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## Abstract

This chapter describes the Mediterranean food pattern as rich in vegetables and characterised by a high consumption of olive oil and a reduced intake of meat and dairy products, particularly liquid milk. The so-called good Mediterranean diet corresponds to the dietary pattern found in the olive-growing areas of the Mediterranean region. The concept is linked to rural communities experiencing a period of economic depression after World War II and before the wide dissemination of the fast-food culture. Despite regional variations, common components and cultural aspects can be identified, namely olive oil as the main source of lipids, the consumption of large amounts of seasonal vegetables, fruits and aromatic herbs (some of them gathered from the wild), as well as small intakes of meat and fish, often replaced or complemented with pulses, as sources of protein. Several global and governmental organizations acknowledge the Mediterranean diet as nutritionally adequate, health-promoting and sustainable because of its emphasis on biodiversity and the intake of small meat portions. In short, Mediterranean-style dietary patterns score highly for health, as well as for estimated sustainability scores, and can be followed in Mediterranean as well as in non-Mediterranean countries.

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## 2.1 The Mediterranean Diet: Food and Nutrient Features

The Mediterranean diet (MD) as a dietary pattern, and its relation to public health, was first noticed and extensively studied by Ancel Keys, an American medical doctor who travelled to Naples in the early 1950s, establishing the concept of what he later called the ‘good Mediterranean diet’ (Grande et al. 1965, 1972; Keys 1995; Keys et al. 1980). Keys and co-workers conducted an extensive epidemiological study known as the ‘Seven Countries Study’ from the middle 1950s to the late 1970s in seven countries: the USA, Finland, Netherlands, Italy, Greece, Japan and former Yugoslavia—now Croatia and Serbia. The study established a correlation

between blood cholesterol levels and the risk of coronary heart disease (Keys and Fidanza 1960; Keys et al. 1980). In the 1960s, coronary deaths in the USA and northern Europe greatly exceeded those in southern Europe, even after controlling for age, cholesterol and blood pressure levels, smoking, physical activity and weight. The Seven Countries Study also showed that cardiovascular risk factors in midlife are significantly associated with increased risk of dementia later in life (Keys et al. 1980). The importance of eating patterns became clear, and Keys described ‘the good Mediterranean diet’ as mainly vegetarian, characterised by a high consumption of olive oil and reduced intake of meat and dairy products, particularly liquid milk, when compared with the dietary habits of northern Europe and the USA. The diet characterised by Keys (Grande et al. 1972; Keys and Keys 1959; Keys et al. 1980; Keys 1995) and other authors (Bach-Faig et al. 2011; Georgoulis et al. 2014; Trichopoulou and Lagiou 1997; Trichopoulou et al. 1995) mainly corresponds to the dietary patterns found in the olive-growing areas of the Mediterranean basin, mainly of rural communities experiencing a period of economic depression after World War II and before wide dissemination of the fast-food culture. There are several variants in the region, but some common components and cultural aspects can be identified, namely olive oil as the main source of lipids; the consumption of large amounts of seasonal vegetables, fruits and aromatic herbs (some of them gathered from the wild); as well as commensality since meals are a communal event.

According to several authors (Keys 1995; Trichopoulou and Lagiou 1997), this dietary pattern included the daily consumption of olive oil, which accounted for most of the energy intake. Tree nuts and table olives were also commonly consumed. Large quantities and varieties of vegetables, legumes and fruits supplied vitamins, fibres and antioxidants. Beans, peas, and cheese were important sources of protein. Meat and fish were consumed in very small amounts. Wheat, potatoes and rice (mostly minimally processed) constituted the carbohydrate sources. Liquid milk was not commonly consumed by adults. It is noteworthy that Trichopoulou and Lagiou (1997) stressed the role of moderate wine consumption during meals, as have other authors more recently (Covas et al. 2010; Jordão et al. 2010; Nishizuka et al. 2011; Opie et al. 2011).

As observed by Keys and co-workers (Grande et al. 1972; Keys 1995), a classical meal always included a large amount of cooked and/or raw vegetables. Typical examples are salads that include a large variety of leaves and herbs, seasoned with olive oil. Meat was absent or consumed only in very small amounts. Red wine was most often present in adult’s meals, except in Muslim countries. Cakes and other sweet desserts were reserved for special occasions, and seasonal fruit was the typical dessert. Besides olive oil, bread, cheese and wine are described as playing central roles in this diet (Keys 1995; Keys et al. 1980). For cultural and religious reasons, green tea with mint is most consumed in Muslim countries, and may, in some aspects, act as wine’s counterpart due to its composition, as we show in Part II.

To lay people, the term ‘diet’ generally means the food and drink consumed by individuals or population groups, but it is even more commonly associated with

voluntary food restriction. However, the original Greek word *diaita* meant ‘way of life’ and the Latin word *diaeta* ‘prescribed way of life’, therefore encompassing food habits, daily activities, culture and lifestyle. When the pioneering works of Keys found an association between several health aspects (longevity, low morbidity and mortality from coronary heart disease and cancer) and what they later coined as the good Mediterranean diet, such characteristics were also registered. Therefore, occupational and leisure activities, adaptation to geographical and weather conditions as well as dependence on local resources and balance between people and the ecological system were as important to the broad concept of the MD as the food and drink included in the daily choices of individuals. It is worth mentioning that the communities investigated by Keys lived simple lives with hard occupational activities leading to high energy expenditure within a framework of food scarcity shaped by seasonal variances. Scarcity was the rule; abundance was the exception that led to festivities (cultural, religious) when people indulged in eating and drinking. Therefore, engaging in demanding occupational activities, under the direct influence of weather conditions and adapting to seasonal variations, constitute a common ground for the food and nutrient features of the MD.

As an expression of culture, history and lifestyle, several elements characterise the MD:

- Daily food intake distributed as four or five meals according to season and in proportion to labour intensity
- First and second daily meals (breakfast and lunch) were more important than the evening meal (dinner)
- Meal sharing, in a calm and peaceful environment
- A large diversity of foods, in small quantities, constituting a variety of textures and tastes
- Seasonal, locally produced and minimally processed foods
- Simple cooking methods
- Marked distinction between common days and festivities

The food features of the MD include the following:

- High fruit and vegetable consumption (unprocessed)
- High intake of wholegrain cereals, pulses and nuts
- Garlic, onions and olives all year round
- Olive oil as the ‘central’ fat
- High fish intake depending on proximity to the sea
- Low intake of red and processed meats
- Preference for white meat, especially poultry
- Moderate intake of dairy foods, with a preference for cheese and yoghurt
- Regular but moderate intake of alcoholic drinks, particularly wine at meal times

The analysis of such food patterns reveals the nutritional characteristics described in Table 2.1.

**Table 2.1** Main nutritional features of the Mediterranean Diet

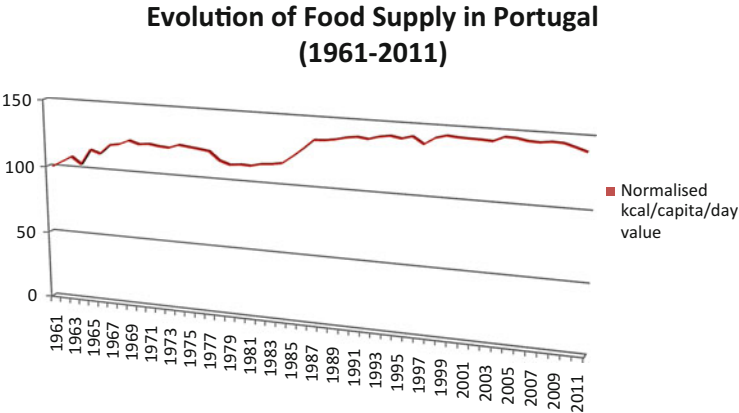
Nutrients	% Total energy intake	Particularities
Carbohydrates	60–70	Of which 50 % starch
Protein	Around 10	Of high biological value; pulses and other vegetables as relevant sources
Lipids	20–32	Monounsaturated fatty acid: oleic acid from olive oil and nuts
		Polyunsaturated fatty acid ratio n-6:n-3 = 1–2:1 from fatty fish, nuts versus vegetable seed oils, margarine
		Modest saturated fatty acid intake
Alcohol	Null	Alcoholic drinks are forbidden in the Muslim religion
	4–7	Mainly from wine, during meals
Fibre	Not applicable	Rich in soluble and insoluble fibre, from fresh fruit, vegetables, wholegrain cereals and nuts

As mentioned above, seven countries are included in the United Nations Education, Scientific and Cultural Organization (UNESCO) MD Representative List in 2015: Portugal, Spain, Morocco, Italy, Greece, Cyprus and Croatia. Data from the corresponding Food Balance Sheets (FBS), obtained from the UN Food and Agriculture Organization (FAO), were compared to illustrate the above observations and to obtain information on time trends in food consumption, merging information with studies that infer deviations by applying diet quality indexes (FAO 2015a). The evolution of dietary patterns, and tools available to assess such changes, are the object of the next chapter. FAO FBS from 1961 until 2011 are publicly available. No information about Croatia exists before 1992, thus reducing the time span under analysis in that country, as shown in Figs. 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 and 2.7.

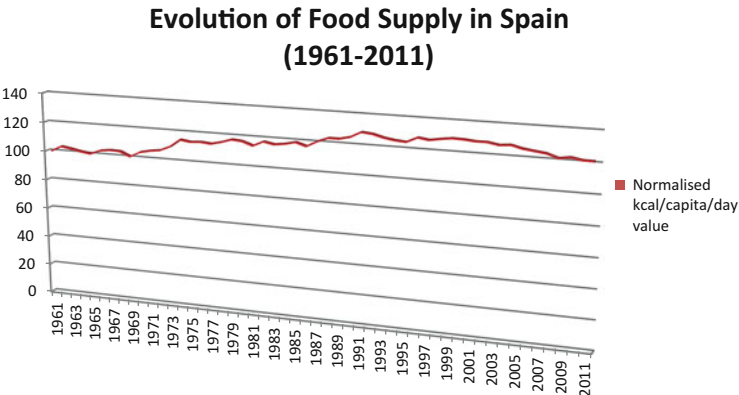
Food availability compiled by the FAO in FBS provides an estimate of the food available for human consumption in a country for a certain period of time, usually 1 year. Total food availability is computed from statistical data on supply (internal production, imports and stock changes), utilisation (exports, feed, seed, industrial use and non-food uses), and changes in stocks during the same period. The per capita value is obtained by dividing the annual quantity of each food group by the total population of the country in the same period. Therefore, the daily energy availability (kjoules or kcal/person/day) is an indirect estimation of food available for human consumption (FAO 2015b).

The FAO and the World Health Organization (WHO) define energy requirement as “the amount of food energy needed to balance energy expenditure in order to maintain body size, body composition and a level of necessary and desirable physical activity consistent with long-term good health. This includes the energy needed for the optimal growth and development of children, for the deposition of tissues during pregnancy, and for the secretion of milk during lactation consistent with the good health of mother and child” (FAO 2001).

Energy for metabolic and physiological functions is derived from the chemical energy bound in food and its macronutrient constituents. As human energy and

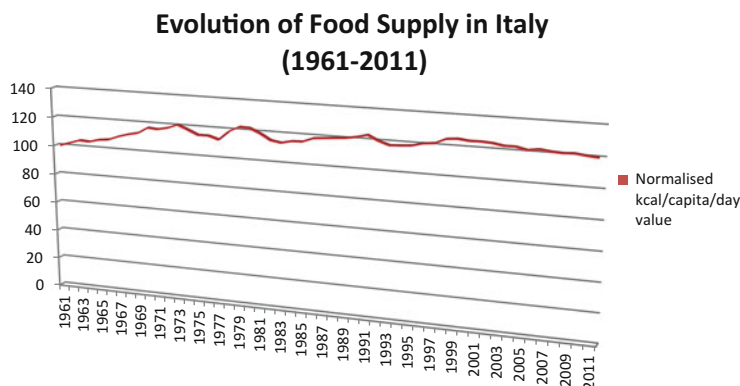


**Fig. 2.1** Evolution of Food Supply in Portugal from 1961 to 2011. The graph shows the observed and normalised trend on the basis of FAO data (FAO 2015a) as kcal/capita/day values. The 1961 value (2476.0 kcal/capita/day) is assumed to be 100. In accordance with FAO criteria, ‘food supply’ corresponds to ‘average food available for consumption’, which differs from actual average food intake, due to losses and waste at various levels of the food chain before reaching individual consumers



**Fig. 2.2** Evolution of Food Supply in Spain from 1961 to 2011. The graph shows the observed and normalised trend on the basis of FAO data (FAO 2015a) as kcal/capita/day values. The 1961 value (2632.0 kcal/capita/day) is assumed to be 100

nutritional requirements vary widely according to age, sex, physical activity, body size and composition and health/disease status, we have considered the theoretical recommendations for an ‘average person’ (that is, a healthy adult with moderate physical activity, irrespective of sex) of 1750–2750 kcal/day, in which the WHO reference value of 2000 kcal/day falls, to illustrate the extent to which national energy availability meets the population’s requirements.

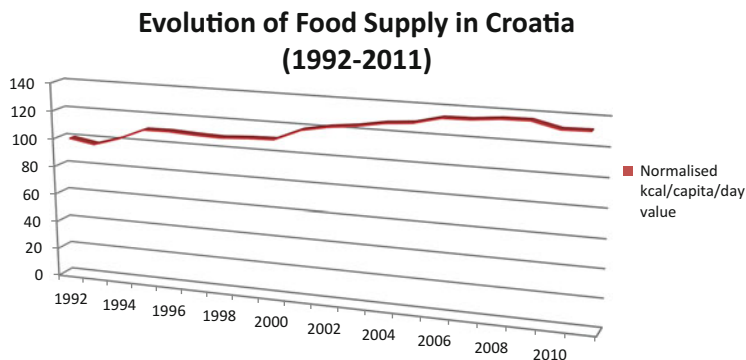


**Fig. 2.3** Evolution of Food Supply in Italy from 1961 to 2011. The graph shows the observed and normalised trend on the basis of FAO data (FAO 2015a) as kcal/capita/day values. The 1961 value (2955.0 kcal/capita/day) is assumed to be 100

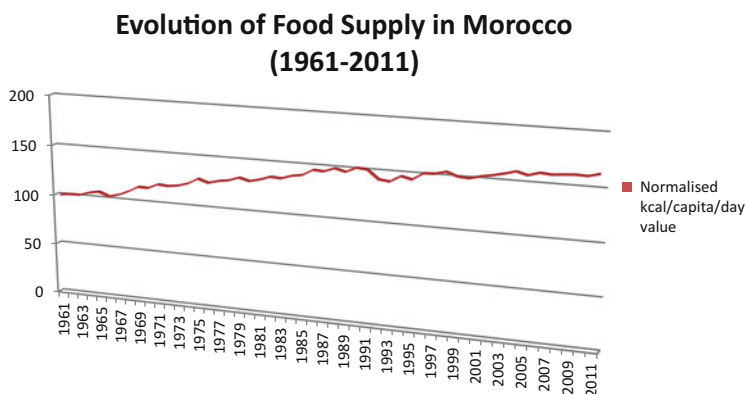


**Fig. 2.4** Evolution of Food Supply in Greece from 1961 to 2011. The graph shows the observed and normalised trend on the basis of FAO data (FAO 2015a) as kcal/capita/day values. The 1961 value (2824.0 kcal/capita/day) is assumed to be 100

Figures 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 and 2.7 indicate that, in 1961 and subsequent years, each average apparent food consumption or food availability at the national level was about 2000–2500 kcal/person/day, falling within the range of the referred ideal energy intake. The lowest value was registered for Morocco in 1961 (Fig. 2.6), followed by Cyprus (Fig. 2.7) and Portugal (Fig. 2.1). However, a marked increase in total energy available for consumption of approximately 450 kcal/capita/day was observed globally in subsequent years (WHO-ROEM 2012), and Mediterranean countries also followed this trend, reaching levels of 3500 kcal/capita/day and higher. More recently, a downward trend in the average total energy available has been registered in the region, except for Morocco and Cyprus (Figs. 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 and 2.7).

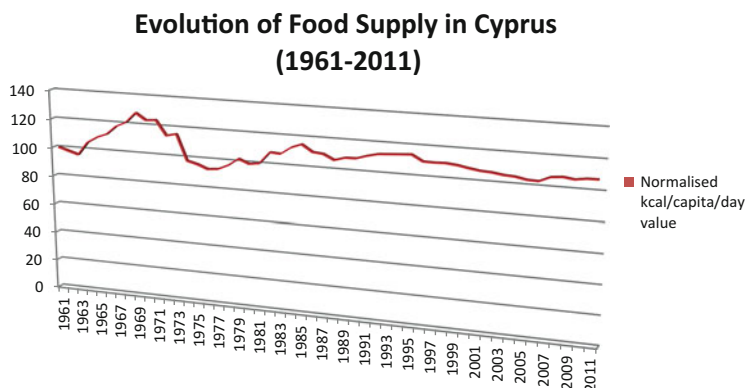


**Fig. 2.5** Evolution of Food Supply in Croatia from 1992 to 2011. The graph shows the observed and normalised trend on the basis of FAO data (FAO 2015a) as kcal/capita/day values. The 1992 value (2312.0 kcal/capita/day) is assumed to be 100



**Fig. 2.6** Evolution of Food Supply in Morocco from 1961 to 2011. The graph shows the observed and normalised trend on the basis of FAO data (FAO 2015a) as kcal/capita/day values. The 1961 value (2047.0 kcal/capita/day) is assumed as 100

By the end of the Seven Countries Study, Keys and colleagues (1980) observed a westernization of food habits in the region, which has recently been confirmed by other authors (da Silva et al. 2009) in Mediterranean European countries. This involves an increased consumption of meat, milk, animal fats, vegetable oils (excluding olive oil) and sugars and a decreased consumption of cereals, legumes and wine and other alcoholic beverages (Vareiro et al. 2009). These aspects are discussed in more detail in Part II.



**Fig. 2.7** Evolution of Food Supply in Cyprus from 1961 to 2011. The graph shows the observed and normalised trend on the basis of FAO data (FAO 2015a) as kcal/capita/day values. The 1961 value (2478.0 kcal/capita/day) is assumed as 100

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