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REVIEW ARTICLE

An update of the nutritional situation in eastern Algeria

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Abstract

The nutritional and epidemiological transitions have affected the Algerians' lifestyle primarily in their nutritional status, eating behavior, and health status. Overweight and obesity, being present at all ages of life, includes several factors related to the risk of developing, at an older age, non-communicable diseases such as diabetes and cardiovascular disease. The nutritional situation of children under 5 years remains a concern of low birth weight, low prevalence of exclusive breastfeeding, stunting growth, and underweight. Nutritional deficiencies, mainly in micronutrients, persist in different age groups, especially in pregnant and lactating women reflecting the consequences of a poor diet characterized by low consumption of fruits and vegetables, and higher consumption of fatty products as well as sweet with high-calorie density. The issue of food and nutritional security remains an important issue. Despite the persistent nutritional problems, the level of food security indicators shows that the country is not exposed to food insecurity, but dependency on food imports remains quite high. The living conditions in rural areas must be improved in order to strengthen the agricultural sector which must be able to meet the needs of the population. Updating and analyzing the nutritional situation using existing data will enable the strategies put in place by national and international organizations to be implemented.

Keywords: Nutritional status, Non-communicable diseases, Risk factors, Eastern Algeria.

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1 Introduction

Algeria is in the northwest of Africa on the Mediterranean coast and possesses an area of almost 2.4 million km^2, making it the largest country on the continent [1]. As of January 1, 2020, the resident population in Algeria was estimated at 43,900,000 inhabitants. The average age of the population continues to grow under the effect of the increase in life expectancy at birth, going from 28.0 years old to 29.4 years old between 2009 and 2019, while the median age fell from 24.5 years old to 27.7 years old during the same period. The part of the working-age population (15-59 years old) continues to decline and reached 60.0% in 2019. Ninety-five percent of the population has access to health infrastructure (98% in urban and 88% in rural areas) [2].

The cultivable land represents only about 8.5 million hectares mainly concentrated in the Northern region. Algerian agricultural production is dominated by arable crops, in particular cereals, market gardening, arboriculture, palm cultivation, and livestock (sheep, cattle, and chickens). As rainfed agricultural production is highly variable due to the irregularity of rainfall, the state has offered priority to the development of irrigation, especially since the 2000s [1].

A report, made in 2019 on Algeria's agriculture, revealed that the country is dependent on its external income to ensure its food supplies. The report mentioned that if the decline in the country's resources were to carry on over the next few years - without any change in lifestyle- the political risk would be enormous of seeing the country unable to meet its food bill [3].

Algeria is a country in the process of epidemiological and nutritional transition. The evolution of data shows the decline in some communicable diseases fo which the profile has changed significantly compared to the 1990s: poliomyelitis and tetanus have been eradicated. Likewise, the incidence of measles, whooping cough, and typhoid fever have largely declined. Although, it should be noted that the persistence of tuberculosis (53.3 cases per 100,000 inhabitants) and the presence of food toxi-infections (7.89 cases per 100,000 inhabitants) which are, in most cases collective, testifies the perfectible nature of the care management, respect of hygiene conditions within communities, and in particular schools, universities and institutions, as well as during occasional events, in familial circumstances [4]. Non-communicable diseases (NCDs), tend to be long-term and result from a combination of genetic, physiological, environmental, and behavioral factors [5]. The NCDs epidemic has devastated health consequences for individuals, families, and communities and threatens to undermine health systems [6]. The National Institute of Public Health conducted a national health survey in June 2005 as part of a global research project on the epidemiological transition and its impact on health in North African countries (TAHINA). This study estimated the morbidity of 35-70 years old in a nationally representative sample of 32,463. Different risk factors such as: toxic habits, overweight, obesity, etc., were analyzed. Among Algerian adults, high blood pressure accounted for 24.58% of chronic pathologies, followed by diabetes mellitus

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(12.33%), by asthma (9%), and rheumatism (8.15%). Other cardiovascular pathologies, mental illnesses, and sensory disabilities are found in significant proportions (6.80%, 5.44%, and 4.60% respectively). Other pathologies of the nervous system, metabolic disorders, and allergic rhinitis (3.66%, 3.06%, 3.03%, respectively) follow. In a sub-sample of 4,750 subjects, the frequency of overweight was 55.90%. It was higher in women than in men (66.52% vs 41.29%). By age, the highest frequency was among 45-49 years old (62.72%). The urban area recorded 58.76% overweight against 50.88% in rural areas. As for daily food consumption, it did not comply with international recommendations for all food groups. It was particularly low for fruits (0.6 times/day), vegetables (0.8 times/day), and dairy products (1.3 servings/day). On the other hand, the consumption of cereals was considerable (3.8 servings/day) followed by fatty and sweet products (2.7 servings/day). Regarding physical activity, most of the activities were represented by those of low intensity (60.5% of Algerians' time). Activities of moderate and very low intensity accounted for only 3.4% and 15.9% respectively [7].

Algeria has opted to integrate sustainable development into its development policy and into the main principles of the Nation through the adoption in 2016 of constitutional provisions that explicitly refer to the concept of sustainable development as its key principles. Algeria aims to ensure the appropriation of the Sustainable Development Goals by the whole of society and the mobilization of the latter in favor of the monitoring and implementation of the 2030 Agenda, thus ensuring the achievement of the various objectives for the benefit of all categories of population [8].

The objective of this article is to present the updated nutritional situation in Algeria. We present as a model what we have achieved in eastern Algeria.

2 Dietary intake

Based on Food and Agriculture Organization (FAO) profile [9] as regards the diet of Algerians, it appears that consumption is mainly based on cereal products. The most common foods that complement this basic diet are rice and potatoes, as well as legumes, fruits, and vegetables. The purchase share of the milk and products group from 750 Algerian households was 26.9% compared to other food products purchased at the family household level. Almost half (44.5%) of the households consumed this group on a regular basis. Urban households targeted dairy products in relation to price, hygiene, taste, nutritional value, brand, and packaging ($p<0.05$) for the purchase of all dairy products [10]. Furthermore, dairy calcium was the one that contributed significantly to total daily calcium intake (46.49%) in 418 subjects aged 18 to 26 years old [11]. In another survey conducted in 2012 in three cities in the east of the country (Jijel, Oum El Bouaghi, SouakAhras) on 508 households, it was observed that cereals constituted the basis of household food (bread/galette: 2.6 times/day; pasta: 1 time/week). Milk was found to supplement this diet (twice a day). Low consumption is observed for fruits and vegetables (less than once a day), red meat (2.2 times a week), poultry (4.3 times a week), eggs (2.1 times a week), and fish (less than once a week). Consumption around once a day was the case for drinks and sweet products. Household size, housing type, monthly income per person, and female activity appeared to be socio-economic characteristics that could influence food consumption frequencies [12]. The consumption model of 18-26 years old showed an unbalanced diet, in contrast to the excessive consumption of fatty and sweet products (5.15±1.89 times/day) and less for the meat, fish, eggs, and charcuterie group (1.42±0.52 times/day); source of essential protein and fatty acids. In the long run, this will compromise the nutritional status of these young adults [13].

In our surveys of estimating energy and food intakes in macro- and micronutrients, it appears that Algerians' diet shows several deviations from the nutritional recommendations. In Table 1, we provided a summary of the studies conducted on healthy subjects. The contribution of dietary energy to the total calorie intake did not change despite the evolution over time of the various studies mentioned in table 1.

3 Micronutrient deficiencies

Worldwide, more than 2 billion people suffer from micronutrient deficiencies, mostly caused by a lack of dietary intake of vitamins and minerals. The fight against micronutrient malnutrition deficiency is a prerequisite for any prospect of rapid and appropriate national development [19].

In infants: The prevalence of iron deficiency anemia found in 200 infants aged between 1 and 24 months was 48.5%. The prevalence of anemia, in this study, was found to decrease with age. It was more common in children aged 1 to 3 months. Prior 24 months of age when children are most vulnerable to iron deficiency compared to other age groups, because of their rapid growth, combined with an often insufficient intake of dietary iron. After 24 months, as the growth rate of children slows down and the diet becomes more diverse, the risk of iron deficiency drops [20].

In pregnant women: Among 214 women belonging to three stages of their pregnancies (22.9% in the first quarter, 37.9% in the second and 39.2% in the third), it was observed, that, 89.7%, 94.1% and 80% respectively [21] failed to meet the average nutritional needs for Vitamin D, and also intakes of retinol (67.3%, 81.4%, 71.4%), vitamin A (30.6%, 24.7%, 27.3%) and vitamin E (42.9%, 28.4%, 39.3%). In the same study, the intakes were insufficient for iron (93.8%, 90%, 88%), calcium (22.4%, 16%, 15.2%) and magnesium (26.5%, 33.3%, 11.9%).

In children: The prevalence of anemia, as a function of hemoglobin level in 200 children aged 6 to 12 years, was 21.5%, while iron deficiency anemia was 22%. Children, consuming more than twice a week vegetables and fruits and foods rich in vitamin C, were significantly less affected by anemia than children consuming one to two times a week (OR = 4.9 and 5.05), ($p=0.006$ and $p<0.0007$) respectively. The logistic regression analysis showed that there was no significant association between the prevalence of anemia and rank of sibling, mother's education level, household size, and age of the child [22]. As for calcium, the proportion was low compared to the

Table 1: Energy intake in healthy subjects aged between 8 and 74 years (Constantine, Algeria)

Study	Study year	Age group (years)	Population	Percentage contribution of dietary fuel to the total energy intake (TEI)			
				TEI (Kcal) Mean±SD	Carbohydrates (%) of TEI	Lipids (%) of TEI	Protein (%) of TEI
Oulamara *et al.* [14]	2003	8-12	251	1911±829	61.00	22.80	16.20
Bencharif [15]	2009	18-26	418	2427±1003	61.64	24.40	13.96
Sersar *et al.* [16]	2012	18-27	100	2202±650	60.60	26.00	13.40
Sersar [17]	2015	20-28	1061	1993±600	60.00	26.10	13.90
Bencharif [18]	2013	24-74	2695	1925±312	59.70	30.10	10.20

TEI: total energy intake

international recommendations [23] among 8-12 years old, it was around 484.0 ± 287.8 mg [14].

In adults: The results of a study on a population aged 20-28 years[17] showed that the average mineral intakes were below the recommendations [23] for calcium (670.4±198.9 mg vs 900 mg/day), magnesium (254.6 ± 85.8 mg vs 350 mg/day), iron in women (9.3±3.1 mg vs 16 mg/day), vitamin A (509.8±196.1 µg vs 600 µg/day), vitamin C (76.7±40.1 mg vs 110 mg/day), vitamin D (1.2±1.0 µg vs 5 µg/day), and vitamin B9 228. 3±82.7 µg vs 300 µg/day for women and 330 µg/day for adult men). In another study on the same age group, calcium intakes were also reported below the recommendations (717.24±284.79 mg/day), but with constant calcemia values and therefore pointing to the notion that an intravenous and extracellular concentration was finely regulated [13].

4 NCDs

In Algeria, the World Health Organization (WHO) [5] estimates that NCDs are responsible for 75% of all deaths (36% cardiovascular diseases, 13% cancers, 3% chronic respiratory diseases, 4% diabetes, and 19% other NCDs). The resurgence of NCDs is mainly due to four main risk factors: tobacco consumption, harmful use of alcohol, physical inactivity, and unhealthy diet [24].

Toxic habits (tobacco, alcohol, drugs) are hardly taken into account in our surveys, because of the taboo aspect. In a survey conducted in Bordj Bou Arreridj on 521 adolescents aged between 10 and 19 years, 5.2% reported smoking tobacco [25]. In another survey carried out in Skikda on the same age group, among the 300 adolescents interviewed, 5% reported smoking [26]. This proportion should not be neglected, as it can increase in the next few years.

The prevalence of overweight has steadily increased in recent years. In eastern Algeria, the prevalence of overweight and obesity has affected all age groups. In Table 2, are presented the results of several studies relating to this effect. The risk factors associated with overweight are primarily family, socioeconomic, and lifestyle-related (poor diet, lack of physical activity). As reported in a study in Constantine (eastern of Algeria) on 340 children aged between 6 and 12 years, among the characteristics of contemporary eating appears the skipping of meals, the high consumption of sweet drinks, ready-to-use products, and the taking of meals in front of television. These parameters were significantly present in overweight children [39]. Another study of 297 children aged 6-10 years showed that overweight children were more neophobic than normal-weight children with p=0.03[40]. In addition, in a study of dietary lipid thresholds and perceptual intensity and weight status [41], overweight subjects were found to be the least sensitive to oleic acid (61.3% vs 38.8%; p=0.04). Low sensitivity to oleic acid was associated with low-fat perception intensity (p=0.01). Among other lifestyle factors associated with overweight, lack of physical activity was reported in our studies. Results from work on a sample of 251 children aged 8-12 years old showed that only 36% of children reported regular physical or sports activity. Overweight children were less likely to participate in sports (p=0.018), while 48% of overweight and obese children spent 2-4 hours a day watching TV [14]. A study carried out on 1,061 students aged 23.3±2.0 years, showed that sedentary physical activities exceeding 3h/day had 9 times [CI=0.08-0.16 at 95%] less risk of occurrence of overweight (including obesity). These activities were: walking, small trips, going up and down the stairs, shopping, cleaning, cooking, praying, doing paid work, and practicing sports [38].

In addition, it appears that in adolescents (10-19 years old), the prevalence of NCDs is not negligible, in a study in Skikda [42], it was estimated at 23% (10.7% diabetics, 12% with chronic respiratory disease, 0.3% with cardiovascular disease) with the presence of overweight (5.71%), family history of NCDs (69.7%) and heavy consumption of fatty and sugary products (6.01±3.17 times/day). Between 2016 to 2019, in eastern Algeria (Annaba, Batna, Constantine, Sétif, Tébessa), a survey involved 200 patients (55.6 ± 13.0 years old) diagnosed with colorectal carcinoma (the second most frequently diagnosed cancer in Algeria). This investigation found that occupational exposures were significantly associated with an increased risk of this type of cancer, as were obesity, alcohol consumption, and passive smoking. Consumption of yogurt, cereals, sugar, butter, and margarine were important protective factors, while consumption of cheese, dried fruits, red meat, juice, and soft drinks were associated with an increased risk [43]. In another study on 132 adult diabetic men in shift work, based on their medical records from 1995 to 2014, it was observed that 81.1% were overweight, of

Table 2: Prevalence of overweight in eastern Algeria of a healthy population aged 4 to 28 years

Study	Town	Year of the study	Age group (years)	Effective	Overweight (%)	Obesity (%)	International reference
Taleb *et al.* [27]	Tébessa	1995-2007	4-5	/	10	5	IOTF [28]
Taleb *et al.* [29]	Tébessa	1998-2005	5-8	3396	4.95	1.41	IOTF [28]
Allam *et al.* [30]	Constantine	2015	5-12	550	16.0	7.1	IOTF [28]
Oulamara *et al.* [31]	Constantine, Jijel, Tébessa	2001-2006	6-10	19 263	6.8-9.5	1.2-1.7	IOTF [28]
Oulamara *et al.* [32]	Constantine	2015	6-10	509	22.8 28.3 22.8		IOTF [28] WHO [33] CDC [34]
Taleb *et al.* [35]	Tébessa	1995-2007	10-12	21 618	12.55-6.38	4.84-1.8	IOTF [28]
Bentaleb *et al.* [36]	Constantine	2019	10-19	400	13.25	3.75	WHO [37]
Bencharif [15]	Constantine	2009	18-26	418	21.77	4.07	WHO [33]
Sersar *et al.* [38]	Constantine	2015	20-28	1061	15.6	2.4	WHO [33]
Bencharif [18]	Constantine	2013	24-74	2695	21.9	7.3	WHO [33]

IOTF: International Obesity Taskforce; WHO: World Health Organization; CDC: Centers for Disease Control and Prevention

which 34.9% were obese. The metabolic syndrome was confirmed in 70.5% of these diabetics, with the presence of four identification criteria (according to the International Diabetes Federation) in 62.4% of the diabetics [44]. In 2014, in 200 subjects aged 16 to 92 years, 60.5% had a pathological waist circumference. This prevalence had reached its peak between 47-66 years of age (p<0.0001) when it was presented as a predictor of cardiovascular disease (RR=1.71; p=0.028). This study found that 16.53% of subjects with pathologic waist circumference were diabetic, 55.5% were hypertensive, 49% had hypertriglyceridemia, 46% had a low level of high-density lipoproteins, and 18% had a high level of lipoproteins of low density [45].

5 Special focus on infant and children < 5 years

Malnutrition is a public health issue with major consequencesfor the development of children into adulthood that requires special attention. Globally, WHO estimates that 155 million children under 5 years were stunted growth in 2016 and 52 million were underweight for height. This is mainly due to a poor diet and repeated infections [6]. Birth weight is influenced by several factors during pregnancy. A study carried out in Constantine (eastern Algeria) on 226 women aged between 19 and 43 years [46] identified pre-gestational body mass index (BMI) as an independent factor and significantly correlated with birth weight. Also, parity, weight before pregnancy, and term of pregnancy were the most correlated factors with birth weight with a correlation coefficient (r) of 0.22; 0.30, and 0.50 respectively (p<0.0001). Another study conducted in Tébessa (eastern Algeria) on 201 pregnant women with an average age of 31.1±5.5 years found that the high weight of newborns was more common for mothers who had excessive weight gain during pregnancy during the second trimester versus those with normal gain (p=0.033). More hypertrophic children were from obese mothers (21.7%) than from those who were overweight (4.8%) or of normal weight (1.6%) with p=0.00036. No link between anemia and birth weight has been found [47]. In contrast, in another study [48], on 97 mothers (31.7±4.7 years old), the authors found that the birth weight of infants was significantly correlated with maternal hemoglobin (r=0.22, p=0.02) and hematocrit (r=0.2, p=0.004).

In general, stunting growth, emaciation, and underweight are present in children. The Multiple Indicator Cluster Survey 3 (MICS3) study which was conducted in Algeria in 2012-2013 to monitor the situation of children and women revealed that infants under six months had a higher rate of underweight (7%) compared to children under 5 years (3% were moderately and/or severely underweight and 1% are classified as severely underweight). In infants aged between 12-23 months and 24-35 months, stunting growth was higher compared to younger and older infants (14%). While the prevalence of wasting was significant in children under six months (13%) [49]. In contrast, in a study of 1,369 infants aged 6 to 24 months, overweight affected 18.41% and obesity 9.93% of infants. Overweight and obesity were significantly more common in households with higher socioeconomic status and in children born to overweight parents. Conversely, the prevalence of overweight and obesity decreased with increasing maternal education [50].

6 Exclusive breastfeeding practice versus early complementary feeding

Breastfeeding is an unparalleled way to provide ideal nutrition for healthy growth and development in infants. WHO recommends that mothers begin to breastfeed their infants within one hour of birth [51]. In Algeria, according to the results of the MICS3 study [49], 35.7% of infants received breastfeeding less than one hour after birth, compared to 71% who had been breastfed within one day of birth. The study also showed that exclusive breastfeeding was more common in the North East of the country (38%), while the continuation of breastfeeding for infants aged 12-15 months was the highest in the Central Highlands (63%).

In the world, only 40% of infants under six months of age worldwide are exclusively breastfed [51]. Breastfeeding has several advantages for both mother and infant. Indeed, breast milk contains all the nutrients a newborn needs in the first six months of his life. Breastfeeding protects against diarrhea and common childhood illnesses, and can also have longer-term benefits for the mothers and children [52]. Of 468 infants aged 6 to 60 months [53], it was found that children exclusively breastfed were significantly less affected by food allergies than those who had followed mixed or artificial breastfeeding (8.38%, 15.17% and 20.45%, p=0.007, respectively).

In a study conducted in Tébessa between 2013 and 2014 on a sample of 713 infants aged 12 to 24 months, the results showed that the prevalence of exclusive breastfeeding was 13.75% while 19.22% had been breastfed only in commercial milk. This prevalence of breastfeeding increased significantly when average household income decreased and mother education increased [54]. However, a study carried out in Constantine on 682 infants 0-24 months of age showed that exclusive breastfeeding time was higher when the mother's education level was low (11.3±8.8 vs 8.7±7.1 months; p=0.02) and that socioeconomic status was also a breastfeeding determinant [55]. Moreover, unbreastfed children were significantly more overweight and obese than breastfed ones. The latter had significantly fewer infections and nutritional pathologies such as digestive and respiratory infections, food allergies, nutritional anemia, and gluten intolerances [54].

In another study in Tébessa in 2009, which included 200 mothers and 200 infants aged 0-24 months, it was found that breastfeeding was less practiced by employed women (40.91%). The practice of exclusive breastfeeding increased when the mother's academic level decreased (50.80% vs 46.15%), the rate of mixed and artificial feeding increased when the academic level increased. The education level (53.47%) played a key role in the selection of breastfeeding type [56].

Regarding the practice of early complementary feeding, a study in Constantine on a sample of 116 infants showed that the age of starting solid food was early (<6 months) for 18.33% [57]. Early initiation was most often performed by mothers with low levels of education [58]. In terms of weight, the incidence of malnutrition appears to be elevated (p=0.018) in this category of infants [55]. This is consistent with the results of another study [59] in the same region, where it was found that BMI was negatively correlated with duration of breastfeeding in children aged 6-7 years (p=0.03) and 8-9 years (p=0.0006). Infants are particularly vulnerable during the transition period when complementary feeding commences [60]. The study performed by Laadjel & Taleb [61] enrolled 578 mother-child couples showed that the foods most often introduced first before the age of 4 months were olive oil (31.31%) and dairy products (11.25%), followed by infant flour (5.88%), cereals (4.33%), fruits (juice and compotes) with 2.25% and vegetables (2.77%). According to WHO [6], complementary foods should be healthy and nutritionally satisfying, while continuing to breastfeed until two years of age or older.

7 Food insecurity

Food security is achieved when everyone, at all times, has the physical, social, and economic opportunity to obtain sufficient, safe, and nutritious food to meet their dietary needs and preferences for active and healthy lives. Food insecurity may result from the unavailability of food, insufficient purchasing power, inadequate distribution, or inadequate use of food at the household level [62].

Several indicators are used to characterize the state of food security in a country. Some indicators focus on specific categories of the population, due to their relative vulnerability [63]. In Algeria, we noticed the following concerns:

- According to the FAO statistics [64], from 2017 to 2019, the prevalence of Algerians undernutrition was 2.8%;
- The prevalence of anemia among women of childbearing age (15-49 years) was 35.7% in 2016 [65]. The results of an analysis of data from a study in Tébessa on 130 pregnant women aged 19 to 45 years showed that 40% of these women suffered from several diseases such as anemia (15.38%), arterial hypertension (4.62%), diabetes (2.31%) and inflammatory pathologies (8.46%). The diets of the surveyed women relied much more on foods of plant origin than of animal origin, which made their diet a little varied because of the increase in the prices of these foods [66]. In the same region, another study[48] conducted on 97 mothers showed that the iron status of the newborn was linked to that of the mother (r=0.2; p <0.05);
- On the Constantine side, a study of 101 parturients giving birth at the main maternity hospital in the city, revealed that 91% of women had insufficient calcium intake and that significant correlations were observed between maternal calcium and calcium intake and between serum calcium in mothers, and that of their newborns [67];
- Analysis of another study [68] of 633 women showed the importance of material conditions for the level and quality of protein intake. The results showed that pregnant women who were in precarious housing had a greater proportion of illiterate and unemployed and consumed less total protein (p=0.0001) including animal protein (p=0.0006).

In addition to these indicators, there are children and more particularly the nutritional status of those under 5 years old and the prevalence of over nutrition, as presented previously.

Moreover, an additional issue affecting food security of the country is the fairly high rate of dependence on food imports [69]. Agriculture provides about 70% of the country's food needs. Agricultural imports concern basic products (cereals, pulses, milk, oilseeds, fodder feed). Algeria has thus become one of the main importers of wheat. Agricultural exports are mainly represented by dates and olive oil, and more recently by agri-food products. The dependence on imports for food security led to the National Agricultural Development Plan in 2000, and in 2009 to the agricultural and rural renewal policy [1]. The quantitative improvement in the available food ration has been, constantly, the result of recourse to imports making it possible to fill a structural deficit in the domestic agricultural supply, especially for the most

consumed goods (durum wheat, soft wheat, milk, sugar, edible oils), the deficit as explained by the rain-fed nature of most of the Algerian agriculture and also by the slow progress in terms of yields and productivity [69].

Two products are also specifically subsidized by the state, the white bread baguette (250g), made from soft wheat flour, and pasteurized milk packaged in a one-liter bag made from imported anhydrous milk powder. Considered as strategic products, the administration of their price and availability has always occupied a central place in food policies. The price of both foodstuffs remained unchanged or even too low. Furthermore, the Covid-19 pandemic has impacted two important factors of food security: public finances and the global food market. The weight of imports in meeting the country's food needs testifies to this sensitivity to disruptions in the functioning of this world market. The economic consequences of the Covid-19 pandemic on the Algerian economy are still poorly known and less studied, but they herald a complex and multifaceted crisis [70].

8 Conclusion

The Algerian population must follow international recommendations on food and health. Mothers must ensure exclusive breastfeeding for their infants for the first six months, followed by the introduction of complementary feeding while continuing to breastfeed until 24 months and over. Children should be taught to eat balanced and diversified, to play active games to avoid the risk of overweight and sedentary. Concerning adolescents, they must eat healthy, be active to fight against sedentary behavior, and avoid conduct that poses a risk to their health (tobacco, drugs, alcohol). For adults, they should show children examples of good behavior, especially in terms of healthy, balanced, and food diversity. It is necessary to reduce the consumption of fats, sugar, and salt, to promote the consumption of cereals, fruits and vegetables; have an active lifestyle by reducing the time of sedentary activities and thus fight excess weight. Nutritionists can help disseminate these recommendations to the population in conjunction with the health sector, through health centers, public health establishments, maternal and child health centers, and in educational establishments as part of the annual medical visits. The Algerian public health system and agricultural development deserve more attention and therefore must be strengthened as long as possible.

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