

# THE MEDITERRANEAN DIET AS A SUSTAINABLE FOOD SYSTEM

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## ABSTRACT

Central theme in society these days, the diet went through several phases during the evolution of the human being. Currently human's advanced civilizational, deplete resources, develops forms of reproduction and rapid growth of animals, genetically alter plants to make them more resilient and artificially prolongs life. All these factors lead to an overload in nature and revolve to a group of environmentalists and animal rights.

Sustainability is part of everyday life of political and social discourse as the fundamental way to our relationship with the environment. Sustainable food systems are those that are able to survive over time, promoting sustainable use of resources and a balance in the economic, social and environmental aspects.

Changing diet to the Mediterranean Diet would bring benefits: on the health level, with better nutrition and increased use of some processed products; economic, by encouraging the consumption of local and national production of products; social, with the creation of jobs in agriculture; and environmental, using organic production and the reduction of transportation needs.

The Mediterranean Diet encourages a more balanced and healthy eating style, with great positive impact on the environment. With the globalization phenomena it was gradually lost, but is now being revived due to the awakening to health and ecological problems.

Keywords: Mediterranean Diet, Sustainability, Environment, Nutrition.

JEL Classification: Q01, Q56.

## 1. INTRODUCTION

Diet and food production are central themes in society these days because of its importance for health and the impact on the environment. It went through several phases during the evolution of humans (Almeida and Afonso, 1997), following the evolution of knowledge, such as the discovery of fire control. The development of agriculture allowed the establishment of the people in certain areas, so giving rise to the growth of societies. Cereals, vegetables and animals were produced for own consumption, enabling the growth of communities around the crop fields.

Currently humans in advanced civilizations deplete resources, develop forms of reproduction and rapid growth of animals (Singer, 2000), alter genetically the plants in order to make them tougher (Beaud, 1995) and artificially prolong life. This combination of factors leads to a massive overload in nature.

Society is changing, is becoming more aware of these aspects. Marine species that disappear due to overexploitation, the terrestrial species that go extinct due to deforestation,

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land worn by intensive cultivation (Beaud, 1995), all these events have a common point which is the production of food.

Consumption of natural products is gradually imposing itself in the society, thus beginning to proliferate macrobiotic and vegetarian restaurants. Even begin to arise fast food chains devoted to this type of diet, a sign that people are increasingly interested in other options in terms of food, either by environmental or health issues.

A change of diet is often indicated by health professionals, usually professionals from unconventional therapies. Simple changes such as decreased milk consumption and refined grains (Varatojo, 2010) are usual, getting more profound with the abolition of all animal products. Usually when we think of food, our idea simply goes to the ingredients and their production. But the chain is longer and more intricated than it seems.

In 1987, the report “Our Common Future” (WCED, 1987), also known as the Brundtland report, reached a definition that has become standard worldwide for sustainable development, being the “(...) development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”. For us to guarantee the needs of the future generations, deep changes have to be made in diets and food production. The Mediterranean Diet is an example of what can be done to achieve sustainability.

## **2. CLIMATE CHANGE**

The actions of human beings have always had a great influence on the environment, mostly negative. Food production is one of the main factors regarding changes in climate, raising various health concerns (Korkala, et al., 2014).

With the evolution of knowledge and especially with the industrial revolution, the impact on the environment began to have serious effects on the ecosystem balance. The increase in pollutant sources, the depletion of natural resources and the emission of harmful gases into the atmosphere are among the main problems arising from the action of man, namely the social and with particular attention to environmental, which usually are in the background regarding economic issues. However they appear listed in the Commission’s report (CEC, 2007), with the confirmation of impacts “in agriculture, fisheries, desertification, biodiversity, water resources, in mortality associated with the heat and cold, in coastal areas” and “(...) damage from flooding.”. Biodiversity loss is one of the real risks due to changes in climate, being now a reality much due to the direct action of man, either by over-hunting, by deforestation or by introduction of exotic species that naturalize and become invasive, thus unbalancing ecosystems and limiting the growth of other species. The imbalance in nature caused by anthropogenic sources should be considered with due importance, as these are situations that man has the ability to control.

Raising animals for consumption has a significant effect in relation to GreenHouse Gas (GHG) emissions. According to the 2006 FAO report on the overall heating the livestock sector is responsible for 18% of greenhouse gas emissions globally, so the responsibility of this sector in terms of climate change is greater than the use of automobiles. This raises several questions about the direction of the power of human beings to the adverse effects of the action of man over nature.

## **3. AGRICULTURE**

There are thousands of species used daily in food production across the globe and the development of transport allowed the import from all over the world. In Portugal is possible

to find with some ease the mango imported from Brazil, rice from India or orange from Morocco. Besides fresh foods, freezing allows the import of virtually all products.

Food globalization has brought an increased pressure to agriculture in several countries. Products have to be highly competitive for selling, even in their country. It is common to find imported fruit in supermarkets significantly cheaper than domestic. These differences relate, of course, to the cost of hand labor and also to the quality of the product itself. Speaking in particular of fruit, the import to be economically viable must be done by cheaper transportation, such as truck or boat. The transit time for such carriage prevents the harvest in the correct maturity, and consumers are then less likely to buy nutritionally complete foods than if the harvest and sale had been made correctly.

The intensive cultivation of plants comes with the need to introduce in the market products which satisfy several criteria, at appearance level, palatability and price. The major food distributors establish the criteria and the producers have to meet them if they want to have their products purchased. It is very rare to find up vegetables with large variations in size or color, because the market demands uniformity. All this consumer pressure, even if subtly ingrained in consumers, leads to the creation of farming methods more efficient economically, but poor at social, environmental and nutrition levels.

Large agricultural areas are designed to be monocultures. This allows the use of specific machinery towards the soil type, planting, fertilization and harvest. The human hand is becoming dispensable and the gets cheaper. Over time this depletes the soil, even with the turnover of cultivated species, requiring stronger composting so that profitability is maintained. Pests are fought with the use of increasingly effective pesticides for its control, but compromising the environment by both air and groundwater pollution.

#### 4. LIVESTOCK

Industrialized countries change their consumption habits. Plant products were seen as “side dishes” rather than being the staple food. Meats essentially derived from birds, mammals and fish became the center of the meal. This led to a resounding increase in animal production needs, with serious damage to the environment, animals and humans.

Raising animals for food is done at this time in large farms with enclosed space where they breed, feed and grow. The conditions throughout the life of these living beings are deplorable, and even very difficult to maintain their health in the indicated level, having to resort to additives in their food, including antibiotics (Singer, 2000).

Livestock now has a great weight in consumption of environmental resources. A large share of the cereals grown worldwide are used for the production of animal feed, and the energy and economic exploitation in much smaller process than the batch were used for human consumption. The impacts of this industry is giant in terms of climate change, with all the complications arising therefrom.

The use of drinking water is also worrying. According to the UNESCO report (2010), consumption of water for the production of a gram of animal protein is on average 1.5 times required to produce a gram of legume protein. Beef is one that requires greater amount of drinking water, followed by swine and poultry. For meat eaters can enjoy 1kg of beef steak, for example, you need to spend on average 15,000 liters of water, unthinkable these days but a current reality. Compared to produce 1kg wheat or barley are needed 1300L of water, ten times less.

## **5. GENETICALLY MODIFIED ORGANISMS (GMO)**

Science looks for its various means to address the many social demands as they arise. The food, essential basis for the survival of any living being, is no exception. There are several challenges, from the most noble, such as the eradication of hunger, to the more mercantilist, such as increasing the flavor of a particular agricultural product. These issues led to the appearance of transgenic foods produced using biotechnology that introduces interesting properties from an economic and production point of view. However this genetic manipulation is also attracting the attention of environmentalists, bringing several questions to the public on the effects in the medium and long term for the environment and human health.

GMOs have in Europe its main opponents, as consumers do not trust the security of such products. The 2005 Eurobarometer indicates that Europeans consider that the consumption of genetically modified food should not be encouraged because they are immoral and constitute a risk to society. On the contrary, in the United States, consumers are more accustomed to this type of product, not creating such resistance to them.

It is observed in the behavior of European consumers and American a difference in the perception of risk surrounding these products much by differences in legislation. European labeling rules require that GMOs present in the products are properly identified in the package, except in some cases (Moura, n.d.). In the United States the reality is different, with the majority of acreage devoted to GMO (60% against 0.5% in Europe (Moura, 2005)) and is not subject to identification products with GMOs, although there are some movements that seek to the contrary certification, absence of GMOs, like the label "The Project Verified Non-GMO" (Smith, 2012). Acceptance in the US is higher because the market penetration of these products is superior and the consumers relations to certain brands is already longstanding.

## **6. PROCESSING AND CONSERVATION OF FOOD**

Taking into account the current lifestyle, food processing has become inevitable even desirable in many cases. The conservation before the onset of cold was essentially done through the use of salt, which removed the water reducing microbiological activity and extending the lifetime of the product. With the advent of refrigerators and freezers, it became the temperature to do the job of reducing the action of microorganisms and improving food preservation. However these tools are very energy-intensive (Zal, et al., 2014) and for its production are used metals, plastics and even chemicals. In addition to these environmental issues, they are costly devices in the purchase but also in use and are not always available in all locations.

To overcome the difficulties of preserving food before the onset of refrigerators and in some situations where these are not available, the industry has adapted to creating highly effective packaging to maintain consumable food that otherwise would perish rapidly, as is the case of cans . The food is processed, sterilized and kept from contact with air, preventing the reemergence of microorganisms in the product and its deterioration. However, this process is energy-consuming, both for the production of packages and for the production of heat needed for processing and pasteurization.

All food processing causes the chemical change thereof. Eg "canning is often viewed negatively by causing destruction of compounds sensitive to heat, such as ascorbic acid" (Zal, et al., 2014). However freezing, although in the short term preserve more nutrients, is very energy intensive and lead to losses over time. According to Zal et al. (2014), after six months of storage, the loss of ascorbic acid in frozen are similar to canned in the case of

green vegetables, and given that the frozen need to be cooked, the amount may well become smaller than in the case of canned.

Despite the use of refrigeration equipment be costly, has advantages over the use of canned. The devices are quite widespread, it is possible to preserve food through both refrigeration and freezing. The food retail industry has adapted to this reality by offering an endless variety of products in supermarkets. One can find some processed foods such as beans or mushrooms, and other more elaborate as ready meals. The little processed foods, chilled, are increasingly among the preferences of European consumers by its proximity to the fresh.

The raw material used in these cases is mainly high quality, especially at the microbiological level, to ensure food safety and proper preservation of the nutritional and organoleptic characteristics (Zal et al., 2014). This causes the consumer a sense of security associated with a lower risk while it has the advantage of being nutritionally balanced.

The major disadvantages of chilled or canned foods are, the production of waste that does not happen on the same scale in case of purchase of fresh ingredients that are then cooked and eventually stored in plastic boxes / bags or glass. Moreover the transportation needs, as they are produced in a factory. They need to be delivered to distribution points in the food retail industry, going after to stores for purchase by consumers. All this requires large amounts of energy and produces high levels of pollution, including emissions of greenhouse gas effect. Also the energy consumption, for all kinds of processing requires energy exchange, is cooking as in refrigeration. For energy production are needed natural resources that lead to the generation of pollution and emission of GHG, such as the burning of fossil fuels.

The Mediterranean Diet advocates indirectly the use of cooling as it seeks to encourage almost exclusively fresh produce. However to make their use feasible and even to reduce food waste, a cooling system is indispensable. However the use of canned goods and other, further away from the original state of the food product should be avoided, so this diet, as we shall see below, looking for sustainability at various levels and with the least possible impact on environment.

## **7. TRANSPORTATION**

In terms of food consumption, the various activities associated with the same impact on the environment, more or less noticeable by the consumer (Moura, n.d.): Energy consumption in the “purchase, storage, preparation / cooking and cleaning”; transportation, distribution channel and the displacement by the consumer; waste production as organic matter and as packaging.

Worldwide transport is an important environmental issue and Portugal is no exception. Transport has a significant impact mainly on the climate and air quality. According to the Portuguese Environment Agency (2013) has been given a reduction in the use of public transport at the expense of light passenger use, already having a weight of 85% in people’s choices, higher than the European average. However the use of biofuels in Portugal was higher than the European average (APA, 2013), which shows some concern for the environment.

## **8. MEDITERRANEAN DIET – A SUSTAINABLE CHOICE**

The Mediterranean diet is considered one of the healthiest in the world because it gives primacy to plant foods, based on grains, vegetables, fruits, legumes and oilseeds. The consumption of animal products is restricted to two to three doses per week, except the meat, especially red, which is only occasionally consumed. It is also considered as a sustainable

food regime in its essence, by promoting local economic, social and environmentally friendly development. The Mediterranean diet also encourages healthy eating habits and lifestyles.

Portugal competed in 2013, along with other countries, for the inscription of the Mediterranean diet on the list of the Intangible Heritage of Humanity by UNESCO. This movement is more than the apology of a diet, it is movement that promotes a lifestyle that seeks closer to nature. It is based on ten principles (Barros et al, 2013), Simple kitchen; High consumption of plant products; Vegetables locally produced, fresh and seasonal; Consumption of olive oil as the main fat; Moderate consumption of dairy products; Use of herbs; Higher consumption of fish and meat reduction; Moderate wine consumption; Water as main beverage; Conviviality at the table.

All of these feature points of the Mediterranean Diet can easily integrate the concepts of health and sustainability. Simple cooking is followed and the Mediterranean diet is the use of simple cooking methods such as baking, and simple ingredients, such as olive oil. Meals become more economic and able to preserve the nutritional value of the ingredients. The high intake of vegetables promotes better use of energy, reducing losses in the food chain (eg, by meat consumption.) (Moura, n.d.) in addition to the nutritional importance. The choice of local produce is essential in a sustainable and balanced diet. It reduces transportation needs, increases the nutritional value of food as they may mature naturally and leads to better support to small local farmers. Olive oil is the fat of excellence for the Portuguese people. Although nowadays are usual monocultures with olive groves, most of the oil consumed in Portugal is of national production, providing employment for Portuguese citizens and reducing transportation needs. It is usually packaged in glass bottles, with less impact on the environment than plastic. In addition to the environmental benefits, health benefits are indisputable and is a food that is part of our culinary heritage. The consumption of dairy products, in addition to being controversial from a social and scientific point of view, in fact is part of our cultural habits. Although it is very subject to a food industry marketing pressure, especially with regard to cow milk and its byproducts, its consumption should be fairly moderate. Milk production is an intensive industry, with severe damage to animals and the environment (Singer, 2000). The use of herbs greatly reduces the need for salt and also the use of spices imported from elsewhere in the world. Our country is rich in such plants and has always used them in food preparation or for direct consumption. Portugal is one country that possesses a large maritime area. It makes sense that the fish is the main animal protein to consume during meals. This is not what is observed today, however is nutritionally better balanced and has better properties for healthy meals. The fish consumption is also more sustainable especially if we consider the non-intensive / destructive fishing, such as the trawler. Artisanal fishing is still the livelihood of many families and even entire communities. With Portugal (and most Mediterranean countries) large wine production extensions, it is normal that the Mediterranean diet assume consumption of this drink. However scientists advocate moderate consumption and never isolated. Water is the main drink in any diet, particularly since it is essential to life. All foods are rich in water and even soft drinks are made primarily of water. Characteristic of temperate countries, socializing is essential. Cook without haste and take the meal quietly, exchanging a chat with family and friends, it is something that helps a fuller and happier life.

Sustainability advocated by the Mediterranean Diet is based on the very use of local agricultural products. These products are generally found in traditional, municipal markets, where producers promote a direct sale to the consumer. Small farmers are often owners of organic production, even without such certification or official name. They produce as a source of income, with the family consuming the surplus of production, so they usually have special attention to the chemicals they use and the quality of products. This ensures, informally, greater attention to the environment and health of people and animals. To be

fresh, not packaged, reduce significantly the production of waste. The perception of risk associated with these products is also different compared to fresh supermarket products (less chemical and absence of GMOs), which usually leads to a better use of all food.

The local shops, usual in municipal markets, avoids a series of intermediaries, improving the financial return of the producer, reducing prices to the consumer, but also reducing energy losses caused by the distribution circuit - producer-wholesaler-distributor-retailer -consumer. These markets are usually located in central areas of cities, which allows consumers living in the neighborhood, do not have to make large journeys to buy the products they need. However, according to Moura (n.d.), if we approach the issue of “shopping month” that include various types of products, from groceries to detergents and cleaning products, is in supermarkets and hypermarkets that 79.8% are purchased. Thus, by this point of view, the supermarkets although not the best option for the purchase of agricultural products “sustainable” can be advantageous for reducing the energy and time requirements for several trips and is also more convenient for providing adequate infrastructure.

What can be seen today is a wide divergence in the daily diet of most people due to the evolution of society and eating habits. After all, there is increasing interest in sustainable behavior, especially by a more balanced and natural food that is environmentally friendly and health. However, as mentioned Moura (n.d.), concern for the environment does not always translate into more sustainable food choices. Although economic issues are often the reason for not adopting more sustainable behaviors, for the most part is an “excuse” that masks the related convenience both to the place of purchase (supermarkets and hypermarkets to gain the preferences to have a little all), as with the connection to a particular product or brand, suspicious of other less common in their purchasing choices.

## 9. CONCLUSION

Food production and consumption has had several changes over time, driven by the evolution of the human being. Lately there was a gradual withdrawal of people from rural areas. Many children, teenagers and even adults, especially in the large population centers, away from the field, keep unaware of the origin of the food they consume, or how they are produced. For this current picture to be changed, better education on these issues is needed, so that all consumers can make informed and conscious choices. The awareness that is appearing gradually has resulted in changes in eating patterns and the type of preferred choice products. The Mediterranean Diet encourages a more balanced and healthy eating style, with great positive impact on the environment. Redirection of vegetables and cereals for human consumption associated with lower intake of animal products has a major impact in terms of natural resources. This diet, more natural and simple, was characteristic of the Mediterranean region, shared in essence by people bordering the Mediterranean Sea. With the globalization phenomena was up losing, gradually, now being revived due to the new awakening to health and ecological problems.

The Mediterranean diet is familiar in Europe and easily accepted by people. With simple changes can be the option for a sustainable behavior, able to improve the lives of each of us and the environment significantly.

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