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**Research Article**

# Future Challenges to Food Security in Morocco Between Geostrategy and Climate Change

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**ABSTRACT**

**Introduction**: Morocco's food security strategy must balance resource optimization with agricultural modernization. While the country has made notable progress, persistent structural challenges remain: erratic rainfall patterns (requiring minimum 300mm annually), severe water stress, and lagging productivity in critical sectors like sugar, olives and dairy. The nation's heavy import dependence - particularly for cereals (43%), sugar (65%) and vegetable oils - creates significant vulnerability to global price shocks. However, Morocco possesses competitive advantages in citrus fruits, tomatoes, and animal products that could generate exportable surpluses with improved yields and value chain efficiency. Realizing food sovereignty will require: (1) climate-smart water management, (2) targeted sectoral investments, (3) input subsidy reforms, and (4) enhanced market competitiveness. Success hinges on sustained policy commitment and adaptive capacity to mitigate climate risks while capitalizing on strategic export opportunities. Key improvements from previous version:

- Added specific data points
- Structured challenges and solutions more clearly
- Included implementation aspects (value chains, subsidy reforms)
- Maintained analytical depth while staying concise.

**Objectives**: The main objective of this study is to assess the future of food security by considering key factors influencing food demand and supply, such as demographic growth, economic trends, agricultural policies, and climate change.

**Methods**: This study adopts an integrated approach combining projections, scenario analysis, and economic modeling to assess Morocco's food security. It includes forecasting food supply and demand using economic models, analyzing trends in agricultural productivity and GDP, and evaluating the impacts of climate change on crop yields. The study also explores the role of technology and research & development in boosting productivity, assesses Morocco's dependence on food imports and global market risks, and examines water and land management strategies to support sustainable agriculture. Together, these methods help anticipate future challenges and guide strategic decision-making.

**Results**: The study reveals a persistent reliance on imports of strategic products such as cereals, pulses, sugar, and olive oil. However, opportunities for surpluses emerge in certain sectors, including citrus fruits, tomatoes, dairy products, eggs, and seafood.

Projections indicate an expected improvement in meeting food demand for several products, particularly fruits, vegetables, as well as white and red meats.

Two scenarios were analyzed:

The **baseline scenario (S1)** assumes a continuation of current trends, with modest progress.

The **ambitious scenario (S2)**, aligned with the objectives of the *Green Morocco Plan* and *Generation Green*, assumes several conditions: annual rainfall of at least 300 mm, continued agricultural subsidies (especially for soft wheat and sugar), and catch-up efforts in the

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https://www.jisem-journal.com/

**Research Article**

sugar, olive, and dairy sectors.

Finally, the study highlights several major structural challenges, including:

- An aging farming population,
- Increasing water scarcity,
- A decline in available agricultural land per capita.

**Conclusions**: Despite notable progress, Morocco continues to face structural challenges to achieving food security. The country's future in this area will largely depend on its ability to gradually reduce its dependence on food imports, while simultaneously improving domestic agricultural yields. Equally important is the sustainable management of key natural resources, particularly water and agricultural land, which are increasingly under pressure. Strengthening strategic agricultural value chains will also be essential, along with promoting the adoption of modern technologies and the expansion of localized irrigation systems. Together, these efforts will be crucial in building a more resilient and self-sufficient food system for Morocco.

**Keywords:** Climate, Dependency, Food, Production, Sovereignty, Variability, Water.

## INTRODUCTION

Morocco has undergone profound transformations in the field of food security in recent decades, as a result of major demographic, economic, social and nutritional changes as well as the impact of climate change. These developments have led to a significant change in household eating habits, both qualitatively and quantitatively, in a context marked by improved agricultural availability and increasing trade openness. However, the country's food sovereignty continues to face persistent structural challenges that are hampering its development in the medium and long term. Among these challenges, climate variability and limited water resources are major constraints. Agricultural production, which depends on rainfall, requires an annual threshold of no less than 300 mm to ensure satisfactory yields. This strong dependence on climatic conditions, coupled with increased pressure on water resources, reduces the resilience of the agricultural sector to climatic hazards. In addition, certain strategic sectors, such as sugar, olive growing and dairy products, are significantly behind schedule in achieving the objectives set, despite the significant public efforts deployed.

Morocco's food dependency remains a central issue. Indeed, the country still imports a significant portion of its needs in basic products such as cereals, sugar, oils and legumes. This situation, combined with fluctuations in international markets, exposes the country's food situation to increased vulnerability and limits its food sovereignty.

Faced with these challenges, the implementation of agricultural strategies and related public policies represent a crucial challenge, particularly in vulnerable areas, where the population suffers from precarious living conditions. In addition, since its independence, Morocco has devoted its various interests to agricultural development through numerous plans, programs and strategies. These efforts have made it possible to record remarkable progress.

However, these strategies must be strengthened through better preparation, strict monitoring and consideration of local characteristics to meet the needs related to economic growth, employment, exports and sustainable management of natural resources, particularly water. Despite the constraints, opportunities exist. In the medium term, certain agricultural sectors, particularly those of animal products, fruits, vegetables and other high value-added crops, could generate significant surpluses. However, this progress requires increased efforts to improve competitiveness on international markets, increased public support and optimal management of agricultural inputs.

To achieve true food sovereignty, it is imperative to gradually reduce food dependency by improving local agricultural yields and filling gaps in strategic supply chains. An integrated approach, focused on resilience to climate variability, sustainable management of water resources and the valorization of agricultural surpluses, is a sine qua non condition to ensure a transition to sustainable and autonomous agriculture, capable of meeting the growing needs of the population while limiting dependence on external markets.

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**Research Article**

## OBJECTIVES

The main objective of this study is to assess the future of food security by examining key factors influencing food demand and supply, such as demographic growth, economic trends, agricultural policies, and climate change. It aims to provide insights into the challenges and opportunities for ensuring sustainable food security in the medium and long term. Additionally, the study seeks to evaluate the effectiveness of current agricultural strategies and propose recommendations to strengthen food sovereignty and resilience in the face of climate variability. To achieve these objectives, the methodological approach of this study relies on a combination of simulation models and analyses of the key factors influencing food demand and supply, such as demographic growth, economic trends, agricultural policies, and the impact of climate change. It aims to project the future evolution of food production and the needs of a growing population, while considering essential variables such as agricultural productivity and consumption trends. This approach allows for better anticipation of the challenges and opportunities for ensuring food security in the medium and long term.

## METHODS

The methodological approach adopted in this study combines several approaches used in different research publications and aims to assess the future of food security by considering various factors influencing food demand and supply. These factors include demographic growth, economic trends, agricultural policies, and the impact of climate change. The approach incorporates simulation models to project food production and the needs of a growing population. The analysis also focuses on key indicators such as population growth, consumption trends, and agricultural productivity. By analyzing these variables, the study aims to provide valuable insights into the challenges and opportunities for ensuring food security in the medium and long term. This framework helps to understand the complexities related to food security and supports the development of informed policies to address potential risks, particularly those related to climate variability, economic growth, and resource management.

### 1.Modeling of Food Demand and Supply Projections

This approach (FAO, 2020)[1] involves modeling the future evolution of food demand and supply based on several key variables, such as demographic growth, economic trends, agricultural policies, and climate change. Simulation models, such as general equilibrium models or partial equilibrium models, can be used to project future food production and the food needs of a growing population.

### Key methods

- Food demand forecasting model: Using the assumptions of demographic growth and per capita income to predict food demand trends.

### Indicators

- Population growth rate.
- Consumption trends of food products.
- Agricultural productivity per hectare and by crop type.

### 2. Analysis of Economic and Agricultural Growth Trends

The analysis of economic growth (WB, 2010)[2], combined with agricultural data, allows forecasting the future developments of the sector. Using the average annual growth rate (AAGR) of agricultural production can provide valuable insights for determining food security developments in the medium and long term.

### Key methods

[1] Food and Agriculture Organization (FAO). (2020). *State of Food Security and Nutrition in the World*. FAO

[2] World Bank. (2010). *World Development Report 2010: Development and Climate Change*. World Bank.

Journal of Information Systems Engineering and Management
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https://www.jisem-journal.com/

Research Article

- Time series analysis: By studying the historical evolution of agricultural and economic data, future trends can be extrapolated.
- Linear or logarithmic regression models: These models help predict future levels of food production based on past economic and agricultural growth.

**Indicators**

- Annual growth rate of agricultural production.
- Gross Domestic Product (GDP) growth rate.
- Labor productivity in agriculture.

**3.Prospective Scenarios Based on Climate Change**

Climate change is a key factor in food security. Studying its impact through climate projections and possible scenarios (optimistic, pessimistic, and realistic) can help anticipate future challenges (CGIAR, 2012)[3].

**Key methods**

- Modeling the impact of climate change on agricultural production: Using climate and agronomic models (such as crop models) to simulate the effects of various climate scenarios on agricultural yields.
- Climate vulnerability scenarios: Analyzing the impact of climate change on food security, with particular focus on the most vulnerable areas.

**Indicators**

- Changes in precipitation.
- Forecasts of droughts, floods, and other extreme weather events.
- Yields of crops sensitive to climate change.

**4.Projections Based on Agricultural Productivity Improvement**

One of the major levers for ensuring food security in countries is the improvement of agricultural productivity. This approach (IFPRI, 2017)[4] focuses on the impact of technological innovations, agricultural modernization, and investments in agricultural research and development on future production.

**Key methods**

- Analyzing the impact of agricultural technology: Studying the effect of emerging technologies on agricultural yields.
- Scenarios of new technique adoption: Projecting productivity gains associated with the widespread adoption of modern agricultural techniques.

**Indicators**

- Yield per hectare.
- Number of farms adopting improved technologies.
- Investment level in agricultural research.

**5.Approaches Based on Analysis of International Markets and Import Dependency**

This approach evaluates food security based on international price fluctuations, trade policies, and import

[3] CGIAR. (2012). Climate Change and Food Security: Risks and Responses. CGIAR.

[4] International Food Policy Research Institute (IFPRI). (2017). 2017 Global Food Policy Report. IFPRI.

Journal of Information Systems Engineering and Management
2025, 10(37s)
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https://www.jisem-journal.com/

Research Article

dependency (IPCC, 2021)[5]. The evolution of food import costs and the impact of trade agreements can influence the food security of countries.

**Key methods**

- Global commodity price analysis models: Analyzing price trends of key food products and assessing their impact on the availability and accessibility of local food products.
- Projections of imports and dependency: Predicting future food import needs based on demographic growth and changes in local agricultural yields.

**Indicators**

- Share of food imports in total consumption.
- Fluctuation of food prices on international markets.
- Degree of food dependency on imports.

**6. Approach Based on Natural Resource Management Strategies (Water, Land)**

Natural resource management, particularly water, is a key factor in food security. This approach (UNDP, 2020)[6] focuses on analyzing the impact of sustainable water and land management on future food production.

**Key methods**

- Sustainable water resource management models: Projecting the impact of water management strategies on food production, especially in areas where water is a scarce resource.
- Agricultural land planning: Projections on land use and the impacts of urbanization on arable land.

**Indicators**

- Water volume available for agriculture.
- Irrigation rates and sustainable land use.
- Land productivity.

These approaches provide a comprehensive and detailed view of the future of food security in a country like Morocco. By combining several of these methods, one can not only project the evolution of food needs but also anticipate future challenges related to production, natural resource management, and global economic fluctuations. Projections based on the average annual growth rate (AAGR) help better understand long-term trends and formulate effective policies to ensure sustainable food security.

Finally, two options were analyzed. The first is based on the development of the trend, while the second takes into account the objectives of strategies and their achievements. Additionally, the demand and consumption of the population were subject to a confrontation analysis with the available supply of basic products.

## RESULTS

Morocco has made significant progress in food security through initiatives such as the *Green Morocco Plan* and *Generation Green*. However, structural challenges persist, threatening the country's agricultural resilience in the medium and long term. A critical reliance on imports for staple products—such as cereals (43% of needs), sugar (65%), pulses, and vegetable oils—exposes the country to fluctuations in international markets. This vulnerability is exacerbated by climate constraints, including erratic rainfall (with a minimum threshold of 300 mm/year required

[5] Intergovernmental Panel on Climate Change (IPCC). (2021). *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

[6] United Nations Development Programme (UNDP). (2020). *Human Development Report 2020: The Next Frontier – Human Development and the Anthropocene*. UNDP

Journal of Information Systems Engineering and Management
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Research Article

for viable production) and dwindling water resources. Additionally, technological gaps in strategic sectors like sugar, olives, and dairy highlight the urgent need for reforms to modernize agricultural practices.

Despite these obstacles, Morocco holds promising advantages. Sectors such as citrus fruits, tomatoes, animal products (milk, meats), and fisheries have export potential, provided yields and value chain efficiency improve. Two forward-looking scenarios emerge: a baseline scenario (S1), which would extend current trends with modest progress, and an ambitious scenario (S2), aligned with national objectives. The latter requires strict conditions: annual rainfall of at least 300 mm, continued agricultural subsidies (especially for soft wheat and sugar), and technological catch-up in key sectors.

Beyond economic and climate challenges, demographic and environmental issues weigh on Morocco's agricultural future. The aging rural workforce and shrinking arable land per capita demand innovative solutions. Climate-smart water management, combined with modern technologies (e.g., localized irrigation, precision agriculture), could mitigate scarcity risks. Simultaneously, revitalizing rural areas to attract younger generations to farming remains imperative.

To achieve food sovereignty, Morocco must prioritize reducing import dependency by boosting local yields and strengthening strategic sectors. This requires targeted investments in resilient infrastructure and sustainable water governance. By capitalizing on export opportunities, the country could fund these transformations while stabilizing its agricultural economy. Dependency ratios (43% for cereals, 65% for sugar) and the critical rainfall threshold (300 mm/year) underscore the urgency for coordinated action. A holistic approach—integrating innovation, social equity, and environmental sustainability—will be essential to secure a safe and autonomous food future.

Here are 5 clear recommendations for Morocco:

1. Develop a strategy for the valorization of agricultural surpluses to generate additional profits for producers and sustain the growth of these sectors.

2. Promote localized irrigation to improve agricultural productivity and reduce pressure on water resources.

3. Encourage the adoption of modern technologies to improve agricultural productivity and reduce production costs.

4. Develop an integrated approach to water resource management to ensure the sustainable use of water resources.

5. Establish a monitoring and evaluation system to assess the effectiveness of agricultural policies and programs and identify areas for improvement.

Ultimately, food security in Morocco will depend on the country's ability to mobilize the necessary resources, innovate in agriculture, and address climate and economic challenges. The medium-term prospects for agricultural production development are promising, but realizing these ambitions will require sustained efforts and a coherent, integrated approach.

## DISCUSSION

### 1.Agricultural trends over a quarter century

### 1.1. Importance of agricultural land capital

The useful agricultural area (UAA) extends over 9.02 million [7] hectares, or 12.7% of the country's total area, according to the 2016 agricultural census. This land is distributed among

1.63 million farms, with an average of 5.5 hectares per farm. However, the average cultivated area has been decreasing over the years.

Between the 1996 and 2016 censuses, the UAA increased by 320,000 hectares, mainly at the expense of vulnerable

[7] RGA 2016.

**Journal of Information Systems Engineering and Management**
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**Research Article**

lands. Cereals occupy a predominant place, representing 57% of the UAA, followed by fruit plantations (16%), fallow land (14%), fodder crops (5%), legumes (4%) and market gardening (3%). This dominance of cereal crops limits agricultural diversification and makes the sector more exposed to climatic hazards, leading to production variability and uncertain growth.

Furthermore, the agricultural area per inhabitant is constantly decreasing: from 0.43 hectares in 1974, it fell to 0.33 hectares in 1996, then to 0.26 hectares in 2016 [8], a decrease of 21% in 20 years, despite a 4% increase in the total UAA.

As for the legal status of agricultural land, land tenure remains dominated by the Melk regime, which represents 75.8% Calculations are made by the authors based on data from RGA 1974, 1996, 2016 and HCP population projections [9] land, followed by collective land at 17.7%. This structure is characterized by a low registration rate, which hinders access to financing. In 2015, only 19% [10] agricultural land was registered, benefiting 11.5% of farms.

### 1.2. Climate trends

Over the last 25 years, Morocco has experienced a decrease in annual rainfall, with an average of no more than 348 mm. This rainfall is marked by strong interannual variations.

The 2008/2009 and 2009/2010 agricultural seasons were the wettest, recording 544 mm and 605 mm respectively.

In contrast, 2022/2023 and 2015/2016 were particularly dry, with only 217 mm and 198 mm, a reduction of 43% and 38% respectively compared to a normal year. Precipitation, concentrated between November and February, exceeds three times the monthly average during this period. However, annual agricultural rainfall follows a slight decline, particularly due to the scarcity of summer rains.

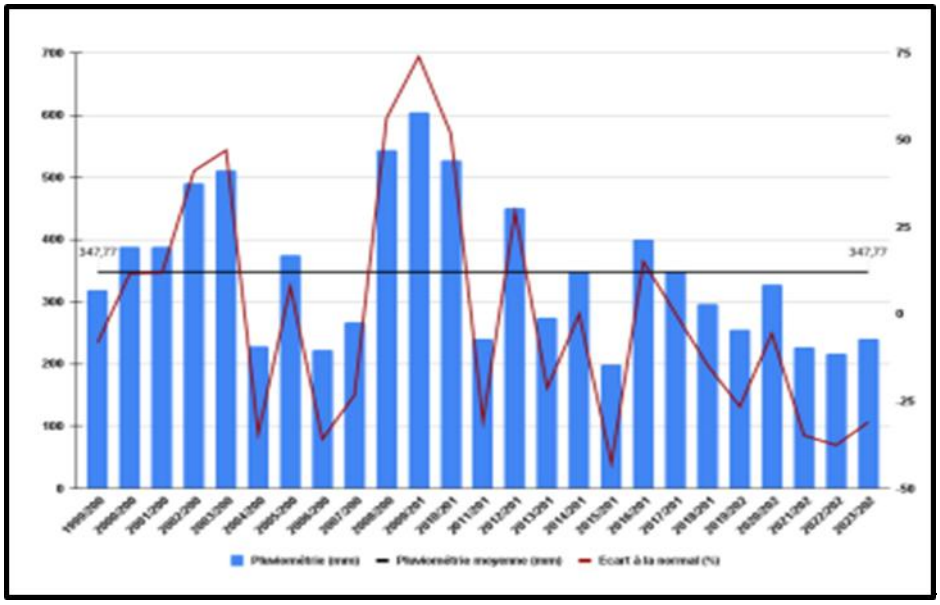


**Fig: Evolution of rainfall at national level in mm,**

**Source :** Authors, based on data from statistical yearbooks (2000-2024).

Analysis of drought cycles reveals a worrying trend: while they occurred every 15 to 20 years in the 1960s and 1970s, they have now been observed every 4 to 5 years since 2010. Since 2019, consecutive droughts have occurred, with two dry years for an average year. In addition, snow cover in Morocco has decreased considerably. While it reached two

[8] Calculations are made by the authors based on data from RGA 1974, 1996, 2016 and HCP population projections.

[9] National conference on "State land policy and its role in economic and social development", 2015.

[10] National conference on "State land policy and its role in economic and social development", 2015.

Journal of Information Systems Engineering and Management
2025, 10(37s)
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Research Article

meters in the High and Middle Atlas in 1979, it has barely been around 35 cm since 2010.

In addition, the rain line in Morocco differs from that of other North African and Arab countries, due to geographical factors and wind movements. It is influenced by the Assyrian Ridge, which regulates rainfall in Morocco, Portugal and much of Spain. Thus, when it rains in Morocco, it often rains on the same day in both countries. On the other hand, Algeria and Tunisia are more influenced by the rain lines coming from England and France, passing through Italy.

The months of November and December are the wettest, with respective averages of 63.4 mm and 57.7 mm, followed by January (53.4 mm), February (47.2 mm) and March (44.6 mm). However, since 2010, a significant reduction in monthly rainfall has been observed, particularly affecting the crucial months for the start of the agricultural campaign (September to February).

### 1.3. Potential of mobilizable water in Morocco and hydro-agricultural infrastructures

Morocco has an annual mobilizable potential of 20 billion m³, divided between 16 billion from surface water and 4 billion from groundwater. However, per capita availability has fallen from 833 m³/year in 1994 to less than 500 m³ in 2020, due to demographic pressure and water deficits recorded in several basins, with the exception of those of Loukous, Moulouya and Bouregreg. In addition, since its independence, Morocco has invested in an ambitious policy of building dams, thus developing essential hydraulic infrastructure.

**Table: Capacity of dams in Morocco**

| **Dams** | **Capacities in Millions of m³** |
|---|---|
| Sebou Dam Complex | 5321 |
| Mansour Eddahbi | 445 |
| Moulay Youssef | 149 |
| Hassan Addakhil | 313 |
| Mokhtar Soussi | 40 |
| Oued el makhazine | 673 |
| Wadi Za Complex | 735 |
| Bin el ouidane | 1233 |
| Lalla Takerkoust | 53 |
| Aoulouz | 89 |
| Hassan 1st - Sidi Driss | 244 |
| Al massira – Ahmed el hansali | 3381 |
| Youssef ben tachfine | 299 |
| Abdelmoumen | 198 |

**Source :** Equipment Department.

Currently, the country has 153 large dams, including 141 small and medium-sized dams providing an additional 192

Journal of Information Systems Engineering and Management
2025, 10(37s)
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https://www.jisem-journal.com/

Research Article

million m³. These infrastructures are supplemented by 17 water transfer structures, making it possible to irrigate 1.6 million hectares, or 18% of the useful agricultural area (UAA), while contributing to the production of electricity and the supply of drinking water for almost all households, both rural and urban.

In addition, the irrigable areas amount to 1.664 million hectares, comprising 880,000 ha in large-scale hydraulics, 484,000 ha in small and medium-scale hydraulics, and 300,000 ha in seasonal irrigation. The area per capita has followed a decreasing trend, from 0.34 ha in 1990 to 0.25 ha in 2020.

However, climate change, combined with economic and social dynamics, is putting increased pressure on water resources. The demand for water concerns the supply of populations, industry, tourism and agricultural irrigation, the latter sector representing the largest share with an estimated consumption of 14.5 billion m³, compared to 1.75 billion for domestic and industrial needs. Indeed, to face these challenges, major initiatives have been undertaken, namely, localized irrigation, promoted by the Green Morocco Plan and continued within the framework of the Generation Green 2020-2030 strategy; and the National Drinking Water Supply and Irrigation Program 2020-2027, which has made it possible to equip 795,000 ha with drip irrigation, or 47% of irrigated areas.

**Summary table Irrigation land in Morocco**

| | **2000-2008** | **2009-2022** | **2020-2027*** |
|---|---|---|---|
| Irrigated land (1) | 1458000 | 1,660,000 | - |
| Localized irrigated land (2) | 159700 | 750,000 | 940,000* |
| % (2)/(1) | 11% | 63% | +60%* |
| Volume of water saved | - | +2 billion m3 /year | 2.5 billion m3/year |

**Source :** Department of Agriculture.

### 1.4. Agricultural growth dynamics: A contrasting trajectory and persistent challenges

Over the past two decades, Morocco's agricultural sector has enjoyed sustained growth, driven by national strategies such as the Green Morocco Plan and Generation Green, and by generally favorable climatic conditions. Rainfall (an average of 385 mm) has contributed to this dynamic, but the high dependence on climatic hazards remains a major constraint.

Between 1999 and 2007, average annual agricultural growth reached +3%, supported by favorable climatic conditions. This trend accelerated between 2008 and 2013, with growth of +7%, driven by increased yields, the expansion of cultivated areas, and the development of livestock farming. However, during the period 2014-2019, the sector experienced a marked slowdown, with an average decline of 5% per year, mainly due to recurring droughts. In addition, the first agricultural campaigns helped save the agricultural economy (+10%), and a significant recovery was recorded in the following two years, and a notable decline in the years preceding 2019. Despite these challenges, agriculture contributes 10.35% to GDP with a dominance of rainfed agriculture.

Journal of Information Systems Engineering and Management
2025, 10(37s)
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https://www.jisem-journal.com/

Research Article

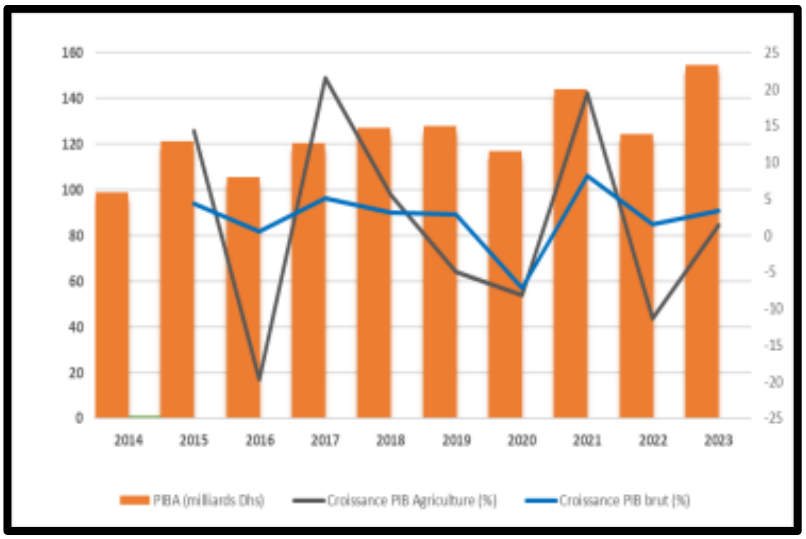


**Fig: Evolution of GDP growth and GDPA**

**Source :** Author, based on HCP data (2000-2024).

Performance varies across sectors: livestock, citrus and arboriculture have posted notable results, while sugar crops have seen a sharp decline. Climate variability remains a structural challenge, limiting yields and hindering the achievement of sustainable food sovereignty.

### 1.5. The Agricultural Labor Market: Demographic Transformations and Challenges

### 5.1 Aging workforce and rural demographic changes

Morocco's rural population has seen a marked decline, from 44.9% in 2004 to 37.2% in 2024. At the same time, the agricultural workforce is aging rapidly. The proportion of young agricultural workers (15-24 years) has fallen to 21% in 2023, compared to 46% in 2000, while workers aged 45 and over now represent 29%, a share that has doubled in two decades. More than 75% of farmers are now over 65, slowing generational renewal and accelerating the rural exodus.

**Table: Legal population of Morocco, average annual growth rate and urbanization rate**

| RGPH | Population size | | | Average annual growth rate | | | Urbanization rate |
|---|---|---|---|---|---|---|---|
| | Urban | Rural | Together | Urban | Rural | Together | |
| 1960 | 3,389,613 | 8,236,857 | 11,626,470 | - | - | - | 29.2 |
| 1971 | 5,409,725 | 9,969,534 | 15,379,259 | 4.34 | 1.75 | 2.58 | 35.2 |
| 1982 | 8,730,399 | 11,689,156 | 20.419.555 | 4.45 | 1.46 | 2.61 | 42.8 |
| 1994 | 13,407,835 | 12,665,882 | 26.073.717 | 3.64 | 0.67 | 2.06 | 51.4 |
| 2004 | 16,463,634 | 13,428,074 | 29,891,708 | 2.07 | 0.59 | 1.38 | 55.1 |
| 2014 | 20.432.43 | 13.415.80 | 33,848,242 | 2.18 | -0.01 | 1.25 | 60.4 |

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**Research Article**

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|---|---|---|---|---|---|---|---|
| | 9 | 3 | | | | | |
| 2024 | 23.110.108 | 13,718,222 | 36,828,330 | 1.24 | 0.22 | 0.85 | 62.8 |
| Growth 1960-2024 | 19,720,495 | 5,481,365 | 25.201.860 | 3.04 | 0.80 | 1.82 | - |

**Source:** HCP, RGPH of 1960, 1971, 1982, 1994, 2004, 2014 and 2024.

### 5.2 Agriculture faces profound transformations

Despite these challenges, the agricultural sector remains essential for employment, employing 2.9 million people in 2023, or 28% of the active population. Between 2000 and 2023[11], agriculture has however lost more than a million jobs. This decrease is explained by departures to other sectors or inactivity, and is accompanied by a continuous decline in the male activity rate in rural areas, estimated at around -0.7% per year between 2016 and 2022. Each year since 2020, nearly 145,000 workers have left the agricultural sector.

### 5.3 Growth of agricultural employment

In this context, agricultural employment is increasing, rising from 13% of workers in 2000 to 20% in 2020. This trend, which affects both men and women, has contributed to an increased feminization of the sector, although gender inequalities persist.

Tableau : Les indicateurs socio-professionnels de l'emploi selon le sexe et, le milieu de résidence (fin)

| Indicateurs | Masculin | Féminin | Urbain | Rural | National |
|---|---|---|---|---|---|
| - Structure de l'emploi selon les secteurs d'emploi (en %) | | | | | |
| Administration publique et collectivités locales (y compris la promotion nationale) | 7,7 | 10,3 | 11,4 | 3,2 | 8,2 |
| Entreprises publiques et semi-publiques | 0,4 | 0,3 | 0,6 | 0,1 | 0,4 |
| Secteur privé (y compris le secteur informel) | 91,9 | 89,3 | 87,9 | 96,7 | 91,4 |
| Non déclaré | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| Total | 100 | 100 | 100 | 100 | 100 |
| - Structure de l'emploi selon les branches d'activité économique (en %) | | | | | |
| Agriculture, forêt et pêche | 25,5 | 37,0 | 4,4 | 64,0 | 27,9 |
| Industrie (y compris l'artisanat) | 11,5 | 15,0 | 16,8 | 5,2 | 12,2 |
| Bâtiments et travaux publics | 14,5 | 0,6 | 12,2 | 10,7 | 11,6 |
| Commerce | 17,2 | 7,1 | 20,3 | 7,1 | 15,1 |
| Transport, entrepôts et communication | 7,0 | 1,4 | 7,5 | 3,2 | 5,8 |
| Administration générale et services sociaux fournis à la collectivité | 8,5 | 18,1 | 14,9 | 3,7 | 10,5 |
| Autres services | 15,8 | 20,7 | 23,8 | 6,1 | 16,8 |
| Activités mal désignées | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| Total | 100 | 100 | 100 | 100 | 100 |

Source: HCP, 2023.

Source: HCP, 2024.

### 2. Analysis of medium-term agricultural production prospects: Scenarios and prospects

The evolution of agricultural production in the medium term is based on two distinct scenarios: a trend scenario,

[11] Calculations based on HCP (Employment Survey) data.

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based on current dynamics, and an ambitious scenario aligned with the objectives of the "Plan Maroc Vert" (PMV) and Génération Green (GG) strategies.

These scenarios highlight considerable economic potential, particularly in terms of wealth creation, but also reveal the persistence of food dependency for strategic products such as cereals and legumes, to which meat has been added for three years. However, certain consumption needs, particularly for citrus fruits, dairy products and eggs, should be covered, marking progress in these sectors.

The trend scenario builds on trends observed over the past two decades. It projects moderate yield growth and stability in crop distribution. This framework predicts an average annual value added of MAD 8-10 billion despite the decline in agricultural production in recent years, reflecting continuity without major changes in policies or investments.

The scenario based on the objectives of the PMV and GG strategies proposes a more ambitious approach. Thanks to targeted measures such as intensification of crops, expansion of cultivated areas and optimization of exports, it envisages an average annual gain of more than 16 billion dirhams. This trajectory requires increased investment, optimized management of resources, particularly water, and adaptation to climate challenges.

However, several constraints limit these ambitions. Food dependency remains a concern, particularly for products subject to climatic hazards. In addition, recurring droughts, the scarcity of water resources and the aging of the agricultural workforce are hampering the sustainable development of the sector.

Despite these challenges, promising opportunities exist, particularly in high-performing sectors such as citrus, dairy and agri-food exports. The transition to more resilient agriculture, integrating modern technologies and sustainable practices, could strengthen food sovereignty while improving overall productivity.

The methodological approach is based on projections of the main indicators related to food security in its four dimensions and to the concerned sectors, particularly agriculture, trade, and natural resources. The approach consists of studying the evolution of the variables (inputs and outputs) over a period of 20 years or more.

In conclusion, the Moroccan agricultural sector is at a crucial turning point, torn between persistent structural challenges and the opportunities offered by ambitious policies. The success of these scenarios will depend on the mobilization of resources, agricultural innovation and the ability to address climate and economic challenges.

**Table: Main determinants of food security**

| | **2020** | **2021** | **2022** | **2023** |
|---|---|---|---|---|
| Public agricultural investment (Billions of DH) | 10.54 | 10.79 | 10.11 | 14.06 |
| Private agricultural investment (Billions of DH) | 7.28 | 9.2 | 8.74 | 8.05 |
| Three main cereals (Millions Qx) | 32.1 | 103.2 | 34 | 55.1 |
| Durum wheat (Millions Qx) | 7.9 | 24.8 | 8.1 | 11.8 |
| Soft wheat (Millions Qx) | 17.7 | 50.6 | 18.9 | 29.8 |
| Barley (Millions Qx) | 6.4 | 27.8 | 7.0 | 13.5 |
| Agricultural export (Millions DH) | 27,568 | 31 174 | 36934 | - |
| Agri Exp/Total Exp (%) | 7.8 | 7.4 | 6.6 | - |
| Agricultural imports (Millions DH) | 31,655 | 32,054 | 49251 | - |

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2025, 10(37s)
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Research Article

| | | | | |
|---|---|---|---|---|
| Agricultural Imp/Total Imp (%) | 7.2 | 5.9 | 6.2 | - |
| Food requirements coverage rate Cereals | 32% | - | 38 | - |
| Food requirement coverage rate Oils | 29% | - | 29 | - |
| Food requirements coverage rate Sugar | 44% | - | 27 | - |

**Source :** Authors.

### 3.Prospects for improved coverage of food needs in animal-based products, but continued dependence in terms of cereals and sugar

The comparison of the results of the projection of the supply and consumption of food products in the medium term reveals a reduction in Morocco's food dependence on the outside, with a rate of coverage of needs which would exceed 100% for fruits and vegetables, fish and certain animal-based by-products.

The average surplus of production over consumption per person would be 42%, 14% and 62%, respectively, on average, for eggs, dairy products and fish under the trend scenario. Citrus fruits, potatoes and tomatoes would show apparent production surpluses of 148%, 41% and 20%, respectively under the same scenario. These products would also show larger surpluses under the second scenario. Subject to specific programme contracts under the MGP (PMV) and consolidated in the new GG strategy, eggs and white meat would see surpluses of 18% and 44%, on average. The production surplus would exceed double the consumption per person for citrus fruits and dairy products.

These surpluses would be mainly due to an improvement in domestic availability per capita, based on massive imports of inputs and favorable conditions in terms of efforts deployed to ensure water availabilityb [12] and soil quality [13]. They nevertheless impose the implementation of a parallel strategy of valorization on foreign markets, with a view to generating additional profit for producers, making it possible to maintain the growth dynamic of these sectors.

Apart from certain animal products, fruits and vegetables, other food products will always present a problem of covering needs by local production in the medium term. Despite the current economic situation of the red meat sector, meat production would continue its progress by recording surpluses in the medium term, conditioned by the implementation of safeguarding the national livestock and the strengthening of imports of meat of all kinds.

Morocco will continue to import significant quantities of cereals and the deficit of production compared to consumption would reach 28% according to the trend scenario and 41% according to the second scenario. The share of wheat in cereal imports would remain at a high level (63%). The rate of dependence on external markets would reach more than 45% on average, according to the S2 scenario. This situation, conditioned by the continuation of public incentives, does not reflect so much an improvement in the coverage of domestic needs, but would rather reflect a reasoned policy in terms of recourse to imports (trend decline in the S2 level). Overall, cereal consumption could not be covered by local production regardless of the scenario and despite the accumulated gains in agricultural land productivity.

According to the trend scenario (S1), food legumes would show a deficit of more than 25%, on average per person, in the coming years, after having presented a production surplus over the last two decades. Olive oil should also record a production deficit that would amount to more than 45% of consumption per person, on average. This deficit would be further amplified by taking into account an improvement in exports. The shortfall to be covered by olive oil consumption would, in fact, amount to 42% according to the trend scenario and 26% according to S2, if their exported quantities are controlled and align with the levels projected in the two scenarios.

Covering sugar consumption needs would also remain critical in the short term. Despite the support measures for the

[12] Seawater desalination program.

[13] Regulation of the use of phytosanitary products.

**Journal of Information Systems Engineering and Management**
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**Research Article**

sugar sectors, Morocco would still be dependent on external markets for sugar to the tune of 65% according to scenario 1, which takes into account the trends invthe sector over the last 10 years. The deficit in production compared to human consumption would be more than 30%, on average, in the medium term according to the trend scenario. This deficit would be completely eliminated according to scenario S2, which projects a production surplus, the result of a forced readjustment of the trends in the sector towards the targets set by the MGP 2020 consolidated within the framework of the SGG 2030.

Overall, and for each of the two scenarios examined above, the projections of supply and human consumption suggest an improvement in the coverage of the population's food needs in the medium term. Dependence on external markets should gradually reduce, but would remain critical for cereals, food legumes, sugar and olive oil. It should be noted, however, that the convergence of the prospects for the development of production in the aforementioned agricultural sectors towards one of the two scenarios, in particular that of the continuation of the PMV within the framework of the GG, would remain difficult and conditioned by 3 main factors:

● Rainfall above 300 mm per year, distributed favorably during the agricultural campaign. The rainfall regime in Morocco is characterized by great variability in time and space, resulting in volatility in the production of cereals and legumes. Other agricultural sectors (animal and plant) that are heavy consumers of water would require a considerable contribution in terms of irrigation.

● The continuation of public incentives upstream and downstream of agricultural sectors (FDA), particularly for soft wheat and sugar, despite the significant budgetary costs associated with them. The removal of the subsidies they benefit from would penalize the country's food supply in these products, particularly during poor seasons and taking into account the complementary and substitution relationships maintained with other food products and the instability of their prices on international markets.

● The catch-up effort in terms of targets relating to the sugar, olive and dairy sectors. The projections for increasing agricultural production are based on the forecasts of the MGP and SGG strategy. However, the comparison of the achievements of the sugar, olive and dairy sectors in relation to these forecasts included in the strategies revealed a relatively significant delay in terms of achieving the objectives. Considerable efforts are therefore necessary to bring the performances of these sectors into line with their development paths planned by the MGP and the SGG.

**Box: Food Security Situation in Morocco**

Food security is a major priority for Morocco, particularly in a global context marked by disruptions in supply markets and repeated droughts. Between 2000 and 2023, the country has made notable progress: hunger has been eradicated, severe food insecurity affected only 2.6% ofthe population in 2020, and the nutrition of children under 5 has significantly improved.

Since 2008, annual availability per capita has increased according to the products: +43% for white meats, +5% for cereals, and a decrease of 6% for sugar. Agricultural production has largely met food needs, reaching almost complete coverage rates: 100% for fruits, vegetables, and meats (white and red), and an improvement for milk (from 94% to 98%) and olive oils (from 93% to 94%). However, the unfavorable climatic conditions of the last five years have reduced the availability of cereals from 219 to 198 kg/capita and the coverage rate from 72% to 59%.

To meet these challenges, Morocco has adopted strong measures: subsidies on basic food products, suspension of customs duties on the import of cereals and legumes, strengthening of cereal stocks, increase in subsidized soft wheat flour and protection of livestock. In addition, programs have been put in place to diversify income in rural areas, support youth initiatives, encourage local food systems, and reduce food losses. Despite these efforts, severe food insecurity increased to 3.2% in 2021, and moderate or severe food insecurity affected 22.1% of the population. Cereal production fell to 32 million quintals, well below the ten-year average of 78 million quintals.

This, combined with rising food prices, growing unemployment, and falling household incomes, has exacerbated inequalities in access to food, particularly among the most vulnerable.

Household food expenditure has changed significantly over the years. Between 1985 and 2019, the average annual expenditure per person increased from 3,623 Dh to 20,389 Dh, an average increase of 11.27% per year. This increase affected both urban (+9.90% per year) and rural (+9.84% per year) areas, but with total expenditure always higher in urban areas.

Finally, the share of food expenditure in total household expenditure decreased from 48.6% in 1985 to 36.6% in 2019. However, the gaps between urban and rural areas have widened, with higher average food expenditure in cities.

Between 1985 and 2014, this gap increased from 629 Dh to 1,575 Dh, reflecting a trend of growing disparities between the two environments.

**Source :** Authors.

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**Research Article**

## CONCLUSION

Despite notable progress, Morocco continues to face structural challenges to achieving food security. The country's future in thisarea will largely depend on its ability to gradually reduce its dependence on food imports, while simultaneously improvingdomestic agricultural yields. Equally important is the sustainable management of key natural resources, particularly water andagricultural land, which are increasingly under pressure. Strengthening strategic agricultural value chains will also be essential,along with promoting the adoption of modern technologies and the expansion of localized irrigation systems. Together, these efforts will be crucial in building a more resilient and self-sufficient food system for Morocco.

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**Journal of Information Systems Engineering and Management**
2025, 10(37s)
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