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Review Article

What food security in the context of global warming: Case of Algeria?

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Abstract

The issue of food security has comeback in force lately, because food consumption has no longer become just a matter of guaranteeing food self-sufficiency for the population or food sovereignty, but of securing food supply and availability for all categories and strata of the population.

Nevertheless, the resolution of the issue of food security is no longer a matter of political or economic decision by a State or an international institution, but rather of a factor and an element which seems to escape any decision or state or UN control, since that it is about the climatic factor and the question of global warming.

Keywords: Food security ; Global warming ; Algeria ; Strategy-State

Food Security in Few Words

We have been discussing and going through this issue of food security for some time, probably due to its global and socio-economic nature, but above all the confirmation that a large number of individuals are complaining and suffering from several impacts of it. , among other things, malnutrition, undernourishment, a nutritional desert, a caloric pandemic, generalized hunger, poverty that moves from social poverty to another more nutritional one, thus pushing economic decision-makers to draw an alarm bell, for once, to alert national and international public opinion to the fact that food insecurity is more dangerous and harmful for the whole planet, sparing practically no one in its wake , especially countres that are still sufering from an economic decline.

Thus, and according to the official definition adopted at the World Food Summit in 1996, "Food security exists when all human beings have, at all times, physical and economic access to sufficient, healthy and nutritious food allowing them to satisfy their energy needs and food preferences to lead a healthy and active life", specifying that this security is directly and automatically linked to the expectations of consumers, all categories combined, in terms of their food and nutritional needs, according to availability at the level of consumer markets and also the quality of the products offered.

This definition takes us to reveal some points:

a) The need to make food products and goods available to consumers and users at market level, trying to avoid breaks, even in a case of low production due to climatic and natural hazards.

b) Economic and physical access to food, making it clear that consumers, especially the most disadvantaged and deprived, can acquire agri-food products according to their income and

wages, thus attempting to avoid any inflation observed at the level of markets.

c) The capacity of food products which must be adapted and comply with international standards in terms of calories and hygiene, both for humans and animals, in order to safeguard human and animal health, and meet regular expectations potential users.

d) Stability over time of the various dimensions mentioned above, as long as consumption patterns can change over time, and certain climatic and natural conditions, such as floods, droughts, or economic and social factors, which may affect the food consumption habits of the population.

e) A global, determined and transparent consensus of the various actors who are really involved in food security, far from hollow speeches and unrealizable and short-lived promises, bearing in mind that the agri-food sector is far from meeting all expectations and needs of the world population.

This also leads us to examine the case of food insecurity which sometimes prevails at times when consumers cannot access food products and goods, which are nevertheless available, because of an inadequacy and imbalance between their financial means and the prices applied, and we can distinguish a few cases of food insecurity:

I. Chronic food insecurity, which indicates that "people are unable to meet their basic nutritional needs over a long period of time".

II. Transient food insecurity, which mentions that "there is a sudden decrease in the ability to produce food or to have access to enough food to maintain a good nutritional status".

According to the latest FAO report [1], it is well mentioned that "moderate or severe food insecurity (determined using the scale for measuring food insecurity experienced or FIES scale) was slowly increasing from 22.6 percent in 2014 to 26.6 percent in 2019. Then during the year 2020, marked by the spread of Covid-19 in the world, it increased almost as much as on throughout this five-year period, to reach 30.4 percent", confirming that ""it is estimated that in 2019, around 3 billion people did not have access to healthy food due to its high cost and the persistence of high income inequalities", thus emphasizing issues relating to the financial and pecuniary aspect for households, and denouncing, in passing, the socio-economic inequalities which are constantly widening and deepening.

It is becoming clear that the theme of food safety is becoming a matter that is not just a relationship between an agricultural sector and industry to provide the most essential and basic products for consumers, but also an involvement of other parameters and economic factors such as income and prices that determine the problem of purchasing power.

Following from what has been preceded as a preliminary explanation, we can identify the main dimensions of food security:

i. Financial dimension (income, salaries, financial assets, etc.).

ii. Human dimension (poverty, unemployment, insecurity, etc.).

iii. Social dimension (social exclusion, marginalization, social vulnerabilities, etc.).

iv. Economic dimension (distribution of income and wages, gender, equity, equality, etc.).

v. Ecological and environmental dimension (fertility, drought, climatic disparities, etc.).

vi. Societal dimension (change in consumption behavior, consumption patterns, etc.).

vii. Health dimension (obesity, chronic diseases, diabetes, infant mortality, and others).

A Burning and Crucial Question: Global Warming

This question has become the most debated and discussed topic in the last decades at the international level, since that the ecological and environmental damage worries, at the greatest point, the international economi decision-makers, and we are heading straight for an ecological crisis.without precedent if the States do not agree on global criteria to limit the undesirable effects of this climate change, not only on human and animal lives, but also on the level of international economy.

In a common and consensual definition, we will know that "Climate change is caused by the modifications of the atmosphere which result from its chemical transformation by greenhouse gases (GHG). This disturbance of the atmospheric balance is expressed by an increase in average temperatures on Earth, modifying its physical, chemical and biological characteristics", and that the impacts and effects on the environment are revealed in: droughts, melting of glaciers and sea ice, sea level rise, tropical storms.

All international meetings (the last being COP 27 in Egypt) have insisted on the need to reduce the temperature by 2 degrees within a few years, if we want to reduce the consequences of this climate deregulation and be part of a more sustainable economic development, which seems relatively complicated given the many frictions and differences between the economic powers, at their head, the United States and China.

To stay in the subject of food security in face of this natural phenomenon, it is important to undertstand that climate deregulation means some concerns at the level of agricultural production, in order to ensure the necessary inputs for farmers in their economic activities, as long as this production takes into account climatic fluctuations in the production process (on the input side) and causes more negative impacts for the planet in terms of GHGs (on the output side).

On this subject, W.R.Cline [2] affirms that "If nothing is done to reduce carbon emissions, agricultural productivity will drop sharply, especially in developing countries", while N.Rouss and R.Arrus [3] indicate that "the increase in temperature, a decrease in precipitation and more variability indeed implies a delay and

a reduction in the periods of growth, as well as an acceleration of soil degradation and the loss of productive land", a way to express fears and apprehensions on the future of the agricultural sector, in particular for the countries of the Maghreb region, because the impacts and repercussions will be more heavily felt by these countries for the next few years.

Other interventions on this theme were approached with the same conviction that the guarantee of food security cannot be ensured and defended if we neglect the involvement of climatic and natural factors, even if the economic and financial conditions plead for such insurance.

It is estimated that the world population will reach nearly 10 billion people in the few decades, meaning that agricultural production must manage to feed this population, with an increase of more than 60%, especially with the possible increases in incomes and the new demands of the consumers, but this is highly disrupted and complicated as it has been shown that more extreme weather events and increased weather unpredictability have already impacted agriculture and food security, leading to production declines and a decrease in income in vulnerable areas.

Admittedly, to mitigate the impacts of this climate deregulation, several alternatives have been proposed, such as nuclear techniques, but will this be able to contribute to the implementation of an agricultural strategy capable of meeting food needs (both in terms of health than hygiene) of a population that is ever more demanding, diversified and multifaceted, even with the support of international institutions such as the FAO.

For the IAEA , it is clearly quoted that "Agriculture will have to make a transition towards systems which are more productive, which use inputs more efficiently, which are less variable and more stable in their production, and which are more resilient to long-term risks, shocks and climate variability. We must accomplish this transformation without impoverishing natural resources", and it is indeed in this last point that the divergences and disagreements have appeared between States which only aspire to preserve their financial interests to the detriment of these resources, and others who are trying to put safeguards in place to preserve these resources.

Regarding the FAO, aware of the fact that this issue of global warming still remains pending and alarmist, insists on the fact of "integrating climate change issues into food security policies and programs and strengthening the resilience of vulnerable groups and food systems in the face of climate change, emphasizing the fact that adaptation to climate change", thus calling on States to demonstrate concrete and realistic facts to reduce the negative impacts and consequences that this may create at the level of agricultural production , knowing that a large part of the world's population risks finding themselves in critical situations in terms of nutrition and food, with a rate of impoverishment and famine more worrying and scaring than ever.

The Issue of Food Security in The Algerian Case

Like many countries, the Algerian State is trying to adopt suitable and appropriate strategies and policies for food security that is less painful and more reassuring for the local population, in an international economic context that hardly calls for global optimism and comforting, with the multiple troubles and disturbances that the world has known, and more recently still, the sad and murderous passage of the Corona 19 pandemic and the militarely conflict between Russia and Ukraine, without forgetting to mention other disappointments in international markets, such as the economic decline of some economic regions, the decline in economic activities of international economic enterprises, and galloping international inflation with its unfortunate economic consequences.

Thus, the subject of food security in Algeria is, as everywhere else, among the priorities of the State, because it concerns a population that requires nutrition commensurate with needs, both in terms of availability, quality, sanitary and hygienic capacity, thus putting a severe pression on the efforts of economic decision-makers to put in place a suitable and appropriate strategy, with a view to the mutual interest of the different categories of the population and the State.

Several authors were interested with this subject, starting with the approaches of A.Daoudi and A.Bouzid [4] that "access for all to cheap food has thus become, over time, a constituent element of the social contract proposed by political authority to the people. This political choice will determine all the economic trade-offs relating to food policy", thus pointing the finger at the role of the State in guaranteeing and safeguarding food security that is accessible to all strata of population.

For his part, H. Rachid [5] is interested in this question from a purely nutritional angle and affirms that "the results obtained indicate that the country is not exposed to serious food insecurity, because the prevalence of undernutrition is estimated at only 3.9% of the population", a rather comforting and reassuring sign on the control of food security, but which does not explain everything about the future of this policy in the long term, particularly in the question of sustainability. and the preservation of a long-term financial stability, knowing the nature of the economy which is a purely rentier economy and too dependent on developments in the oil markets and the price of a barrel.

In the same subject, O. Bessaoud [6] believes that the food challenge constitutes a challenge for the Algerian State, in particular because food imports continue to be among the concerns of officials, given their weight in the trade balance (and therefore the balance of payment) and its imâxts on public treasury, affirming that "Algeria is today highly dependent on its external means of payment to ensure its food supplies. If the decline in these resources were to continue over the next few years - all other things remaining equal - the political risk would be great of seeing the country unable to meet its food bill".

For our part, we believe that the debate on food security in the algerian case turns, essentially, around the following elements of discussion:

a) The external dependence for food imports which regularly evolve between 8 and 10 billion $ each year, with the financial effects pn public finance.

b) Agri-food production, including that of cereals and derivatives, too dependent on the vagaries of the weather which seem to be, in recent times, more unfavorable and inadequate to ensure good coverage of food needs of the population.

c) A demographic evolution totally out of balance with agri-food production (it is estimated that the local population will reach nearly 50 million inhabitants in 2030).

d) A national economic strategy that seems to seek a reassuring way to ensure a diversified, sustainable economy, despite the changes in some factors.

To properly measure the sensitivity of this subject for this specific case, we will focus on the evolution of domestic cereal production and that of food imports during the period 2011/2021, through the following tables:

Table 1: Evolution of cereal production: Millions of tons.

Year	Production
2011	3,7
2012	5,1
2013	4,9
2014	3,4
2015	3,2
2016	3,4
2017	3,5
2018	6
2019	5,6
2020	3,9
2021	2,7

Source: FAO, 2022.

A simple glance tells us that this production fluctuates from one year to another, but does not seem to correspond to the expectations of economic decision-makers in terms of food availability at market level.

For this case of algerian economy, with most revenues from hydrocarbons that sometimes show insufficient amounts, obviously, such revenues of imports indicate food dependence and a threat to food security.

Table 2: Evolution of food imports: Billion $

Year	Imports
2011	7,7
2012	6,9
2013	7,6
2014	8,9
2015	9,3
2016	8,2
2017	8,4
2018	8,2
2019	7,7
2020	7,7
2021	7,6

Source: FAO, 2022.

Based on these facts, it is clear that the problem of food security in Algeria lies in a strategy that includes several actors and stakeholders, because according to another intervention, we note that "In Algeria, as in other parts of the world, agricultural and food issues are treated as a sovereign function of the State; in other words, it is a matter of state because the resolution of these issues is crucial to ensure its sustainability and is decisive for the social and political stability of the country. The objective of food security

is found in all the founding strategic documents of the agricultural policies adopted by the country", certainly a way of confirming the approach of this country concerning this theme, but which requires another more economical approach, both macroeconomic, microeconomic and mesoeconomic.

It should be added, for a better clarification of this question, that the ministry concerned has well thought of including this theme in the policy of rural and agricultural renewal, launched in 2007, knowing that a large part of the population which finds certain difficulties in accessing foodstuffs, projecting some challenges such as food security through national production, strengthening food production, taking into account climatic changes and promoting appropriate and other techniques, thus indicating that this policy does not want to take advantage of just an agricultural issue but rather to establish another policy based on access to agri-food products, knowing the socio-economic character which specifies the nature of the Algerian State, with a very social predominance expanded and widespread. This sums up our concern to analyze this issue in a more objective, realistic and transparent way in order to properly approach the issue of global warming.

Global Warming and Food Security in Algeria: What Outcome?

It is well known and accepted that we cannot control or predict any change made at the level of the climate and natural changes, even if it is quite obvious that we can predict forecasts on this parameter, through trends observed during the latest developments and according to forecasts intelligently studied and analyzed by experts and research centers.

In the Algerian case, one cannot seriously and objectively discuss agricultural development without referring to the too frequent and unexpected changes in climatic factors, a variable that cannot be controlled with accuracy and certainty, thus leading agricultural producers to consider the tactics to be used to circumvent, at best, the undesirable and detrimental effects on their production, which will, de facto, affect and impact agri-food production and therefore the rise of food security problem.

Some remarks were made on the subject, among others: O. Bessaoud who declares that "Global warming will result even more in the future in a modification of the vegetative cycle of plants and a shortening of agricultural seasons, a displacement of bioclimatic floors as well as increased parasitic and health risks", a rather scientific explanation for a phenomenon which is spreading much more and raising doubts and worries for farmers, especially in countries which are recording quite unfavorable climatic changes and lightning.

For his part, B.Djamel [7] observes that "In Algeria, a country most of which is desert, climate change is a major concern. Indeed, due to its geographical position, Algeria is exposed to the negative effects of climate change and greenhouse gas emissions, in particular floods, drought and high temperatures", thus confirming that agriculture Algeria is well exposed to this issue of climate change which seems to be leading to other natural and climatic upheavals of which no one can predict the consequences and effects.

This referential overview has allowed us to raise the fact that agricultural production in this country is not exempt from any climatic upheaval for the years to come, and cannot rely solely on variables that are fairly controllable in the future. example of capital, human resources or even new production technologies, but how to confront dramatic situations such as droughts, floods, soil drying out, water shortages, changes in ecosystems and other phenomena, with some policies that do not seem to convince some specialists in the field, which has a direct impact on a production which will not be able to satisfy either the local market or the agri-food industries in their quest for food security.

Aware of this compicated situation, the local government, through the ministry concerned, has thought of an approach and an initiative which is based on a few programs such as the action programs related to the improvement of the healthiness of food, action programs to improve the sustainability of production systems, action programs to improve social equity, and cross-cutting measures to support the sustainable transformation of food systems, with a project to reconfort the local population and foreign partners (especially international institutions) for the proper handling of this issue.

It is also a question, for the question of sustainability, of setting up a new agricultural strategy based on renewable energies, as is strongly recommended and advised by international institutions, since this agrcultural sector is being accused to play a heavy role in global pollution through greenhouse gases.

Thus, in this particular case of Algeria, this concept is very new and innovative, despite the fact that the agricultural sector is led to put in place a sustainable food security strategy, as it is mentioned "that it is now more that urgent, the recourse to the adoption of new, more appropriate techniques which take into account scientific and technical parameters making it possible to make profitable the cultivated surfaces, to reduce their costs and to increase their outputs while preventig the environment and the balance of the ecosystems alluding to a more intelligent and technological agriculture through the use of potential renewable energies as a basis, even if it means setting up, as a matter of urgency, a real battle for this type of energy, as was the case for fossil energies.

It is then a question of setting up a new concept for the agricultural sector, called smart or tomorrow's agriculture, which will attempt to review the production process taking into account the availability of renewable energies and think seriously to food security, which will be more reassuring, convincing and above all durable and sustainable, in an international context which is constantly changing and becoming more threatening, worrying and unstable, with a more scared demographic rate, world agricultural production at the mercy of the climate change and international economic strategies plagued by divergences and conflicts, constituting, as a result, more pressure on the States, in particular those which still suffer in the agri-food sector, source of a just, equitable and social food security for all.

Conclusion

The previous discussion on food security and the issue of global warming and climate change has clearly informed us that the debate remains open and accessible for all other scientific contributions on this subject, especially since the recent work undertaken in this context has converged towards the fact that food security is closely linked to the development and growth of agricultural sector, itself dependent on climatic and natural factors, unfortunately considered as elusive and untenable variables and which can result sometimes in favorable consequences for some, but also unfavorable for others, with economic and financial impacts too heavy to bear for States fighting to ensure agricultural and food security for all.

In the Algerian case, even if for the moment, this question of food security is more or less ensured and guaranteed thanks in particular to food imports supported by oil revenues during times of euphoria and financial windfall, but the fact that the production agri-food is highly dependent on climatic fluctuations and that the State has not yet put in place an adequate and appropriate strategy on this subject, for lack of administrative will and slowness at the level of managerial and hierarchical decision-making, with also some reluctance and hesitations observed and noticed at the level of the government, this insurance is indeed threatened and risky for the years to come.

The latest news on this climate issue is hardly reassuring, with a total failure of COP 27 and a certain possibility of the emergence of other threats on the planet, which means that the Algerian government is bound and led to take quick and decisive decisions on this subject, because it is indeed the future of agricultural and therefore agri-food production that is at stake, thereby reflecting the concerns raised by certain experts and analysts on the ability to guarantee food security, more durable and sustainable, in the face of a major challenge, namely: the probable climatic disturbances which are announced for the near future and which will affect a large part of the States and regions.

It is no longer a question of funding to settle this case, but of real transformations and profound changes that must be undertaken and developed in the agricultural field, with real and certain eventualities on the devastating and harmful effects of climate change on agricultural production (plant and animal), which will result in some difficulties not only in ensuring domestic production, but also imports from foreign markets (because they themselves can be affected by unfavorable climatic conditions as was the case recently with rice production in Pakistan and India).

The climate challenge is certainly complicated, delicate and very complex when it is approached with food security, but it is necessary and urgent to properly face this challenge, through strategies and policies which must be well examined and studied according to the real means and set objectives.

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Conflict of Interest

No conflict of interest.

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