

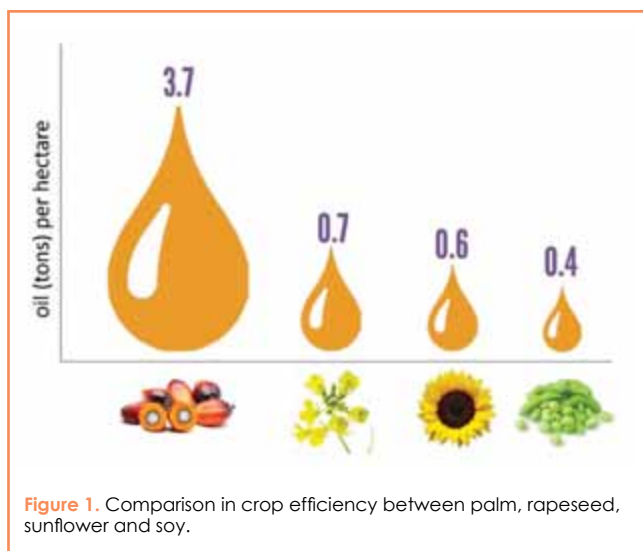
# Why palm oil intake is of no health concern

**KEYWORDS:** Palm oil, saturated fatty acids, palmitic acid, cardiovascular disease.

**Abstract** Palm oil is an oil with a widespread use in food industry, mainly in applications where texture, neutral taste and long shelf life are required. In the last few years some opinionates, non-governmental organizations as well as industries, mainly in France, Italy, Belgium and Norway have contributed to an escalation of negative publicity surrounding this oil. This article aims at critically scrutinizing the main dietary concerns about palm oil.

## ARTICLE

Palm oil is the most widely-used vegetable oil in the world, followed by soybean oil, rapeseed and sunflower oil. With a growing world population, the global demand of fats and oils is rising. Palm oil is inexpensive to grow and has a high yield: a single hectare can produce up to seven tons of oil, which is 7-10 times higher than the other major oilseed crops (1) (Figure 1). In addition to the use as food component, palm oil is also used in detergents and personal care products, particularly in soaps, but can also serve as biofuel.



**Figure 1.** Comparison in crop efficiency between palm, rapeseed, sunflower and soy.

Oil palm trees grow in the humid tropics (Figure 2). Apart from the major palm oil producing countries Indonesia and Malaysia, there is an increase in palm oil production in other parts of the world including South and Central America,

Thailand and Western Africa. In the last few years, advocacy groups or single individuals with varying agenda, have made of palm oil a "specially monitored ingredient", accused of increasing cardiovascular disease risk and of being the major culprit of deforestation (2-5).



**Figure 2.** Growing areas of palm oil plants.

It is commonly believed that palm oil, compared to other vegetable oils, is a highly "processed" or "industrial" oil. It is not commonly known that palm oil is produced by simply pressing the pulp of the fruit of the oil palm tree (*Elaeis Guineensis*) and refined in a similar way to that of extra-virgin olive oil. The palm fruit has a peculiar high content of oil, about 30-35%, and the size of a large olive, with a single kernel, which, in addition to the fruit, is also used to extract oil (palm kernel oil) (Figure 3). Palm fruit oil and palm kernel oil differ significantly in the way they are processed (Figure 4) and in their fatty acid composition (Figure 5), resulting in very different nutritional properties. However, they are sometimes mistakenly thought to have the same composition or nutritional effect, which in part may be responsible for the current confusion about the nutritional effects of palm oil.

The current demand for healthier foods is attracting a wide range of customers. In response, supermarkets and producers are adapting their products and have identified the growth

potential of products carrying a “free-from” claim. The “no-palm oil” logos have become powerful marketing tools. A growing number of products in France, Belgium, Italy and the Scandinavian countries bear “palm-oil free” logos (Figure 6), indicating there is no palm oil in the product and leading consumers to perceive their products as “healthier” and/or “better to the environment”.

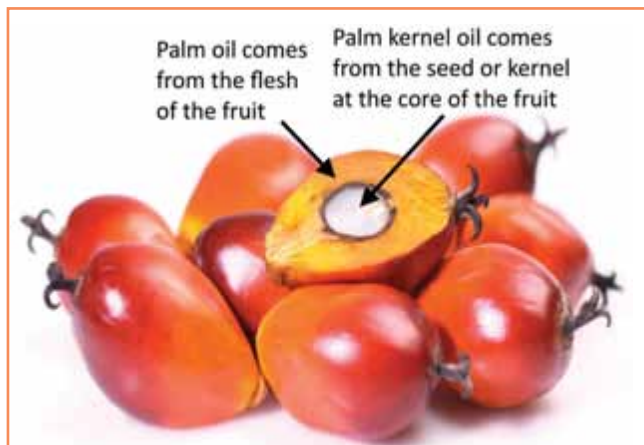


Figure 3. Palm oil fruits showing the raw material for palm oil and palm kernel oil.



Figure 4. Schematic view of palm oil and palm kernel fat processing.

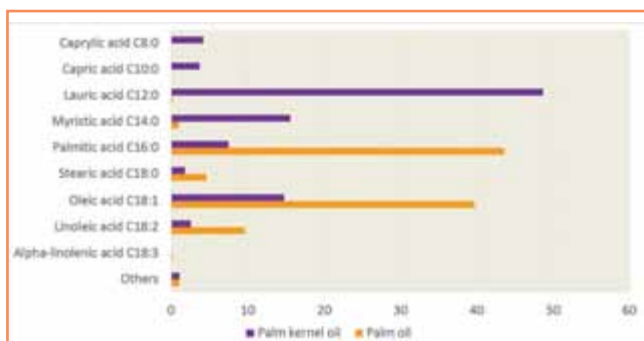


Figure 5. Fatty acid profiles of palm oil and palm kernel oil.



Figure 6. Type of no-palm oil logos used in France and Italy.

In France and Italy, where alleged harmful effects of palm oil have hit the news, the internet and even the supermarket shelves, the average consumer is prone to think that palm oil is unhealthy and should be banned. The public debate on palm oil in these countries is highly skewed and based on misconceptions rather than scientific evidences. It is the aim of this article to look into the currently available evidence and to provide facts to argue against these misconceptions in the public debate.

**Promoters of the no-palm oil logos argue that palm oil is very rich in saturated fat (SAFA) compared with other oils and fats (6). Is this statement true?**

All oils and fats, irrespective of their origin, contain both saturated and unsaturated fatty acids. The ratio depends on the type of oil or fat. On average, palm oil has almost equal amounts of saturated and unsaturated fatty acids (7). Olive oil, sunflower oil and rapeseed oil are higher in unsaturated fatty acids compared to palm oil. At the same time, coconut, cocoa butter, and dairy butter, often used to replace palm oil, are higher in saturated fatty acids than palm oil (Figure 7). The choice of mix of fats and oils determines the SAFA content in a product.

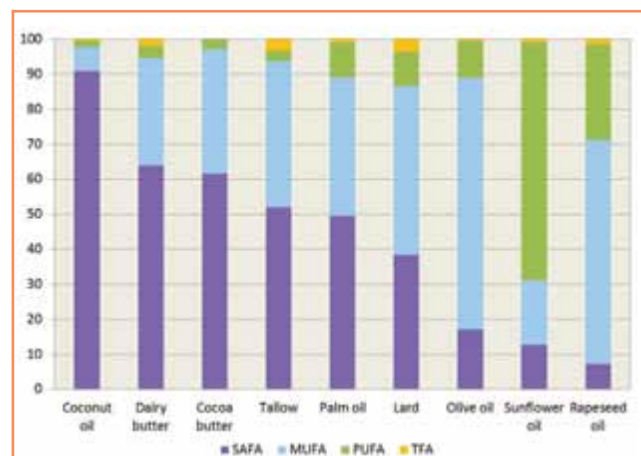


Figure 7. Fatty acid profiles of common fats and oils (7).

**Promoters of the no-palm oil logos argue that palm oil considerably increases the risk of cardiovascular diseases due to its SAFA content. Is this statement true?**

Around 1950, human studies showed that dietary SAFA correlated with the risk of coronary heart disease, i.e. a higher SAFA consumption meant a higher risk of developing coronary heart disease. For decades experts advised consumers to replace saturated fats by cutting down on dairy, butter and meat. The re-examination of some of the old studies (8) as well as new studies are now challenging that advice. A 2010 meta-analysis concluded that there was no significant evidence that saturated fat intake is associated with an increased risk of cardiovascular disease (9). An even more recent meta-analysis also concluded that current evidence does not support low consumption of saturated fats (10). A Japanese study in 2010 even concluded that SAFA intake was inversely associated with mortality from stroke (11).

Although dietary saturated fat may raise LDL cholesterol levels, associated with a higher risk of cardiovascular (CVD) disease, in the 1950's scientists were unaware that saturated fats also

raise another component of serum cholesterol, called HDL and known by most as “good cholesterol”. As shown by Mensink et al. (12) the positive counter effects of higher HDL should be taken into account. By many the total/HDL ratio is seen as a more accurate indicator of cardiovascular disease risk rather than just LDL cholesterol (12-13). Furthermore, there are two kinds of LDL particles: small, dense ones and large, “fluffy” ones. These “fluffy” LDL particles, in particular, are strongly associated with atherosclerosis, and have been shown to increase with an excessive dietary intake of carbohydrates. The latter, often predominate in high-SFA diets (14). It is important to understand that CVD risk cannot be reduced modifying one value (LDL cholesterol) only, and that decreasing the intake of one food component does not necessarily improve the CVD risk. When producers reduce levels of one food component, they have to replace it with something else, which may not result in a better health outcome (15). It is now well established that replacing SAFA with PUFA lowers CVD risk, whereas replacing SAFA with carbohydrates has no benefit and replacing SAFA with MUFA has no evident effects (16).

As for palm oil, up to now there is no indication that consumption of palm oil in a balanced diet is related to any specific health concern (17). In French adults, the intake of palm oil is only 2.7 grams per day, equivalent to 1,3 grams of SAFA per day and only 0,7 % of the total daily energy intake. This is very low compared to the amount of saturated fats recommended by most (inter-)national advisory bodies (5 - 12 energy %) (18). It is indeed estimated that in France the major contributors to SAFA intake are dairy (15g/day) and meat products (4,7 g/day) (19).

An increasingly consistent message from cardiovascular researchers and nutrition experts is that overall dietary patterns—rather than individual nutrients—hold the key to better health.

**Consumers who purchase products labelled as “palm oil free” think they are healthier than products containing palm oil. Is this statement true?**

Replacing palm oil in food products or diets with fats higher in saturated fatty acids or with added sugar to compensate for the palatability and taste, will not provide a health benefit (20). Furthermore, the idea that a food, with a (perceived) health-logo is better, might induce the consumer to overindulge and exceed on calories. The relation between nutrients and health should be considered within the whole diet and not in terms of single nutrients.

**The internet is crowded with so called “experts” who promote the use of alternative solid fats instead of margarines. They argue that palm oil is unhealthy because it is used in margarine, which contains hydrogenated fat and consequently *trans* fatty acids. Is this statement true?**

Palm oil, like other refined vegetable oils, has negligible amounts of *trans* fat (Figure 8). Contrary to what is commonly believed, it is only the partial hydrogenation that increases *trans*-fat in a fat or oil, not the full hydrogenation.

Some consumers are concerned about the presence of hydrogenated fat perceived as being industrially processed

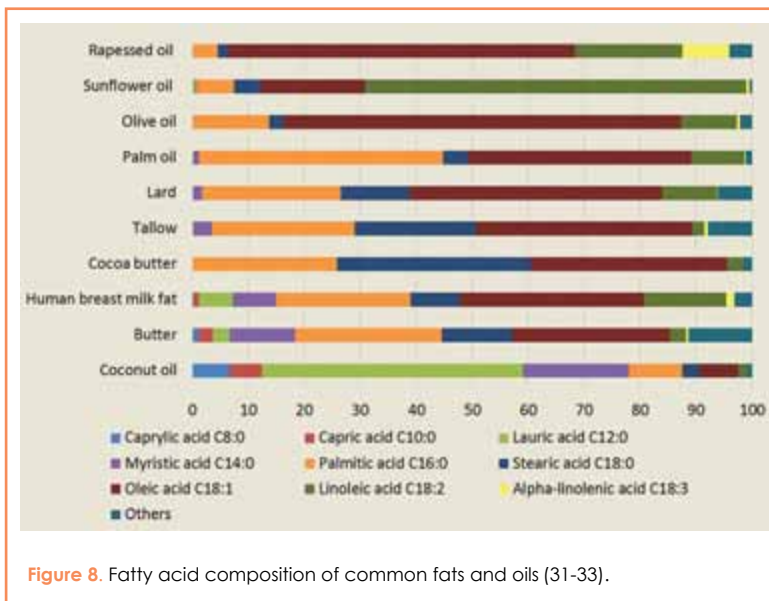


Figure 8. Fatty acid composition of common fats and oils (31-33).

and consequently “less natural”. It is important to highlight that the majority of margarines in Western Europe do not contain hydrogenated fat, neither fully hydrogenated nor partially hydrogenated. This has been made possible with the use of oils that are naturally higher in solid fats or SAFA, such as palm oil.

When the harmful effects of *trans* fatty acids became apparent, margarine development focused on minimizing the amount of *trans* fatty acids. Fractionation (separation of for example liquid and solid phase) of oils and blending with different type of vegetable fats and oils, in particular palm oil fractions helped to replace partially hydrogenated fats while safeguarding that the SAFA content did not increase.

**Promoters of the ban on palm oil argue that palm oil is unhealthy because it contains palmitic acid. Is this statement true?**

Palmitic acid (C16:0) has important physiological functions in humans. Palmitic acid is a fundamental component in cellular membranes; it is a component of the lung surfactants responsible of the correct functioning of the lungs; it regulates many cellular proteins; it is the precursor of bioactive molecules such as palmitoylethanolamide, with analgesic and antiinflammatory properties; and it is required for the storage of vitamin A as retinyl palmitate (14, 21-23).

When present in excess, it increases the LDL cholesterol and is a risk marker for inflammation and insulin resistance (24). Nevertheless, blaming palmitic acid in palm oil for the negative effects of excess palmitic acid is over simplistic. Palmitic acid is present in many other oils and fats and palmitic acid is also endogenously produced in the body from sugars and alcohol (25-27).

Probably due to its important physiological function, palmitic acid is the most common saturated fatty acid found and endogenously produced in animals, plants and microorganisms. Approximately 25 % of butter, chicken, fat cocoa butter, lard, and beef tallow is palmitic acid. More than 10% of olive oil and soybean oil is palmitic acid (Figure 8). In human breast milk palmitic acid accounts for 20 - 25 % of the fat. Since the human body cannot tell the difference between palmitic acid from palm oil or olive oil once it has been absorbed into

the gut, all products contribute to the palmitic acid intake in humans.

The capacity to endogenously produce palmitic, and to further convert it to oleic acid is likely an evolutionary adaptation to maintaining desirable physiological balances of these two important fatty acids. Because of this self-regulating mechanism, dietary intake and plasma palmitic acid concentrations are not clearly related (27-28).

As it is true for all ingredients, excess palmitic acid intake can be harmful. In our current Western diet, an excess in palmitic acid intake can easily derive from other fats than palm oil or from unbalanced diets rich in sugars and alcohol.

**Promoters of the ban on palm oil argue that palm oil production and import in Europe is much higher than that of locally produced oil crops. Therefore palm oil must be omnipresent in many food products and intake must be very high. Is this statement true?**

Global consumption rose from 17.7 million tons in 1997 to 52.1 million tons between 1997 and 2012, making it the most consumed oil in the world. But there is general confusion about the word consumption compared to use. The main users of palm oil are China, India, Indonesia and the European Union. Palm oil is not only consumed via foods, but a considerable percentage is used in non-food applications. For example, it is estimated that in Italy 90% of the imported palm is used for non-food purposes, in particular energy, leaving 10% for food consumption (29).

Since palm is often used in fats and oil blends, the pro-capita consumption of palm oil is difficult to estimate. In Italy, where palm oil is mainly used in confectionary products, the Italian Association of Producers of Confectionary and Pasta Products (AIDPEI), has estimated that palm oil consumption is only 6,1 gram per person per day (29), equivalent to 3 grams of SAFA per person per day. Since reference intake for SAFA in EU is 20g per person per day (30) the palm oil contribution to the reference SAFA intake is merely 15%.

Compared to other vegetable oils, which are liquid at room temperature, palm oil has a higher melting point and denser structure and is semi-solid at room temperature. This characteristic proves an important asset in applications such as margarines, bakery shortenings, and confectionary fats where a semi-solid consistency is needed and the replacement of partially hydrogenated fat is a necessity. Due to its natural antioxidants and its moderate content of PUFA, palm oil provides good oxidative stability at high temperatures and is often used for frying. Furthermore, its triglycerides composition provides the opportunity to fractionate palm oil in olein and stearin fractions with very different melting profiles. This further increases its widespread use in food applications. For some applications, such as margarines or spreads, using palm oil fractions facilitates the blending with other oils rich in PUFA, helping to improve the overall PUFA intake, in line with the recommendations by the WHO and other health organizations worldwide.

## CONCLUSION

All vegetable oils contain a mix of saturated and unsaturated fat and together they will determine the fatty acid composition

of a product. Palm oil contains about 50% saturated fatty acids (mostly palmitic acid), 40% oleic acid (monounsaturated) and 10% linoleic acid (polyunsaturated), which makes it an edible fat or oil with an average SAFA content.

Palm oil can be found in many food products, including baked goods. These food products need saturated fats for stability, taste and structure. While replacing saturated fats with polyunsaturated fats delivers clear health benefits, this can only be applied in specific products where structure, stability and shelf life are not an issue. In those products that require saturated fats, there is no scientific consensus that replacing one source of saturated fat with another will provide a clear health advantage. The replacement of palm oil with carbohydrates may even give raise concerns related to obesity, diabetes and CVD. Palm oil free products are no guarantee of improved health benefit. They confuse consumers on what real healthy eating behaviour is about and in the end will lower consumer trust in food industry.

Currently, there is no nutritional ground nor any recommendation by health authorities to eliminate the use of palm oil in food. Instead, we should focus on improving the nutritional composition of the overall diet. It is important to realise we eat food, not nutrients.

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