

## Feature

# Dietary lipid supply in Lebanon: Does it fit the Mediterranean diet profile?

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## Summary

Lipids supply between 30–40% of total energy intake of Lebanese people and about 40% of this is derived from imported vegetable oils (soybean, sunflower, and corn oils). In Lebanon, olive oil, mostly locally produced, contributed to a consistently low percentage of total energy intake (2.2% on average) for the past forty five years. Although Lebanon borders the Mediterranean Sea, the Lebanese diet is far from the traditional Mediterranean diet. Compared to other Mediterranean countries, Lebanon has one of the lowest fish and seafood consumption rates. This pattern of consumption favors an increased ratio of omega-6:omega-3 with a concomitant low intake of omega-9. Efforts should focus on ways to increase fish and olive oil consumption.

## Introduction

Fats (or lipids) are a type of nutrient found in almost all what we ingest. They are the most energy rich macronutrient since they provide 9 kilocalories per 1 gram (compared to 4 kilocalories for the other macronutrients). Health experts advise having 30 to 35 percent of the total daily energy intake from fat. Throughout the years, researchers have attributed to dietary fats both beneficial and harmful properties. As a result, fats have been classified as good and bad fats.

'Good' fats, the mono and polyunsaturated fatty acids are found in vegetable sources and sea products (nuts, fatty fish, oils, olives, avocado, etc.); whereas animal and processed foods are traditionally considered sources of 'bad' fats which are saturated and trans fats (milk, butter, biscuits, cookies, etc.). Studies are nowadays stressing on the importance of dietary patterns in terms of disease prevention. Diets providing good quantities of mono and polyunsaturated fats such as the Mediterranean diet have been shown to decrease the risks of non-communicable diseases. In line with that a claim stating that a daily consumption of about 2 tablespoons (~23 grams) of olive oil may reduce the risk of coronary heart disease was approved by the Food and Drug Administration (USA) (2003) [US Food and Drug Administration, <http://www.fda.gov/food/ingredientspackaginglabeling/labelingnutrition/ucm072963.htm>].

**Table 1.** Lipid profile of the Mediterranean diet

Types of fats	Estimated intake
"Good fats"	
Monounsaturated fats	Very high (higher than 13%).
Omega-3 polyunsaturated	High (at least 2 g/d).
"Bad fats"	
Saturated fats	Low (about 8–10% of total energy intake)
Trans fats	Very low (possibly none at all)

Source: De Meester, F., & Watson, R. R. (2008). *Wild – type food in health promotion and disease prevention* (pp. 463-467), Humana Press.

## Mediterranean diet

The Mediterranean diet is known to be rich in fresh and seasonally available fruits and vegetables, whole grain cereals, olives and olive oils, fish, nuts and dairy products (mostly cheese and yogurt). Red wine is consumed in moderation and red meats are usually low. The qualitative aspect of fats in the Mediterranean diet appear to be responsible for its role in reducing the risk of chronic diseases such as type 2 diabetes, CVD, and metabolic syndrome. The lipid profile of the Mediterranean diet (**Table 1**) is marked by the high consumption of olive oil (*omega-9*). In 2013, UNESCO recognized that the Mediterranean diet is part of the Cultural Heritage of Spain, Portugal, Morocco, Italy, Greece, Cyprus and Croatia [2]. This article discusses whether the lipid profile of the Lebanese diet adheres to that of the Mediterranean diet.

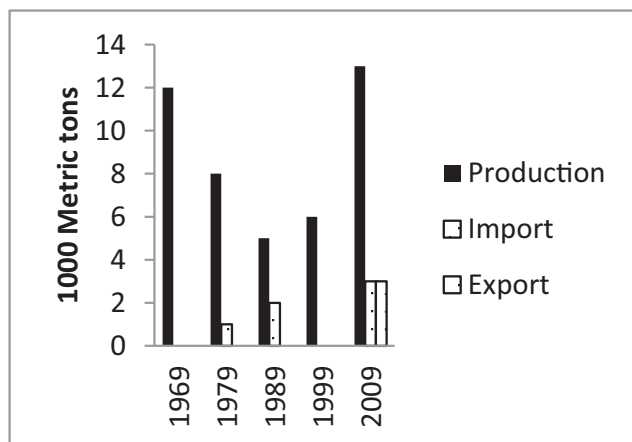
## Lipid, fish and seafood supplies

The Mediterranean diet is known for its high content of fish and olive oil which give both its taste and health benefits. Compared to other Mediterranean countries, Lebanon has one of the poorest fish

**Table 2.** Some Mediterranean countries olive oil and fish and seafood supply per capita (g/d)

Country	Olive oil supply per capita (g/d)	Marine fish and sea food supply per capita kg/y (kcal/d)
France	5.1	33.7 (70)
Greece	40.8	20.4 (37)
Italy	37.9	24.6 (49)
<b>Lebanon</b>	<b>7.1</b>	<b>9.3 (17)</b>
Morocco	9.8	11.2 (22)
Portugal	23.4	61.1 (98)
Spain	31.4	42.9 (87)
Syria	18.1	3 (7)
Turkey	4.3	8.2 (16)

Source: FAO Database 2014, Food Balance Sheet



**Figure 1.** Patterns of olive oil supply in Lebanon Source: FAO Database 2014, Food Balance Sheet.

and olive oil intakes. The Food and Agricultural Organization (FAO) database (**Table 2**) shows that in 2009 Lebanon had the lowest consumption of olive oil when compared with some European (Spain, Greece, Portugal, and Italy) and Arab countries (Syria and Morocco) and it had the lowest fish and sea food intake excluding Syria and Turkey. Although Lebanon borders the Mediterranean Sea, the Lebanese diet is far from the traditional Mediterranean diet.

As shown in **Figure 1**, olive oil production decreased sharply between 1969 and 1989. This could be related to the Lebanese war and other critical situations. It then shows an increase for the following ten years; though the enormous sudden enlargement of olive oil production between 1999 and 2009 is questionable since Lebanon didn't experience any significant increase in the field of olive agriculture throughout these years. The postulated theory behind this huge increment in olive oil production in 2009 and the sudden appearance of the export could be the result of smuggling between Lebanon and Syria through the Lebanese borders.

## Fat intake

Musaiger [4] reported that fats contribute to 32% of total dietary energy consumption of Lebanese people between years 2003 and 2005. However, Nasreddine et al. [5] showed that fat intake is around 39% of the total daily energy intake, while according to FAO food balance sheet [3], fat food supply was 30.3% of total daily energy in 2009. The difference might be due to the criteria of selection in the second study (adults living in the capital) and to the limitations of the methods used in data collection.

With the trend of food modernization, the quality of fats of the

traditional Lebanese diet is altered (**Table 3**). Fat intake increases with an extension of the total energy consumed per day (2354 kcal in 1969 to 3153 kcal in 2009) [3]. Olive oil consumption seems to be constant throughout the years since it is the predominant source of lipid exclusively in salads and some traditional dishes but not in cooking [5] where different types of vegetable oils tend to be used (other vegetable oils). The ratio olive oil/vegetable oil has decreased due an elevation in vegetable oil consumption while olive oil consumption remained constantly low. The predominance of vegetable oils varies with years: soybean oil was ranked first in 2009, followed by the sunflower oil and the maize oil respectively (**Table 3**). In 1969, olive oil contributed about 38% of vegetable oil usage and this percentage decreased with time reaching 16% in 2009. In the past forty years, the increase in vegetable oil supply (excluding olive oil), has been met by imports as these oils are not produced in the country. Increased use of soybean, sunflower, and corn oils may partially be related to their relatively low cost compared to the olive oil (45–65 \$ compared to 150 \$ per 20 L), as well as their ease of use in cooking since they are refined. Cooking in unrefined olive oil is known to produce strong odor and availability of refined olive oil is limited.

It is true that vegetable oils have the highest contribution in terms of lipids [3–5] and they are sources of polyunsaturated fats of type omega-6, however, after exceeding a ratio of omega 6/omega 3 in the range of 2–3/1 [6], omega-6 may start to have harmful effects, inhibiting the anti-inflammatory pathways and stimulating inflammatory and thrombotic pathways.

In parallel, intakes of animal derived foodstuffs, such as dairy products, meats, poultry, are significantly increasing, elevating the intake of saturated fats in the diet. Nonetheless, fish consumption is found to be low compared to other countries (**Table 2**). The low fish intake, coupled with the way of fish consumption (fried in vegetable oil) is believed to increase the ratio of omega-6 to omega-3, a trend magnified by the fact that the majority of the fish consumption is of non-fatty fish. Although access to fish is relatively easy in a country like Lebanon, many causes can limit fish consumption: the cost is relatively high and fish preparation takes time and generates unpleasant odors.

## Refined olive oil

Refined olive oil is obtained from virgin olive oil by refining using methods that do not lead to alterations in its initial structure [www.whyoliveoil.com, 2014]. Refining of virgin olive oil leads to "lightening" of the taste, nutrient, and natural antioxidants content, while preserving the high levels of monounsaturated fats; refined olive oil is thus preferable to other vegetable oils [www.whyoli-

**Table 3.** Fat food supply in Lebanon from 1969 to 2009

Food supply per capita	1969	1979	1989	1999	2009
Total energy	2354	2557	2982	3098	3153
Total fat g/d (% energy)	60.7 (23.2)	73.9 (26)	95.1 (28.7)	108.1 (31)	106.2 (30.3)
<b>Vegetable oils g/d</b>	<b>24.2</b>	<b>31.1</b>	<b>41.3</b>	<b>48.6</b>	<b>43</b>
Olive oil g/d	9.2	7.6	5.5	3.6	7.1
Cotton Seed oil g/d	7.2	3.7	2.9	0.1	0.1
Maize germ oil g/d	0.5	1.1	1.7	7.6	4.9
Sunflower oil g/d	0.2	1.5	1.2	3.9	7.2
Soybean oil g/d	1.5	10.9	21.5	25.9	14.4
<b>Animal fats g/d (butter, cream, raw animal fat, etc.)</b>	<b>7.1</b>	<b>10.2</b>	<b>13.3</b>	<b>6.7</b>	<b>6</b>

Source: FAO Database 2014, Food Balance Sheet,

veoil.com, 214]. Refined olive oil has an increased smoking point making it suitable for cooking and frying at high temperatures.

In Lebanon, to our knowledge, few factories (1 or 2) are known to have limited capacities to refine olive oils. Thus, refined olive oil is still commercially not available in the market, and is mainly produced on demand.

In summary, the Lebanese population consumes primarily vegetable oils in cooking and raw olive oils in salads. Although the direct usage of saturated fats such as butter and margarines has decreased throughout the years, a significant amount is still consumed indirectly through dairy products and meats. Being located on the Mediterranean Sea seems not to be sufficient for adequate fish consumption.

## Conclusion

Some decisions could be taken to encourage olive oil usage. Such an arrangement could be decreasing the cost of olive oil by supporting olive culture and oil production by the government. Utilizing olive oil in cooking and hot food preparation can be stimulated and boosted up by introducing the refined olive oil to the general population. These strategies by themselves can increase olive oil consumption thus elevating the olive oil/other vegetable oil ratio.

At the same time, fish intake should be encouraged by making it affordable and by promoting healthy recipes.

## References

- [1] De Meester, F., & Watson, R.R. (2008). Wild – type food in health promotion and disease prevention (pp. 463–467). Humana Press.
- [2] The Mediterranean diet on UNESCO list, 04/12/13, retrieved from <http://www.stari-grad-faros.hr/en/the-mediterranean-diet-on-unesco-list.aspx>
- [3] FAO Database 2014, Food Balance Sheet, Retrieved from [http://faostat3.fao.org/faostat-gateway/go/to/download/C/\\*E](http://faostat3.fao.org/faostat-gateway/go/to/download/C/*E)
- [4] Musaiger, A.O., Food consumption patterns in the Eastern Mediterranean Region, 2011, ISBN No. 978-99901-15-73-4, p. 16.
- [5] Nasreddine, L., et al. *Food consumption patterns in an adult urban population in Beirut, Lebanon. Public health nutrition.* 2006, 9, 194–203.
- [6] Simopoulos, A.P. *The importance of the ratio of omega-6/omega-3 essential fatty acids. Biomedicine & pharmacotherapy.* 2002, 56, 365–379.

