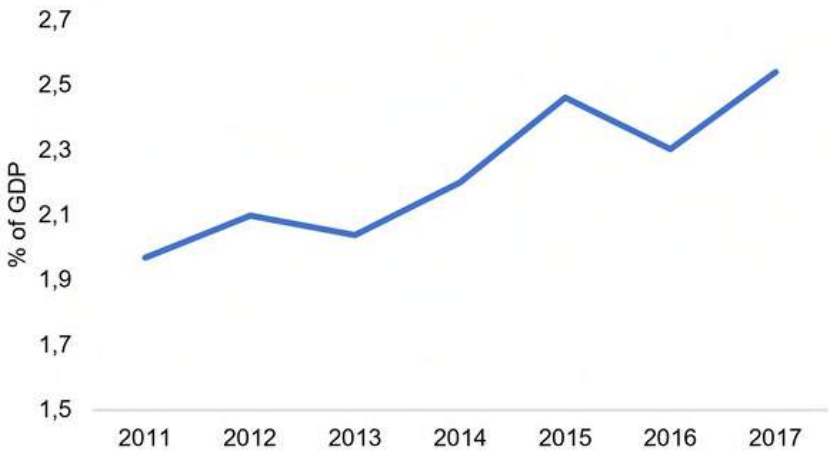


Figure 56. Food, beverages and tobacco manufacturing value added, % of GDP

Source: own calculations, based on World Bank data

2.4. CHALLENGES IN AGRICULTURE

The scaled agricultural support policy, established in Algeria in early 2000s has helped the sector to increase production significantly over the span of two decades and promoted productivity growth. It was primarily targeted at achieving macroeconomic balance and was characterized by centralized and standardized approach and was criticized for **lack of continuity and efficiency** (Khaled, 2012; Sahli, 2010; Adair et. al, 2022).

Main problem associated with the abovementioned support program is its **dependence on Algerian fossil fuel income.** Program was started in the period of high oil prices, when the Algerian budget was able to finance the extensive subsidy policies. When the fossil fuel prices started declining in the 2000s it became harder to finance, leading to decrease in government spending on agriculture and irrigation (Figure 58), which is reflected in production data. Rapid growth of the 2000s stagnated in the mid-2010s, with some commodities even facing a slight decrease in production (milk and meat of cattle, wheat).

Land scarcity is one more issue Algerian agriculture is facing. As desert and mountains take up 95% of the territory, the remaining area is used for multiple purposes, such as agriculture itself, or tourism, industrialization or urban sprawling. Amount of agricultural land has reached a sort of threshold of 415 thousand sq. km in 2005 and did not increase further. With further population growth, per capita amount of agricultural land will be inevitably decreasing.

2.5. AGRICULTURAL POLICY OVERVIEW

The main agricultural policy framework in the 21st century was set by the **National Agricultural Development Plan** (2000-2010), **Agricultural and Rural Development Plan** (2010-2014) and **FELAHA Plan** (2014-current). All three programs were intended to target key issues, which Algerian agriculture is facing, by working in four **directions:**

- Increase in domestic production, as heavy reliance on imported food makes Algeria vulnerable in face of rising crises and growing population.
- Increase in productivity, in order to satisfy domestic demand at prices «compatible with consumers' incomes» in conditions of limited land resources.
- Improving the well-being of rural communities.
- Protecting natural resources and ecological system in the context of climate change.

The measures taken so far are: 1) producer price subsidies; 2) incentives for intensification through increased use of production inputs (irrigation, fertilizers, machinery); 3) agriculture development loans; 4) land reclamation.

In the 2000s, increased prices of fossil fuels, the main Algerian export commodity, allowed the government to start an ambitious agriculture revitalization project. As mentioned previously, the primary goal was to catalyze the increase in added value and agricultural growth through: increase in local production to satisfy growing domestic demand and get rid of food import dependence; the emergence of production surpluses of high value-added agricultural commodities for export.

Financing of agriculture development programs of the sector during the period of 2000-2015 required an overall envelope of summed up to 14164 million USD, with annual average expenditure being 884 million USD (WFP 2017).

Over the period of 2000-2010, a total of approximately 17.47 billion USD was granted to the budget of the Ministry of Agriculture and Rural (Figure 57). Direct financial support to farms is 6752 million USD over the period of 2000-2010. Amount of expenditure on agricultural commodities' price subsidies is estimated at 7112 million USD over the period of 2006-2010 (price subsidies policy started in 2006).

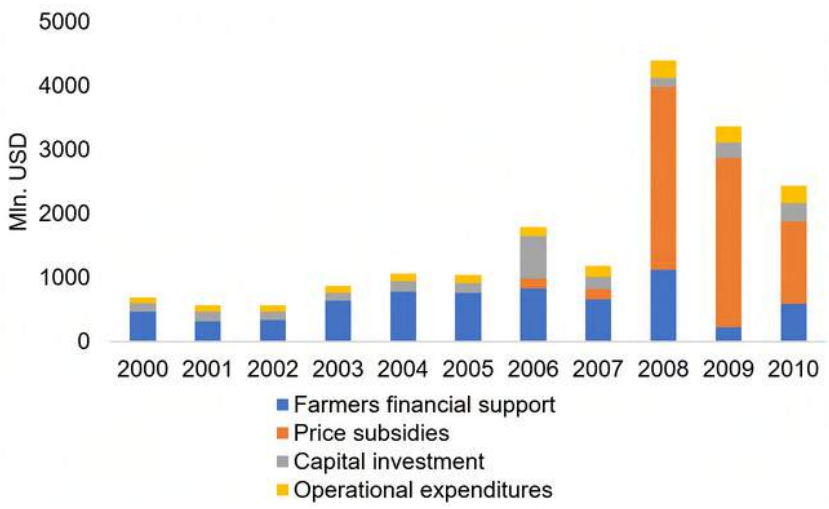


Figure 57. Structure of Algerian Ministry of Agriculture and Rural Development budget

Source: Bessaoud, O. (2019). Rapport de synthèse sur l'agriculture en Algérie. Projet d'Appul A l'Initiative ENPARD Mediterranee

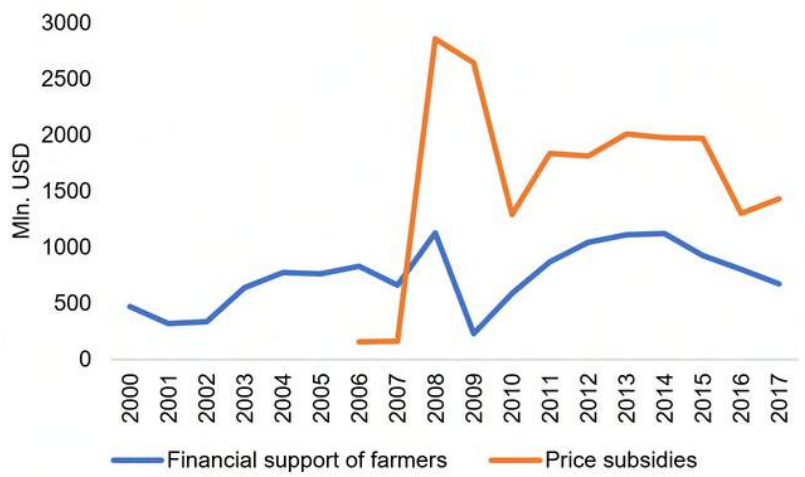


Figure 58. Evolution of expenditures on price subsidies and farmers support

Source: Ferrouki, S., Boumghar, M., Chehat, F. (2021). Analyse des effets des subventions sur la croissance agricole: un essai de mesure pour la periode (2000-2018). Les Cahiers du Cread, Vol. 37 (2); Bessaoud, O. (2019). Rapport de synthèse sur l'agriculture en Algérie. Projet d'Appul A l'Initiative ENPARD Mediterranee

In addition, budgets allocated to agricultural investment have gone from 450 million USD/year in the 2000s to more than 2.5 billion USD/year in 2010-2014. After this date, it decreased to an average of 1.2 billion USD/year, reflecting the reduction in the Algerian State budget (Bessaoud, 2019).

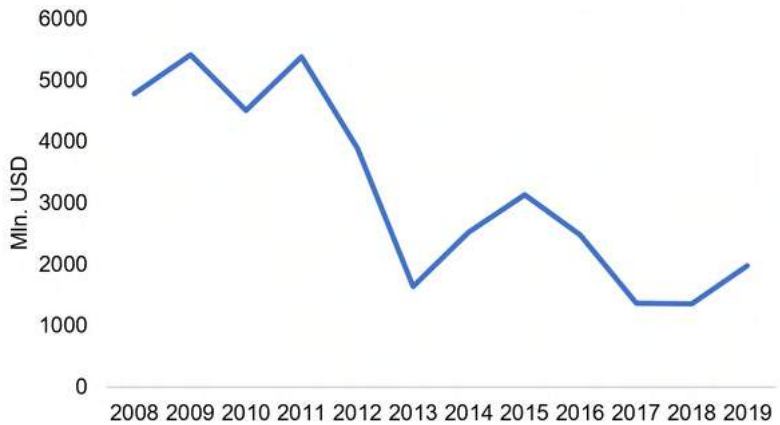


Figure 59. Total government expenditures on agriculture and irrigation in 2008-2019

Source: Bessaoud, O. (2019). Rapport de synthèse sur l'agriculture en Algérie. Projet d'Appul A l'Initiative ENPARD Mediterranee

Current policies and their impacts

Food subsidy and farm-gate price setting

In its agricultural development plan, the Algerian government defined the so-called «strategic sectors». They were selected as those, development of which is the main priority. Those sectors are production of cereals, potatoes and milk (UNEP/WFP, 2016). Producers working with mentioned commodities received financial support in the form of production inputs subsidies, direct financial aid for production and processing (grants), and subsidized investment loans (Sidoun et. al, 2022).

On the other side of the market, the government subsidized the consumer prices in order to make food prices more «compatible with consumers' incomes». Domestically produced commodities included in this program are cereals, raw milk, tomatoes, and bread. Guaranteed grain and milk prices were set above the level of world prices.
Concerning wheat and milk, the government sets the fixed farm-gate prices at levels above the world market. On the consumer side, the selling prices of wheat to flour mills is fixed as well. Difference between these prices is compensated from the state budget. As of 2017, farm-gate prices for durum wheat were set at 4500 DA/quintal versus 2220 DA/quintal purchase price for flour mills, for common wheat these prices were 3500 DA/quintal and 2215 DA/quintal, respectively. Similar mechanism is applied to milk, with the addition of fixed consumer price set well below the international market level (on average approx. 50% lower) (Ferrouki et. al, 2021).

A study by Ferrouki et. al (2021) have found subsidies effect on agricultural value added to be significant, with a return effect of subsidies of 1.3 (implying 1 DA of subsidy increased the value added by 1.3 DA) in 2000-2018.

Agricultural loans

In 2008, two types of subsidized agriculture loans were established. First is the 3 to 7 year «Ettahadi» investment loan, intended for creation or modernization of farms, and equipment purchase. Interest rates range from 0% to 3%. Second is the 2-year «Rfig» interest-free plant production loan. Hattab and Gaouar (2016) reported that there is a lack of access to the agricultural credits, as only 7-12% of farms in Ain Fezza, El Gor and Sidi Djilali regions received these loans, while almost 100% of the surveyed farms reported credit as a desired funding form.

SYPRALAC system

In 2008, the Algerian government established the SYPRALAC (Système de régulation des produits de large consummation), which was intended to reduce price fluctuation of potatoes. Later garlic, onions and meat were included as well. The main idea behind the mechanism is that the state buys commodities from producers during periods of rising supply (and decreased prices) and sells it on the market when the prices are growing. Given the fact that public storage capacities are limited, private storage owners are engaged on a voluntary basis. This policy has not been efficient throughout the last decade and has been criticized for inability to reduce price fluctuations and ignoring the price depreciation of stored products.

2.6. ALGERIA: SUMMARY

Algeria is the second most-populated and the most food secure country in North Africa. The relatively high level of food security is ensured by the relatively high economic growth (compared to the neighboring countries) and focusing on ensuring food self-sufficiency via the state support of local agricultural production. In the 2019-2021 period, less than 2.5% of Algerian population was food insecure. The diet of Algerian population is more nutrient-rich compared to the diet of the total North African population. Meanwhile, Algerians still consume insufficient amount of protein; this implies the potential for the local market of animal products.

Given the low food insecurity level, the operational activity of the World Food Programme in Algeria is targeted to Sahrawi refugees which are located in camps in the south-western part of the country. Their population was about 90,000 in 2022. There is an essential gap in food security levels between the refugees and the rest of population; as of 2018, only 12% of the refugees were food secure.

Algeria is a net importer of food; however, the value of agricultural imports is gradually decreasing. The main products imported are cereals, dairy products, processed food products. The main food exporters to Algeria are Brazil, France, Argentina. The geographical structure of food imports was relatively unchanged during the last decade; this means the perspectives of Algerian market for other exporters, particularly Ukraine. Ukrainian exports to Algeria consist mostly of cereals; Ukraine has almost lost Algerian vegetable oils market over the last years.

Share of agricultural production in Algerian GDP has been increasing throughout the last decade. After a period of stagnation in the mid-2000s, it increased from 7% of GDP in 2008 to 12% in 2021. Algerian agriculture specializes in the production of potatoes, wheat, fruits and vegetables. Farmland takes 17% of the total Algeria's area. Farmland area has been increasing until 2005, and remaining relatively unchanged after that period. Only about 3% of farmland are irrigated. As compared to 2002, irrigated area increased by 2.3 times.
As for livestock production, chicken egg and meat, cattle milk and meat are the leading livestock commodities produced in Algeria. Chickens are the most widespread animal in Algerian livestock sector, their number has been growing gradually throughout the period of 2001-2021. Meanwhile, the number of goats and cattle remained relatively unchanged.

The main food processing sub-sector is flour production. There are around 430 mills operating in Algeria and, despite privatization efforts of the past decades, most of them are owned by a state-owned company ERIAD. Flour production is followed by the vegetable oils, in particular, olive, soybeans, groundnut oils.

Algeria's agriculture faces a number of challenges. First, the inefficient centralized and standardized approach of local agricultural policy did not allow to

realize fully the potential of the sector. The main problem was the dependence of agricultural support budget on Algerian fossil fuel income. Therefore, some sectors were overstimulated during the period of high oil prices; afterwards, they stagnated when oil rent decreased. This implies that the structure of the sector was not fully based on market signals. The second issue is land scarcity; the potential of cultivating additional land is limited due to natural restrictions. With the further population growth, per capita amount of agricultural land will be inevitably decreasing.

As for the agricultural policy, it is conducted according to FELAHA Plan since 2014. The main priorities of this policy are: 1) import substitution on food market via stimulation of local production; 2) stimulation of increasing efficiency of agriculture; 3) improving the well-being of rural communities; 4) protecting natural resources and ecological system in a context of climate change. The direct support of agriculture is pro-cyclical and dependent on the incomes from oil exports. In the long-term, this undermines the competitiveness of local agriculture. Government highlights «strategic sectors» for support: production of cereals, potatoes, and milk. These sectors are subject to inputs subsidies, direct financial aid for production, guaranteed grain and milk prices set above the level of world prices. Meanwhile, consumer prices are also regulated by the government; the difference between farm-gate and consumer prices is compensated from the budget.

Algeria's agriculture is supported via subsidized loans; the traditional loans are mostly unavailable for farmers. Also, the government supports farmers via the SYPRALAC system. This system of governmental market interventions (purchase and selling) is aimed to reduce price volatility. The policy has been criticized for inability to reduce price fluctuations.
In respect to the described above, we conduct the SWOT analysis for the sector (Table 5).

Table 5. SWOT analysis of the Algerian agricultural sector

Strengths	Weaknesses
1. Growing agricultural production and exports. 2. Developed food processing industry. 3. Moderate level of rural poverty.	1. Dependence of agricultural budget on Algerian fossil fuel income. 2. Land scarcity, slack progress in land reclamation. 3. Distorted market signals due to: a) prioritizing «strategic sectors» in the agricultural support; b) administrative price setting.
Opportunities	**Threats**
1. Geographical diversification of food trade. 2. The development of irrigation systems on the existing agricultural land areas (413 sq. km).	1. Underfinancing of agricultural sector due to low oil incomes of the country. 2. Low resilience of non-irrigated agriculture to climate change.

Source: Created by authors

3. MOROCCO

3.1. FOOD SECURITY

Morocco is the third most-populated North African country. Since 2000, its population increased from 29 to 37 mln. people (Figure 60).

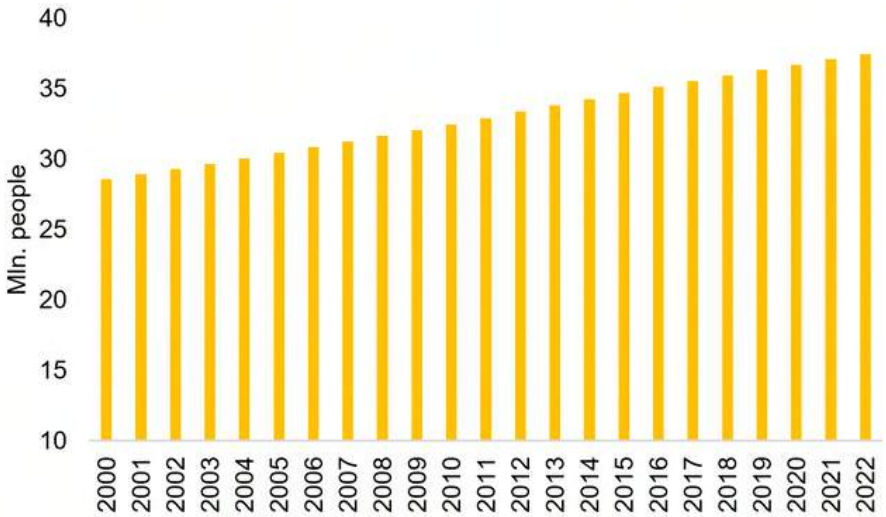


Figure 60. Total population in Morocco

Source: World Bank

The national GDP per capita is lower than in neighboring North African states (Figure 61).

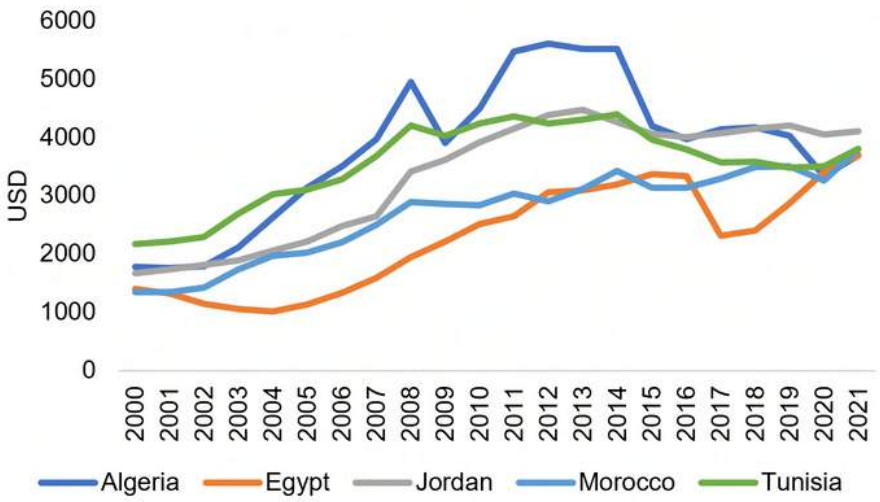


Figure 61. GDP per capita

Source: World Bank

The share of undernourished population decreased over the last two decades and was below the average level in the region (Figure 62). Over the last years this indicator increased, approaching the regional level. In 2019-2021, approx. 6% of population were undernourished.

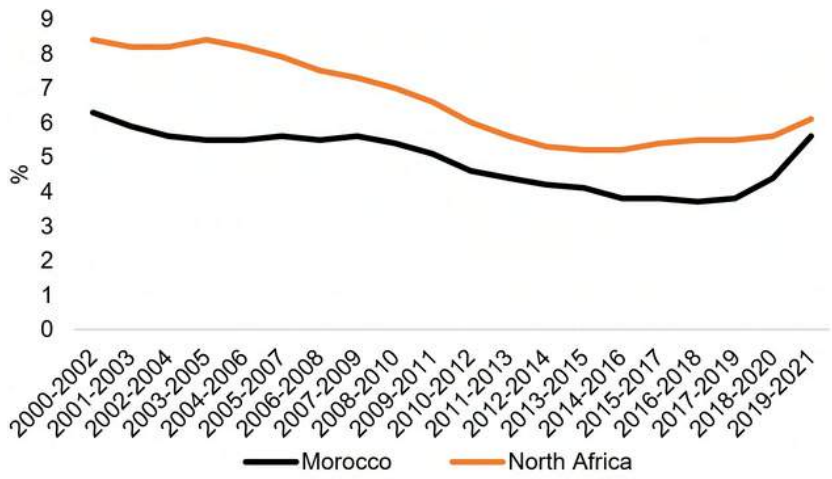
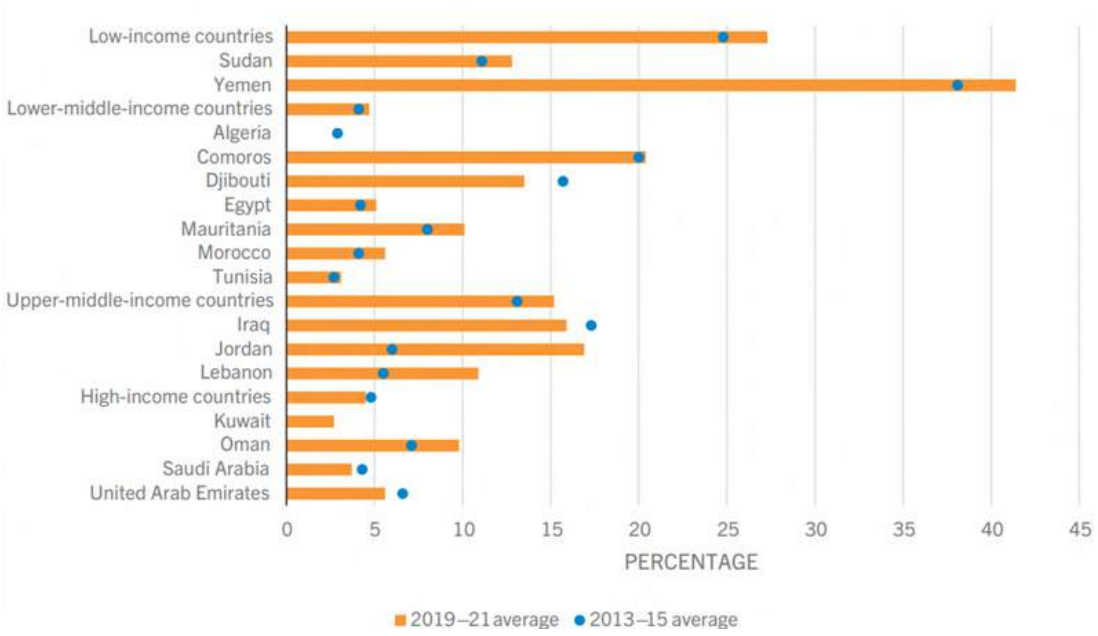


Figure 62. The share of undernourished population

Source: FAOSTAT

As cross-country comparison shows, Morocco has a moderate undernourishment rate compared to the other lower-middle-income countries; this rate has not changed much from the 2013-2015 period (Figure 63).

Figure 63. Prevalence of undernourishment in the Arab states by country



Source: FAO, IFAD, UNICEF, WFP, WHO & UNESCWA. (2023). Near East and North Africa – Regional Overview of Food Security and Nutrition: Trade as an Enabler for Food Security and Nutrition

The number of undernourished persons was relatively stable (Figure 64). In 2019-2021, around 2.1 mln. people were food insecure.

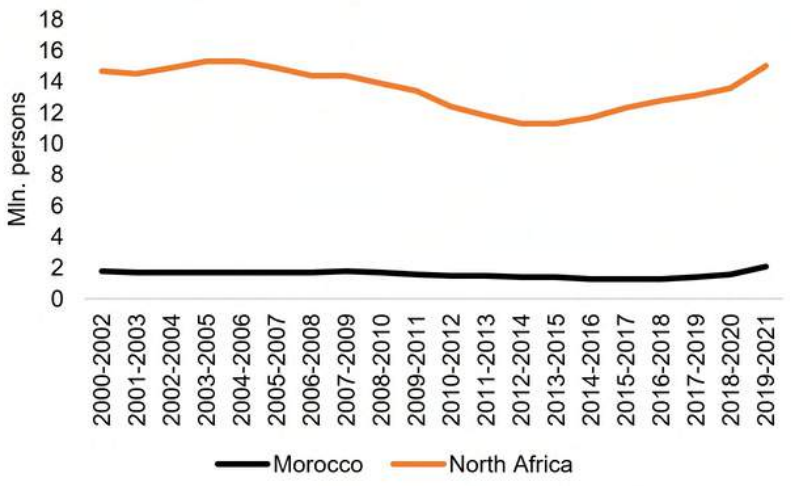


Figure 64. The number of undernourished persons

Source: FAOSTAT

Meanwhile, the dietary energy supply is higher than the average level in North Africa; it has been relatively stable since 2013 (Figure 65).

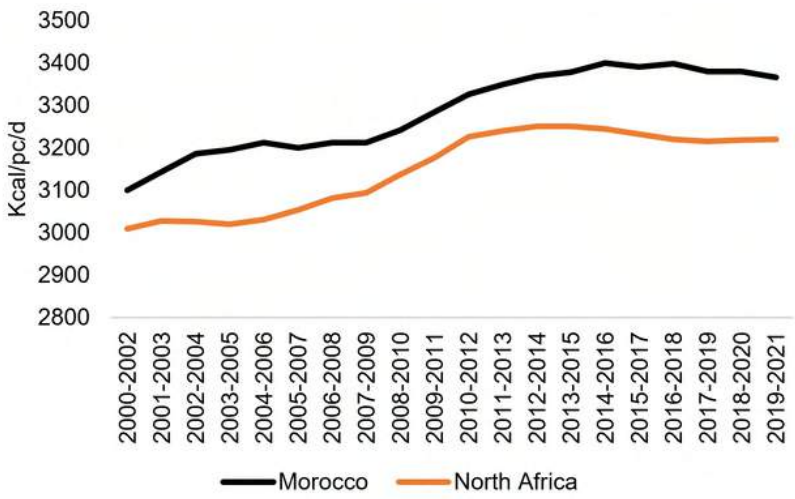


Figure 65. Dietary energy supply

Source: FAOSTAT

The average dietary energy supply adequacy shows the same dynamics. In 2019-2021, it was around 142%, just by 3% above the average level in North Africa (Figure 66).

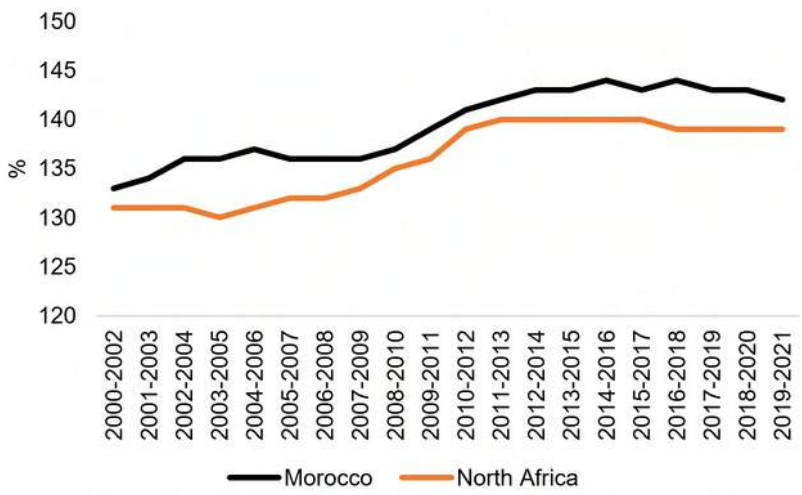


Figure 66. Average dietary energy supply adequacy

Source: FAOSTAT

The share of dietary energy supply derived from cereals, roots and tubers was 60% in 2017-2019, which is close to the average level in North Africa (Figure 67).

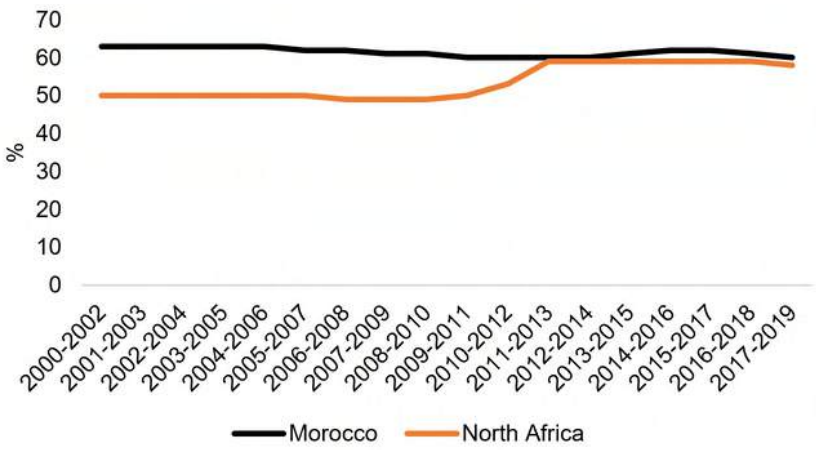


Figure 67. Share of dietary energy supply derived from cereals, roots and tubers

Source: FAOSTAT

The average protein supply has been gradually increasing since 2000 and was above the North Africa level (Figure 68). The same dynamics was for the average animal protein supply (Figure 69).

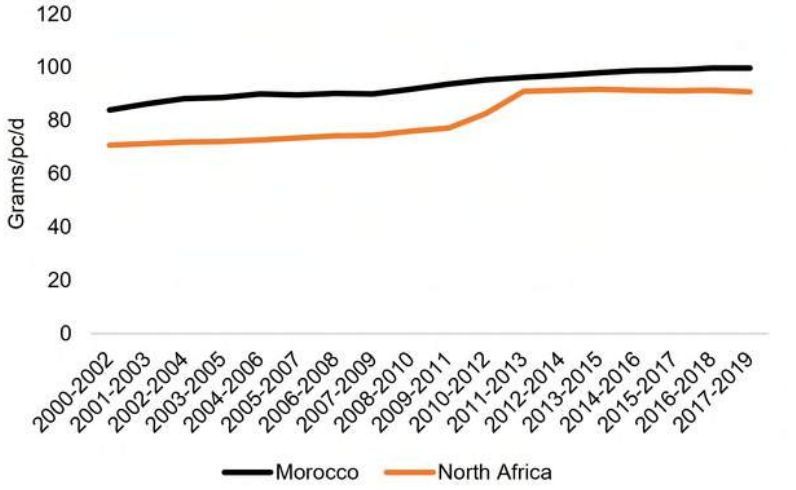


Figure 68. Average protein supply

Source: FAOSTAT

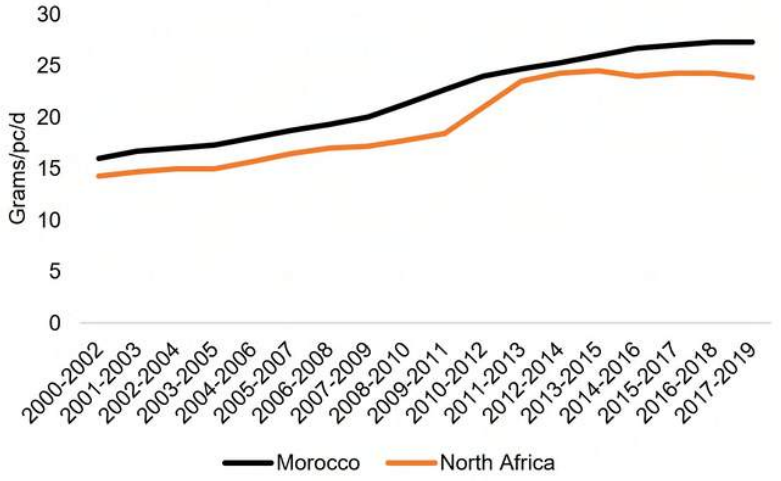


Figure 69. Average animal protein supply

Source: FAOSTAT

Meanwhile, per capita food supply variability decreased since 2000 and was close to the regional level (Figure 70).

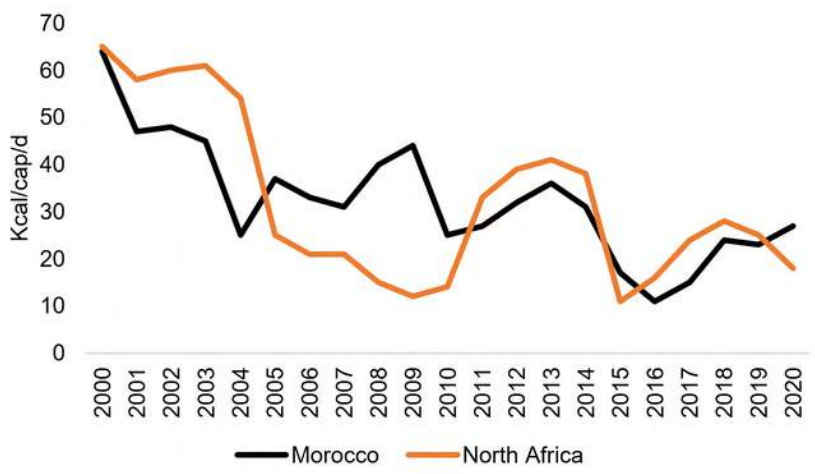


Figure 70. Per capita food supply variability

Source: FAOSTAT

Despite the decreasing trend of poverty in Morocco, it still remains the main factor contributing to food insecurity in the country. The northern and central regions of Morocco, which include urban areas like Casablanca and Rabat, tend to have lower poverty rates compared to the rural and less developed regions in the south and southeast, such as the Atlas Mountains and the Sahara Desert. This disparity is largely driven by variations in economic opportunities and access to infrastructure and services.

Demographically, poverty disproportionately affects certain groups. Rural populations, particularly those living in remote and less fertile areas in southern and eastern Morocco, are more vulnerable to poverty and food insecurity due to limited access to education, healthcare, and economic opportunities. Additionally, women, youth, and minority groups are often at a higher risk of experiencing poverty, as they face greater barriers to employment and education. The persistence of poverty in Morocco can be attributed to a complex interplay of factors, including a lack of access to quality education and healthcare, insufficient job opportunities, and inadequate social safety nets.

Latest household expenditures and income survey was conducted in 2014. The urban-rural gap in poverty rates decreased over 2001-2014, but remained large. From 2007 to 2014 the growth of households' consumption in the bottom quintiles was positive and above the average. In addition, the growth of consumption in urban areas was higher than in rural areas. Thus, urban poverty rate decreased faster than the national rate: in 2001 urban poverty was half the national level, in 2014 it decreased to a third. This was true in most regions, except for Casablanca-Set and the Region du Sud, where urban poverty was higher in 2014 than in 2001 relative to the national average. Poverty rates in rural areas are almost twice as high as the national level. As of 2014, 40 percent of the population lived in rural areas and accounted for 79.4 percent of the 1.6 million poor and 62.1 percent of the 5.4 million vulnerable.

The percentage of households receiving public transfers increased substantially in all quintiles, remained higher in urban areas and in the fifth quintile. The share of

households receiving public transfers more than doubled, going from 10.8 to 22.9 percent between 2001 and 2014. The percentage of households receiving public transfers in the first quintile was 8.9 percent compared to 40.2 percent in the top quintile. The impact on poverty of cash transfer has increased between 2001 and 2014. In 2014, without any transfer the poverty rate would have been 56% higher overall, more than double in urban areas and 26% higher in rural areas. The effect in 2001 was of 28%. Public transfers had a very high impact on poverty reduction in urban areas, while in rural areas transfers from other households in Morocco had the largest impact. Without remittances poverty is estimated to have been 19% higher in urban areas compared to 2% in rural areas.

By contrast to Egypt and Algeria, **World Food Programme activity** in Morocco is not diversified. The strategic plan for the 2019-2021 period was focused mostly on nutrition and social protection, in particular, on school meal programmes (Table 6). WFP plans to proceed with this agenda after 2021.

Table 6. WFP support programms in Morocco in 2021

Strategic Outcome	Activity	Expenditures, mln. USD	Share in total expenditures, %
National institutions in Morocco have strengthened capacity to implement enhanced school meal programmes that improve food security, nutrition and social protection by 2021.	Activity 1: Provide policy advice and technical assistance to the national institutions that implement school meal and social protection programmes.	86 415	100

Source: https://www.wfp.org/operations/ma02-morocco-country-strategic-plan-2019-2022

3.2. AGRI-FOOD TRADE

Over the last decade, agri-food imports to Morocco increased essentially (Figure 71). The main importing categories are cereals, vegetable oils, and other food products.

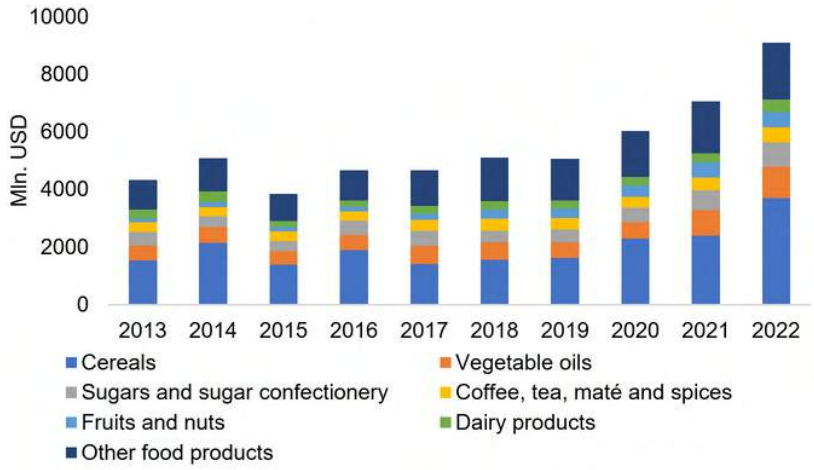


Figure 71. Agri-food imports to Morocco

Source: ITC Trade Map

Meanwhile, Morocco's food exports are also growing (Figure 72). The country actively supplies vegetables, fruits and nuts, fish products, other food products.

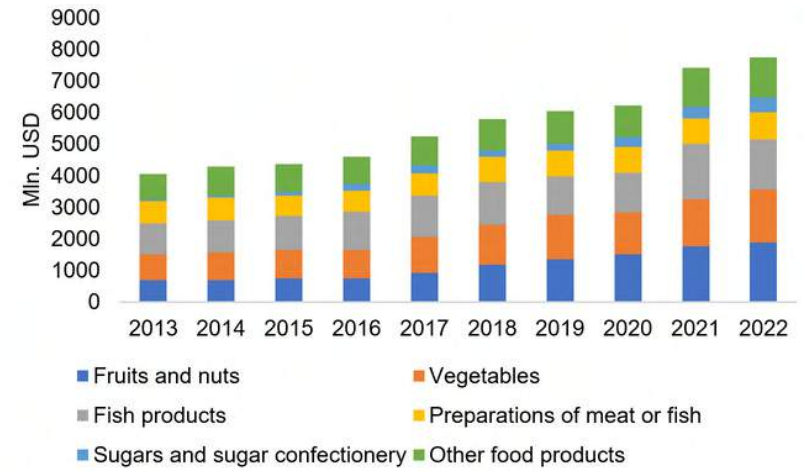


Figure 72. Agri-food imports to Morocco

Source: ITC Trade Map

As for the agri-food exports from Ukraine to Morocco, it has increased over the last decade. The main categories are cereals and food residues (Figure 73).

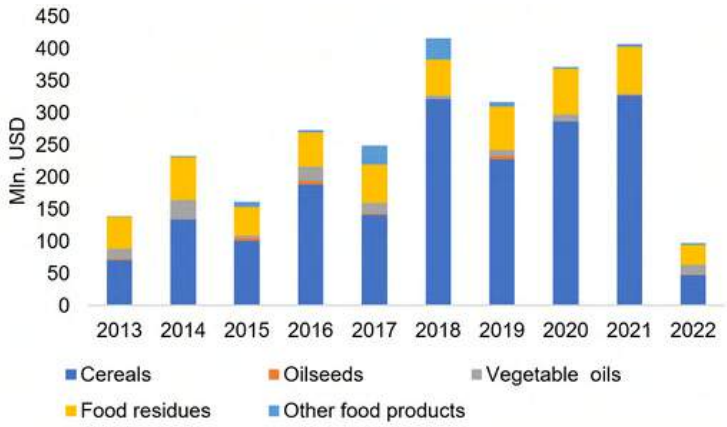


Figure 73. Agri-food exports from Ukraine to Morocco

Source: ITC Trade Map

Agri-food exports from Morocco to Ukraine is relatively low; 90% of exports are fish products (Figure 74).

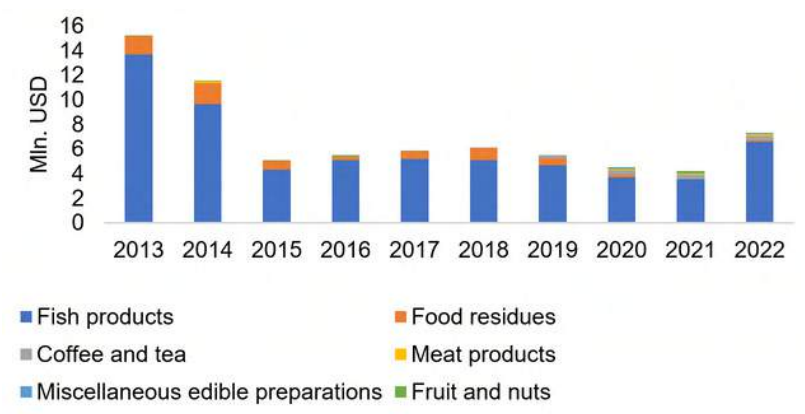


Figure 74. Agri-food exports from Morocco to Ukraine

Source: ITC Trade Map

3.3. LOCAL AGRICULTURAL SECTOR

Agriculture is an important sector in the Moroccan economy, employing 34.5% of the working population, as of 2021. The share of population employed in agriculture remained relatively unchanged throughout the 1990s – 2000s, fluctuating around 43-45%, and then decreased by around 10 percentage points over the last decade. Share of agriculture in GDP was 12% in 2021. It remained unchanged since the late 1990s (Figure 75).

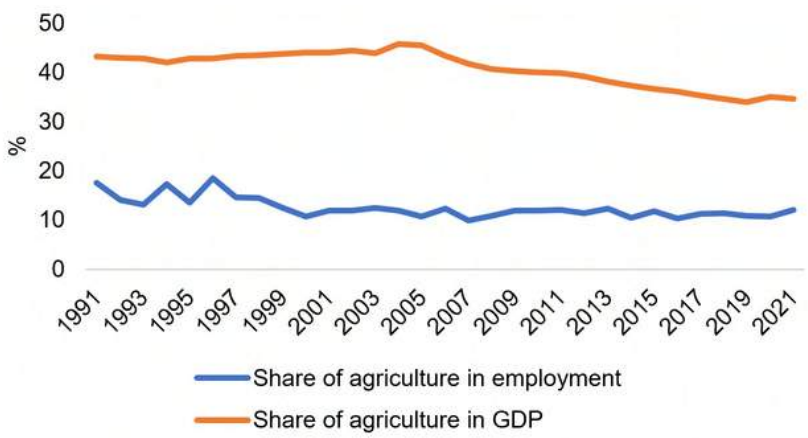


Figure 75. Share of agriculture in GDP and total employment, 1991-2021

Source: World Bank Database

Despite the share of agriculture in GDP being unchanged, in monetary terms agricultural production has been growing since the 2000s. In 2022, the monetary value of produced commodities in constant 2015 USD was more than two times higher than the 2000 value (233% of 2000 value). Observed rapid growth slowed down in mid-2010s. After 2015, agricultural production remained relatively unchanged in monetary terms (Figure 76).

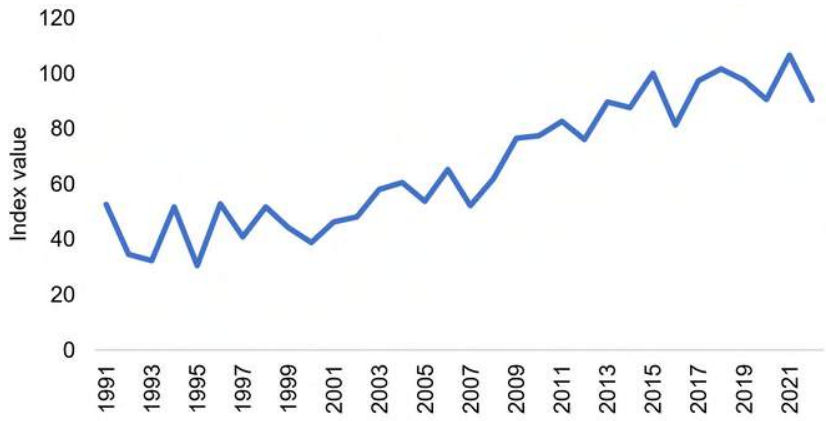


Figure 76. Agricultural production value index, constant 2015 USD. Baseline: 2015

Source: FAOSTAT

Crop production

Main crop produced in Morocco is wheat, with 7.5 million tons produced in 2021. It is followed by barley, potatoes, and sugar beet. As of 2021, their amounts of production were 2.8, 1.6, and 2.6 million tons, respectively. Another significant sub-sector of Moroccan agriculture is vegetables and fruits production. Olives, tomatoes, apples, oranges and tangerines are among the leading crops in this category. Their production in 2021 constituted 1.6, 1.3, 0.9, 1.0, and 1.3 million tons, respectively.

Throughout the last two decades, the structure of production has undergone changes. In 2000, the main commodities produced were sugar beet and sugar cane. Amount of harvested sugar beet remained relatively unchanged through 2000-2021, while sugar cane production dropped by more than two times. Cereals production increased significantly over the mentioned period. The 2021 harvest of wheat and barley constituted approx. 540% and 590% of the 2000 level. Although, these amounts are not stable and have been highly volatile throughout the last two decades, with periods of big and small harvests taking turns (Figure 77).

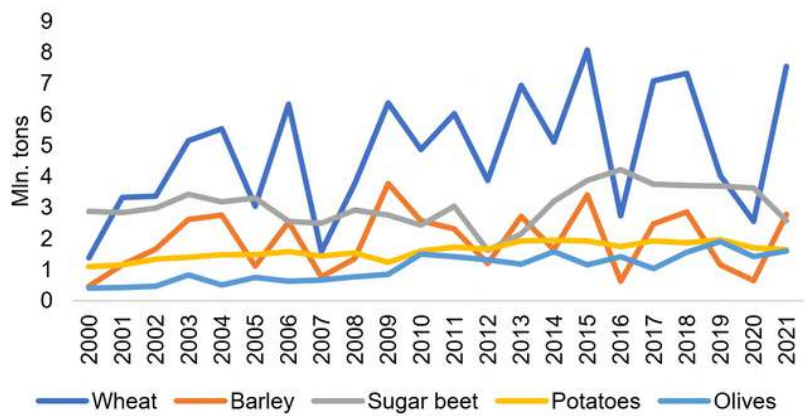


Figure 77. Production amounts of the 5 most-produced crops in Morocco, 2000-2021

Source: FAOSTAT

Land use and sown areas

As of 2020, 304 thousand square kilometers of land were used for agricultural purposes, which is 68% of the total Moroccan area (Figure 78). Amount of agricultural land have been increasing in the 1960s-1980s, as desert lands were reclaimed. Then it reached the ceiling in the 1990s, fluctuating within 300-310 thousand square kilometers over the last three decades. In the sown areas structure, wheat, barley, and olives are dominating. These three crops take up 41%, 22%, and 16% of the total sown areas.

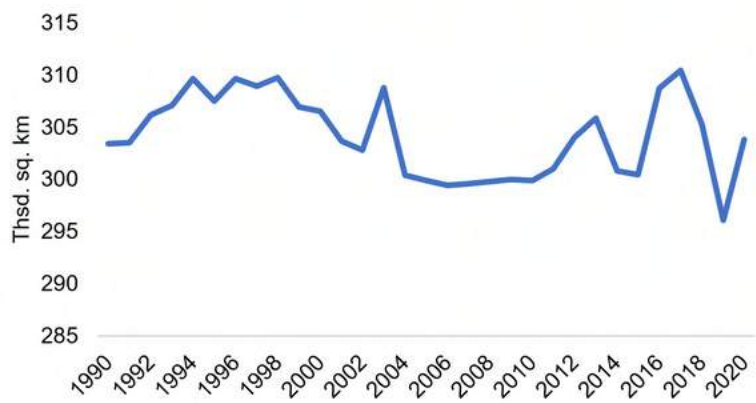


Figure 78. Agricultural land in Morocco

Source: World Bank Database

According to FAO's AQUASTAT, as of 2019, only 6% of the agricultural land have been equipped for full control irrigation. This number has been slowly growing in the last two decades, increasing by 1.7 percentage points over the period of 2004-2019. About 65% of this area is irrigated with surface water, while the rest is using groundwater sources.

Livestock production

Milk, chicken eggs, and various meat kinds are the leading livestock commodities produced in Morocco. As of 2021, 7.1 billion chicken eggs were produced, which is equal to approx. 525 thousand tons. Milk production is dominated by cattle milk (2.5 million tons in 2021), although sheep, goat, and camel milk are produced as well, but in non-significant amounts (45, 36, 9 thousand tons in 2021, respectively). Meat types produced include chicken, cattle, sheep, and turkey meat. As of 2021, their production amounts were 525, 282, 179, and 115 thousand tons, respectively. Shorn wool is a one more significant commodity of the Moroccan livestock sector, with 63 thousand tons produced in 2021 (Figure 79).

Over the last two decades, structure of production did not change significantly. Production amounts of mentioned commodities have been growing gradually, increasing by 2-2.5 times on average over the 2000-2021. The only exception is turkey meat, for which a rapid growth of production is observed. It increased from 3 thousand tons in 2000 up to 115 thousand in 2021.

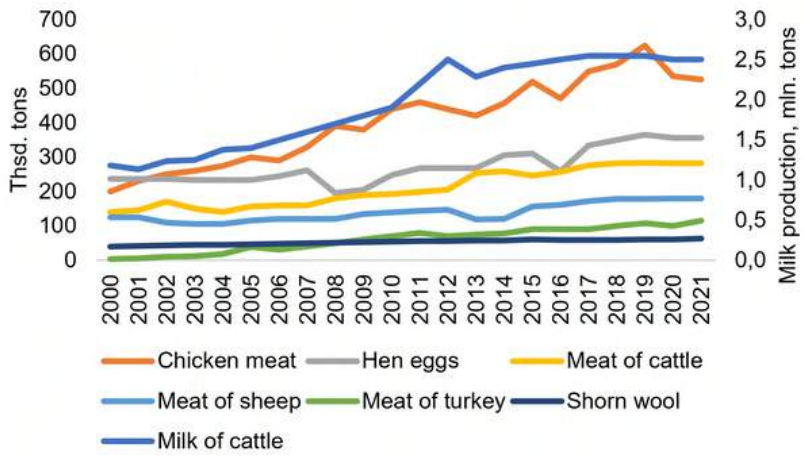


Figure 79. Livestock commodities production in Algeria, 2000-2021

Source: FAOSTAT

Chickens are the most widespread animal in the Moroccan livestock sector, with 217 million heads, as of 2021. It is followed by sheep, turkeys, goats and cattle, with the quantity of 22.7, 12.8, 6.2, and 3.2 million heads (Figure 80). Throughout the period of 2001-2021, the number of goats and cattle remained relatively unchanged. Amount of chicken and turkeys has been growing since 2005. Number of alive chicken stock increased by 58% over the 2005-2021. Turkey's stock growth was much more rapid, with a 293% growth over the 2005-2021. Number of cattle and goats remained relatively unchanged in the last two decades. Stock of alive sheep has been growing gradually in the 2010s, with a 34% increase over the 2009-2021.

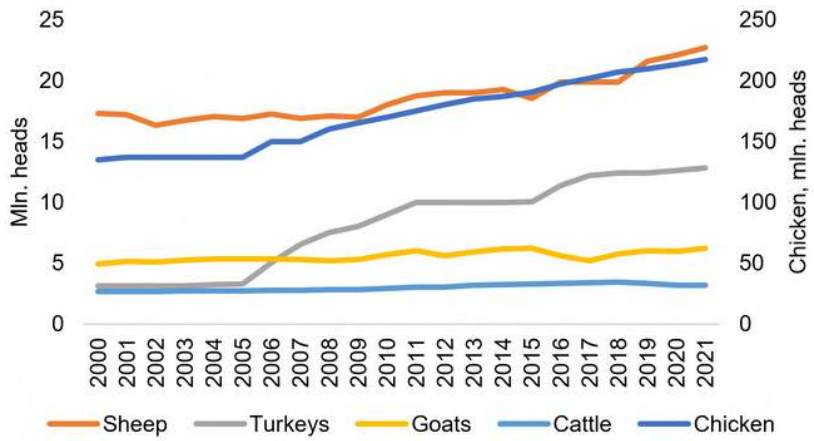


Figure 80. Live animals stock

Source: FAOSTAT

Processing sector

As of 2021, the added value created by the food, beverages and tobacco manufacturing sector amounted to 3.76% of the GPD. Throughout the last two decades, it decreased by around 2 percentage points. However, it did not imply the sector did not experience growth. As of 2021, value added, created by the food, beverages and tobacco production amounted to 4.4 billion constant 2015 USD (Figure 81). Over the period of 2001-2021, it increased by 34% in constant 2015 USD. The most rapid growth occurred in 2005-2012. In terms of employment, around 1.3% percent of the nation's labor force works in the sector, as of 2021 (Fardaoussi, 2022).

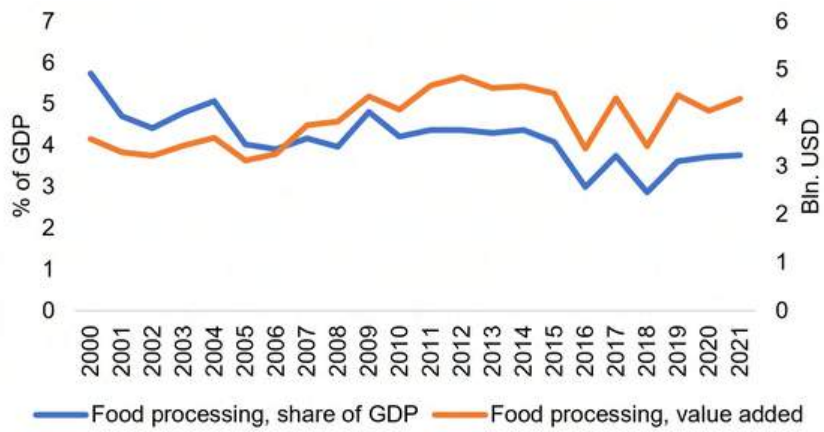


Figure 81. Food, beverages and tobacco production, value added 2000-2021

Source: own calculations based on World Bank data

Primary processed product produced is skim milk, with 1.02 million tons produced in 2020. Other dairy commodities, such as butter or cheese, are produced in much lower amounts, rarely exceeding 40 thousand tons over the last two decades. The second important subsector is sugar production, with 526 thousand tons of sugar and 158 thousand tons of molasses produced in 2020 (Figure 82). Vegetable oils production is dominated by olive oil (165 thousand tons in 2020), but groundnut and soybeans oil are present as well (13.9 and 13.0 thousand tons in 2020, respectively). Barley beer and grape wine are the 5th and 6th most-produced commodities in the sector, with 76 and 41 thousand tons produced in 2020. Over the 2000-2020, the biggest growth was observed in production of skim milk and olive oil. Amounts of sugar and molasses produced remained relatively unchanged.

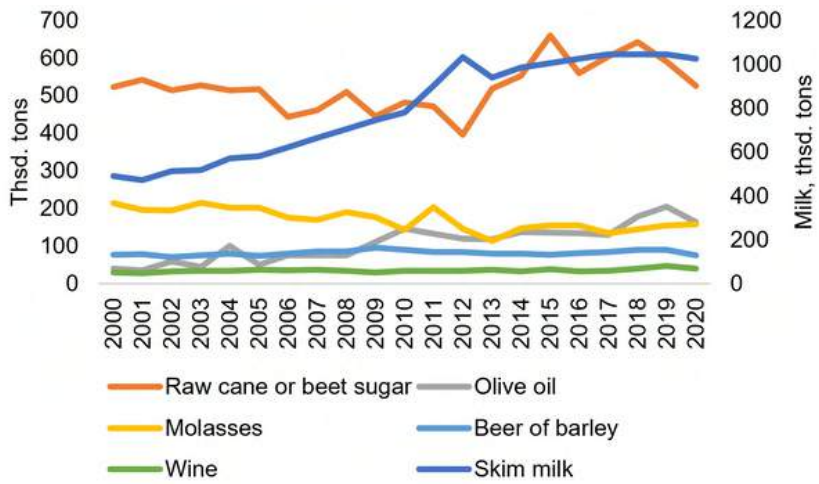


Figure 82. Processed commodities production, 2000-2020

Source: FAOSTAT

3.4. CHALLENGES IN AGRICULTURE

Biggest challenge Moroccan agricultural producers are facing is the **water scarcity**. The amount of renewable water available in the country was already fully utilized in the early 2000s. This issue is the most pressing in the arid Eastern and Southern parts of Morocco, where agricultural production is nearly impossible without irrigation. Increase in production of water-intensive crops (fruit trees, fodder maize) caused the increase in demand for water. To ensure water security, groundwater use and more efficient drip-irrigation were promoted. However, these measures struggle to solve the issue and are far from being efficient (Batchelor et al., 2014). Another type of solution that emerged is desalination of seawater, but it does not seem to solve it due to high costs. According to Srairi (2017), desalinated water is almost 20 times more expensive than the surface irrigation water ($1, and $0.04-0.06 per cubic meter as of 2016, respectively), thus, making it too expensive for the majority of producers.

The second challenge producers are facing is **revenues uncertainty** due to price volatility and rain irregularity. As a large share of agricultural land in Morocco is rain-fed, yields depend highly on the amount of rainfall, and are vulnerable in face of dry seasons. Another source of uncertainty is farm gate fruit prices volatility. Fruits are the

main exporting sub-sector of Moroccan agriculture and drops in prices harm the sector. The most critical events happened in 2016-2017, when citrus fruits prices dropped below the average production costs level, which caused the farmers to decide on not harvesting fruits (Srairi, 2017).

The third challenge is the **weak resilience** of the sector. The differentiation between irrigated and rain-fed areas created significant discrimination within the Moroccan agriculture. Farms located in the rain-fed regions almost do not benefit from the government aid, research efforts, and investment. It becomes a growing issue, as two sectors are complementary to one another. On the one hand, production of rain-fed cereals and fodder crops are crucial to ensure the domestic food security. On the other hand, irrigated crops production is less risky and is able to provide more secure incomes. Disproportionate development of the mentioned two sectors might lead to decrease in the sector resilience. Another differentiation of the sector takes place between a small number of modern large farms and the majority of small farmers, which mostly use outdated production methods. Current policies (The Green Morocco Plan) give priority to large farms, encouraging production of export crops, while paying less attention to satisfaction of domestic food demand and smallholder farms (Akesbi, 2015).

3.5. AGRICULTURAL POLICY OVERVIEW

Morocco's agricultural policy has been shaped by the agricultural state support framework and the Plan Maroc Vert (PMV) agricultural development strategy. Country's policy emphasizes irrigation development, financial assistance, insurance programs, and tax exemptions. Moreover, the comprehensive approach of the PMV program, adopted in 2008 and implemented over the years, was targeted to considerably improve the productivity, resilience, and sustainability of the agricultural sector.

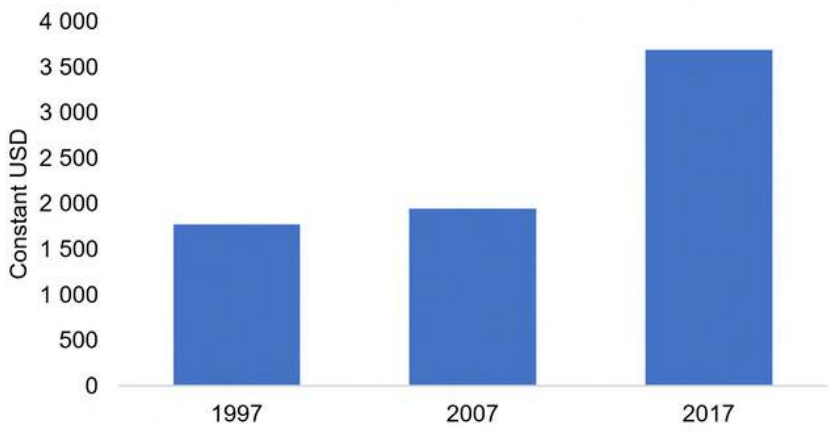


Figure 83. Agricultural value added per worker, constant prices

Source: FAOSTAT

Given the fact that nearly half of the value added in the agriculture of Morocco is attributed to irrigated production, the agricultural state support policy in Morocco places a strong emphasis on irrigation development, with a significant allocation of investment to this sector. Approximately half of the agricultural investment, or nearly $300 million annually between 2008-2014, budget was dedicated to modernizing, refurbishing, and

expanding irrigation systems, with the goal of promoting water-saving techniques (WTO, 2016). Agriculture has also experienced increased credit finance inflow during that period, having doubled since 2006 in real terms (Figure 84).

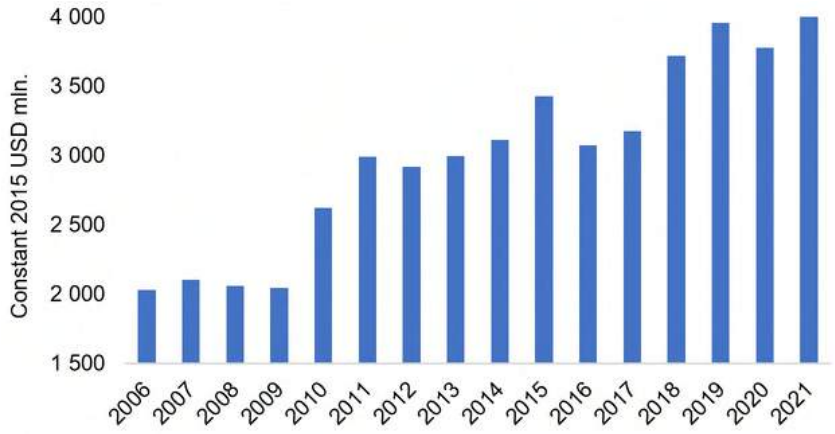


Figure 84. Credit to Agriculture, constant prices

Source: FAOSTAT

To encourage the adoption of high-efficient agriculture through well-developed irrigation technologies, Morocco introduced the National Irrigation Water Saving Programme (PNEEI 2008-2020), which specifically aimed to promote the use of localized irrigation techniques. Additionally, the Irrigation Expansion Programme (PEI 2008-2020) was implemented to target an irrigation expansion, optimizing water resources from existing and planned dams.

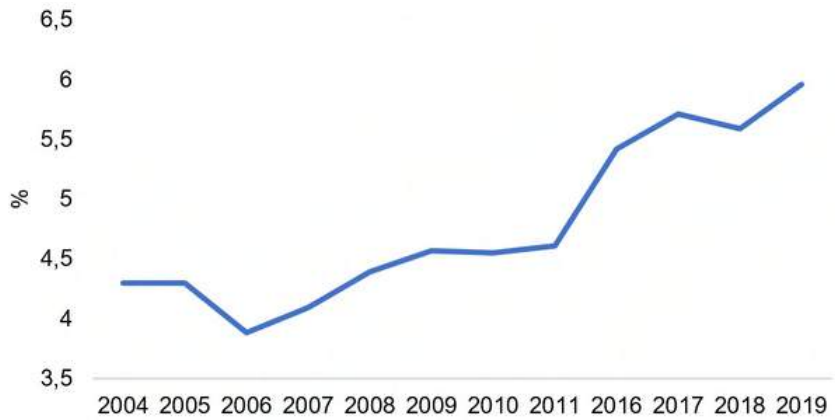


Figure 85. Agriculture area actually irrigated, % of Agricultural land

Source: FAOSTAT

Government support for these initiatives included investment in collective irrigation networks, financial aid for water-saving techniques, and capacity building for associations of irrigators and the Regional Offices for Agricultural Development (ORMVA). Tax stimulus included VAT exemption for irrigation equipment to boost the adoption of best practices.

State financial aid is also provided through the Agriculture Development Fund (FDA) administered by the Moroccan Agricultural Credit Bank (CAM). One of its main functions is to offer seasonal loans and medium- to long-term credit for farm equipment and modernization at decreased interest rates. On top of that, a comprehensive insurance system was established in 2011 through a public-private partnership with the Agricultural Mutual Insurance Company (MAMDA) to cover major weather hazards in

the agricultural sector. The state also subsidizes farmers' premiums for crop insurance against various risks.

In terms of taxation, the agricultural sector previously enjoyed exemptions from income and corporation tax until 2015. Large agricultural enterprises gradually started paying these taxes from 2015 onwards. Morocco prioritized the elimination of trade barriers in order to boost its exports of processed agricultural goods with higher value added. This was demonstrated through the signing of a free trade agreement with the EU in 2012, which facilitated the export of Moroccan agricultural products and allowed Europe to export its processed goods to the Kingdom. As a result of this agreement, 70% of European imports received duty-free access, and duties on 55 percent of Morocco's exports were lifted (European Commission, 2023).

The PMV ambitious strategy, launched in 2008, further complemented Morocco's agricultural state support policy by addressing various challenges and setting specific objectives for the sector. The PMV consisted of two core blocks. The first one focused on industrialized and commercial agriculture, aiming to maximize production, promote agribusiness investment, and expand agricultural exports. Meanwhile the second block supported small-scale farming (40% of population in Morocco in engaged in Agricultural activities, with up 80% in rural areas), improving their incomes and overall situation with food security in the country (Abdelmajid et al., 2021). Morocco has undertaken organizational reforms and secured substantial agricultural investments (over $650 million) from international organizations, including the World Bank, African Development Bank, FAO, USAID to support the implementation of the program.

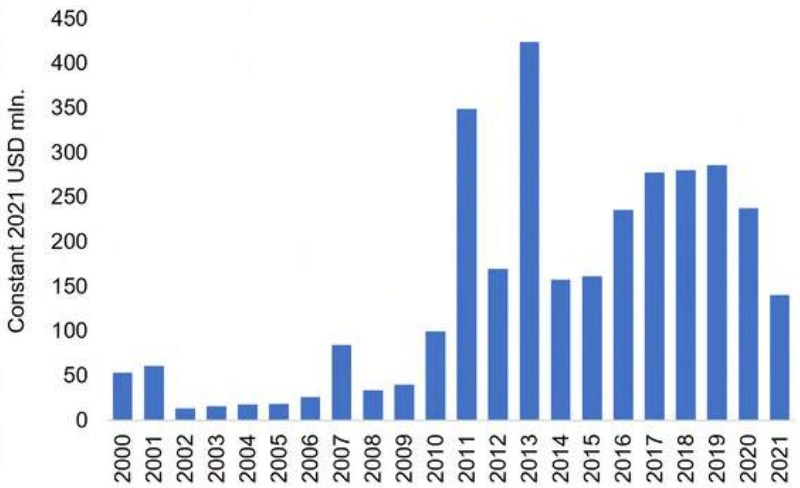


Figure 86. Development Flows to Agriculture, constant prices

Source: FAOSTAT

The implementation of the PMV has resulted in notable achievements, such as the conversion of irrigation systems to more efficient localized irrigation, contributing to enhanced productivity, resilience, and resource conservation. During the program's implementation period, agriculture has increasingly added to the overall economy growth, rising from 7% in 2008 to over 17% in 2018. Particularly, the highest growth was observed in fruit trees, livestock and market gardening sectors.

Import tariffs policy

Morocco implemented significant agricultural policy reforms in 2013, with the aim of enhancing the competitiveness of its agricultural products and reducing the trade deficit.

These reforms included an extensive tariff reform that resulted in a reduction of average tariffs on agricultural imports from 44.5% in 2009 to 30% in 2015. The primary objectives were to promote local production with higher value-added for both domestic consumption and export by utilizing imported inputs and to replace imports of finished goods. However, despite these reforms, the agricultural sector in Morocco still maintains high levels of tariff protection, with rates of at least 30% on 210 tariff lines (WTO, 2016). This high level of protection acts as a deterrent to imported agricultural products and increases costs for consumers.

In terms of import trade policy, around 13.5% of Moroccan tariff lines related to agricultural products are covered by tariff quotas, even though import volumes in some years exceeding the specified quotas (particularly poultry, sheep meat, rice, and colza) for most products. Additionally, Morocco provides tariff preferences to specific trading partners, offering exemptions from customs duties for agricultural products originating from countries within the Greater Arab Free Trade Area (GAFTA). Tariff reductions are also granted on imports from the European Union (EU) and the United States under their respective agreements.

3.6. MOROCCO: SUMMARY

Morocco is the third most-populated North African country with the level of food security close to the average regional level. The World Food Programme activity in Morocco is focused mostly on nutrition and social protection, in particular, on school meal programmes.

Over the last decade, agri-food imports to Morocco increased essentially. The main importing categories are cereals, vegetable oils, and other food products. Meanwhile, the country actively exports vegetables, fruits and nuts, fish products. Ukraine exports to Morocco mostly cereals and food residues.

Agriculture is an important sector in the Moroccan economy, employing 34.5% of the working population, as of 2021. Share of agriculture in GDP was 12% in 2021. Main crop produced in Morocco is wheat, followed by barley, potatoes, and sugar beet. As of 2020, 304 thousand square kilometers of land were used for agricultural purposes, which is 68% of the total Moroccan area. In the sown areas structure, wheat, barley, and olives are dominating. Chickens are the most widespread animal in the Moroccan livestock sector, followed by sheep, turkeys, goats and cattle. The main challenge for local agriculture is water scarcity.
Morocco's agricultural policy has been shaped by the agricultural state support framework and the Plan Maroc Vert (PMV) agricultural development strategy. Country's policy emphasizes irrigation development, financial assistance, insurance programs, and tax exemptions.

The SWOT analysis for the Moroccan agricultural sector is presented in **Table 7.**

Table 7. SWOT analysis for the Moroccan agricultural sector

Strengths	Weaknesses
1. Growth of export of vegetables, fruits and nuts, fish products. 2. Liberalization of agricultural markets (in particular, via signing the free trade agreement with the EU in 2012). 3. Strong progress in land reclamation in 1960s-1980s ensured boost of agricultural production.	1. Poverty at the rural areas in the south regions. 2. Increasing dependence on imported cereals and vegetable oils 3. Low market integration (problems with exports) induce excessive price volatility on the fruits market. 4. State support is very differentiated across irrigated and rain-fed areas as well as between small and large farmers.
Opportunities	**Threats**
1. Reforms in the national irrigation policies. 2. Shifting to non-discriminative agricultural policy and fostering small farmers.	1. Exacerbation of water scarcity amidst climate change processes. 2. Limited state support of small farmers in arid areas stimulates urbanization that undermines domestic food self-sufficiency.

Source: Created by authors

REFERENCES

Abdelmajid, S., Mukhtar, A., Baig, M., Reed, M. (2021). Climate Change, Agricultural Policy and Food Security in Morocco. In: Behnassi, M., Barjees Baig, M., El Haiba, M., Reed, M.R. (eds) Emerging Challenges to Food Production and Security in Asia, Middle East, and Africa. Springer, Cham

Adair, P., Lazreg, M., Bouzid, A., Ferroukhi, S. (2022). L' agriculture algérienne: l'héritage du passé et les défis contemporains. Les Cahiers du Cread, 38 (3)

Akesbi, N. (2015). Who makes the agricultural policy in Morocco? When the export substitutes himself to the researches. Annales de l'INRA Tunisie, Vol. 88

Al-Habbal, I., Belliard, M. J. (2018). Egypt – Food Processing Ingredients Annual 2018. USDA Foreign Agricultural Sevice, Cairo Post

Batchelor, C., Reddy, V., Linstead, C., Dhar, M, May, R. (2014). Do water saving technologies improve environmental flows? Journal of Hydrology, vol. 518

Bessaoud, O. (2019). Rapport de synthèse sur l'agriculture en Algérie. Projet d'Appul A l'Initiative ENPARD Mediterranee.

Breisinger, C., Daniel, G., Karachiwalla, N., Kurdi, S., El-Enbaby, H., Jilani A., Thai, G. (2018). Impact evaluation study for Egypt's Takaful and Karama cash transfer program. Part 1: Quantitative report. IFPRI MENA RP Working Paper 14

Energy Sector Management Assessment Program (ESMAP). (2017). Energy Subsidy Reform Facility Country Brief: Egypt. World Bank Group

Epravda. (2016). Egypt refused Ukrainian grain

European Commission. (2023). EU trade relationships by country/region – Morocco

FAO. (2016). AQUASTAT Country profile – Egypt

FAO. (2019). AQUASTAT Country profile – Algeria

FAOSTAT. (2021). Egypt

Fardaoussi, M. (2022). Morocco – Food Processing Ingredients. USDA, Rabat post

Ferrouki, S., Boumghar, M., Chehat, F. (2021). Analyse des effets des subventions sur la croissance agricole: un essai de mesure pour la periode (2000-2018). Les Cahiers du Cread, Vol. 37 (2)

Hattab, M., Gaouar, A. (2016). Évaluation des moyens de production céréalière dans la région d'El Gor – wilaya de Tlemcen. Revue Agriculture. 11 (2016) 37 - 43

INDDEX. (2023). Per Capita Food Supply Variability

Konandreas, P., Mermigkas, G. (2014). WTO Domestic Support Disciplines: Options for Alleviating Constraints to Stockholding in Developing Countries in the Follow-up to Bali. FAO Commodity and Trade Policy Research Working Paper No.45.

Kurdi, S., Mahmoud, M., Abay, K., Breisinger, C. (2020). Too much of a good thing? Evidence that fertilizer subsidies lead to overapplication in Egypt. IFPRI Middle East and North Africa. Regional Program Working Paper 27

McGill, J., Prikhodko, D., Sterk, B., Talks, P. (2015). Egypt. Wheat Sector Review. Country Highlights, FAO/EBRD

OECD. (2015). Review of Agricultural Investment Policies of Ukraine

Omar, S. (2022). Egypt – Livestock and Products Annual. USDA, Cairo Post

ReliefWeb. (2023). UNHCR Algeria Fact Sheet - April 2023
Sahli, Z. (2010). Agriculture and rural development in Algeria. Status, risks and challenges. Bulletin UASVM Horticulture, 67(2)
Saidoun, R., Ait Hammou, S., Chehat, F. (2022). La politique agricole et rurale en Algerie: de la centralization a la gouvernance. Les Cahiers du Cread, Vol. 38 (3)
Shalaby, M., Al-Zahrani, K., Baig, M., Straquadine, G., Aldosari, F. (2011). Threats and challenges to sustainable agriculture and rural development in Egypt: implications for agricultural extension. The Journal of Animal & Plant Sciences, 21 (3)
Srairi, M. (2017). New challenges for the Moroccan agricultural sector to cope with local and global changes. In Danh N. T. (Ed.). Morocco: Environmental, Social and Economic Issues of the 21st Century. NY: Nova Science Publishers
Stads, G., Moussa, H., Badwan, R. (2015). Egypt: Agricultural R&D indicators factsheet. IFPRI
Sweed, A. (2019). Fertilizers system in Egypt. IFPRI
Tellioglu, I., Konandreas, P. (2017). Agricultural Policies, Trade and Sustainable Development in Egypt. FAO/ICTSD
UNEP/WFP. (2016). Stratégie méditerranéenne pour le développement durable 2016-2025. Valbonne. Plan Bleu, Centre
USDA. (2023). Grain and Feed Annual. Egypt
Yehia, A. (2022). The Impact of Restructuring Principal Bank for Development and Agricultural Credit on Financing the Agricultural Sector in Egypt. Indian Journal of Economics and Business 21 (1)
World Bank. (2019). Understanding Poverty and Inequality in Egypt
World Bank. (2020). Poverty and Equity Brief: Arab Republic of Egypt
Worldometers. (2023). North Africa population
WTO. (2016). Trade Policy Review: Morocco