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The state of urban food security, a global and national overview: The case of Algerian Cities

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***Abstract*---**In recent decades, an overview is given by the United Nations Population Division about the urbanization extent in the world. Africa and Asia - whose urban populations are already larger than those of Europe, Latin America or North America, respectively - are the continents where the share of city dwellers has increased the most since the middle of the 20th century. The objective of our study is to visualize and clarify the reality of food security in cities and urban agglomerations around the world, and then distinguish the challenges of urban dwellers to ensure their food security precisely in Algerian cities. Our study arrived after having treated the world food challenges and those of Algerian cities that the problem of urban food security is relative to four dimensions: F**ood availability** especially what is interested to urban agriculture and domestic food production level ; **Food** a**ccess** is relative to the lower levels of income and high food inflation; **Food utilization** explained by a large number of people with obesity and chronic diseases; and the S**tability** of these three indicators, That is the case of negative impacts related to fluctuation in international food prices, climate change, an unexplained price spikes especially those associated to some food commodities for the purpose of speculation , as well as some irrational urban consumer behaviours (Consume fast foods as well as food products offered in cities without respecting food safety requirements).

***Keywords*---**Urbanization, Urban Agriculture, Food Availability, Food access, Food utilization, Urban Food Security.

Introduction

Despite hopes of an end to the crisis caused by the covid-19 pandemic and a start to improve food security, hunger has gained ground the world in 2021 (Between 702 million and 828 million people have suffered from hunger). After remaining relatively stable since 2015, the prevalence of undernourishment jumped from

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8.0% to 9.3% between 2019-2020, then rose at a slower pace in 2021, rising to 9.8%. (FAO, IFAD, WHO, WFP, & UNICEF, 2022)

However, 55% of the world's population, or 4.2 billion people, live in cities (bank, 2023). This trend is expected to continue by 2050, where the current number of city dwellers is expected to double, and almost 7 in 10 people worldwide will live in urban areas. As people migrate to cities in search of a better life, accelerated urbanization in turn creates new challenges. If there are more people in urban areas, more food, infrastructure, services and jobs will be needed; therefore, it is essential to focus on food security, nutrition and livelihoods in urban and peri-urban areas to help poor urban dwellers especially to have a healthier life.

So the task of feeding adequately all cities in the world became an increasingly pressing challenge, requiring the coordinated interaction between producers, transporters, traders and countless food retailers. Therefore, it requires a good understanding on the part of municipal authorities as well as national and international development organizations of this common problem, and trying to find sustainable solutions to feed cities.

For a good clarification of this observation concerning cities in the world, and specially the Algerian cities where the population recorded an increase of nearly 205% between 1966 - 2011,with a rate of 66.3% of urban population in 2011,Which is expected to rise in recent years (Results of the latest population survey in 2022 are yet to be published), so we must logically bring the problematic of this research towards the following main question:

What are the urban food security challenges given the high level of urbanization in Algerian cities?

To answer this question, we will examine our vision of all the complexities that caused food insecurity in urban areas, especially in the context of an inefficient urban food system because from production to consumption, the urban food system consist a complex interrelated and interdependent of many parts: socio-economic elements, organisms, processes and structures; These interdependence requires a structural and systemic analysis of global and local linkages.

However, we must also focus on the spectacular urban growth in recent years, and the growing threats to food security for millions of city dwellers. The scope and urgency of the issues call for an analysis of urban food security issues and new policies and practices to foster the adoption of sustainable urban food systems.

In order to reach the purpose of this study, we have adopted the following methodology: diagnose the situation of urban population around the world and in Algeria, and then address the most significant changes that have affected consumer habits in these areas, thereby reaching the challenges and determinants of urban food security in the world and in Algeria cities.
Our study is therefore divided into three main parts:

- Urbanization and Food problem.

- Urban food security challenges.
- Urban food security determinant

The limits of this study are between time and spatial bound. The first relates to our focus on a range of study variables from 1966 to 2024, depending on the availability of data, while the spatial boundaries are associated to evolution of these variables in world urban areas and in Algerian cities. Hence, our study facade many limitations relative to data abundance, especially those related to Algerian cities through the lack of new data and the absence of certain data for all.

In terms of practical implications, the study analysed the most important variables associated to urban food security by identifying the most important impediments for households in covering their food needs, thereby alerting local authorities of their responsibilities in providing the most important infrastructure, administration and procedures that can help citizen and through an urban food policy that works within the framework of an urban food system to achieve urban food security.

The study's social implications lie in the analysis of many social variables affecting urban families like urban poverty, mess markets, fragile and chaotic constructions and the form of sanitation and sewage found in the beds of cities, especially with very high population density without forgetting the problem of widespread women's work in urban areas and its negative effects on the upbringing of children and the provision of their nutritional needs through fast-eating restaurants rather than household eating.

The Originality of this study is that it touches on a new topic for the Algerian economy, which has several dimensions, associated to one of the most important subjects on the international scene, given the high population density in cities and urban areas around the world, and in Algeria, as well as the problems that have become borne as urban poverty and chronic diseases, which cost the national state treasury a large funds such as cancer, diabetes and Cardiovascular Disease.

The first part: Urbanization and Food problem

Food in the urban environment poses many challenges differently from those in rural areas, where the particular behaviours of urban dwellers are imprinted in cities regardless of their activities, income, standard of living, their consumption habits and other characteristics of urban household and active institutions; therefore, it is necessary to identify the features that characterize urban areas.

1) Urbanization:

Urbanization takes various social forms and invests space in several ways: megacities, strong expansion of medium-sized cities, agglomerations, conurbations, extension of rural villages and gains on the hinterland, it therefore extends into a patchwork of heterogeneous geography.

1.1) In the world:

Since 2007, the number of urban residents has surpassed that of rural residents **3.36** billion in urban area versus **3.35** billion in rural. In 2022, World urban population was **4,52** registered **34.52%** compared to 2007 world's population lives in cities as mentioned in Figure(01). According to population projections, this figure could rise to 68% by 2050, mainly driven by the continuation of urban development in Africa and Asia. (UN, n.d.)

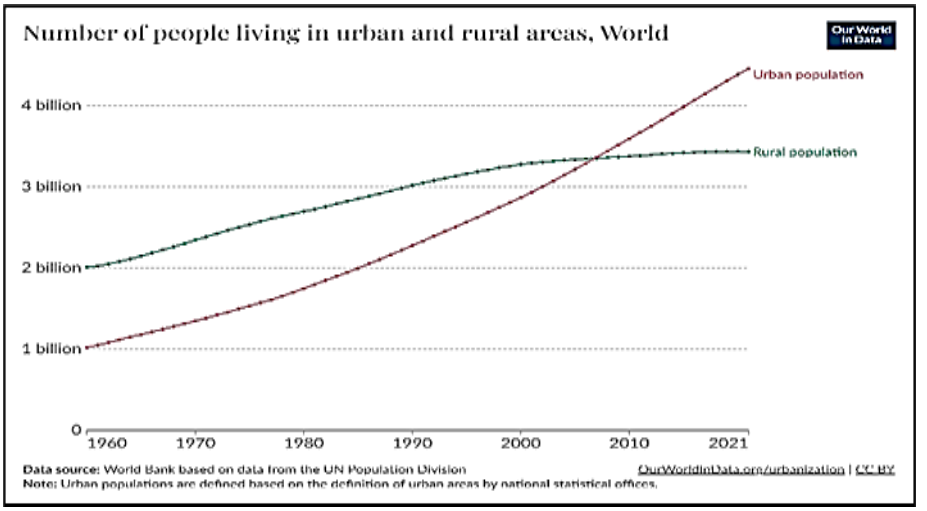


Figure (01): Development of urban and rural population in the world (1960-2021)
Source: https://ourworldindata.org/urbanization#all-charts

1.2) In the national level:

For the case of Algeria, the population recorded an increase of nearly 205% at the national level between 1966 - 2011, but this is the direct effect of a change in urban planning with a population growth rate of 544% increasing the rate of urbanization from 31.4% to 66.3% while the rural environment sees its population decline to 33.7% in 2011.

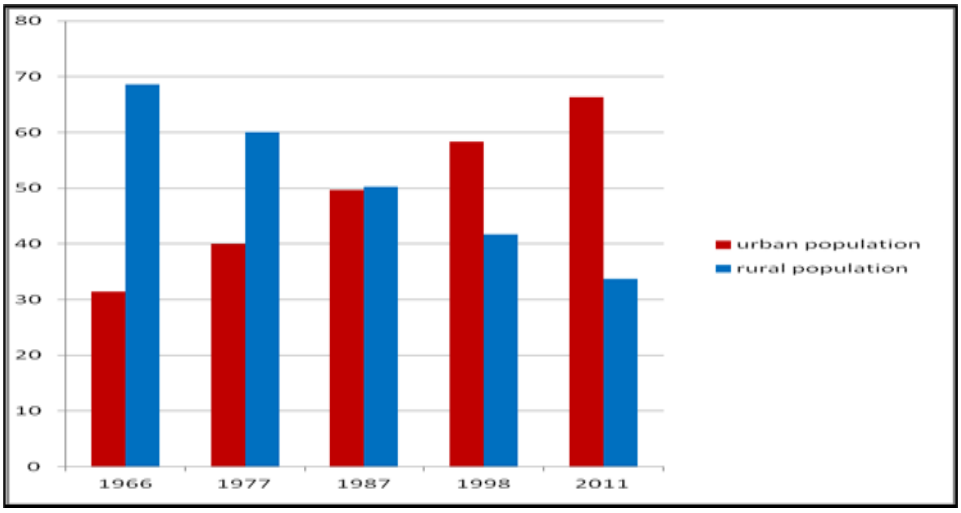


Figure (02): Development of rural and urban populations in Algeria during the period (1966-2011)
Source: Algerian Statistical Office data and others

Indeed, FAO had estimated that Algeria would reach in 2021 a urban population rate that exceeds 74.3%, as mentioned in figure (03).

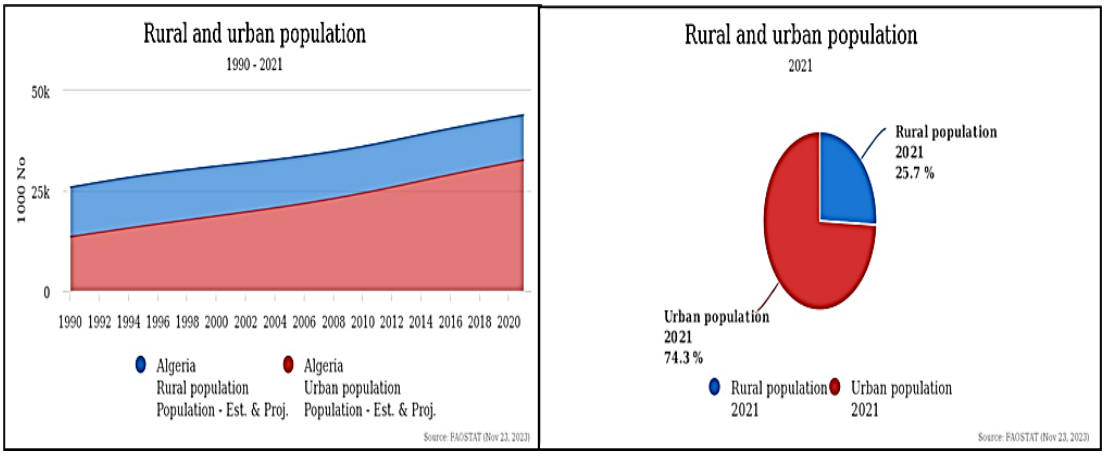


Figure (03): Estimation of rural and urban populations (%) in Algeria in 2021
Source : FAO (https://www.fao.org/faostat/en/#country/4)

In order to understand this situation, we can say that urban population growth is differentiated according to the size of the agglomerations mentioned in the table below.

Table (01): Changes in the number of agglomerations by size between 1977 and 2008 in Algeria

Size of agglomérations	Number of agglomerations in the GRUP								Increase in urban agglomerations Number		
	1977		1987		1998		2008				
	total	Urb	total	Urb	total	Urb	total	Urb	1977-1987	1987-1998	1998-2008
Less than 5000	1985	32	2962	49	3218	0	3562	3	17	-49	3
5000 to 10000	113	47	260	185	409	198	465	283	138	13	85
10000 to 20000	73	70	100	92	216	201	257	238	22	109	37
20000 to 50000	38	38	93	79	133	114	178	142	41	35	28
50000 to 100000	16	16	37	26	51	34	61	47	10	8	13
100000 and more	8	8	18	16	30	32	40	38	8	16	6
Total	**2233**	**211**	**3470**	**447**	**4057**	**579**	**4563**	**751**	**236**	**132**	**172**
Net change in number of agglo	-	-	1237	236	587	132	506	172			

Source: Statistical Collections No. 163/2011 Series S (Social Statistics). Urban Structure. P85.

Reading the preceding table shows that: (Statistics, 2011)

- The number of urban agglomerations between 5,000 and 10,000 inhabitants increased sixfold between 1977 and 2008 (from 47 to 283).
- Those between 10,000 and 20,000 inhabitants number increased by 3.4-fold over the same period.
- The number of small towns (between 20,000 and 50,000 inhabitants) had multiplied by 3.7 in 31 years.
- On the other hand, average cities (between 50,000 and 100,000 inhabitants) grew less than larger cities; however, the most spectacular element is the rise of large cities with more than 100,000 inhabitants.
- Between 1977 and 1998 it almost doubled every 10 years and saw 6 new urban agglomerations cross this threshold during the last decade.
- To justify this development, the number of urban units was doubled between 1977 and 1987.

This densification of the network is explained by:

✓ The reinforcement of small urban centres (with less than 20,000 inhabitants) which now account for nearly 73% of the workforce of the entire network, or 326 out of 447 in 1987. During this period, 177 agglomerations of less than 20000 inhabitants strengthened the network already existing in 1977. This can be linked to successive administrative reorganisations (1974 and 1985) and the expansion of economic activities, basic infrastructure and services.

✓ The unfavourable economic and security conditions experienced by Algeria during the decade 1987-1998 encouraged the population to confine itself to the urban centres closest to the companions; This has caused a strong urbanization of small towns in general, and in particular those whose size is between 10,000

and 20,000 inhabitants who gained a staff of 109 units between the two periods at the expense of those smaller than 10,000 inhabitants.

2) Feeding in Urban Areas:
Feeding requires a reliable and permanent supply while food products are producing either in rural areas or in urban and peri-urban areas. Thus is a question of guaranteeing their availability for all, with creating conducive conditions of investments, processing and distribution capacities, facilities and services necessary, maintaining the rules of hygiene, quality, stability and respect for the environment. (FAO, Food for Cities, 2007)

2-1)In the world:
Rapid urbanization, changing food consumption patterns, increasing malnutrition, climate change and the COVID-19 crisis have highlighted the increasingly important role of cities and their metropolitan areas in food systems. Although urban areas are part of the challenges of food insecurity, malnutrition and poverty, they are also the places from which innovative solutions can be provided by taking advantage of their territories characteristics and their networks of interdependencies.

By 2050, more than 80% of food is expected to be consumed in cities; so, ensuring urban food security requires a value chain that connects rural and urban areas. Therefore, a comprehensive vision of food chain needs to establish a sustainable supply, promote food diversity, boost economic development, and reduce food waste with fostering innovation. (Peciña-Lopez, 2023)

Food availability focuses on the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports. Evidence suggests that major crop yields across Africa and South Asia may decline by 8% by 2050 as a result of climate change (Knox et al., 2012; Wheeler and von Braun, 2013). Yield changes in Africa are estimated as follows: maize (−5%), sorghum (−15%), millet (−10%), and wheat (−17%). In South Asia, sorghum and maize are predicted to have yield decreases of 11% and 16%, respectively (Wheeler and von Braun, 2013). These declines in production levels will have consequences on food production and food availability. (Teressa, 2021)

According to the November 2023 edition of the Agricultural Market Information System (AMIS) Market Monitor shared some key developments in the commodity markets for wheat, maize, rice, and soybeans. Production forecasts for all four crops remained virtually unchanged from October, but it is forecast that wheat production will be 2.2% lower in 2023 than in 2022. By contrast, maize, rice, and soybean production in 2023 is projected to be 4.5%, 0.8%, and 7.3% higher, respectively, than in 2022. In terms of crop conditions, dryness in the southern hemisphere, particularly in Argentina and Australia, is anticipated to result in below-average wheat yields. In the northern hemisphere, winter planting is underway with mixed conditions. For maize, China, Russia, and the United States are expected to have near-average harvests despite some localized drought-like conditions, while sowing conditions are favorable in Brazil but not in Argentina. In the case of rice, harvest conditions are favorable in China and north India, but limited rains have impacted the planting season in certain parts of Southeast

Asia. For soybeans, harvests in Canada and the United States, as well as sowing in Brazil, have been affected by mixed weather conditions, but significant yield impacts are not expected.

The figure (04) shows the most significant evolutions (2014-2023) affecting the volume of production, utilisation and stocks of the most important products that have large volume in the global trade: wheat, Rice and coarse grain. (FAO, Medium-term prospects for agricultural Commodities, PROJECTIONS TO THE YEAR 2010, 2003)

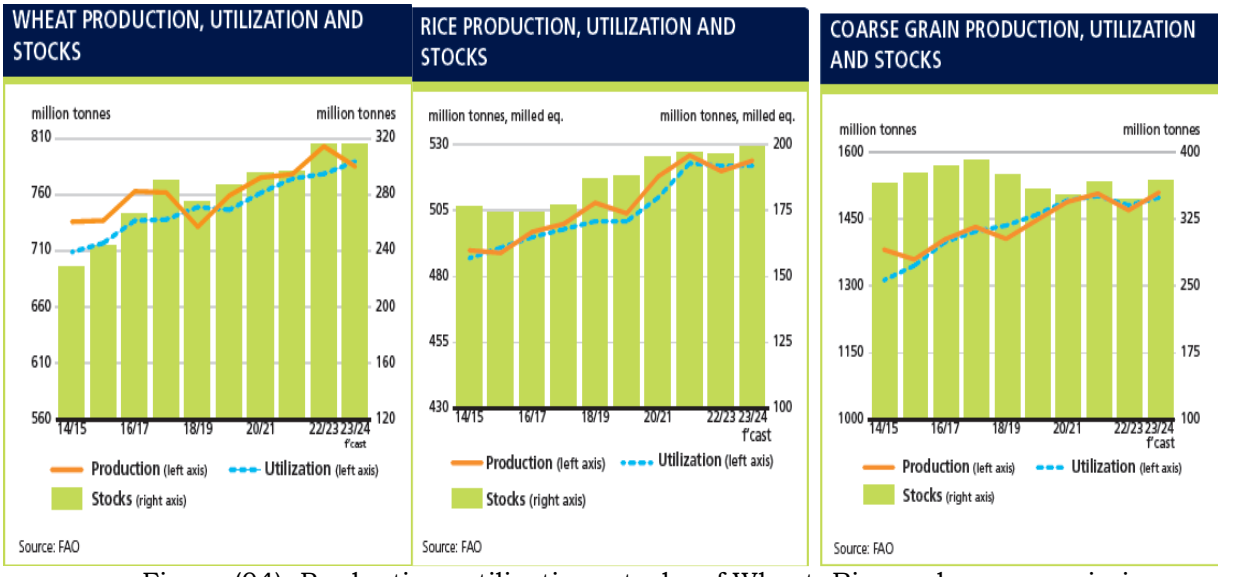


Figure (04): Production, utilisation, stocks of Wheat, Rice and coarse grain in the world (2014-2023)

The International Grains Council mentioned in his Grain Market Report that: (IGC, 2024)

- Expectations for a bumper world maize harvest, **total grains** (wheat and coarse grains) production is forecast to rise by 1% in 2023/24. Although wheat output will be smaller y/y, the crop is still expected to be the second largest on record. Total demand is placed at 2,308m t (+2%), mostly on gains in feed and industrial uptake. World stocks at the end of 2023/24 are seen dropping by 2% to 585m t, a seventh consecutive year of tightening, including reductions for wheat (-6%), barley (-11%) and oats (-50%). However, boosted by large US maize carryovers, total exporter stocks are seen gaining by 10% y/y. Another reduction in global grains trade is envisaged, seen at a five-season low of 410m t (-4%).
- With bigger crops in Asia and the Americas, global **rice** output in 2023/24 is seen at a peak of 521m t (+6m). A population-driven increase in food demand is set to underpin consumption; while inventories, the bulk of which are located in China, are predicted near-unchanged y/y. Trade in 2024 (Jan/Dec) is projected to contract by 4% y/y on softer buying interest from Asia and Africa. While shipments by Pakistan and the US could expand, Indian dispatches are likely to drop sharply.

2-2)In the national level:
According to the National Statistical Office (NSO) (NSO, 2015), the satisfaction of Algerian food needs generated an annual expenditure of about 1.875 billion Algerian dinar (AD) in 2011(13 billion $). This expenditure has increased sharply since 2000 and has a multiplier of 2.7, whose overall annual food expenditure almost tripled in urban areas, from 449 billion dinars in 2000 to 1281 billion in 2011(3.2 billion$ to 9.15 billion$).

In addition, cereal products occupy the first place in the food budget of Algerian households (17.5% of total food expenditure) directly followed by fresh vegetables (13.4%) and red meat (13.3%). Dairy and white meat are in 3rd position (8.4% and 8.3% respectively). With an estimated share of 7.6%, the heading «other food expenditure» which includes ceremonial food expenditure as well as external expenditure occupies the fourth place which it shares with «oils and fats» whose share is 7,1%, as well as 5.1% of the largest food expenditure is allocated to fresh fruit.

On the other hand, the hierarchy between food products is the same, according to the environment of residence but with different proportions.
- For cereal products: the budget share is about 20% in rural areas compared to 16.3% in urban areas.
- Red and white meats is higher in urban areas with 22.5% compared to 19.6% in rural areas.
- The proportion devoted to the acquisition of milk and milk products is slightly higher in urban areas while the consumption of oils and fats is significantly higher in rural areas.

It should be noted that for these last two products, self-consumption, which is included in household consumption, represents a significant share in the consumption of rural households.

The second part: Urban food security challenges

The importance of developing a framework to address urban food security issue is based on food product needs to respond interconnected complexities as: social, economic, environmental processes, policies and cultures that shape these geographies and their implications for food systems.

By focusing on the urban landscape, this does not imply a simple orientation towards food in cities, but rather draws attention to the (re)connections, places and (in) justices that can be reworked through practical institutions and governance that place participatory action and decision-making on the development of resilient and sustainable food systems, by harmonizing international trade and local production with strong links.

1) In the world:

By 2050, it is projected that almost seven in ten people will live in cities, but even today the proportion is about 56 percent. New global estimates show that while food insecurity is higher in rural areas (affecting 33 percent of adults); it is also very high in peri-urban areas (28 percent) and urban areas (26 percent); this

situation has caused many challenges facing households in the world's urban areas mentioned in the FAO rapport about The State of Food Security and Nutrition in the World 2023: (FAO I. U., 2023)

1-1) Prevalence of a new agrifood system: Urbanization is increasingly driving changes in agrifood systems across the rural-urban continuum, creating both challenges and opportunities for food security and access to affordable healthy diets. Urbanization is leading to rising and changing food demand and shifts in patterns of food supply – especially in sub-Saharan Africa and Southern Asia, the two regions exhibiting the highest urbanization rates.

1-2) New foods: A critical challenge is that urbanization is resulting in a greater availability of cheaper, convenient, and fast foods. But these are often energy dense and high in fats, sugars and/or salt that can contribute to malnutrition. In nearly every region of the world, there is insufficient availability of vegetables and fruits to meet the daily requirements of healthy diets. While more advanced in Asia, Latin America and the Caribbean, new analysis shows that highly processed foods have penetrated even in Africa's rural areas.

1-3) The exclusion of small farmers: Urbanization and increasing connectivity across the rural-urban continuum are creating other challenges for food security, including the exclusion of small farmers from formal value chains as well as the loss of lands and natural capital due to urban expansion.

1-4) Food inflation:

The FAO Food Price Index (FFPI) is a measure of monthly changes in the international prices of food basket commodities. It consists the average of five commodity group price indices weighted by the average export shares of each group over 2014-2016. (FAO, World Food Situation, 2020)

Figure (05): FAO Food Price Index (2021-2023)
Source : FAO (https://www.fao.org/worldfoodsituation/fao-food-price-index/en)

a) **The FAO Food Price Index*** (FFPI) averaged 120.6 points in October 2023, down 0.7 points (0.5 percent) from September, continuing the downward trend and standing 14.8 points (10.9 percent) below its corresponding value a year ago. The slight drop in October reflects declines in the price indices for sugar, cereals, vegetable oils and meat, while the index for dairy products rebounded.

b) **The FAO Cereal Price Index** averaged 125.0 points in October, down 1.3 points (1.0 percent) from September and as much as 27.3 points (17.9 percent) from its value a year ago. International wheat prices fell by 1.9 percent in October, reflecting generally higher-than-earlier-anticipated supplies in the United States of America and strong competition among exporters. By contrast, international prices of coarse grains firmed marginally, increasing by 0.6 percent month-on-month. Thinning maize supplies in Argentina placed upward pressure on world maize prices, but this was capped by higher seasonal supplies in the United States of America, where the harvest progressed, and a strong export competition from Brazil. Among other coarse grains, world sorghum prices rose in October, while barley prices fell. International rice prices dropped by 2.0 percent month-on-month in October, weighed by generally passive global import demand.

c) **The FAO Vegetable Oil Price Index** averaged 120.0 points in October, down 0.9 points (0.7 percent) from September, marking the third successive monthly decline and standing 31.3 points (20.7 percent) below its value one year ago. The marginal fall in the price index chiefly reflected lower world palm oil prices, more than offsetting higher prices of soy, sunflower and rapeseed oils. International palm oil prices continued to drop in October, mainly due to seasonally higher outputs in leading producing countries as well as protracted subdued global import demand. By contrast, world soyoil prices rebounded after declining for two months in a row, underpinned by robust demand from the biodiesel sector, particularly in the United States of America. In the meantime, international sunflower oil quotations rose slightly on firm global import purchases, while rapeseed oil also increased moderately on reduced crop prospects in Canada.

d) **The FAO Dairy Price Index** averaged 111.3 points in October, up 2.4 points (2.2 percent) from September, following nine months of consecutive declines, but still down 28.0 points (20.1 percent) from its value one year ago. In October, world milk powder prices increased the most, principally driven by surges in import demand for both near- and longer-term supplies, especially from Northeast Asia. Tight milk supplies in Western Europe and some uncertainty over the impact of the El Niño weather conditions on the upcoming milk production in Oceania added further upward pressure on prices. World butter prices also rose due to increased retail sales ahead of the winter holidays in Western Europe and higher import demand from Northeast Asia. By contrast, international cheese prices dropped slightly due to the impact of the continued weakening of the Euro against the United States dollar and increased exportable availabilities in Oceania.

e) **The FAO Meat Price Index*** averaged 112.9 points in October, down slightly (0.7 points, or 0.6 percent) from September, marking the fourth consecutive monthly decline, and standing 3.9 points (3.4 percent) below its value a year ago. In October, international pig meat prices fell for the third consecutive month, principally driven by the persistently sluggish import demand, especially from some East Asian countries, with further downward pressure stemming from high exportable availabilities in some leading suppliers. By contrast, world poultry meat prices rebounded slightly, as avian influenza outbreaks continued to constrain supplies from several world leading suppliers amid robust consumer demand due to the relative affordability of poultry meat. International bovine and ovine meat prices also increased marginally, reflecting the persistent, robust import demand from some leading importers, notwithstanding ample supplies of bovine meat from Australia and Brazil and ovine meat from Oceania.

f)**The FAO Sugar Price Index** averaged 159.2 points in October, down 3.5 points (2.2 percent) from September after two consecutive monthly increases. International sugar quotations remained, however, 50.6 points (46.6 percent) above their levels in the same month last year. The decline in October was mainly driven by a strong pace of production in Brazil, despite the negative impact of rains on sugarcane crushing in the first half of October. The weakening of the Brazilian real against the United States dollar and lower ethanol prices in Brazil also weighed on world sugar quotations. However, persistent concerns over a tighter global supply outlook in the recently started 2023/24 season, together with shipment delays from Brazil due to logistical constraints, capped the declines of world sugar prices.

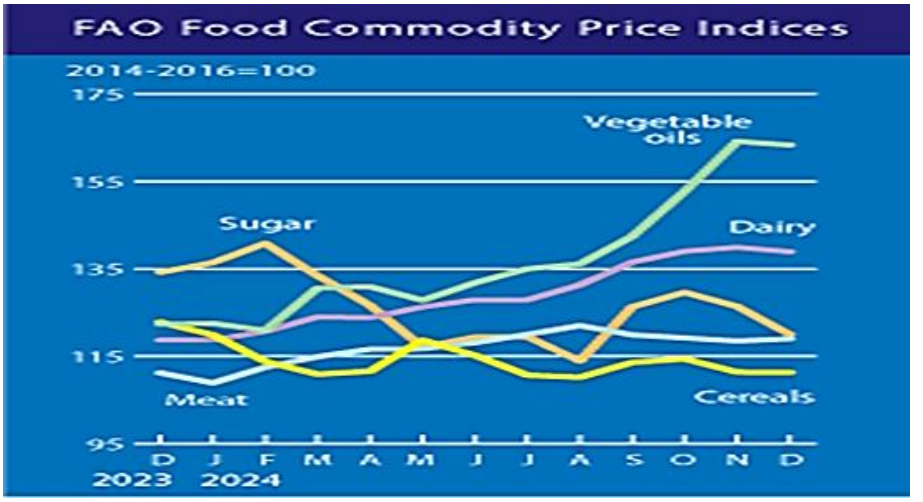


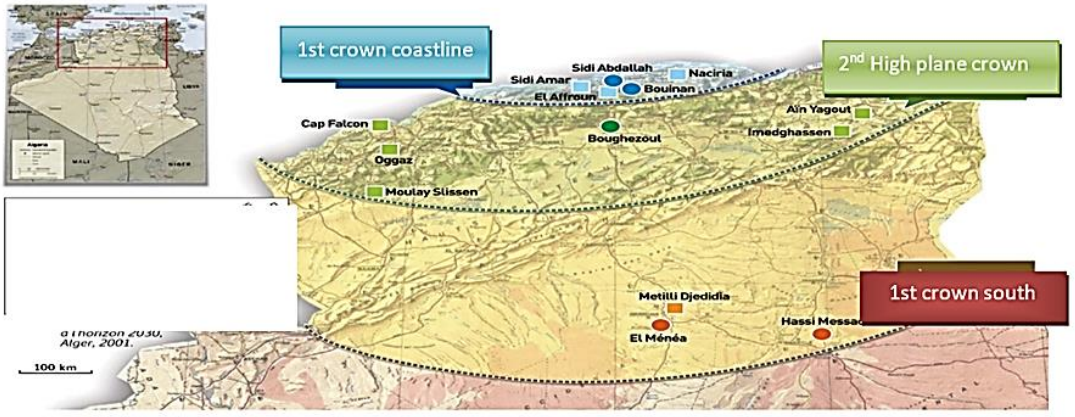
Figure (06): FAO Food commodity Price Index (Oct-2022 to Oct-2023)
Source : FAO (https://www.fao.org/worldfoodsituation/fao-food-price-index/en)

1-5)Food utilisation :
At present rising of obesity becomes a principal public global health and economic concern. In 1997, the World Health Organization (WHO) has declared the obesity as global epidemic. About one-third of the world population is now suffering from overweight or obesity. It is estimated that some diseases, such as hypertension, cardiovascular diseases, Alzheimer disease, asthma, metabolic syndrome, liver steatosis, gallbladder disease, osteoarthritis, obstructive sleep apnea, certain types of cancer, hypercholesterolemia, metabolic syndrome, musculoskeletal disorders (joint and muscle pains), and type 2 diabetes are increased globally due to obesity. Obesity can affect nearly every organ system of human body and even may cause of total heart failure. On the other hand, obesity is incurring substantial costs for healthcare that are already affected the society. (Devajit Mohajan, 2023)

2) In the national level: In the case of Algeria, the challenges of urban food security worsen as the following circumstances:
2-1)Algerian urban population: The massive increase in urban population that has evolved rapidly (66.3% in 2011) because the rural exodus and the urbanization policy that has always adopted within the framework of the National

Spatial Planning Plan (SNAT) established for 2030, in relation to the creation of new cities mentioned in the following map.

Map 01: New city projects in Algeria



Source: National Land Use Plan (NLUP)

It is noted through this map that the number of programmes embodied in northern regions reached 05 with a large population census that increases the density of population there, and aggravates the problem of food security, especially since most of these programmes were embodied on agricultural land.

2-2) Labour force in agriculture sector:

Investment in farmer's activities has known many problems similar to rain level declining with, raw materials price rising, even seeds and fertilizers, which has made this activity unprofitable for farmers, especially young ones. This has made it imperative for them to leave farming activity and look for a new job that gets an accepted income. This has made it imperative for them to get closer to some cities or urban areas to take advantage relative to employment availability, such as trade activities or construction.

Given the evolution of farmer's number in Algeria, it has fluctuated considerably. The figure below illustrates this, despite the lack of data in Algeria.

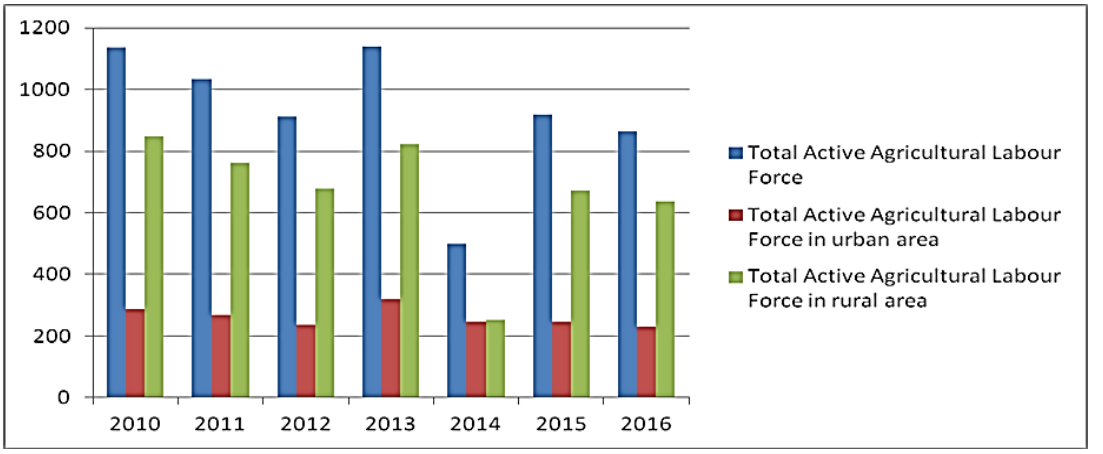


Figure (07): Total active agricultural labour force in urban and rural Algerian area (2010-2016)
Source: prepared by the researcher according to Algerian Statistical Office data

2-3) Food availability:

Agriculture around the world is increasingly at risk of being disrupted due to multiple hazards and threats such as flooding, water scarcity, drought, declining agricultural yields and fisheries resources, loss of biological diversities and environmental degradation. Variations in water supply and extreme temperatures are two of the biggest factors that directly and indirectly impact agricultural production. (FAO, The Impact of Disasters on Agriculture and Food Security 2023, 2023)

In the case of Algeria, **c**ereal products (all species combined) occupy a strategic position in the Algerian food system, which have seen a sharply declined during the 2020/2021 campaign (-36.6%) compared to 2019/2020. It should be noted that the production of this sector has experienced a downward trend since the 2018/2019 season.

Indeed, after a return of 19.5 quintals (Qx)/ha in 2017/2018, a declines were marked in successive seasons to 14.3 Qx/ha in 2020/2021; this decline is explained by the water stress, because Algeria is one of the lowest rainy countries, it ranked 171st globally with a rate of rainfall of 89 mm in 2021.

Winter cereal production in the 2020/2021 crop year is estimated at 27.6 million quintals, compared to 43.9 million quintals in 2019/2020, with a drop of 37%. In detail, durum wheat production, which accounts for 66% of winter cereals, reached 18.3 million quintals in 2020/2021 compared to 25.8 million quintals in 2019/2020, which is a significant drop of 29%. The same goes for barley, wheat tender and oats, which saw their production fall by 54%, 37% and 42% respectively. Moreover, triticale production continues its upward trend to reach a volume of 6,148 quintals in 2020/2021 with a growth of 128% compared to in the previous campaign. (NSO, Agricultural Production Campaign (2020-2021), 2022)
The Figure (08) below denotes the Algerian Cereal Production evolution between (2019-2021).

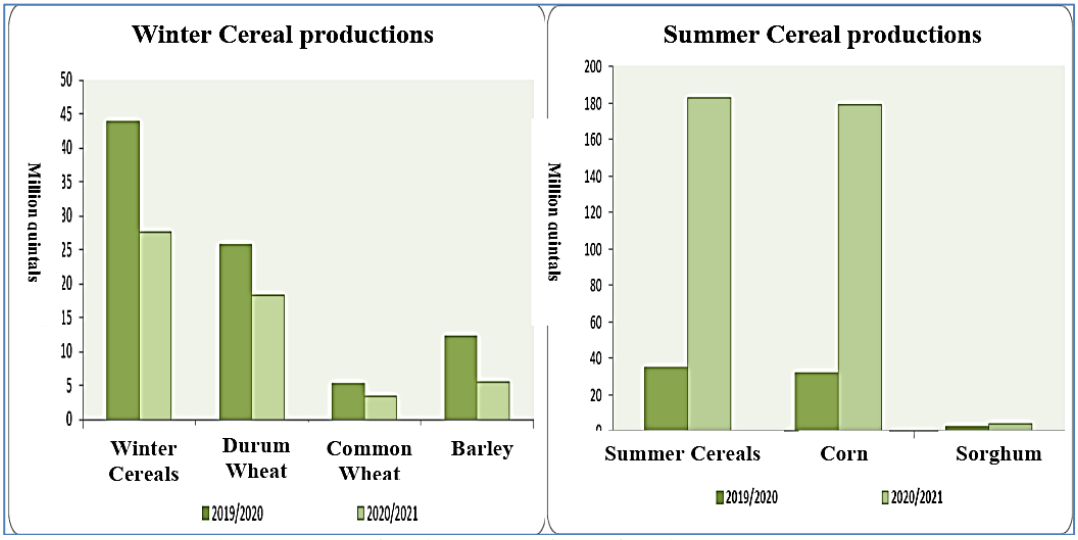


Figure (08): Algerian Cereal Production (2019-2021)
Source: Algerian Statistical Office. Agricultural Production Campaign (2020-2021), Statistical Collections №990.p2

For summer cereals, production increased sharply during the 2020/2021 season, recording a volume of 183,076 quintals against 34,776 quintals in 2019/2020 for an area of 3586 hectares against 598 hectares. This increase is due exclusively to speculation in order to record a production of about 179212 quintals, or 146 999 quintals more. The same goes for sorghum, which saw its production increase by 51%.

2-4) National Food inflation :

The increase in food inflation prices is due to domestic and international inflationary factors, as shown in Figure09 below.

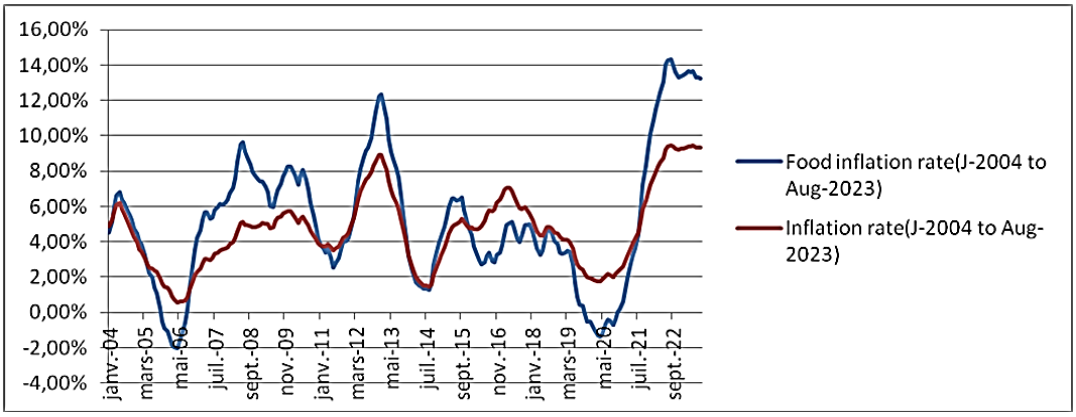


Figure (09): Relationship between food inflation and inflation in Algeria (Jan-2004 to Aug-2023)
Source: prepared by the researcher according to Algerian Statistical Office data

The figure 09 shows an accelerated rate of inflation mainly related to food products, especially after the end of the corona virus crisis (2021). After that, all food commodities have seen a significant rise (double digit), especially with regard to large-scale commodities consumed as mentioned in the below table.

Table 02: Some elements about food inflation in Algiers city (Janury-2020-Janury-2024)

Commodity Price Level Index (Weight of index)	**(CPI) Jan-2020**	**(CPI)Jan-2024**	**Variation (2020-2024)**
Fresh agricultural products (169.18/430.9)	260.22	406.25	**56.11%**
Industrial food products (261.72/430.9)	176.59	232.26	**31.52%**
Meat and offal of mutton (57.22/430.9)	298.34	520.75	**74.54%**
Meat and offal of beef (10.82/430.9)	275.49	396.27	**43.84%**
Fresh fish (4,27/430.9)	576.72	985.59	**70.89%**
Eggs (7.71/430.9)	195.71	333.17	**70.23%**
Vegetables (33.83/430.9)	244.97	343.53	**40.23%**
Fruits(16.46/430.9)	329.60	419.09	**27.15%**
Oils and fats(59,3/430.9)	197.38	311.84	**57.98%**
Potato(14.78/430.9)	212.56	287.95	**35.46%**
Milk- Cheese- Derivatives (110.7/430.9)	151.79	192.69	**26.94%**
Coffee –Tea and Infusion (35.5/430.9)	207.60	316.63	**52.51%**
Non-alcoholic drinks(39.2/430.9)	215.94	270.94	**25.47%**
Total(Food - Non-alcoholic beverages) Algiers	209.97	300.76	**43.23%**
Total(Food - Non-alcoholic beverages) national	220.34	310.06	**40.71%**

Source: Algerian Statistical Office

According to these data, we note the following results which show the ranking of food commodities in terms of inflation from higher to lower between (2020-2024):

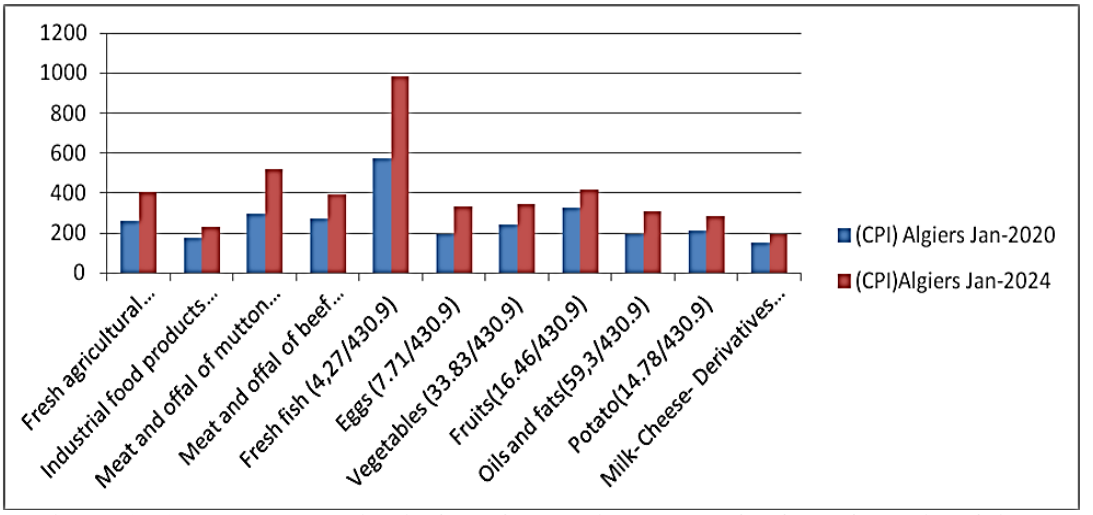


Figure (10): consumer price index of many important food products in Algiers (2020-2024)

Source: prepared by the researcher according to Algerian Statistical Office data

To explain the Food price evolution in Algeria, especially that is related to the important food commodities, we note that food inflation has reached a level of 43.23% more than the total inflation rate, it was at 9.82% between January 2020 and January 2024. This shows that prices rising is significantly touches by food commodities (>50%)in particular those related to fresh fish, Meat, Fresh agricultural products, eggs, Oils and fats, Coffee –Tea and Infusion.

Note through the above form that Meat and offal of mutton recorded the highest inflation rate at 74.54% caused by many problems faced by ranchers, especially those related to feed boils that have seen price rising in global markets, as well as the climate change problems, that Algeria has experienced repeated waves of drought in recent years.

In the other hand, fresh fish have seen a higher inflation rate caused by the fishing sector offshore and the weakness of the fleet fishing vessels, further than a lack in its human crews, without forgetting the importance of this product in the healthy diet, that has been recommended by many doctors after the spread of many diseases such as diabetes, cardiovascular disease and others that require a more balanced diet.

For the other products: eggs, vegetables, fruits, oils, potatoes and milk products and derivatives, which are also known a price-inflation, that is the result of high prices of their inputs, especially after the restriction of imports, which led a lack of supply in the national market and thus inflate their import bill.

2-5) Food utilisation:

Utilization is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the

diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals. (FAO, Food Security Information for Action Practical Guides (An Introduction to the Basic Concepts of Food Security), 2008)

Talking about food utilisation in Algeria leads us to several situations related to:
- The new pattern of food for Algerian households, especially those living in cities and urban areas, where the consumption of fast food and soft drinks are higher, which increased Glaucids and lipids level and then the number of calories.
- Women working in cities lead them to consume foods from restaurants and fast-food shops.

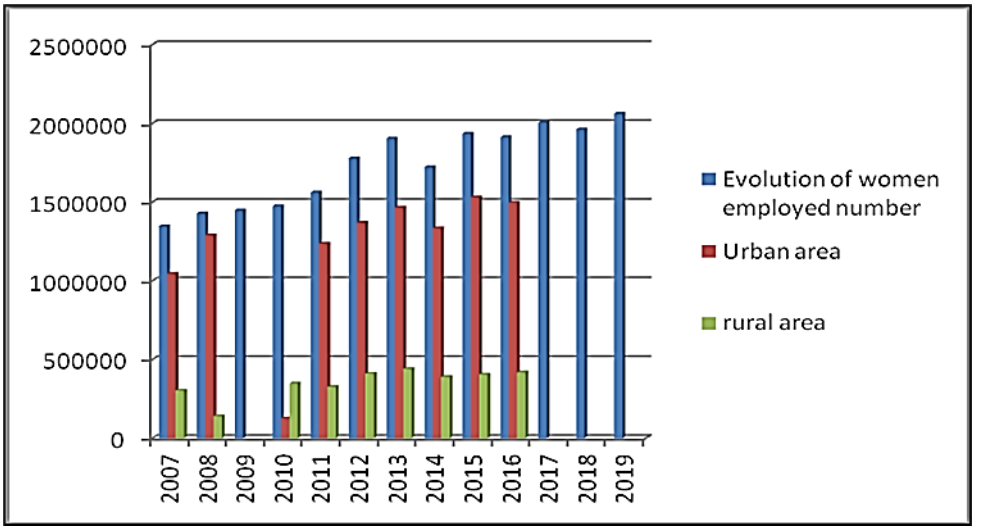


Figure (11): Evolution of woman employed number
Source: prepared by the researcher according to Algerian Statistical Office data

- The spread of irregular markets in which food and consumables are displayed without observing conservation and storage requirements.
- The number of cases of intoxication in urban area has risen, especially in summer.

As a result of these conditions, there have been many chronic diseases in Algerian society, which doctors and specialists classify as being greatly explained by malnutrition, irregular and unhealthy eating.

According to a study carried out by the National Institute of Public Health (NIPH) in Algeria for 4818 households, taking the individual aged between 35 and 70 years; it was carried out the drawing of lots relative to person who was the subject of an interrogation and anthropometric measurements (the reflection of nutritional and health status) that have made it possible to measure obesity.
Overall, the prevalence of overweight is significantly higher in urban areas than in rural areas (58.92% versus 50.93%).
- For men, the prevalence is significantly higher in urban than in rural areas (43.73% versus 36.95%).

- For women, the prevalence is significantly higher in urban than in rural areas (69.47% versus 62.61%). (NIPH, 2010)

The figure below shows the vulnerability evolution of adults over 18 years to obesity based on FAO data.

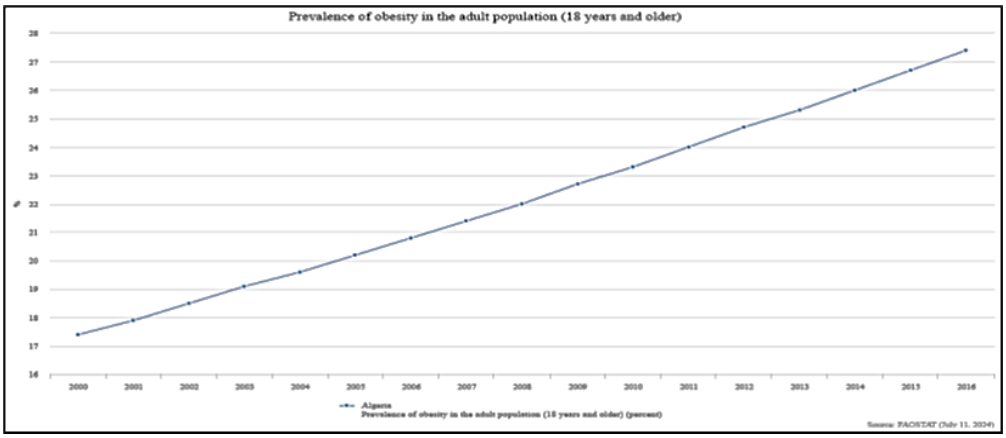


Figure (12): Prevalence of obesity in the Algerian adult population (18 years and older)

This figure shows a rapid increase in the proportion of people living with obesity in Algeria. Especially during this period 2000-2016, this ratio is expected to rise further during the last decade, under the rising in Algerian urbanization as an improvement in living standards, especially in relation to higher levels of per capita income after successive rises in wage levels from 2022 to 2024, important infrastructure related to hospitals and residential poles constructed in urban areas that outnumbered 70,000 apartments.

According to the 2016/2017 national survey, obesity in Algeria affects 30% of women and 14% of men. If urgent measures are not taken, the phenomenon will affect 46% women and 14% to 30% men by 2030.Among other risk factors for this disease, classified since 2018 by the World Health Organization (WHO) as a serious chronic disease, caused by bad nutrition, lack of physical activity, in addition to genetic factors. (Algerian Press Service) (APS, 2022)

In addition, a national survey called Transition and Health Impact in North Africa (TAHINA) was conducted as part of a global research project on epidemiological transition and its impact on health in North Africa. It was carried out in 2005 by the National Institute of Public Health of Algiers (NIPH) in collaboration with the European Union in 16 departments. According to this study, diabetes is the second most common disease (8.78%) after high blood pressure (16.23%). It affects 12.21% of Algerians with a female predominance of 12.54%. Diabetes is more common in urban areas; it is about 10.15% against 6.40% in rural areas.

Among the most prevalent types of cancer in society, the national registry cites colorectal, lung, prostate, bladder and digestive tract cancer in men. Then breast cancer, colorectal cancer, thyroid gland and cervix in women. Cancer of the digestive tract generally remains the predominant at the national level in both

sexes. Experts attribute this wide proliferation in Algeria, like some countries of the world, to several factors, including the change in the population diet, dominated by industrialized foods, to environmental factors, such as pollution, fertilizers that are added to agriculture, and other genetic factors. (APS, Cancer: Algeria records nearly 50, 000 new cases annually., 2022)

The third part: Urban food security determinant

The 21st century has been defined as the Age of Cities. While most people in Latin America already live in urban areas, the same is not true for Asian and African cities whose population is likely to double in the next decade. The majority of low-income urban consumers will increase. Food security will therefore depend on the level and stability of access to food as well as the variety and quality of food.

1) The changing context of urban food security: The urban food security area has undergone seismic paradigm transitions in its evolution. In view of the rise of food insecurity in cities, this field of research is relatively attached to urban transformations that play an important role in the development of future municipal food policies. Thus, understanding the historical evolution and future directions of the field can provide insight into how these policies may be shaped by future urban food security research.

Table 03: The changing context of urban food security

The context of food security	The founders
Food insecurity was caused by a disruption in the food supply	*(Clapp, 2015), (Barrett, 2002 ; Jenkins andt Scanlan, 2001)*
food insecurity was caused by supply and access disruption	*d'Amartya Sen (1980)*
The motivation to solve urban poverty problems	*(Haddad et al. 1999 ; Maxwell, 1999 ; Satterthwaite and Mitlin, 2012)*
Divided urban food security into two households: one focused on supply dynamics (focusing notably on issues of urban agriculture, supermarket and informal food system), and the other on household food access (under the pressure of household poverty, public health problems, rising food prices, access to infrastructure)	*(Zezza and Tasciotti, 2010; Frayne and al. 2014; Orsini and al. 2013; De Bon and al. 2010)*
The growing dominance of supermarkets in urban food systems and their implications for household access to food, food supply and food diversity.	*(Crush and Frayne, 2011a; Reardon and Hopkins,2006; Battersby and Peyton, 2014)*
The contributions of the informal economy to maintaining household food security in terms of food supply and employment.	*(Battersby and Marshak, 2017; Skinner, 2008)*
The link between household food security and household poverty.	*(Maxwell, 1999 ; Tawodzera et al. 2016)*

The context of food security	The founders
The impacts of infectious diseases on urban food security.	*(Crush and al. 2011a, b)*
The relationship between urban food security and non-communicable diseases.	*(Smit and al.2016 ; Demmler and al. 2017 ; NCD-RisC 2019)*
The impact of food prices on urban food security in the event of a food price crisis.	*(Cohen and Garrett, 2010 ; Sonnino, 2016)*
The link between urban food security and urban planning and access to infrastructure.	*(Pothukuchi and Kaufman, 1999 ; Morgan, 2013 ; Frayne and Mc Cordic, 2015).*
the concept of food desert has attempted to formalize the observation that food may be more difficult to access in some urban areas than others.	*(Beaumont and al. 1995) and (Wrigley and al. 2003)*
The influence of economic, social and political factors on access to food.	*(Horstand al., 2016 ; Sadler and al. 2016 ; Shannon, 2016)*

Source: Established by ourselves from: Bruce Frayne, Truzaar Dordi, Cameron McCordic*, Naomi Sunu and Clare Williamson. A bibliometric analysis of urban food security

2) Urban food security Characteristics:

Several dimensions of urban systems make them significantly different from rural ones in terms of their contribution to:

2-1) Household: The average composition of urban households is different from that of rural areas. Urban households are smaller than rural families. On the other hand, due to the prevalence of nuclear families and single-parent families, urban households may have a higher ratio of children to adults.

2-2) Livelihoods: Many urban poor are most likely to be insecure (unemployed or underemployed) and increasingly have jobs only in informal sectors, which are often highly unstable, poorly paid and seasonal. On the other hand, since most food is bought at markets, street vendors and processing facilities therefore play an important and unique role in urban areas. They also present unique problems (street food addiction) because they expose urban residents to higher levels of contaminated food.

2-3) Women's work: In cities, women are increasingly involved in the labour force to earn money. The traditional role of women in the selection, production and distribution of food within the household is therefore changing in the urban context. This can have an impact on both the quantity and quality of food consumed and particularly affects young households. Women spend more time working outside the home, less time is spent cooking. This translates into a greater reliance on buying packaged food that is quick to prepare or buying meals from street vendors, which are generally less nutritious and higher in fat and salt. The effects of low micronutrient diets are particularly damaging to women, especially pregnant women, and children, who need a wide range of micronutrients for healthy reproduction and growth. In both developed and developing countries, female-headed households tend to be the most vulnerable and least secure.

2-4) Food costs: Urban dwellers generally pay more for food and food preparation than their rural counterparts. In addition, the fragmented nature of many urban food markets means even higher food costs in remote neighbourhoods, which experience greater fluctuations in both food quantity and price. Some estimate that in developing countries, the cost of food is 30% higher in urban areas. 34 % in many countries, poor urban dwellers spend 60-80% of their income on food.

2-5) Infrastructure: Urban areas depend on their transport and storage facilities to ensure that enough food is available for their populations. Lack of basic infrastructure, poor or deteriorating roads and disruptions in any segment of the infrastructure can lead to shortages and increase food price volatility.

2-6) Formal and informal safety nets: Coping strategies in place during food shortages are different for urban and rural residents. Urban residents tend to have safety nets that can help minimize exposure to harmful foods shocks than their rural counterparts. This may be because of the weaker sense of community in urban landscapes. This situation is exacerbated by frequent displacement, urban violence and crime, which undermine trust and loyalty to the community. Urban residents in some countries are therefore increasingly dependent on government safety nets such as food coupons or food distribution by non-governmental organizations and other means of managing negative shocks. Many urban dwellers in developing countries may not have access to any form of safety net during a crisis.

2-7) Environment and sustainability factors: Urban areas tend to have higher levels of pollution than rural areas. Lack of clean water, basic sanitation and solid waste disposal facilities in many urban slums adds to the problem. This has implications for food preparation and thus affects the health status of the urban population. The nutritional status of urban dwellers is also more variable; the poorest urban dwellers have higher rates of malnutrition than their rural counterparts.

3) Definition and dimensions of urban food security:

3-1) The definition of urban food security: According to the Chicago Council on Global Affairs(CCGA), urban food security is: « A state where people in cities have sustainable physical, economic and social access to safe, sufficient resources, various calories and micronutrients necessary for a healthy lifestyle ». (CCGA, 2013)

Food security is therefore ensured when all human beings have, at any time, the physical, social and economic possibility of obtaining sufficient food, Healthy and nutritious, allowing them to meet their food needs and preferences for a healthy and active life. Based on this definition, four dimensions of food security can be identified: availability, economic and physical access, use and stability.

3-2) The Dimensions of Urban Food Security: According to FAO, achieving food security rests on four pillars, or critical dimensions: availability, access, utilisation and stability. (J.Battersby & G.Haysom, 2018)

- **Food availability**: The availability of sufficient quantities of quality food, provided by domestic production or imports (including food aid).
- **Food Access**: Individuals' access to adequate resources (rights) for the acquisition of appropriate foods for a nutritious diet. The rights are defined as the sum of all lots of goods on which a person may command, considering legal,

political, economic and social arrangements the community in which they live (including traditional rights such as access to common resources).

• **Food utilisation**: using food through adequate nutrition, clean water, sanitation and health care to achieve a state of nutritional well-being where all physiological needs are met. This highlights the importance of non-food inputs in food security.

• **Stability:** To be in food security, a population, household or individual always has access to adequate nutrition. They must not risk losing access to food because of sudden shocks (for example, an economic or climate crisis). Crisis or cyclical events (for example, seasonal food insecurity). The notion of stability can therefore refer to both the availability and access dimensions of food security.

4) The urban food system:

Nearly to 85% of the world's population lives within three hours of a city of 50,000 or more, resulting in the strengthening of inter-city food systems. Regions and Agglomerations is essential to developing inclusive local economies, which contribute to livelihoods and job creation, rural transformation and sustainable development in general. This requires considering the complexity of rural-urban linkages and implementing solutions that span the rural-urban divide.

4-1) Definition of food system:

Food system means an « interdependent network of actors (enterprises, financial institutions, public and private bodies) directly or indirectly involved in the creation of flows of goods and services geared towards satisfying the food needs of a group of consumers, in a given geographical area». (Rastoin, 1996)

In its report on food loss and waste, HLEG (High-level expert group) on Food Security and Nutrition of the Committee on World Food Security adopted the following definition of a food system: «A food system is made up of a set of elements (environment, individuals, inputs, processes, infrastructures, institutions, etc.) and activities related to production, processing, distribution, the preparation and consumption of food, as well as the outcome of these activities, including socio-economic and environmental impacts». (HLEG, 2018)

The HLEG has always considered food security and nutrition not only as a result, but also as a prerequisite for sustainability. It defines a sustainable food system as being « A food system that ensures food security and nutrition for all without compromising the economic, social and environmental foundations necessary for food security and nutrition for future generations».

Placing food security and nutrition at the core of assessing the sustainability of food systems will help break the cycle of malnutrition and intergenerational disease and will help policymakers translate data into action. Food security and nutrition should never be one of the variables on which to reach a compromise.

4-2) Types of food systems:

Three types of food systems predominate in urban and peri-urban areas: a traditional food system; a modern, rapidly emerging global food system; and an informal food system, primarily targeted at low-income people.

To meet the growing food demand in urban areas, municipalities and metropolitan districts are sourcing food from a combination of chains short national supply and food imports. Below, we briefly discuss each.

• **Traditional food systems:** Traditional urban food systems are characterized by a dynamic urban wholesale market trade linked to rural areas, by a diverse group of rural traders (assemblers, aggregators, etc.) and various scales of wholesalers

(including smaller "semi-" wholesalers) who are in the agriculture of towns and small towns. Traditional urban food systems are prevalent in many cities in Africa and Asia but continue to thrive worldwide despite the growing presence of various types of modern food chains.

• **Modern food systems:** Modern urban food systems consider all the variants and actors involved. They are characterized by modernized wholesale and food security systems, capital intensive food processing, integrated cold chains and food service, leading logistics, private label, labelling and packaging, retail and modern restaurants and global integration. Wholesale operations can be more specialized than traditional food systems, operate on a larger scale and make extensive use of supply contracts with large commercial producers. They can source food from long and short national food supply chains, as well as from food imports as direct purchases between consumer and producer. Modern retail trade is in a variety of shapes and scales, including a rapidly growing segment that meets the food demand of middle and high-income consumers, and an evolving set of preferences based on value and aspirations, including health and well-being, social impact, Animal welfare and the shopping experience. Informal system and urban poor.

• **The informal food system** represents a third subsystem that primarily targets the urban poor through informal food vendors and restaurants, which are generally not registered businesses. It is largely cash-based and characterized by small volumes of retail transactions, involving both domestic and imported products, from open or wet retail markets or wholesale markets in the traditional system. Some sellers may grant credit to regular customers. It also includes informal safety nets that poor households use to secure food, including food transfers from family members in rural areas and through sharing with neighbours.

4-3) The interests and challenges of an urban food system:

• **The interests:** Cities can build more sustainable food systems for: (FAO, A vision for City Region Food Systems, Building sustainable and resilient city regions, 2015)

- prevent and reduce food waste,
- provide decent livelihoods for rural, peri-urban and urban producers,
- promote sustainable food production, processing and marketing,
- Ensure food and nutrition security for all consumers and value chain actors.

• **The challenges:** Urban food systems will increasingly be called upon to contribute to multiple programs and objectives including job creation, nutrition and health, environmental sustainability and food security. Each of these system results foods will in turn affect broader poverty reduction and prosperity objectives. Several major issues of the food system can be highlighted: (WB, FAO, & UN, 2017)

- Urban food security and nutrition are important determinants of urban health and well-being. As food is a major component of household spending for the urban poor, food prices are a determining factor in food insecurity and poverty. Based on the food insecurity experience, FAO estimates that 50% of urban populations in low-income countries are food insecure compared to 43% in rural areas. A healthier population is also a more productive one, so addressing urban food and nutrition security can directly contribute to national economic development.

- Growing consumer demand for convenience foods, increased consumption of processed foods, diversified diets with more animal protein, and increasing food consumption outside the home, represent huge market opportunities nearly to 7.8 trillion $ in the global food industry. So, changing your diet will also affect nutritional and health outcomes.
- Food systems are a major contributor to greenhouse gas (GG) emissions and climate change, with each function of the food system from production, processing, distribution, retail and consumption of food, managing food waste and loss uses resources and makes a carbon footprint. Agricultural production functions are estimated to contribute 25% of GGs while downstream food system functions generate about 6% of GGs.
- Food systems are also sensitive to a variety of socio-economic and agro-climatic shocks, underlining the importance of various risk management measures to strengthen resilience and reduce vulnerabilities (Bellagio Communiqué, 2017).
- The food system is an important generator of urban jobs and livelihoods in food processing and food distribution regions (and potentially, recycling and waste management); large and small formal and informal enterprises benefit from the food system; and it is often a key source of work for women and youth. The food and beverage sector are the only low-labour-intensive industry labour that supports growth in value added and employment in manufacturing and services as countries move to higher and higher middle incomes.

Conclusion

Considering the development observed in cities around the world, and which affected the capacity of urban families to meet their food needs, and the accompanying phenomena resulting from urbanization, and urban lifestyle reflected in increasing population density and urban poverty, informal markets and slums, child labour and low living standards for many families in urban areas; All these phenomena have exacerbated urban food insecurity, which is linked to the conditions guaranteeing physical, economic and social access, in order to obtain sufficient and varied calories, and micronutrients for a healthy lifestyle.

Our study concludes that:

- ✓ Urban food security concerns all the conditions that guarantee stable physical, economic and social access to the urban population in order to obtain adequate, varied and healthy calories.
- ✓ Algeria has experienced remarkable urbanization, having a negative impact on the food security of the urban population, especially on the poor classes who live in cities, such as pensioners, unemployed widows, workers with low or irregular wages, workers in the informal sector, the elderly and people with illnesses will cause disabilities, or those with reduced mobility.
- ✓ Change in the eating habits of the urban Algerian population, whose citizens are derived towards the consumption considered more animal protein, as well as eating out (fast food, pizzeria, etc.)
- ✓ Despite the improvement of the level of income of the Algerian population, the purchasing power and especially urban remained still limited, aims at the product breaks, the price increase (due to speculation especially).

- ✓ The attention of many leaders of Algerian local authorities is focused on housing, transport, security and social facilities, more than it is directed towards food systems and urban food policy.
- ✓ Algerian agricultural markets are characterized by a lack of transparency, a lack of clarity and complexity of food marketing channels, which does not allow consumers and producers to fully benefit from the benefits of competition.

Based on the results obtained, we suggest ways to improve the food system and ensure food security in Algerian cities:

- ➢ The need for an adequate understanding of the food value chain process in urban areas, where local authorities must have a strategic vision on how to move the city forward in the medium term (4-6 years) and long term (10-15 years) in terms of spatial, demographic, economic and social development.
- ➢ Develop local policies and programs to reduce food costs and loss.
- ➢ Promote productive employment in urban and/or peri-urban agriculture.
- ➢ In order to reduce costs, mobile and weekly markets, supermarkets that buy directly from organized producers should be activated.

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