

ANALYSIS OF THE FOOD AND NUTRITION SECURITY SITUATION IN NORTH AFRICA

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Abstract

Description of the subject: The present paper aimed to review the actual food and nutritional security situation in North African countries, through the analysis of the main indicators of food security.

Objective : The objective is to understand the overall food security situation in this region

Methods : Analysis of food and nutrition security indicators.

Results : Food availability is generally sufficient, however 4.15% of the population suffer from undernourishment. Furthermore, the nutritional situation is alarming for some population fractions. For instance, 17.82% of children under 5 years are stunted, 6.22% suffer from wasting and 31.88% of women at childbearing age have anemia. However, obesity in adults and overweight in child were 28.92% and 14.30% respectively.

Conclusion : Improving the situation of food and nutritional security in North Africa requires additional efforts from decision-makers in these countries for improving economic access to food, ensuring balanced diet, increasing public awareness about healthy nutrition, reducing risks linked to food dependence and upgrading scientific research to meet future challenges, in particular climate changes and its impacts on local food production.

Keywords : Anemia; Food and nutritional security; North Africa; Stunting; Undernourishment.

ANALYSE DE LA SITUATION DE LA SÉCURITÉ ALIMENTAIRE ET NUTRITIONNELLE EN AFRIQUE DU NORD

Résumé

Description du sujet : Le présent article essaye de passer en revue la situation actuelle de la sécurité alimentaire et nutritionnelle dans les pays d'Afrique du Nord, à travers l'analyse des principaux indicateurs de la sécurité alimentaire.

Objectifs : L'objectif est de comprendre la situation globale de la sécurité alimentaire dans cette région.

Méthodes : Analyse des indicateurs de la sécurité alimentaire et nutritionnelle.

Résultats : La disponibilité alimentaire est généralement suffisante, cependant 4,15% de la population souffre de sous-alimentation. De plus, la situation nutritionnelle est alarmante pour certaines fractions de population. Par exemple, 17,82% des enfants de moins de 5 ans ont un retard de croissance, 6,22% souffrent d'émaciation et 31,88% des femmes en âge de procréer souffrent d'anémie. D'autre part, l'obésité chez les adultes et le surpoids chez l'enfant atteignent respectivement de 28,92% et 14,30%.

Conclusion : L'amélioration de la situation de la sécurité alimentaire et nutritionnelle en Afrique du Nord nécessite des efforts supplémentaires de la part des décideurs de ces pays pour améliorer l'accès économique à la nourriture, assurer une alimentation équilibrée, sensibiliser le public à une alimentation saine, réduire les risques liés à la dépendance alimentaire et améliorer la recherche scientifique pour relever les défis futurs, en particulier les changements climatiques et leurs impacts sur la production alimentaire locale.

Mots clés: Anémie; Sécurité alimentaire et nutritionnelle; Afrique du Nord; Retard de croissance; Sous-alimentation.

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INTRODUCTION

Morocco, Algeria, Tunisia, Libya and Egypt are the main countries in North Africa with an estimated population of 198.9 million in 2019 [1] and a total area of 5.75 million km² [2]. On the southern shore of the Mediterranean, the region is marked by its eastern, northern and western maritime limits. On the south side, most of these countries are a vast desert (the Sahara), bordering the rest of the African continent. Due to a shortage in local food production, all the North African countries suffer from an imbalance between food production and demand, which is partially covered by imports. This region represents the largest net importers of food over the world, mainly for cereals and milk powder [3, 4].

In the past and for faster results, it was easier to import than to produce, especially for oil-exporting countries [5]. However, the situation has been changed since 2007 when food prices are beginning to be more and more volatile on the international markets. Indeed, uncertainties about food security have increased, at the same time as the risks linked to access to food, the stability and the social cohesion [6], [7, 8]. Dependence and prices volatility pose a risk to the economic balances of importing countries, public finances and inflation [9].

In order to ensure accessible food, North African countries were forced to cover price volatility using food subventions, according to the standard of living of the populations. Food subvention systems played an important role in providing basic commodities at affordable prices [10]. Aiming to improve the local production, public support for import was associated with a support for production, with significant budgetary consequences [11-13].

In addition to the public policies followed, several factors have contributed to the weakness of the agricultural sector in the North Africa. Aridity of the climate is the first natural limit for productive agricultural sector due to water scarcity [3, 14]. Furthermore, water scarcity is likely to intensify in the coming decades due to climate change concomitant with growing population and increasing demand [15, 16]. In addition, several technical and organizational constraints affect agri-food production, including low crop yields [17-19], low livestock productivity and the lack of farming technical efficiency [20, 21].

Several disabilities are also recorded in agricultural structures [22].

Investment in research and durable development remains low [19]. Finally, markets and marketing channels lack organization, and technical and economic performance of operators are behind modern technology [12, 23, 24].

In fact, food security has always been a major concern for North African countries [13, 22, 25]. It is likely to continue to do so for several years, given the volatility of international markets and insufficient local production while food demand is gradually increased. This represents a big challenge for the coming decades, especially with the climate change and water scarcity in North African region [26], [27, 28]. Furthermore, food safety will be another challenge since these countries are intensively using the pesticides in agriculture, hoping to increase the local production, which is a serious problem for human health and the environment [29]. Successful management of these concerns requires a detailed analysis of the situation and the identification of possible factors that affect it. Therefore, this paper aims to establish a global vision of the food and nutritional security situation, based on indicators provided by specialized international organizations. This analysis would help decision-makers for monitoring, planning and synchronizing actions to be taken in the area of food security governance [30].

MATERIAL AND METHODS

1. Definition of food and nutrition security concept

According to Food and Agriculture Organization [31-33] food and nutrition security is defined as the situation where all human beings have physical, social and economic access to food at all times, in sufficient quantity and of suitable quality in terms of variety, diversity, nutrients and health security to meet their energy needs and food preferences and can thus lead to healthy and active lives, while benefiting from a sanitary environment and adequate health, education and care services. Indeed, in addition to availability, access, usage of food and the stability of these conditions, emphasis is also placed on the nutritional quality of food and on all the sanitary and hygienic conditions in which individuals live.

2. Analyzed indicators

Through the present paper, eight indicators were analyzed: food availability in kilocalories (kcal)/person/day,

prevalence of undernourishment, number of undernourished persons, prevalence of stunting and wasting in children under 5 years, prevalence of anemia in women at childbearing age (15-49 years), prevalence of obesity in adults (≥ 18 years) and prevalence of overweight in child (<5 years).

Undernourishment is the situation in which an individual's usual food intake is insufficient to provide the dietary energy levels necessary for a normal active and healthy life. The prevalence of undernourishment is the percentage of people who are undernourished compared to the total population [32]. Likewise, stunting in children have short height in compared to normal children at a given age which reflects the cumulative effects of undernutrition and infections from pregnancy and after birth [32]. Wasting children has light weight compared to his age and high, indicating severe weight loss or lack of weight gain due to insufficient diet and low health condition [32]. Anemia in women of childbearing age is defined as pregnant women with hemoglobin level less than 110 g/liter, or less than 120 g/liter in non-pregnant women [32]. Furthermore, the overweight and obesity indicates body weight

that is above normal for height as a result of an excessive accumulation of fat. It is usually a manifestation of expending less energy than is consumed. Obesity in adults (≥ 18 ans), is defined as a BMI (body mass index) of 30 kg/m^2 or more. Overweight in children under five years of age, is defined as weight-for-height greater than 2 standard deviations above the WHO child growth standards median [32].

RESULTS

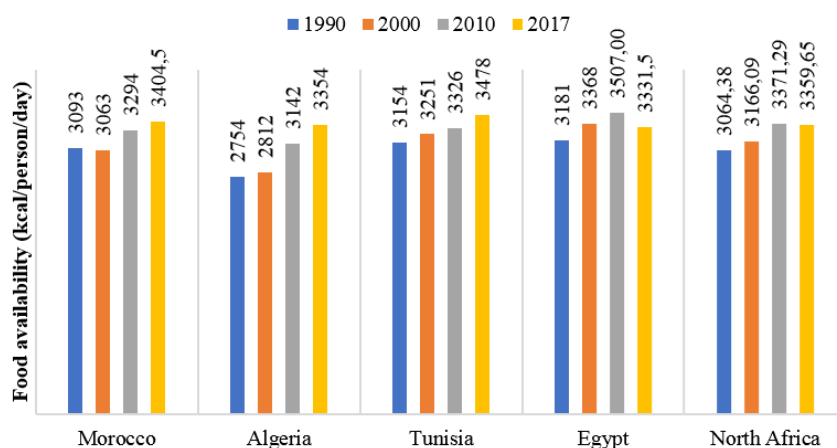
1. Prevalence of undernourishment

Data of food availability, prevalence of undernourishment and number of undernourished people are summarized in Table 1. It seems that food availability in North African region between 2016 and 2018 is good compared to other parts of the world (Table 1). With a mean of 3359 kcal/person/day, the food availability is overall sufficient and even better than the recommended energetic values (3100 kcal) [34]. In the recent decades, the North African countries have been in the process of improving food availability and significant progress has been made (Fig. 1). The overall energy availability increased by 9.6% from 3064.38 to 3359.65 kcal/person/day [31].

Table 1: Food availability and undernourishment in North Africa during 2016-2018 [31].

Country	Food availability (Kcal/person/day) ^a	Prevalence of undernourishment (%)	Number of undernourished people (millions)
Morocco	3404.5	3.4	1.2
Algeria	3354	3.9	1.6
Tunisia	3478	4.3	0.5
Libya	-	-	-
Egypt	3331.5	4.5	4.4
North Africa	3359.65 ^b	4.15 ^b	7.7
South Europe	3353.5	<2.5	-
World	2911	10.7	809.9

- : Not available data, ^a: Data for 2016-2017, ^b: Weighted arithmetic mean calculated based on the population in 2017.



(No data available for Libya)

Figure 1. Evolution of food availability in North Africa during 1990-2017 [31]

In fact, 4.15% (7.7 million) of North African habitants suffer from undernourishment [31]. The undernourishment recorded in North Africa reveals a problem of economic access to food since all these countries, except Libya, enjoy an acceptable level of political and social stability. Statistical data revealed that poverty is a serious problem in all the North African countries (Table 2). Subject to heterogeneity of the year

of measurement, table 2 shows that the poverty rates compared to the national threshold are quite high, particularly in Egypt (32.5%) and Tunisia (15.2%) [2]. Adopting the international threshold of 5.50 USD/day, we expect a higher poverty rate and at least third of the population in Morocco and Algeria and more than 2/3rd of the population in Egypt will be subject to poverty.

Table 2: Ratio of poor population in North African countries [2].

Country	Year of measurement	Poor population according to the national threshold of poverty (%)	Poor population according to the international threshold of poverty (%)		
			Population under 1.90 USD/day	Population under 3.20 USD/day	Population under 5.50 USD/day
Morocco	2013	4.8	1.0	7.7	31.3
Algeria	2011	5.5	0.5	3.9	29.2
Tunisia	2015	15.2	0.2	3.0	17.5
Libya	-	-	-	-	-
Egypt	2017	32.5	3.2	26.1	70.4

-: no data available.

The comparison of poverty rate with southern European countries was not possible due to insufficient data. However, Gross Domestic Product per capita (GDP/capita PPP, current international \$) can be used to indicate the difference in level of wealth. In 2019, the region of North Africa had lower individual incomes (\$7 826,2 - \$ 15 803,1) compared to Southern European countries (\$15 791,7 - \$ 60 750,4) [2].

2. Nutritional security of children and women

Data on the prevalence of stunting and wasting in children under 5 years and the prevalence of anemia in women of childbearing age are presented on table 3. The prevalence of these three parameters is relatively high in the North African countries, compared to Southern Europe. The prevalence of stunting and wasting in children estimated at 17.82% and 6.22% respectively, represents double the rates recorded at the northern shore of the Mediterranean (9% and 3%, respectively) [35].

Table 3: Prevalence of stunting and wasting children and anemia in women of childbearing age [31, 35].

Country	Prevalence of stunting children ^a	Prevalence of wasting children ^a	Prevalence of anemia in women at childbearing age ^b
	(%) 2013-2018	(%) 2013-2018	(%) 2016
Morocco	15	2	36,9
Algeria	12	4	35,7
Tunisia	10	3	31,2
Libya	21	7	32,5
Egypt	22	9	28,5
North Africa ^c	17,82	6,22	31,88
South Europe	9	3	18,6
World	22	6	32,8

a: Children under 5 years old [35], b: Women of childbearing age (15-49 years) [31], c: Weighted arithmetic mean calculated according to the population in 2017 [1].

3. Prevalence of obesity and overweight

The prevalence of obesity in adults (≥ 18 years old) and overweight in children (<5 years old) in North African countries are summarized in Table 4. It seems that obesity and overweight

are major concerns in North Africa, with an overall prevalence of 28.92% and 14.30%, respectively [31], [35]. These values are close to those reported in Southern Europe, with 24.6% and 17%, respectively [31], [35].

Table 4: Prevalence of obesity and overweight in North Africa [31, 35].

Country	Prevalence of obesity in adults ^a (%) 2016	Prevalence of overweight in children ^b (%) 2013-2018
Morocco	25,6	11
Algeria	26,6	12
Tunisia	27,3	14
Libya	31,8	22
Egypt	31,1	16
North Africa ^c	28,92	14,30
South Europe	24,6	17
World	13,2	6

^a: Adults older than 18 years [31], ^b: Children under 5 years old [35], ^c: Weight average calculated according to the population size in 2017 [1].

DISCUSSION

The results show that the food availability at the level of the countries of North Africa is overall sufficient. It was even better that the recommended energetic values [34]. However, the food availability does not benefit for everyone, 7,7 million inhabitants suffer from undernourishment [31]. The undernourishment in this region is linked to a problem of poverty and economic access to food. Several studies show that poverty is the main causes of undernourishment in the world [36-40]. The lack of balanced nutritional status is one of the underlying causes of poverty, which is the origin of the vicious circle that leads poor households [41].

At the household level, women and children are often the most vulnerable persons in terms of nutritional security due to their specific needs. Indeed, the three indicators analyzed (prevalence of stunting children, prevalence of wasting children and prevalence of anemia in women at childbearing age) show fairly high prevalence. Undernutrition has severe and permanent consequences on physical, mental and psychological development of children and, therefore might negatively affect their future. For instance, stunting is considered as a symptom of deprivation in the past but also an indicator of poverty in the future [35]. According to table 3, the prevalence of stunting in children varies between countries where it is 10% in Tunisia against 22% in Egypt. Furthermore, this variation is noticeable within each country. For instance, in Tunisia the prevalence of stunting girls is widely different between the north and the south of the country, respectively 10.3% and 28%. Same findings were reported for wasting girls with 8% in the north of the country against 13.6% in the south [42].

In the northeast of Algeria, 27% of newborn and babies (1-20 months old) are subject for stunting [43]. At the west of Morocco, the prevalence of stunting and wasting children were 24% and 2%, respectively [44].

It seems that the prevalence of stunting increases with child's age [42]. The undernutrition in children is mainly linked to living conditions, including the size and economic level of the household, educational level of parents and early motherhood. Furthermore, sanitary conditions play an important role in the prevalence of stunting and wasting, especially recurrent infectious respiratory and digestive diseases that reduce weigh gain of children [42, 44, 45].

Anemia in women at childbearing age is 1.7 times higher in North African countries compared to South European countries (31.88% against 18.5%, respectively) (Table 3). Morocco (36.9%) and Algeria (35.7%) had the highest prevalence of Anemia in North Africa, which means that third of women between 15 and 48 years suffer from anemia [31]. Anemia is a major public health issue, with multiple consequences on individual health and economic and social development. Furthermore, women with anemia has less energy and more vulnerability for several diseases, with noticeable reduces of productivity all of which will negatively affects the quality of life and reduce self-confidence [46]. In its severe form, anemia increases the risk of postoperative and postpartum mortalities [46].

In Northwest of Morocco, 59.4% of women suffer from anemia, especially young women aged 16 to 25 years [47]. Most of the studies focus on anemia in pregnant women, since the problem has long lasting negative effect on the mother and the baby.

It seems that the prevalence of anemia increases with the pregnancy stage since the nutritional requirements of the baby increase drastically, mainly during the third trimester [47, 48]. In Algeria, 46.66%, of pregnant women at third trimester suffer from anemia, compared to 30% during the first trimester [48].

Anemia is mainly due to an unbalanced diet with deficient in micronutrients [48, 49]. In North African countries, other factors might increase the risk of anemia, mainly low socioeconomic level of the household and the high number of children, making it more difficult to insure adequate diet for everyone [49, 50]. Finally, the consequences of poverty are evident on all aspects of food and nutritional insecurity, from undernourishment to undernutrition. Therefore, fighting poverty is one of the main actions to be undertaken by decision-makers aiming to improve household food and nutritional security.

In addition to the problems of undernourishment and undernutrition previously discussed, the populations in North Africa are facing a serious danger of overnutrition and unhealthy weight gain [51]. Obesity is one of the major modern public health issues since it is strongly linked to several chronic diseases, such as cardiovascular diseases, diabetes, musculoskeletal disorders and cancers [52-54]. In fact, the Mediterranean region is considered as a space in nutritional transition, where undernourishment coexist with overeating and obesity [55].

Surveys carried out in North African countries revealed a prevalence of adult obesity of 24.9% in northern Algeria, where the prevalence was higher in women (30%) compared to men (12.76%) [56]. In Egypt, the prevalence of obesity varies from 24.1% to 28.7% depending on the criteria used for the diagnosis method, with a significant correlation with the occurrence of diabetes and hypertension [57].

The obesity is mainly due to a rich energy diet, including cereals and starches associated to a low physical activity. The average annual consumption of cereals in North Africa estimated, during 2017 to 249.12 kg/person, which is 1.4 times higher than the world average (175.99 kg) and 1.8 times than the southern Europe average (139.78 kg) [31]. As risk factors, obesity was linked to advancing age, female gender, low education and higher or lower income [56, 58, 59].

Several researches have been conducted about the double effect of malnutrition by either overnutrition or undernutrition [49, 60-62].

Indeed, surveys indicate that adult obesity coexists with stunted growth in children in 9.48% of households in Northwest Morocco [63]. In Tunisia, maternal obesity is associated with childhood anemia in 14.4% of households [64]. Fight against the problem of the double burden of malnutrition requires a strong awareness of households on good feeding practices.

CONCLUSION

In the presented paper we analyzed the actual situation of food and nutritional security in North African countries. Analysis shows that despite the food availability exceeding the needs, 4.15% of the population suffers from undernourishment [31]. This seems to be related to the lack of economic access to food, especially among poor households. The nutritional situation of children and women is worrying: 17.82% of children under 5 are stunted, due to poorly balanced diets [35], and 31.88 of women of childbearing age have anemia [31]. Here too, poverty forces households to have unhealthy eating behaviors. In recent decades, North African countries have made notable progress in the area of food security, however further efforts are required to consolidate the situation, such as: fighting against poverty, increasing awareness-raising efforts on the risks and the multiple faces of malnutrition, and developing scientific research especially to meet the challenge of increasing agri-food production and climate changes

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