

Perception and knowledge of organic food among the Moroccan population

Soumaya Atouife¹, Abdelghani Aboukhalaf¹, Jamila Elbiyad¹, Seloua Essaih¹, Kaoutar Naciri¹, Adil Kalili¹, Rekia Belahsen¹

¹Faculty of Sciences, Chouaib Doukkali University, Training and Research Unit on Nutrition & Food Sciences, LABS, El Jadida 24000, Morocco.

Corresponding Author: rekiabelahsen@gmail.com

RESUMEN

Los recientes cambios en las pautas de producción y consumo de alimentos tienen importantes repercusiones en los sistemas alimentarios, con implicaciones para la salud humana y medioambiental. La agricultura ecológica se perfila como una palanca prometedora para fomentar el consumo sostenible de alimentos. El objetivo de este estudio es evaluar el nivel de consumo y la percepción de los marroquíes sobre los alimentos procedentes de la agricultura ecológica. Se realizó una encuesta a 423 participantes, principalmente de la provincia agrícola de El-Jadida en Marruecos. Se utilizó un cuestionario en línea creado con la herramienta Google Forms para recoger información sobre las características de los participantes, sus conocimientos y los factores determinantes y obstáculos que influyen en el consumo de alimentos ecológicos, así como las categorías consumidas de estos alimentos. Los datos de la encuesta muestran que el 81.7% de los encuestados consumían alimentos ecológicos por razones relacionadas principalmente con los beneficios para la salud humana y la reducción del impacto medioambiental, mientras que el 85.5% de los participantes declararon que el elevado coste de estos alimentos era la principal razón para no consumirlos. Además, el estudio reveló que una gran parte de los participantes, el 66.3%, tiende a confundir los productos ecológicos con los productos locales también llamados «Beldi». Los datos de este estudio confirman el creciente reconocimiento de la agricultura ecológica por parte de los marroquíes y ponen de relieve la necesidad de emprender acciones de sensibilización y desarrollo para seguir promoviendo este nuevo modo de producción agrícola sostenible.

ABSTRACT

Recent changes in the patterns of food production and consumption have a significant impact on food systems with implications for human and environmental health. Organic farming is emerging as a promising lever for promoting sustainable food consumption. The aim of this study is to assess the consumption level and the perception of Moroccans regarding foods from organic farming. A survey was carried out on 423 participants, mainly from the agricultural province of El-Jadida in Morocco. An online questionnaire created with the Google Forms tool was used to collect information on the participants characteristics, their knowledge and the determining factors and obstacles, that influence the consumption of organic foods as well as the consumed categories of these foods. Survey data shows that 81.7% of respondents consumed organic foods for reasons mainly related to the benefits for human health and reduced environmental impacts, while 85.5% of the participants declared the high cost of these foods as the main reason for not eating them. In addition, the study revealed that a large part of the participants 66.3% tends to confuse organic products with local products also called "Beldi". The data from this study confirm the growing recognition of organic agriculture by Moroccans and highlight the need to undertake awareness and development actions to further promote this new mode of sustainable agricultural production.

Palabras claves:

Alimentos ecológicos
Alimentos locales
Consumo
Percepción
Población de Marruecos

Recibido: 20-02-2024

Aceptado: 06-04-2024

Keywords:

Organic food
Local food
Consumption
Perception
Morocco Population

Introduction

Sustainable food manifests itself as a key lever to overcome current challenges in order to protect both health and the environment (FAO & WHO, 2019). Indeed, the adoption of a lifestyle and traditional and local agricultural practices in the past have always made it possible to live in harmony with nature without harming the environment. However, the concern to feed the growing world population, estimated by food and agriculture organization (FAO) to increase by (60%) or 2.3 billion people by 2050 compared to 2009 (Alexandratos & Bruinsma, 2012), as well as the industrial revolution, have led to changes of these practices toward increase of the production, an overexploitation and waste of natural resources leading to their depletion to the detriment of human health and that of the planet (Capone et al., 2012). The adoption of efficient production and food consumption behaviors limiting waste and losses would make it possible to modify or reverse this trend towards sustainable production and consumption (CIHEAM, FAO, Mediterra, 2016).

Global transition

Populations have moved from a society characterized by high birth and death rates to one with significantly lower mortality rates. This transition associated with the efforts of health systems is explained by the increase in life expectancy and the reduction in mortality rates often linked to communicable diseases thanks to medical progress, accessibility to health care and improvement of sanitary conditions (Antoine et al., 2010).

This transition generated population growth and a transition of the food system towards an increase in agricultural production. Furthermore, an economic transition due to industrial development and improving incomes has also changed eating habits. At the same time, societies have evolved from a dietary model based on seasonality and the consumption of local products towards a model focused on processed products, always available in abundance and rich in calories (Ronto et al., 2024). While this evolution has led to sufficient global production to feed the entire world population, malnutrition, hunger, food and nutritional insecurity however persist, affecting a

significant part of our world, and continuing to increase despite adopted efforts (Sundaram et al., 2015). Paradoxically, while overnutrition is increasing and affecting a portion of the world's population, health problems linked to undernutrition still persist. The nutritional transition associated with these changes has led to health effects generating epidemiological profiles characterized by an increasing emergence of non-communicable diseases such as obesity, cardiovascular diseases, cancer and diabetes and has led to the double burden of malnutrition (Belahsen, 2014).

Effect on the environment and sustainable food

The intensive growth of global food production also has negative consequences on the environment, including the depletion of natural resources such as water scarcity, soil depletion, overfishing, deforestation, loss of biodiversity, pollution, biodiversity loss, air pollution and climate change. These are all major challenges that require the adoption of sustainable practices to overcome this situation and preserve the health of both humans and the planet (Dubey et al., 2021).

According to the Brundtland Report commissioned by the United Nations (UN) in 1987, sustainable development must meet the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987). Indeed, development must precisely be economically efficient, socially equitable and ecologically sustainable (UN, 1992). Likewise, sustainable diet is introduced into this sustainable concept by adopting a lifestyle that reconciles meeting the nutritional needs of the current population and responsibility towards the environment without compromising the needs of future generations (Claasen et al., 2015).

Sustainable practices and Mediterranean diet

Different agroecological practices, such as the establishment of ecological farmer cooperatives or community organizations for green and circular agriculture, have emerged over the last decade, as an environmentally friendly agricultural approach, with social innovations aimed at ensuring a healthy and sustainable food supply to address concerns about food security while contributing to achieving the United

Nations Sustainable Development Goals (SDGs) (Claasen et al., 2015; FAO, 2021).

The Mediterranean dietary model constitutes a notable example of diet assuming the harmony between human health and environmental preservation (Serra-Majem et al., 2020). Indeed, the traditional diet of Mediterranean-type (MD) is recognized for its health benefits, widely documented in the literature since the first study of the seven countries (Besançon et al., 2000). The beneficial effects of MD on health, due to its nutritional composition, its respect for the environment, of the seasonality and biodiversity protection, have made MD and therefore of food system of Mediterranean countries, a sustainable diet model (Burlingame & Dernini, 2012; Serra-Majem et al., 2020). The strong interconnection, in this model, of nutrition, local food production, biodiversity, culture and sustainability generates a lower impact on the environment. In addition, the notions of seasonality, fresh, traditional local and environmentally friendly products, culinary activities, variety of colors of fruits and vegetables were introduced at the same time as the main meals, conviviality and physical activity. It was therefore also included in the United Nations Educational, Scientific and Cultural Organization (UNESCO) world heritage list (Trichopoulou & Lagiou, 1997).

Transition from the Mediterranean dietary model

The MD is considered among the healthy diets recommended to combat non-communicable diseases (WHO, 2012). Moreover, consumers' awareness of the importance of adopting a healthy lifestyle on the environment and the impact of a healthy diet on strength of the immune system was also revealed during the Covid-19 pandemic crisis. Studies have indeed reported that adherence to a healthy diet, such as the MD diet, protected against Covid-19 infection (Perez-Araluce et al., 2022). However, the Mediterranean dietary model has also suffered increasingly amplified erosion in Mediterranean countries. Indeed, the current global transition including economic improvement, in addition to globalization accompanied by other factors such as food abundance and increased consumption have led to changes in food habits and quality with effects on nutritional status and health status (Serra-Majem et al.,

2020). Furthermore, the Mediterranean model is threatened with being confronted with enormous challenges linked to climate change since Mediterranean countries are experiencing problems of water stress, a significant influx of inputs (pesticides, chemical fertilizers, etc.), and erosion of cultivable soils associated to the intensive human activities such as intensive agriculture that led to a loss of agricultural productivity and a breakdown of food systems (Iglesias et al., 2011). Added to this are the health problems that until now were at low prevalence compared to that in non-Mediterranean countries and which are currently increasing in this region, making this food system unsustainable (Iglesias et al., 2011).

On the other hand, the disruption of global supply chains created by various crises such as the pandemic and then the geopolitical conflict in Ukraine, has also shed light on the vulnerabilities of the global food system (Durand, 2023). This situation has prompted to rethink the food sovereignty of countries and direct consumption towards local production. This also placed emphasis on food production methods and the need to seek healthier options considering the sustainability of the food system while respecting the environment (Durand, 2023). On a global scale, the diet in the Mediterranean basin has also been affected by environmental problems compromising its sustainability. Safeguarding the latter requires taking into consideration the principles of sustainable development and adopting effective solutions for the long term (Serra-Majem et al., 2020).

Organic farming as a lever for sustainability

One of the sustainable and efficient agriculture models introduced as an aspect of agroecology is organic agriculture, which represents an alternative that respects the health of humans and the planet. Thanks to its standards and strict regulations, this agriculture is growing while gaining large shares of the global market and meeting the expectations of populations concerned about their health and that of the environment. It promotes health and well-being, the preservation of the environment, reduction of the carbon footprint, social equity, the local economy and it aligns with the concept of sustainable development (Bertrand et al., 2018).

As defined by the United States Department of Agriculture (USDA), organic agriculture means the

application of a set of cultural, biological, and mechanical practices that support the recycling of resources on the farm, promote the ecological balance and preserve biodiversity. This includes maintaining or improving soil and water quality, conserving wetlands, forests and wildlife, and refraining from the use of synthetic fertilizers, sludge purification, irradiation and genetic engineering (USDA, 2015).

Organic farming has been adopted by Mediterranean countries due to their favorable climate and the fact that the Mediterranean dietary model is close to the principles of sustainable agriculture. The adoption of this agriculture is made at different levels depending on the resources and means of each country. Indeed, Italy is one of the leaders of the organic market in Europe followed by Spain (Agence BIO, 2019).

The case of Morocco

Morocco, an African country on the southern shore of the Mediterranean basin, also became aware of the importance of organic agriculture from 1980. The first organic productions such as the cultivation of olive trees in the region of Marrakech and citrus fruits in the Benslimane region emerged in 1986. The organic sector was included in development strategies as in the Green Morocco plan (Bakkali, 2022; El Ghmari et al., 2022). In addition, the country is among the first African countries that adopted legislation specific to organic production set by the Moroccan government to regulate organic agriculture, including the law 39-12 relating to the organic production of agricultural and aquatic products. It has also established an 'BIO MAROC' label which allows it to produce organically for export (ONSSA, 2013). Furthermore, although Morocco faces enormous challenges to the sustainable development of organic agriculture, the demand for these products is continuously growing by Moroccan consumers who have become increasingly aware of the link between the quality of these products and health. Indeed, consumers are ready to invest more to guarantee healthier and more nutritious diet. This trend is also confirmed by the significant growth experienced by the market for organic infant products in Morocco, given the awareness of the benefits of organic farming among parents concerned about the origin and quality of the foods offered to their children. (Moussaid & Kharouaa, 2024).

Indeed, the choice of food of the Moroccan population is often oriented towards local products, locally called 'Beldi' products that they consider better than products from conventional agriculture judged on qualitative or taste aspects (Jazi & Kasmi, 2022).

Nevertheless, the development of sustainable organic agriculture within Morocco currently remains insufficient (Jazi & Kasmi, 2022) and the consumption of organic foods, also called "bio", remains modest or even low in the population. Knowledge of the situation and the determining factors which promote or prevent the consumption of organic products would therefore be of crucial importance for the development of organic agriculture in Morocco.

From this perspective, this work consists of a survey to understand the current situation and the evolution of the relationship and perception of the Moroccan population, with regard to the consumption of organic foods. More specifically, this involves collecting data on the way in which organic products are defined in the local context, the frequency of their consumption as well as the drivers and constraints of consuming products from organic farming among the population of the agricultural province of El -Jadida.

Materials and methods

Sample and the Survey conduction

Our questionnaire aimed to collect data on the perception of organic products by Moroccan consumers, mainly in the province of El Jadida which is an agricultural community. The questionnaire was developed taking into account the research objectives, including questions on the definition of organic products, the frequency of consumption as well as the motivations and obstacles to the consumption of products from organic farming. Participants were contacted randomly.

The study was conducted online from May 31 to August 22, 2023. The sample is made up of people contacted randomly via social networks (WhatsApp, Facebook, Instagram) and via the personal and professional networks of the authors of the study. Participants were also encouraged to share the questionnaire link with their acquaintances and networks. Some participants, mainly fruit and vegetable sellers, were contacted directly to collect

information using a pre-established questionnaire. Questionnaires with incomplete responses were discarded after the survey closed. The size of the final sample reached and used in this study was 423 respondents.

The questionnaire used to collect information from respondents was distributed online using the Google Forms tool and included questions on socio-demographic characteristics, consumption determinants and the type of food produced from the Organic Agriculture.

Data collection

Information on participant characteristics included the place of residence, the monthly income, the age range, the education level, the employment status, and their knowledge concerning organic products. Information on consumption determinants included frequency of consumption, motivation to consume and disincentives to consume organic products. Information on the types of organic foods consumed in the food categories of starches, fruits and vegetables, dairy and meats was also recorded.

Two essential parts were considered in the survey questionnaire, a first part intended for individuals familiar with the organic concept or organic farming, and a second part intended for individuals who are not familiar with this concept. Two groups are then created from the respondents participating in the study, the group of respondents called "organic known" (n=232) that was familiar with organic farming, and the 2nd group bringing together participants who are not familiar with these products and called "organic unknown" (n=191). The individuals included in this 2nd group were entitled to an awareness video before completing part 2 intended for them in the questionnaire. The video was released online and aimed to highlight the difference between organic and conventional farming. The awareness program presented in this video addressed the evolution of human food consumption through the ages with a focus on conventional agriculture and the emergence of organic agriculture. The program also highlights the positive and negative aspects of these two types of agriculture. The language used in the video was the Moroccan dialect to reach a larger number of people of different education levels. In addition, respondents

have the choice between the two languages, Arabic or French to complete the questionnaire, to facilitate the collection of qualitative and quantitative data.

Strengths and limitations:

The present survey, largely based on the online aspect, gave us many advantages, not only in terms of ease for data collection and accessibility, but also by guaranteeing anonymity, thus promoting strong honesty in the responses to the questions. However, these responses may be influenced by factors such as whether participants are in a hurry to complete the questionnaire. Additionally, this technology-based survey method excludes a portion of the population that is not familiar with technology or does not have access to the internet. This is why our survey was not exclusively carried out on the internet; it was supplemented by a face-to-face survey carried out mainly within local markets. Certainly, the survey provides good results, but it is essential to take into account these limitations when analyzing the results.

Ethical considerations

Survey participants are informed of the purpose of the survey and that the information collected will be anonymous, confidential and used for research purposes only. Respondents also volunteer to participate in this anonymous study and are asked to provide consent before starting to complete the questionnaire. They are also free to leave the survey at any time if they wish.

Results

The Tables 1 and 2 and the Figures 1-8 present the data obtained in the present study. As shown in Table 1, among a total number of 423 respondents representing the final study sample, the majority were women (59.1%), resided mainly in urban areas (97.3%) and mostly students (59.5%). Also, 27.4% were professors, 25.7% workers, 21.0% employees and 1.7% were the retired and 12.8 unemployed people. The most represented age group (63.8%) was mainly that of 20 and 40 years old, followed by the group of those between 40 and 60 years old (20.0%) then the age group under 20 years old (15.3%) and finally, the respondents over 60 years old represent only 0.7% of the sample.

Table 1. Characteristics of the study sample (n=423) from El Jadida province (May 31 to August 22, 2023).

Characteristics		Number	%
Area of residence	Urban :	412	97.30%
	Rural	11	2.60%
Gender	Females	250	59.10%
	Males	173	40.80%
Age range	Under 20 years old	65	15.30%
	Between 20 and 40 years old	270	63.80%
	Between 40 and 60 years old	85	20.00%
	Over 60 years old	3	0.70%
Education level	High School	7	2.70%
	Baccalaureate	75	29.70%
	Baccalaureate+2yrs	58	23.00%
	Baccalaureate+3yrs	59	23.40%
	Baccalaureate+5yrs	33	13.00%
	Baccalaureate+>5yrs	20	7.90%
Professional Activity	Workers	44	25.70%
	Professors	47	27.40%
	Employees	36	21.00%
	Unemployed	22	12.80%
	Retired	3	1.70%
	Other professional activities	19	11.10%
Income per month (MAD)	< 4000	10	6.90%
	4000 - 8000	60	41.90%
	8000 - 15000	65	45.40%
	>15000	8	5.50%

Based on the response to the central question of the questionnaire consisting of whether the participants “know about organic farming?”, the respondents were classified into two distinct groups of individuals, those who know it and those who do not know it, named respectively "organic known" and "organic unknown".

The answers to the specific questions in each part of the questionnaire aimed to better raise awareness and understand the habits and perspectives of organic food consumption of each group.

The data obtained revealed that just over half 54.8% (232) of the participants were aware of organic farming, while 45.1% (191) said they had no idea.

Sensitization

This section presents the results regarding the answers to the questions asked to the participants of the group who were unfamiliar with organic products, which represent 191 of the total participants (423), named "organic unknown" after the broadcast of the awareness video. The results regarding the definition of organic by the participants in this group as presented in Figure 1, shows that 38.5% consider organic foods to be equivalent to "Beldi" or local products, a proportion of 52.6% associate them with health, 33.8% link them to quality, 18.2% perceive them to contribute to well-being, 19.2% declared them expensive, while 29.1% consider them in relation to the environment.

Table 2. Results of the survey conducted in the province of El Jadida, from May 31 to August 22, 2023.

Results		N	%
Definition of organic by "organic unknown" participants (n=191)	Health	101	52.80%
	Well-being	35	18.30%
	Quality	65	34.00%
	Environment	56	29.30%
	Expensive product	37	19.30%
	Beldi	74	38.70%
Motivations for consuming products from organic farming by "organic unknown" participants (n=191).	The preservation of the environment	88	46.00%
	Maintaining and improving your health	118	61.70%
	Participation in the development of animal welfare	18	9.40%
	The quality of the products (taste, nutritional, etc.)	63	32.90%
	None	1	0.50%
Factors that can slow down purchases of organic products by "organic unknown" participants (n=191).	Very expensive	161	84.20%
	Insufficient choices	25	13.00%
	Lack of confidence (are they really organic products?)	68	35.60%
	Difficulty finding these products	63	32.90%
	Appearance	5	2.60%
Varieties of organic food products consumed by 214 participants who are already familiar with organic foods.	Meats	79	36.90%
	Fruits and vegetables	132	61.60%
	Dairy products	124	57.90%
	Starchy products (bread, pasta, rice, etc.)	127	59.30%
	I don't know	9	4.20%
	Other	6	2.80%
The ways in which participants of "organic known" (n=232) recognize organic products.	Packaging indications (certifications, brands, labels...)	111	51.80%
	Trust in sellers	24	11.20%
	Does not contain preservatives or pesticides	15	7.00%
	Purchasing from farms	28	13.00%
	Not sure	24	11.20%
Reasons for consuming products from organic farming by participants that consume organic products (n=214).	They are more delicious in terms of aroma and flavor	127	59.30%
	Their production does not use pesticides	100	46.70%
	They may provide benefits for human health	175	81.70%
	They are less polluting for the environment	73	34.10%
	They are more nutritious	143	66.80%
	They help local farmers	63	29.40%
Reasons likely to slow down the consumption of products from organic farming by participants that consume organic products (n=214).	Because their prices are generally more expensive than conventional foods	183	85.50%
	Because they are the same as those produced conventionally	11	5.10%
	Because they are not for sale near me or my workplace	112	52.30%
	Because these products are less beautiful	28	13.00%
	Because I don't think they meet all food safety standards	25	11.60%

Places to buy organically grown food according to "organic known" participants (232 participants).	Supermarket	129	55.60%
	Local grocery store	52	22.40%
	Online, with commercial platforms	12	5.10%
	Organic shop	39	16.80%
	Go directly and in person to the producer	130	56.00%
	Online, with the producer's platform	7	3.00%
	I don't know	10	4.30%

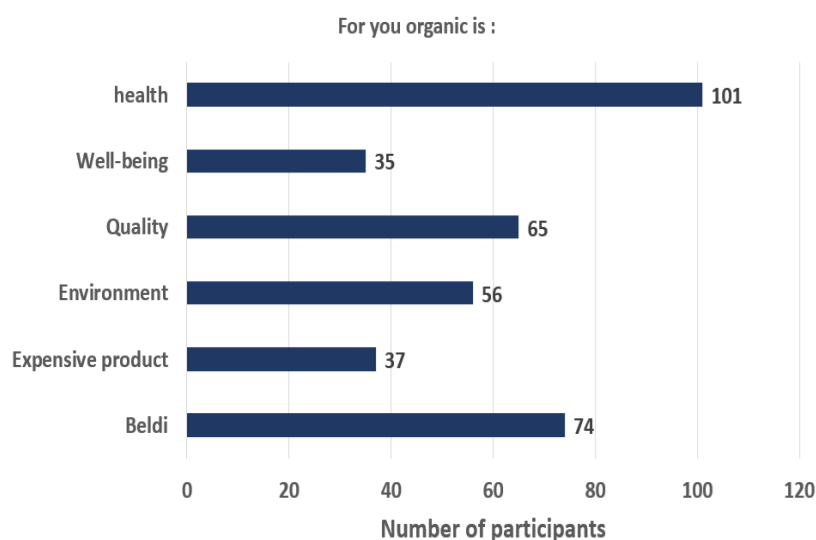


Figure 1. Definition of organic by "organic unknown" participants (n=191) from the province of El Jadida, from May 31 to August 22, 2023.

Regarding their willingness to consume organic agricultural products in the future, the results reveal that a significant percentage (48.9%) of respondents from the "organic unknown" group stated that they consider consuming these products in the future, while 7.8% have no intention of changing their consumption habits. However, a large proportion of participants, representing 43.2%, remain undecided about consuming organic products

The results concerning the reasons or motivations to adopt an organic diet by the "organic unknown" participants are presented in Figure 2. This figure shows that the vast majority of these participants (61.4%) associate the consumption of organic food with better health, 45.8% believe it contributes to environmental preservation, 32.8% consider that organic products surpass those from conventional

agriculture in terms of quality, and 9.3% link organic consumption to animal welfare.

Data regarding the limiting factors likely to discourage participants from opting for organic food consumption are presented in Figure 3. According to these results, the main reason given by the majority of respondents (83.8%) was the high cost of these products. Next comes the lack of confidence among producers of organic products regarding effective compliance with the standards in force for organic products, representing a percentage of 35.4% of participants' responses. The third reason given by 32.8% of respondents is the difficulty of obtaining or finding organic products locally. Then, the limited choice of products offered by producers is declared by 13.0% of participants. Finally, the appearance of organic products constituting a minor obstacle was only declared by 2.6% of those questioned as part of the present survey.

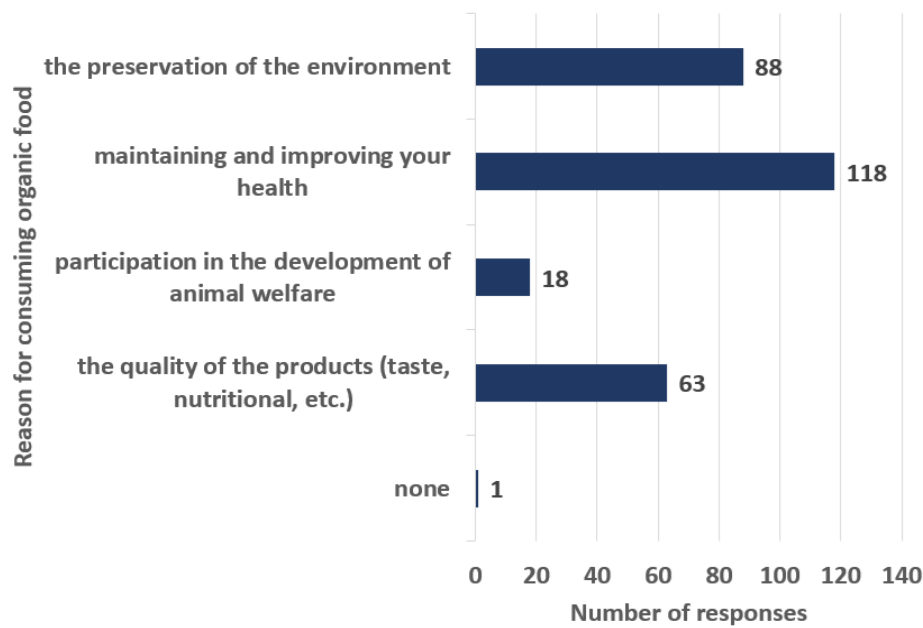


Figure 2. Motivations for consuming products from organic farming by "organic unknown" participants (n=191) from the province of El Jadida, from May 31 to August 22, 2023.

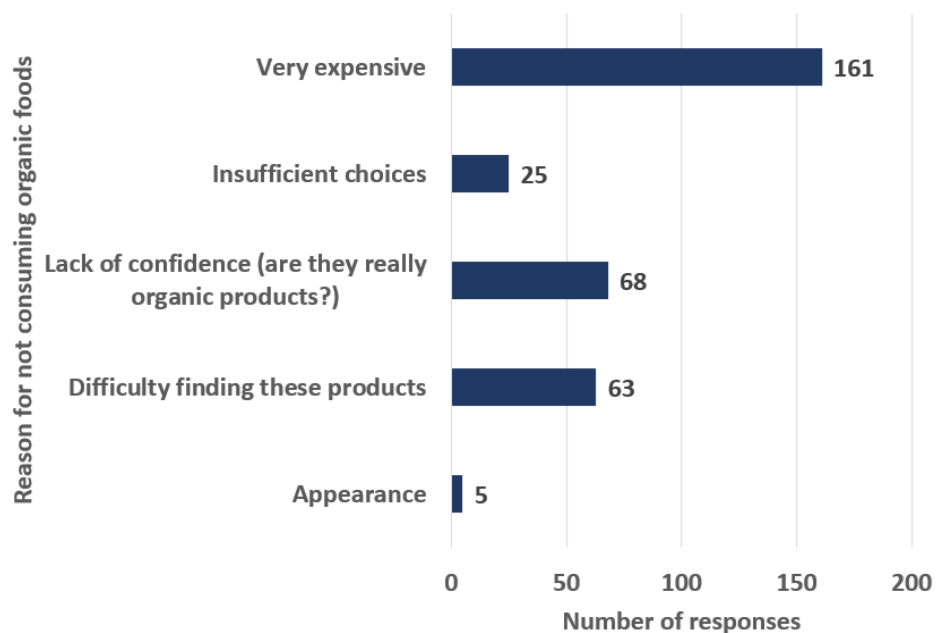


Figure 3. Factors that can slow down purchases of organic products by "organic unknown" participants (n=191) from the province of El Jadida, from May 31 to August 22, 2023.

Occasional consumption of organic

In this part of the study, the main objective of the results obtained is to provide a better understanding of the consumption habits of products from organic farming. They consist of responses to questions from

the part of the questionnaire which exclusively targeted participants familiar with organic farming representing 54.8% of the sample surveyed, or 232 individuals. These results reveal that 86.2% of participants of this group, qualified as "organic known", have declared that

they occasionally consume organic products and only 6.0% consume them regularly while 7.7% declared that they do not consume them at all.

Regarding knowledge of the difference between organic food products and local products, commonly called "Beldi" in Moroccan dialect, the results showed that 66.3% of participants declared considering the term "Organic" as being synonymous with "Beldi" (local or terroir), while only 33.6% responded that the concept of "Organic" products differs from that of "Beldi" products.

Concerning the consumption habits of participants who consume organic products, representing 214 out of the total 423 participants, in terms of types of organic food products, including fruits and vegetables from organic farming come in 1st place, with 61.6% of those surveyed having declared a propensity to consume these products. Starchy foods come in 2nd position with 59.3%, then dairy products whose consumption is planned in the future at 57.9% and finally meat consumption was declared by 36.9% of the participants (Figure 4). However, 4% of the participants were unsure about what they would consume in terms of organic products, while 2.8% said they would use organic oils, honey and mint.

Regarding how consumers (214) recognize or determine whether the products they purchase are

organic, the study results shown in Figure 5 reveal that more than half of study participants (approximately 51.8%) reported relying mainly on packaging indications, such as certifications, brands or labels like AB or Bio. Additionally, only about 11.2% of respondents expressed trust in sellers or suppliers, while 7.0% said they believe a product is considered organic if it does not contain preservatives or pesticides. Additionally, 13.0% knew the organic origin of their product because they purchased it from farms selling organic or "beldi" (local) products. Finally, 11.2% admit to not being sure of the true organic nature of their products.

The motivations underlying the consumption of organic foods among participants familiar with the organic concept (214) are summarized in Figure 6. Among these, concern for health was cited by 81.7% of participants, followed by nutritional quality mentioned by 66.8% and the taste of organic food products which comes in third position (59.3%). Other motivations were also declared by the participants of this group and concerned the desire to avoid harmful products such as pesticides (46.7%) and the impact on the environment expressed by 34.1%. Additionally, 29.4% of respondents mentioned using these foods to support local farmers.

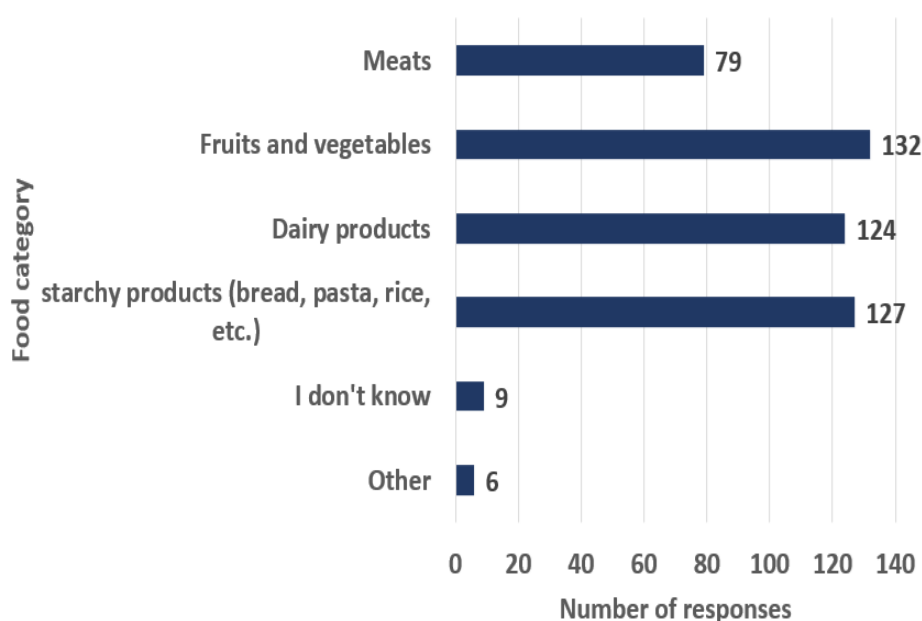


Figure 4. Varieties of organic food products consumed by 214 participants who are already familiar with organic foods in the province of El Jadida, (May 31 to August 22, 2023).



Figure 5. The ways in which participants of "organic known" group (n=232)

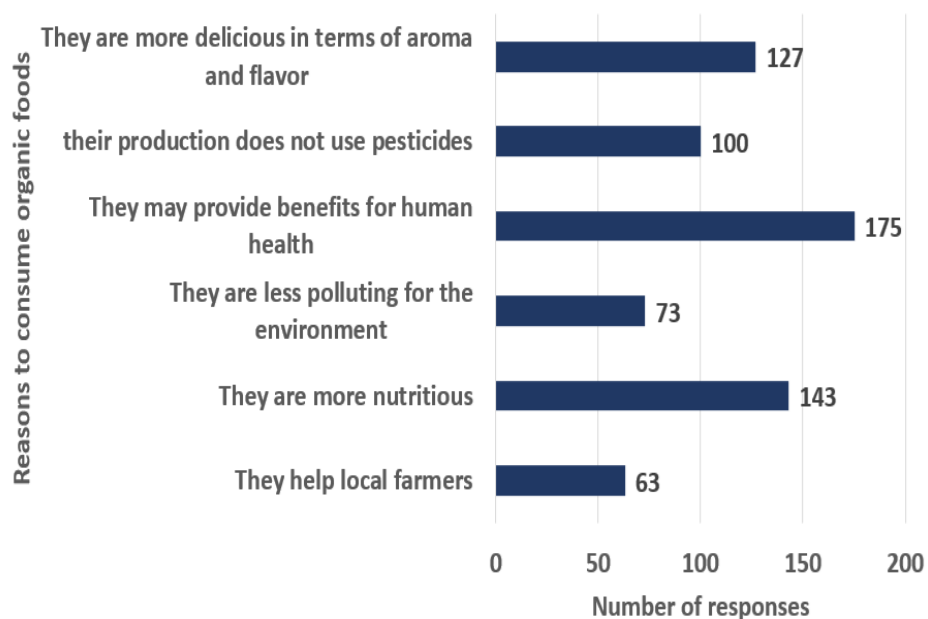


Figure 6. Reasons for consuming products from organic farming by participants that consume organic products (n=214).

The Figure 7 shows that the consumption of food products from organic farming by the participants (214) however remains moderate. The results of Figure 7, based on the declarations concerning the factors which slow down the purchase and consumption of these products by the participants, show that for the

majority of them (85.5%) the high cost of these products represents the main reason. The non-availability of these products near the participants' place of residence was also mentioned by 52.3% of them, coming second, followed by the apparent aspect and appearance deemed unattractive by 13.0%. In

addition, 11.6% of the participants mentioned the non-compliance with health standards by these products and 5.1% believe that these products do not sufficiently distinguish themselves from conventional products.

As shown in Figure 8, among the consumers of organic farming products (214), the most favorable

places to make purchases are supermarkets for a percentage of 55.6% and directly from producers for a percentage of 56.0%. Next come grocery stores (22.4%), followed by stores specializing in organic products (16.8%), as well as online purchases (8.1%).

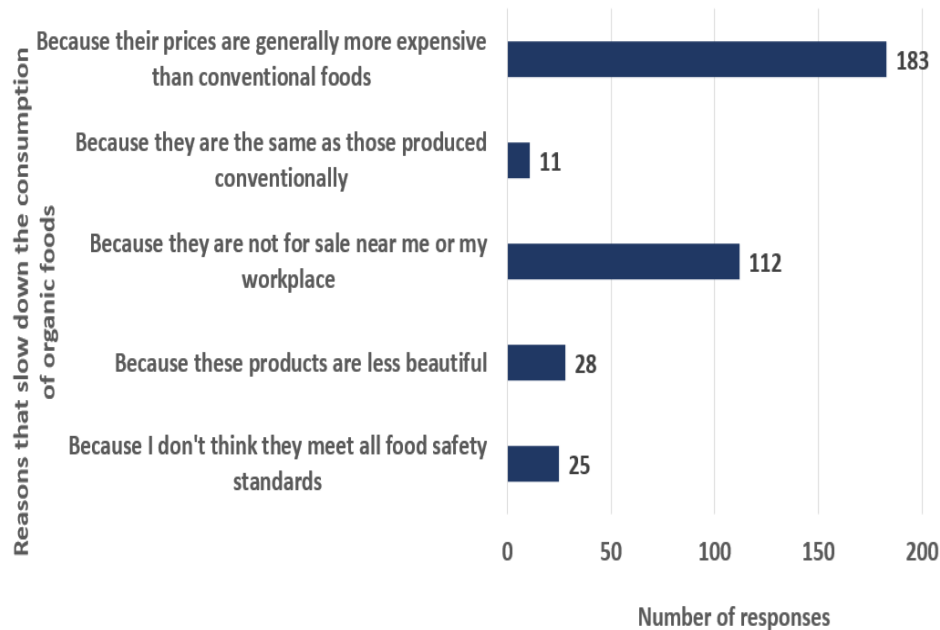


Figure 7. Reasons likely to slow down the consumption of products from organic farming by participants that consume organic products (n=214).

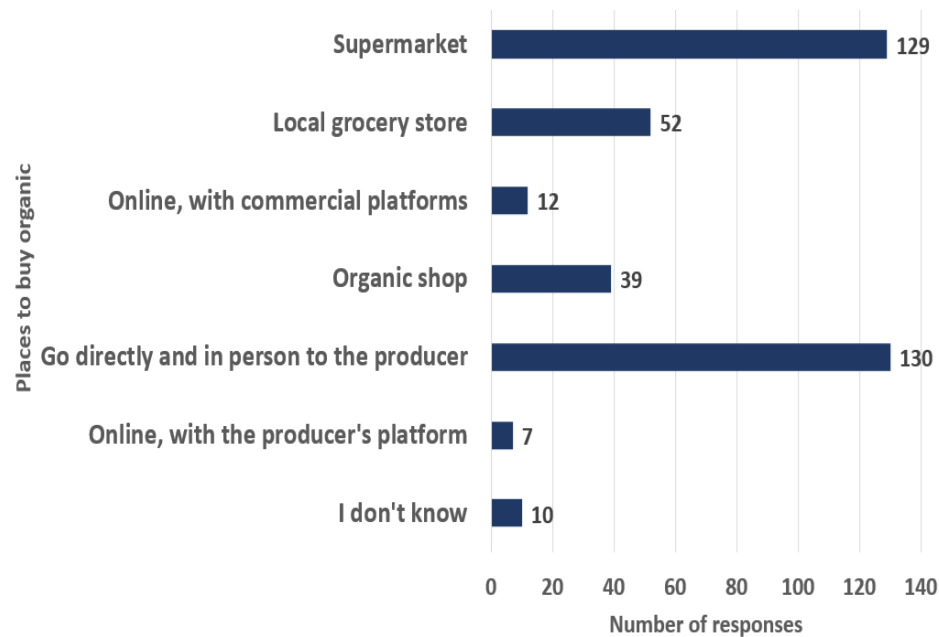


Figure 8. Places to buy organically grown food according to "organic known" participants (n=232).

Among respondents in the "organic known" group (232), the majority (85,7%) say there are few places to find organically grown products, while only 6,4% believe there are enough places to get these products and 7,7% have no idea of their availability.

Concerning the evaluation of knowledge of the label established to identify national organic products, named "BIO MAROC", the survey results show varied responses among the 232 participants, the majority (52.1%) having declared not to know the label "BIO MAROC » against 24.1% of participants who recognize this. Furthermore, 15.0% say they are aware of the existence of the "ORGANIC MAROC" label but have never had the opportunity to see it during their purchases.

The opinion of the participants interviewed, on the impact of the major health crisis that the world has recently faced, namely the COVID-19 pandemic, on the consumption habits of organic products was also sought. The results showed that around 46.9% of those surveyed said they were not sure whether the consumption of organic farming products had increased after the crisis. However, 47.4% of those deemed 'organic known' believe that society began to place more value on local and organic products after the pandemic.

Discussion

This work sheds light on the motivations and obstacles to the consumption of food products from organic farming within the Moroccan population. The results showed that more than 50% of participants are aware of products from organic farming, half of which consume them and among the latter 81.7% declared "health" as the main motivation for this consumption. On the other hand, 85.5% cited the high price as the main obstacle to organic consumption. This work also made it possible to notice that 66.3% of the participants tend to confuse organic with local products also called 'Beldi' products. The study data reported in this article made it possible to assess Moroccans' knowledge of organic farming and their level of consumption of its products. The approach adopted included two parts in a survey with, on the one hand, individuals familiar with the concept of organic food and on the other hand to raise awareness among those who are not, through a

video highlighting the advantages and disadvantages of organic farming compared to conventional farming.

As in other countries, organic agriculture in Morocco is of crucial interest. Currently, it constitutes an essential lever for the transformation of food systems in order to contribute to sustainable development. In Morocco, the agriculture sector represents 14% of GDP and accounts for 40% of the active population (Bakkali, 2022). Historically, the country has, since the 1960s, seen its economy and its social fabric flourish. This economic growth has been accompanied, however, by major concerns, notably the reduction of rural life and space associated with a gradual disappearance of local products directly from the land (Motib et al., 2020). This phenomenon is attributable to climate change, the rise of industrialization, the emergence of large commercial outlets, modernization in parallel with these factors the appearance of new diseases and the increase of certain health ailments. These problems have often led to a change in agricultural practices, which have become more intensive and characterized by the use of dangerous chemicals, directly impacting the sustainability of the food system.

In this regard, Morocco, a Mediterranean country, has favored, in its future orientations, agriculture, particularly organic farming, considered as an opportunity to achieve sustainable development ensuring the prosperity of the three main areas of society, namely, the economy, the social and the ecosystem (Capone et al., 2012). The country began the practice of organic farming in 1986 in certain regions, notably in the Marrakech region with the cultivation of olive trees and in Benslimane with citrus fruits. The country has since achieved its first organic harvests and continues to display organic production, mainly dedicated to export. Furthermore, this orientation is now more framed by laws and standards, in this case law 39-12 of January 16, 2013, relating to the organic production of agricultural and aquatic products and its BIO MAROC label (Bakkali, 2022; ONSSA, 2013).

Everyone is aware that conventional agriculture has the capacity to feed a large population that organic farming does not have. Nevertheless, one of the distinctive assets of the latter is to offer prospects for sustainable development and to contribute to the preservation of biodiversity (Bertrand et al., 2018).

Furthermore, the orientation of organic agriculture mainly towards export is linked to increased demand and valorization by importing countries (AFC, 2020), in addition to the high level of awareness among populations about the benefits of these foods both for health and on the environment. Paradoxically, this valorization leads to an increase in their expensive cost for local populations who thus resort to cheaper available products (Boulaoual & Gaber, 2016). Filling the lack of data on the situation of consumption of organic products in the Moroccan population as well as on the determinants which facilitate and those which hinder this consumption is of crucial interest. In the present study some elements of responses to these questions are provided.

The data collected in the present study, from respondents unfamiliar with organic food "organic unknown", revealed that a large part of the participants in this group tend to confuse organic products with local products locally named "Beldi". Furthermore, the majority of these participants expressed their intention to integrate products from organic farming into their diet. Their main stated motivation was the benefits of these products on their health. However, they recognize that barriers such as high prices, lack of diversity of organic products at points of sale and distrust of farmers and producers of these products could limit their adoption of sustainable consumption of Organic Products. Furthermore, the lack of control over food products quality from organic farming has also aroused a certain mistrust on the part of consumers. This explains the tendency of participants not to favor organic products to the detriment of those from conventional agriculture.

Confusion between organic and local or "Beldi" (terroir) products also existed among the group declared to be familiar with organic products, "organic known" group. Indeed, the results show that most of the participants in this group actually confuse these two terms and only consume organic products occasionally. The reasons for consuming organic products as mentioned by the participants were mainly the health benefits, better quality in terms of nutritional value of these products as well as the taste and the lack of chemicals and harmful products such as pesticides. In addition, organic foods consumed occasionally in this group were mainly composed of organic fruits and

vegetables. These products constitute an important food group of the Mediterranean diet and basic ingredients of culinary preparations widely consumed by the Moroccan population. The introduction of these foods when their origin is organic rather than conventional agriculture would have a beneficial impact on health (Baudry et al., 2019). However, the high cost and unavailability of these organic products are considered essential obstacles to their consumption by most individuals who are familiar with these foods ("organic known" group). Thus, it is noted that most individuals prefer to find out about organic products directly from the producers in the first place, or in supermarkets when shopping for these products. In addition, a large majority affirmed that there were few places that offer products from organic farming. This constitutes another among the many reasons mentioned which slow down the large consumption of organic products. The other reasons are similar to those noted in the first axis of the "organic unknown" group, which gives certain coherence to our study.

The data from this study also reveal the reasons explaining the lack of organic products on the Moroccan market. Indeed, organic agriculture in Morocco occupies a significant place and benefits from particular attention through the establishment of specific laws and regulations and measures whose objective is to protect both producers and consumers of foods from organic farming. In this context, the label 'BIO MAROC' was also established, to identify national organic products (Bakkali, 2022). However, these measures are rather focused on products intended for export. Among the reasons given for the unavailability of organic products, the most main is that a large part of local production is intended for the international market (AFC, 2020). This finding is supported by the statements of a large proportion of participants who are not aware of the 'BIO MAROC' label. Further, the few people who claim to know this label say they have never seen it when shopping. This confirms the legitimate thesis mentioned, namely that the majority of organic production is intended for export.

In this survey, knowing the extent of an urgent situation namely the covid crisis, on organic consumption was also evaluated. According to the results found, most respondents declared that during

this crisis, organic products were valued by society thanks to their better quality in relation to their nutritional value content. However, this increase in organic consumption was prevented, especially with the rise in prices following the economic crisis caused by COVID and aggravated by the geopolitical conflict between Ukraine and Russia.

Conclusion

This work reports that awareness of the positive impact of organic food on health and the environment begins to make itself known among consumers in Morocco. They nevertheless remain convinced that the prices of organic foods are excessively high. The data also shows that the population insists on the need to establish strict control to guarantee the availability of organic farming products in addition to ensuring compliance with the standards and regulations that govern them.

This study also drew attention to the importance and need to raise awareness about organic farming among individuals. Indeed, the information conveyed by the video used for this purpose in this research work, although modest and restricted, managed to reach a considerable part of the participants. More particularly, in the current context that the planet is experiencing with global warming, the broadcast of this video also made it possible to raise awareness of the interest in consuming products from organic farming, not only to improve their health but also to the preservation of the environment. Introducing the content of this video into a youth education program could have more impact.

The present survey also revealed the conviction of most of the respondents that “Bedi” and organic are synonymous and that it is enough to consume products from the countryside to adopt a sustainable diet. The present data also show that it is necessary to inform consumers to shed light on the difference between organic products and local products or “Bedi” within the Moroccan population. Efforts must be made in this direction, both to show the importance of organic and to eliminate the confusion between organic and “Bedi”.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Bibliography

- AFC (2020). La filière biologique au Maroc : Etat des lieux et stratégie de développement Dialogue technique agricole et forestier maroco-allemand (DIAF)- Composante 1 : Agriculture biologique (PROJET N° MAR 19-02). www.afci.de, 2020. https://issuu.com/afc-agriculture_finance/docs/diaf_c1etude_la_fili_re_biologique_au_Maroc_chiba
- Agence BIO. (2019). La bio dans le monde édition 2019. https://www.agencebio.org/wp-content/uploads/2018/10/carnet_monde_2017.pdf
- Alexandratos N., Bruinsma J. 2012. World agriculture towards 2030/2050: the 2012 revision. ESA Working paper No. 12-03. Rome, FAO.
- Antoine P., Formoso B., Segalen M. (2010). Transitions démographiques et transformations familiales. AFD, 2011, p. 299-377. (Conférences et Séminaires; 2). Université d'Eté Régionale en Sciences Sociales: Les Journées de Tam Dao (Viet Nam), 2010/07, Hanoi. <https://doi.org/10.13140/2.1.3791.5840>
- Bakkali J. (2022). La filière agricole biologique au Maroc: une contribution à l'économie verte et inclusive. IJARI 5(1), 1-17. <https://ijarimss.org/>
- Baudry J., Pointereau P., Seconda L., Vidal R., Taupier-Letage B., Langevin B., Allès B., Galan P., Hercberg S., Amiot M. J., Boizot-Szantai C., Hamza O., Cravedi J. P., Debrauwer L., Soler L.G., Lairon D., Kesse-Guyot E. (2019). Improvement of diet sustainability with increased level of organic food in the diet: findings from the BioNutriNet cohort. Am J Clin Nutr 109(4), 1173–1188. <https://doi.org/10.1093/ajcn/nqy361>
- Belahsen R. (2014). Nutrition transition and food sustainability. Proc Nutr Soc 73(3),385–388. <https://doi.org/10.1017/S0029665114000135>
- Bertrand C., Lesturgeon A., Amiot M.J., Dimier-Vallet C., Dufeu I., Habersetzer T., Lairon D., Majou D., Mondejar G., Taupier-Letage B., Tchamitchian M.,

- Vidal R. (2018). Organic food: State of the art and perspectives. *Cah Nutr Diet* 53(3), 141–150. <https://doi.org/10.1016/j.cnd.2018.02.004>
- Besançon P., Debosque S., Delpeuch F., Descomps B., Gerber M., Léger C.L., Padilla M., Puygrenier M. (2000). Alimentation méditerranéenne et santé: actualités et perspectives. Montrouge: John Libbey Eurotext. https://doi.org/https://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers21-03/010031783.pdf
- Boulahoual A., Gaber H. (2016). Produits Bio: état des lieux et étude des tendances de la consommation. In *IOSR J Eng* 6(10), 1-22. www.iosrjen.org
- Brundtland (1987). Report of the World Commission on Environment and Development: Our Common Future. <http://www.un-documents.net/ocf-ov.htm>
- Burlingame B., Dernini S. (2012). Sustainable diets and biodiversity: directions and solutions for policy, research and action: proceedings of the international scientific symposium Biodiversity and sustainable diets united against hunger, 3-5 november 2010, FAO headquarters, Rome. FAO.
- CIHEAM, FAO, Mediterra 2016: Zéro gaspillage en Méditerranée. Ressources naturelles, alimentation et connaissances. Presses de Sciences Po, « Hors collection », 2016, ISBN: 9782724619201. DOI: 10.3917/scpo.cihea.2016.01. URL: <https://www.cairn.info/mediterra-2016-zero-gaspillage-en-mediterranee-9782724619201.htm>
- Claasen N., Covic N.M., Idsardi E.F., Sandham L.A., Gildenhuys A., Lemke S. (2015). Applying a Transdisciplinary Mixed Methods Research Design to Explore Sustainable Diets in Rural South Africa. *Int J Qual Methods* 14(2), 69-91. <https://doi.org/10.1177/160940691501400207>
- Dubey P.K., Singh A., Chaurasia R., Pandey K.K., Bundela A.K., Dubey R.K., Abhilash P.C. (2021). Planet friendly agriculture: Farming for people and the planet. *CRSUST* 3,100041. <https://doi.org/10.1016/j.crsust.2021.100041>
- Durand B. (2023). La covid-19 et le conflit en Ukraine ne révèlent-ils pas la vulnérabilité des supply chains internationales? *Cahiers du CRINI n°4, Crises et défis dans les échanges internationaux: Supply chain et commerce, mondialisation et cultures locales*, URL: <https://crini.univ-nantes.fr/cahierscrini4-durand>
- El Ghmari H., Harbouze R., El Bilali H. (2022). Pathways of Transition to Organic Agriculture in Morocco. *World* 3(3),718–735. <https://doi.org/10.7251/AGRENG2103005E>
- FAO. (2021). TAPE - Outil pour l'évaluation de la performance de l'agroécologie - Version test. (2021). Food and Agriculture Organization of the United Nations. <https://doi.org/10.4060/cb4706fr>
- FAO & WHO. (2019). Sustainable healthy diets guiding principles. <https://doi.org/https://doi.org/10.4060/CA6640EN>
- Iglesias A., Mougou R., Moneo M., Quiroga S. (2011). Towards adaptation of agriculture to climate change in the Mediterranean. *Reg Environ Change* 11(1), 159–166. <https://doi.org/10.1007/s10113-010-0187-4>
- Motib I., Batchi M., Fatah F. (2020). Conservation Des Ressources Naturelles Pour Une Sécurité Alimentaire Durable Au Maroc. *Eur Sci J* 16(9), 240. <https://doi.org/10.19044/esj.2020.v16n9p240>
- Moussaid H., Kharouaa, A. (2024). Study of the purchase intention of organic infant food products: survey of Moroccan parents. *IJAFAME* 5(2), 122-135. <https://doi.org/10.5281/zenodo.10646648>
- ONSSA. (2013). Loi n°39-12 relative à la production biologique des produits agricoles et aquatiques, promulguée par le dahir n°1-12-66 du 4 rabii I 1434 (16 janvier 2013).
- Perez-Araluce R., Martínez-González M.Á., Gea A., Carlos, S. (2022). Components of the Mediterranean Diet and Risk of COVID-19. *Front Nutr* 8, 805533. <https://doi.org/10.3389/fnut.2021.805533>
- Capone R., Lamaddalena N., Lamberti L., Elferchichi A., El Bilali H. (2012). Food Consumption Patterns and Sustainable Natural Resources Management in the Mediterranean Region. *J Food Sci Eng* 2(8), 437-451. <https://doi.org/10.17265/2159-5828/2012.08.003>
- Jazi S., Kasmi G. (2022). Consumption Values of Organic and “Beldi” Food Products in Morocco. In: J. Kaswengi, A. Ingarao, (Eds) *Brand, Label, and Product Intelligence. Springer Proceedings in Business and Economics*. Springer, Cham. https://doi.org/10.1007/978-3-030-95809-1_4
- Ronto R., Alves Lopes C.V., Bogueva D., Davis B., Bhatti A.J., Navarrete P., Chau J.Y. (2024). Exploring Australian News Media Portrayals of Sustainable and Plant-Based Diets. *Nutrients* 16(7), 996. <https://doi.org/10.3390/nu16070996>
- Serra-Majem L., Tomaino L., Dernini S., Berry E.M., Lairon D., de la Cruz J.N., Bach-Faig A., Donini L.M., Medina F.X., Belahsen R., Piscopo S., Capone R., Aranceta-Bartrina J., La Vecchia C., Trichopoulou, A. (2020). Updating the mediterranean diet pyramid towards sustainability: Focus on environmental concerns. *Int J Environ Res Public Health* 17(23), 1–20. <https://doi.org/10.3390/ijerph17238758>
- Sundaram J.K., Rawal V., Clark M.T. (2015). Ending Malnutrition from commitment to action. ISBN: 978-93-82381-64-8 <http://www.fao.org/3/a-i4921e.pdf>
- Trichopoulou A., Lagiou P. (1997). Healthy Traditional Mediterranean Diet: An Expression of Culture, History, and Lifestyle. *Nutr Rev* 55(11): 383-389. <https://doi.org/10.1111/j.1753-4887.1997.tb01578.x>

- UN. (1992). Rio Declaration on Environment and Development. Report of the United Nations Conference on Environment and Development. Rio de Janeiro, June 3-14, 1992).
<https://www.un.org/french/events/rio92/aconf15126vol1f.htm>
- USDA. (2015). USDA National Organic Program Agricultural Marketing Service. www.ams.usda.gov/
- WHO. (2012). Promoting a healthy diet for the WHO Eastern Mediterranean Region: user-friendly guide, 2012. <https://www.emro.who.int/fr/noncommunicable-diseases/publications/guidelines.html>