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The Mediterranean diet: a comparison between Italy and France

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Abstract

The Mediterranean Diet has been a dietary model for centuries, for a great number of countries. It has been transformed over the years but remains one of the pillars for a healthy lifestyle. As cultures merge and adapt, the adherence to the Mediterranean Diet has lowered. This is applicable to Italy specifically in recent years but also France and other European countries. Even though France is part of the Mediterranean basin it does not have such a strong bond to the Mediterranean Diet as Italy does. The food habits of the French population show a low adherence and interest in the Mediterranean diet, with nutritional guidelines based on different nutritional methods. Similarly both countries aim to reduce the amount of unhealthy food being consumed and help the population with having a healthier lifestyle all around.

A survey was developed based on the Medi – Lite questionnaire and distributed to a French and Italian cohort through social media. The results showed that Italian participants had a higher adherence and knowledge of the Mediterranean Diet rather than French participants. France however had higher percentages of respondents with a higher education degree and living independently. Through further research though, it was found that Italy and France face the same challenges when confronted with metabolic diseases and public health. Lack of access to healthy food, knowledge of a balanced diet and nutrition literacy being a main issue.

1.Introduction

1.1 The Mediterranean diet

1.1.1 History

The Mediterranean diet (MD) as it is known today is the evolution and mixture of cultures that date back to Greco-Roman times. The MD was composed of a triad of olive oil, bread and wine (*Fondazione Dieta Mediterranea*, n.d.). Cereals were consumed in their natural form or processed into flour for bread and other derivatives. Grapevines were largely diffused, together with olive groves, and most of the grapes were transformed into wine. There was some meat consumption, primarily goat and sheep but vegetables weren't very common as the woods and unexplored lands were not exploited, especially in the south of Italy.

The name derived from the fact that it was spread mainly in the Mediterranean basin due to the growth of olive trees. As olive oil was and still is one of the most important pillars of this diet. Olive oil is a healthy fat as it is rich in monounsaturated fatty acids such as oleic acid and polyunsaturated fatty acids mostly in the form of linoleic acid. Polyphenols also play a major role in the healthy composition of olive oil. They are antioxidants and anti-inflammatory (Frankel, 2011). Many studies have demonstrated that the consumption of olive oil helps with the prevention of cardiovascular disease and has positive effects for patients suffering prediabetes and diabetes. It is also reported that extra virgin olive oil (EVOO), the main source of fat in the MD, improves inflammation, oxidative stress, coagulation, platelet aggregation, fibrinolysis, and endothelial function (Yanai, 2019). Olive oil was not only prized for its health properties but was also used for centuries as a precious exchange good. As the Greek empire started to gain wealth thanks to this product, it was then brought to Italy and the rest of Europe. The Ancient Romans also entered the trade of olive oil with much success. But it wasn't only about the oil itself, the whole olive tree was considered as a sacred plant with many derivatives used in religious ceremonies. Wreaths were made of olive tree branches; olives were one of the most appreciated fruits. The Ancient Romans invented the screw press for the making of olive oil and that mechanism has stayed unchanged for about 2000 years (Kostelenos & Kiritsakis, 2017).

The MD took a turn when, towards the end of the Medieval Ages the barbarian invasions started to take place. The barbarian diet was made up of meat, polenta from millet and then subsequently corn,

and beer (*Fondazione Dieta Mediterranea*, n.d.). They were hunters and fishermen, and reared mainly pigs. They also cultivated home gardens for vegetable consumption and foraged the woods for wild berries. Cereals were only grown to produce beer. The north of Italy started to adapt its diet to follow the barbarian one, but the south remained engrained in its ways. With time the southern food habits started to spread in the more northern territories of Europe and vice versa the southern lands started to assimilate parts of the barbarian diet. These elements were represented by the addition of more vegetables and fruits, with the cultivation of small patches of land for personal consumption. The population started to venture into the woods to forage and hunt. Animal products such as dairy and meat were introduced, as well as more fish. This evolution is more reflective of the MD known and consumed today even though it has continued to change over the centuries.

The diet though was also heavily influenced and still is in modern days also by religious and societal beliefs. In the Middle East alcohol is not consumed along with red meat due to religion. There is contradicting evidence stating that with the westernization of diets, the adherence to the MD is decreasing whereas in some cases it is being rediscovered also because of its potential for a circular economy (Vinci et al., 2022).

With the changes in lifestyle, the Mediterranean Diet Foundation has created a representative food pyramid of not only the foods themselves that must be consumed but how they are cooked following the customs and traditions of the Mediterranean basin. The main food groups are at the base, foods to be consumed in moderation at the center and foods to be consumed rarely at the top. In addition, it is recommended to exercise and rest daily as well. The adherence to the MD is still very much centered in the respect of traditions and food habits that have been taught since a young age.



Figure 1 Mediterranean Diet Food Pyramid.

As it can be seen in **Figure 1** the base of the pyramid consists of cereals, vegetables and fruits that must be consumed at every meal together with water. In addition, olive oil, bread, nuts, legumes and some dairy in the form of yogurt or cheese is recommended daily. White meat, eggs and fish are advised a couple of times a week, red meat and processed meat are to be consumed at a lower quantity and finally sweets are to be consumed in the least amount possible. The MD though isn't only about food, it also represents a way of life. Home cooked meals with fresh ingredients consumed around the dining table with family and friends. It is a moment of conviviality, sharing and eating as a pleasure, following the seasonality of produce and wine may accompany the meal but is not compulsory. Rest and physical exercise are equally as important. A nap after lunch followed by a walk is highly recommended. As the diet has changed and evolved to match the different years, its basis has remained the same for centuries. This demonstrates how beneficial and effective it can be for people's health.

1.1.2 Modern Day culture

“The Mediterranean Diet – from the Greek word *díaita*, meaning lifestyle – is a social practice based on the set of skills, knowledge, practices and traditions ranging from the landscape to the cuisine, which in the countries of the Mediterranean culture concern the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption.” (*Mediterranean Diet - UNESCO Intangible Cultural Heritage*, n.d.). The MD has been recognized as a UNESCO Intangible Cultural Heritage with 7 countries representing it: Cyprus, Croatia, Spain, Greece, Italy, Morocco and Portugal. The aim is to protect this way of life but also to promote it as it is not only about a diet but also about food security, sustainability, tradition, and health. Projects and initiatives are carried out in these different countries for its citizens but also to increase tourism and further interest of this vast heritage which unites many different cultures. The diversity of the cultures and populations grouped in the MD has also been the focus point of many studies along the years. Even though there are cultural differences the MD has found a way to remain prevalent in these different circumstances.

During the 1950s many doctors started to investigate the cause and subsequent prevention and reduction of certain diseases that were the main cause of deaths around the world. Ancel Keys, an American doctor, started to notice how diet and lifestyle had a much bigger incidence on these illnesses than what was thought in the past. Specifically, the most spread illness was coronary heart disease (CHD). Doctor Keys spent time in the south of Italy and noticed how the diet was quite different compared to the United States and how CHD incidence was much lower. This observation kickstarted the Seven Country Study which was a major factor in the recognition of the MD health benefits worldwide. The seven countries were chosen based on different lifestyles and health indexes. It was tested exclusively on men of a certain demographic and in specific areas of the different countries. “It became a collective effort to study their joint questions about heart and vascular diseases among countries having varied traditional eating patterns and lifestyles.” (*The Seven Countries Study*, n.d.). The seven countries were the following: USA, Finland, Italy, Greece, the Netherlands, Japan and former Yugoslavia (Serbia and Croatia). The population samples selected were 20 to 50 men ranging from 40 to 59 years old for each cohort. The cohorts were chosen as follows: for the United States, men of the northwest that worked in the railroad industry with different occupations. In Finland, participants were selected from east rural villages where there was said to be a high saturated fat content diet and high CHD mortality, and in the west where CHD appeared to be lower. For the Netherlands the county of Zutphen was selected, as well as an individual study was carried out for this sample with a dietary survey. In Italy 3 samples were analyzed. First one in the north of Italy where

the diet was rich in animal fat. Second in the center of Italy in a hilly area not far from the sea where it was thought that the MD was already prevalent. And finally, the Rome railroad which acted as the Italian counterpart for the US railroad group. Different occupations and physical levels were observed. For Greece, the islands of Crete and Corfu were selected as there was a very high consumption of olive oil. In former Yugoslavia now identified as Croatia and Serbia 5 samples were selected: populations with a high plant diet and high animal product intake on the counterpart, agro-industrial cooperative work villages and finally, faculty members from university. For Japan two different communities of the same island of Kyushu were chosen, one being a farming community and one a fisherman village.

The measurements for the study included socio-demographic characteristics including occupation, smoking, physical activity, diet and medical history. Various physical examinations and blood tests were taken. Dietary data was collected and the food itself was also tested for specific nutrient levels. It was very important at this point that the study be standardized specifically because of its multicultural nature. This was done through the survey that was divulged and the preliminary tests. Reexamination surveys were done every 5-10 years in certain cohorts and then after 25 and 50 years. Many were the factors analyzed and conclusions drawn. A healthy lifestyle during youth increases the chances of having less diseases during old age. Balanced nutrient intake and physical activity are essential for good health. Many factors can have repercussions on health later in life, so avoiding certain practices such as smoking, heavy drinking or a sedentary lifestyle can be beneficial long term. Selecting seasonal produce and eating varied meals to have all the necessary food groups should be practiced through the whole life span. Many other studies were carried out to compare the data and find similarities and differences. The FINE study, the SENECA study and the HALE project were all carried out during the 50 years with certain cohorts from the 7 countries to evaluate more findings (Knoops et al., 2004). The FINE study (Finland, Italy, Netherlands, Elderly) observed the survivors of the cohorts in Finland, the Netherlands and Italy that were re-examined after 25 years. The SENECA (Survey in Europe on Nutrition and the Elderly: A Concerted Action) was created to record dietary and lifestyle factors in elderly Europeans for a healthy ageing. Finally, the HALE project (Healthy Ageing: A Longitudinal study in Europe) used data from the SENECA and FINE studies to further examine dietary patterns and mortality risks.

It is because of the Seven Countries Study that today all this information about ageing and CHD is available and the findings continue to be analyzed through different approaches. Data collection is

still being carried out to further learn and guarantee better health during ageing for the future generations.

1.1.3 The Italian Case Study

Diet in Italy represents traditions, community, lifestyle and therefore it is not only about sustenance but about family and sharing. Sociodemographic and education levels influence the adherence to the MD. The higher the nutritional knowledge the higher the adherence and vice versa (Aureli & Rossi, 2022). Other findings though do contradict this evidence. Even though Italy appears to be one of the main advocates and representatives of the MD it is not as followed as it should be. A decline in the adherence to the diet especially with the introduction of fast foods and easy access to ready-made meals has been recorded (Bonaccio et al., 2014). When looking at the MOLISANI study which evaluated the adherence to the MD from 2005 to 2010, a dramatic drop was recorded in 2007, the period in which the global economic crisis became manifested (Bonaccio et al., 2014). Also, the rising cost of olive oil in the last decade is diminishing its use and this accounts for a large part of the data stating that adherence to the MD is lowering (Veronese et al., 2020). Price does influence food choices, so healthy food should be more accessible for everyone. Food composition has also changed drastically, production methods and crop cultivation have influenced this change. There is a higher daily intake of sugar and many refined products that have a higher glycemic index (D'Alessandro & De Pergola, 1960). The rise in obesity in adolescents comes with many health issues and disordered eating, that if not corrected will be carried through to adulthood, resulting in even more complications.

Health issues such as metabolic syndrome, type 2 diabetes, precocious puberty, orthopedic complications and psychological and social disturbances are rising in children and young adults. Some of these effects used to only be found in the older generation posing now a threat for premature death in young adults (Noale et al., 2014). Because of these increasing health issues for children, various programs also on European level have been developed to combat malnourishment. It is important to educate children from a young age and their parents not only on eating habits but on a complete meal with all the necessary food groups and a schedule to gain the maximum benefits from food (Roccaldo et al., 2014). It has been found that adults usually follow the diet they have been taught in their early years, so many projects such as ZOOM8 have been launched to make sure that children and parents have the correct nutritional education. Through this study, carried out in elementary school children with the participation of the parents, it has been gathered that even though parents do try and make the healthiest choices for their children, they are not always able. Maternal

education plays an important role, in fact, the percentage of children with low adherence to the MD decreased with increased maternal education level and the number of high adherers increased at the increasing of the level. (Roccaldo et al., 2014).

It is not only about food but also about physical activity. Studies in adolescents have shown that even in subjects that adhere to the MD, if exercise is not applied then there still is a high risk of obesity, as the daily caloric intake is still quite high (Noale et al., 2014). Therefore, education must also be towards a complete view of physical health. All the studies end with the same conclusion: nutrition and diet patterns should be taught in school so that food education is learned from a young age and will be followed through into adulthood for an overall healthier life. The food choices made in youth will affect the body throughout the life cycle and will increase the chances of chronic illness in old age.

1.1.4 The French Case Study

France is recognized worldwide for its traditional culinary practices. Its protection of the culinary heritage through the implementation on the “terroir” and food transformation and culinary techniques developed over the years have highlighted France for refined products and for its exquisite cuisine, characterizing the country for its strong food culture (Andrade et al., 2021). With this vision in mind the French population still follows the three meal a day plan with moderate portions and varied food intakes (Lhuissier et al., 2012). However even though the food identity is very strong, the western diet is starting to take its stand in the French households. This is now leading to increasing health issues that the French government has decided to fight with the health program “Programme Nationale Nutrition Santé” (PNNS) that was put into place in 2001 and developed over the years with the major factors being health, nutrition and physical activity. Now into its 4th chapter (2019-2023) it aims to reduce salt, sugar, ultra processed foods and increase the overall nutritional content of food (*PROGRAMME NATIONAL NUTRITION SANTÉ*, 2019). These goals will be sustained with the implementation of better food in canteens countrywide, from schools to workplaces. As well the aim is to reduce plastic use for a more sustainable environment, nutritional education in schools and more help for the parents from pediatricians in regard to nutritional literacy. Therefore increasing attention towards practicing physical activity and combatting malnourishment in both cases of overweight and underweight people. Lastly one very important issue in modern day society is body image, France

wants to avoid images and ideologies that can harm the public causing them to develop food disorders and other issues related to physical appearance.

Studies such as the ESTEBAN and INCA 3 observe the eating habits of the population over decades. The main factors observed are that the consumption of fruit and vegetables is not up to par, 5 portions are recommended as the appropriate daily intake, but it is recorded that only about 3 portions are consumed. As well there is a need to decrease the consumption of salt and alcohol. It was observed that alcohol intake is quite high in women compared to men and that it is harder for women to follow a healthier diet (Balicco et al., 2017). As well the level of education influences a lot of the eating choices. The consumption of ultra-processed foods which are currently making up one third of the average diet are too high. The western diet is becoming more popular in the younger generation while the older generation is staying attached to its roots and traditions (Andrade et al., 2021). While this is quite similar to Italy in the respect that culinary tradition is one of the pillars of the society, many researchers believe that it is this traditional diet that causes the high intake of sodium. Therefore, while following French traditional eating habits, that especially in the south of the country follow the Mediterranean diet, some changes need to be put into place. This is especially significant as it is the older population that observes this diet and having many more risk factors for their health, their diet should be more controlled.

Another aspect of the typical French diet that has been the topic of various scientific discussions is how the French manage to stay relatively healthy despite the intake of fats. One of the conclusions is the French paradox which is the intake of red wine during meals to act as a balancing agent. As red wine contains polyphenols that are known antioxidants it is said that these compounds inhibit platelet aggregation and protect low-density lipoproteins (LDL) from oxidation (Sun et al., 2002). The MD does defend this paradox as wine has been part of the triad for centuries and a small amount is beneficial but not obligatory (Goldberg et al., 2001). Many studies prove that the polyphenols contained in red wine and mostly flavonoids such as resveratrol, catechin and quercetin have anti-inflammatory properties (Sun et al., 2002). It is this specificity that helps in cardiac health. Polyphenols are found in many fruits and vegetables, but the greatest concentration is in grapes specifically in the skin where anthocyanins are also present giving its distinct red color and in the seeds. The Copenhagen Heart Study, a prospective follow-up of 13,000 individuals, showed an inverse correlation between the amount of alcohol consumed and coronary risk, but only for wine drinkers, and not for consumers of beer and spirits (Vidavalur et al., 2006). Consumption must always

be moderate of all alcoholic beverages and the French Paradox only applies to red wine (Vidavalur et al., 2006).

A recent project launched by the French government in 2017, is the application of the Nutri-score, a front of pack labelling system. Its aim is to help consumers in making healthier choices and push producers into creating more nutritionally adequate options. It is based on the scale created by the British Food Standards Agency and adapted to French nutritional values. So far, the feedback has been very positive, consumers and producers are responding well to the label and nutritional conscience is improving visibly (Julia & Hercberg, 2017). Considering it is voluntary for manufacturers to put the label on their products, already several big enterprises ranging from supermarkets to retail producers are adhering to the program. Companies have already changed some of their ingredients and recipes to fit the Nutri-score. A study has been carried out on the awareness of the Nutri-score among adolescents and the numbers were very promising with many already purchasing these items. This could have a particularly important impact on the nutritional education of the younger generations (Ducrot et al., 2022). The label is also having a positive impact on the disadvantaged population helping with making healthier choices when grocery shopping (Julia & Hercberg, 2017). Further studies should be conducted as this is quite a recent addition.

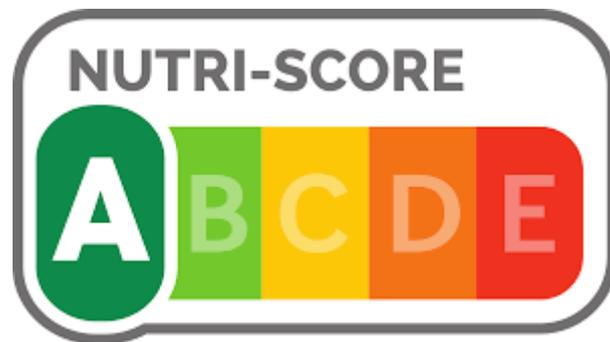


Figure 2 Nutri-Score Label.

In the case of Italy the Nutri – Score label is not as straight forward as it does not differentiate between refined and whole grain cereals (fiber is not a marker of whole cereals), all types of breads fall under the same category, components as trans fatty acids, cholesterol, added fats, artificial sweeteners, alcohol, are not included in the criteria, and a global judgment such as this one may lead consumers to neglect examining the single nutrients a product contains (Volpe & Maggi, 2020). As the MD is about following a balanced diet with different amounts and types of nutrients this may mislead the consumers into not introducing all the components needed everyday.

Italy is trying to develop its own food label which aims to create a well-rounded nutrient intake, but it is still in the initial stages of development. The best solution would be to have a European label that adapts to international guidelines, but at the same time also with the national guidelines and able to represent all European countries with different food and eating cultures and nutritional problems, so that even the typical products of one nation can fall under the new system (Volpe & Maggi, 2020). This is something that is being worked on but still needs further research to be completed. The current labels found on the market are still a reasonable indicator of which foods are a healthier choice compared to others.

1.1.5 Economic and Environmental insights

Diet does not only affect the body, but it also affects the environment, society, and the economy. When consuming food, all the ripple effects must be considered. In the case of the MD many case studies have been carried out to demonstrate that it is more eco-friendly. It follows seasonality, it respects biodiversity and therefore can be quite frugal in some respects. It limits the use of excessive natural resources and has been deemed less polluting. The consumption of meat is lower and therefore there is a reduction of greenhouse gases. Even though the consumption of fruit and vegetables is higher and there is a higher water consumption, treated wastewater is usually used for irrigation so it is still a cleaner option (Grosso et al., 2020). With the promotion of these benefits, it can also be considered that there is a higher territorial valorization, local business producers, farmers markets, KM0 products, reduction of travel times, so all around it is positive not only for the environment but also for the local economy. In some cases, a slightly higher cost in the overall grocery shopping can be observed but it is minimal and still worth it considering the health benefits. In turn with the population being healthier less health services are needed, and this also reduces the costs of living all around.

Tourism must also be considered when talking about economic factors. The MD reflecting also on the lifestyle of the various countries can lead to a growing business related to food tourism and traditions. With the increasing development and request of rural tourism, food plays a major role. Especially in the south of Italy food tours about local products which are already part of the MD are expanding. This type of tourism can be linked to other countries as well such as Greece and France where food and wine are also a major element of tradition (Sotiriadis, 2017). This though can be said

for all the countries that represent the MD in UNESCO and surround the Mediterranean Sea itself. It is a form of national identity, meals are an integral part of the day, for conviviality and family bonding. This is something that is not common everywhere in the world and many tourists come to experience this specifically. This is a marketable experience that can be linked to the MD. A new model for the Mediterranean diet has been defined in the last decade by the International Foundation of Mediterranean Diet (Dernini et al., 2017). It has been named Med Diet 4.0 and reflects on 4 points: Environment, Economy, Society and Culture, and Benefits. It has been shown that in the last decades people stopped following the MD as much, because food habits do change over the years and with the recent globalization and food availability there has been a revolution. Consumers do not look at seasonality anymore and choice is more cost driven. Because of this, a way to promote the MD has been to analyze not only its health benefits but the surrounding positives as well. As said before it has a lower environmental impact, respects, and promotes tradition, has major health benefits and all around promotes local economy. With this idea in mind more business models should be built around this diet.

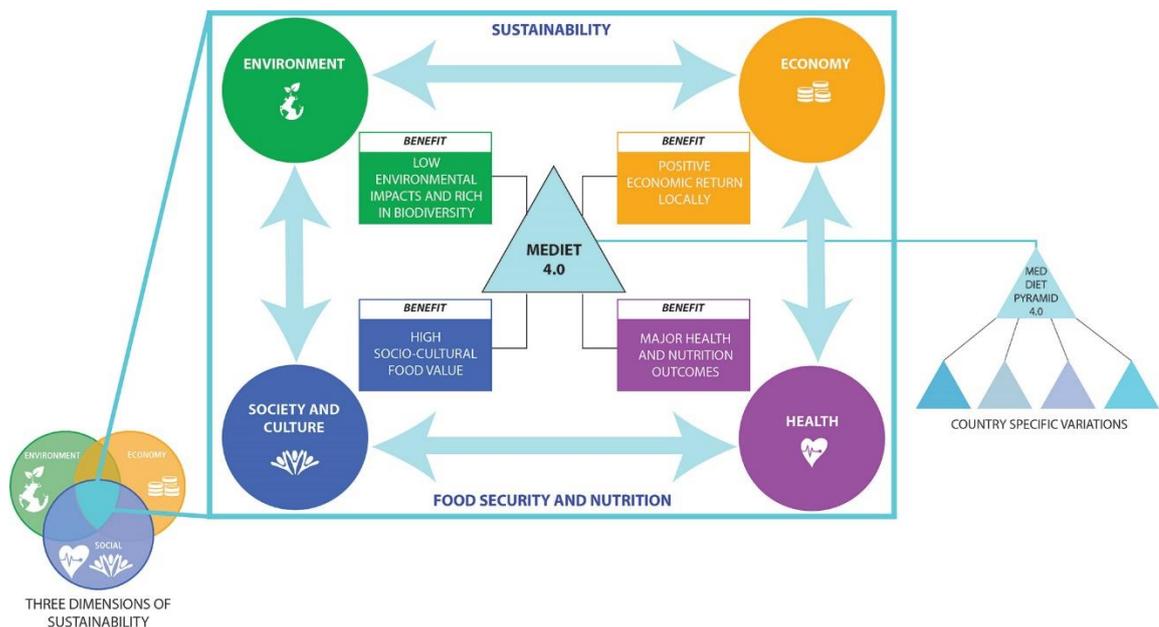


Figure 3 Med Diet 4.0.

Figure 3 which represents this new model shows how it can be adapted to a different country specifically as there are different environments, flora and fauna, traditions, and habits. This rebranding of the MD can inform the greater public about the other possibilities of the structure and

not only the health benefits for which it is already well known. This can transform the diet in a full lifestyle model adapted to each country, though more research needs to be carried out before this is fully possible (Dernini et al., 2017).

In the case of Italy this model is already being promoted through the union of the MD and the Made in Italy production, linking businesses and a positive agro-food production line. With this comes innovation and an immediate impact on Italian territories. A communication campaign is launched with experts and stakeholders promoting the project, and lectures and events together with a newsletter are divulged. Lastly the MD is promoted through digital campaigns and Artificial Intelligence with virtual reality and a chatbot to reach as many people as possible (*Premessa: La Dieta Mediterranea La Campagna Italiana*, n.d.).

2. Aim

Diet and food are in constant evolution, eating habits change over the centuries and new trends take over. In Italy the consistent food pattern since ancient roman times has been to follow the MD. In recent years though this has changed, western food and easy access to ready-made meals have changed the way the population eats. This is especially prominent in the younger generation.

This change isn't only registered in Italy though. France, another European country with a vast gastronomic heritage, is also seeing a drastic change in food habits. This is also due to the rising cost of healthy food and lack of nutritional knowledge.

Food being one of the driving forces of life and therefore a precursor for healthy aging, it is important to follow a balanced diet from childhood. In the past decade, a rise in nutrition related illnesses has been registered in the population ranging from younger to older.

Governments continue to put into place dietary guidelines and promotional campaigns and projects for healthy eating, but food accessibility and the economic situation might be the real issue.

3. Materials and Methods

3.1.1 Questionnaire

A questionnaire was submitted in Italian and French language through social media platforms and personal contacts. The data was collected through google forms anonymously between the months of February and May 2023. The first questions were about sociodemographic information: age, nationality, education degree level, occupation and living situation. Education level was divided into high school degree, bachelors, masters and doctorate. Occupation asked whether they are a student, worker, working student or other. The living situation asked if the person lives at home with family, alone, with roommates or other. The nationality was asked and subsequently from which region they are originally from. The next part of the questionnaire focuses on the Mediterranean diet and eating habits. Questions based on the Medi-Lite questionnaire were used. The sample size constituted of 104 participants living in Italy and 65 participants living in France.

The post-hoc power calculation demonstrates that group sample sizes of 104 in group 1 and 65 in group 2, achieve 63% power to detect a difference of 0.18 in the proportions of participants with high adherence to the Mediterranean diet between the two groups.

3.1.2 The Medi-Lite questionnaire

The Medi-Lite questionnaire was developed, through a metanalysis of multiple studies by Sofi et al, at the University of Florence. The aim of the questionnaire was to measure the adherence to the MD in an easy and accessible way. The questionnaire is available online on the Medi-Lite website and only takes a couple of minutes. The questionnaire has cut off points for consumption values and there are three categories of consumption for each food group (*Medi-Lite Questionnaire* | *Medi-Lite*, n.d.). Depending on the food group (typical or non-typical) daily or weekly consumption is assigned and calculated. Values arranged from 2 to 0 (highest to lowest) for typical food groups and inversely for the non-typical 0 to 2 (lowest to highest). For alcohol consumption 2 is average, 1 is low and 0 is the highest. Olive oil consumption ranged from 2 for regular use to 0 for occasional use. The sum of all these values for a maximum final score of 18 points (0 lowest – 18 highest) determines the adherence to the MD (*Medi-Lite Questionnaire* | *Medi-Lite*, n.d.). The cut off for the greater adherence is 9.

What is the consumption of the following food groups?			
FRUIT <i>1 portion: 150 g</i>	<1 portion/d <input type="text" value="0"/>	1-2 portion/d <input type="text" value="1"/>	>2 portion/d <input type="text" value="2"/>
VEGETABLES <i>1 portion: 100 g</i>	<1 portion/d <input type="text" value="0"/>	1-2.5 portion/d <input type="text" value="1"/>	>2.5 portion/d <input type="text" value="2"/>
LEGUMES <i>1 portion: 70 g</i>	<1 portion/week <input type="text" value="0"/>	1-2 portion/week <input type="text" value="1"/>	>2 portion/week <input type="text" value="2"/>
CEREALS <i>1 portion: 130 g</i>	<1 portion/d <input type="text" value="0"/>	1-1,5 portion/d <input type="text" value="1"/>	>1.5 portion/d <input type="text" value="2"/>
FISH <i>1 portion: 100 g</i>	<1 portion/week <input type="text" value="0"/>	1-2.5 portion/week <input type="text" value="1"/>	>2.5 portion/week <input type="text" value="2"/>
MEAT AND MEAT PRODUCTS <i>1 portion: 80 g</i>	<1 portion/d <input type="text" value="2"/>	1-1.5 portion/d <input type="text" value="1"/>	>1.5 portion/d <input type="text" value="0"/>
DAIRY PRODUCTS <i>1 portion: 180 g</i>	<1 portion/d <input type="text" value="2"/>	1-1.5 portion/d <input type="text" value="1"/>	>1.5 portion/d <input type="text" value="0"/>
ALCOHOL <i>1 Alcohol Unit (AU) = 12 g</i>	<1 AU/d <input type="text" value="1"/>	1-2 AU/d <input type="text" value="2"/>	>2 AU/d <input type="text" value="0"/>
OLIVE OIL	Occasional use <input type="text" value="0"/>	Frequent use <input type="text" value="1"/>	Regular use <input type="text" value="2"/>
	Total:		
	<input type="text"/>		

Sofi et al., Public Health Nutr 2014

Figure 4 Medi - Lite Questionnaire.

3.1.3 Statistical Analysis

Participants' characteristics were summarized in terms of counts and percentages (categorical variables) or means \pm standard deviation (quantitative variables). Comparisons of participants' characteristics by country of residence (Italy vs France) or by MD adherence (Medi-Lite score dichotomized ≤ 9 vs > 9) were performed considering the Chi-squared or the Fisher exact tests for categorical variables, and Wilcoxon rank sum test for quantitative ones.

A logistic regression model was defined to identify characteristics associated with high adherence to the Mediterranean diet (Medi-Lite > 9); variables were entered in block, and results were presented as odds ratio (OR) and 95% confidence interval (CI).

All statistical tests were two-tailed and statistical significance was assumed for p-value < 0.05 . The analyses were performed using SAS, V.9.4 (SAS Institute, Cary, NC).

4. Results

4.1.1 Respondent characteristics

Between February and May 2023, a total of 169 subjects participated in the survey: 104 of these were living in Italy and 65 in France. In **table 1** the general characteristics of the subjects are analyzed.

Table 1. General characteristics of the respondents

	Total sample (n=169)	Living in Italy (n=104)	Living in France (n=65)	p-value
Age, Years, mean \pm SD	27.1 \pm 8.5	27.3 \pm 8.1	26.8 \pm 9.2	0.034
Highest educational level, n (%)				<0.001
Secondary school	37 (22.0)	25 (24.0)	12 (18.8)	
University	96 (57.2)	77 (74.0)	19 (29.7)	
Higher	35 (20.8)	2 (2.0)	33 (51.5)	
Main occupation, n (%)				0.635
Housewife	2 (1.2)	1 (1.0)	1 (1.5)	
Student	81 (47.9)	46 (44.2)	35 (53.9)	
Worker	54 (32.0)	36 (34.6)	18 (27.7)	
Student-worker	32 (18.9)	21 (20.2)	11 (16.9)	
Living arrangements, n (%)				0.069
Alone	41 (24.2)	19 (18.3)	22 (33.9)	
With family	91 (53.9)	61 (58.7)	30 (46.1)	
With others, not family	37 (21.9)	24 (23.1)	13 (20.0)	
Do you practice physical activity? n (%)	87 (65.4)	65 (63.1)	22 (73.3)	0.300

Abbreviations: SD (Standard Deviation) (In bold differences with $p < 0.05$)

Respondents had an average age of 27 years and about 75% declared to have a university degree or higher; 48% reported to be students, 32% workers and 19% student – workers. Regarding the living arrangements more than 50% answered to be living at home with their family and 24% lived alone. More than 65% of the respondents declared to practice physical activity the most frequent answers being: gym/fitness (42%), walking (12%), swimming (8%) and dance (4%). It is to be noted that French participants were slightly younger than the Italian (26.8 years vs 27.3 respectively, $p = 0.034$) and had a higher education, more than 50% reported having a greater title than a university degree. As well in the French answers more reported to be living alone compared to the Italian residents with 34% vs 18% and less with their family 46% vs 59% respectively. In **Figure 5 and 6** the regions of residence at the time of the survey are represented. In Italy most of the respondents lived in Veneto and Lazio regions, followed by Campania, Toscana and Lombardia. The majority of the respondents from France lived in Ile-de-France, Bourgogne and Grand Est.

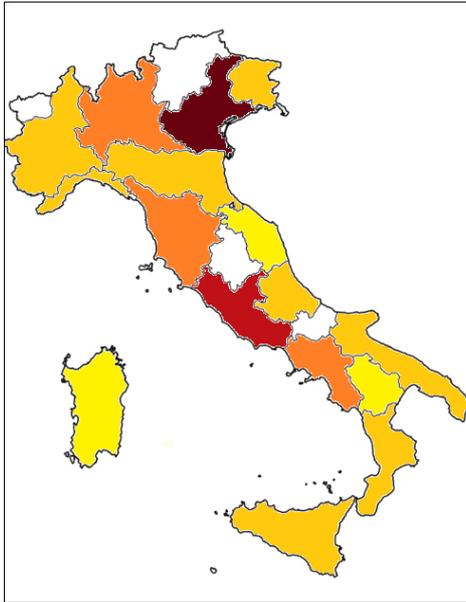


Figure 5 Respondents Region of origin, Italy.

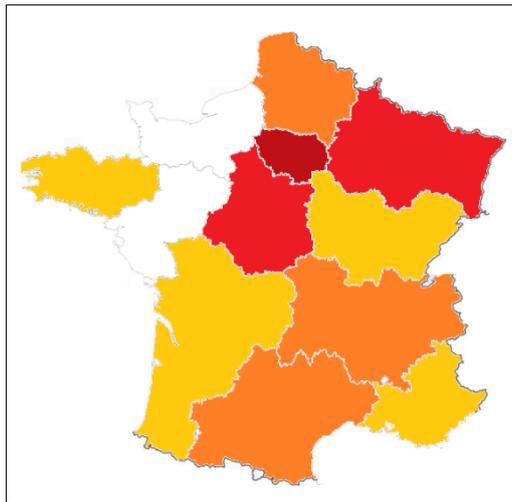
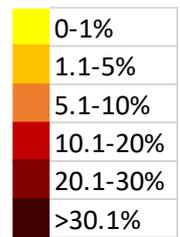


Figure 6 Respondents Region of origin, France.

4.1.2 Knowledge of the MD

Figure 7 represents the adherence to the MD, in Italy 86% of the respondents declared knowing the MD compared to the 45% of the French respondents ($p < 0.001$) (**Figure 8**). At least 80% of the participants from Italy answered to following completely or partially the MD principles compared to 37% of the French sample ($p < 0.001$). 4% of the Italian sample declared not being interested in the MD compared to the 21% of the French sample ($p < 0.001$). There were no significant differences between Italians and French participants in relation to conviviality and the people with whom they generally eat their meals: in both groups, about 30% of subjects reported to usually eat alone ($p = 0.701$). The average monthly amount spent for food is significantly higher in France than in Italy (272 vs 241 euro/month, $p = 0.004$), (**Figure 14**).

“Do you know the Mediterranean Diet?” ($p < 0.001$)

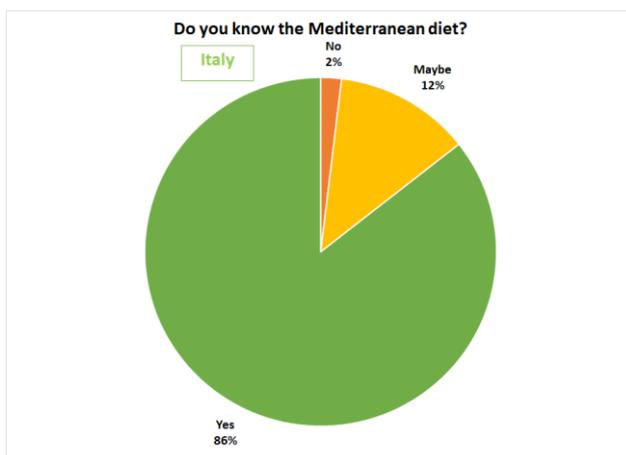


Figure 7 Knowledge of the MD, Italy.

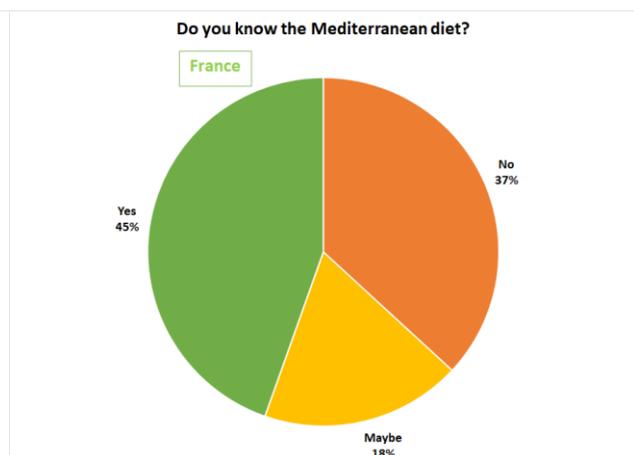


Figure 8 Knowledge of the MD, France.

Figures 7 and **8** represent the general knowledge of the MD in Italy and France. Numbers are significantly higher in Italy.

“Do you follow the Mediterranean diet principle?” ($p < 0.001$)

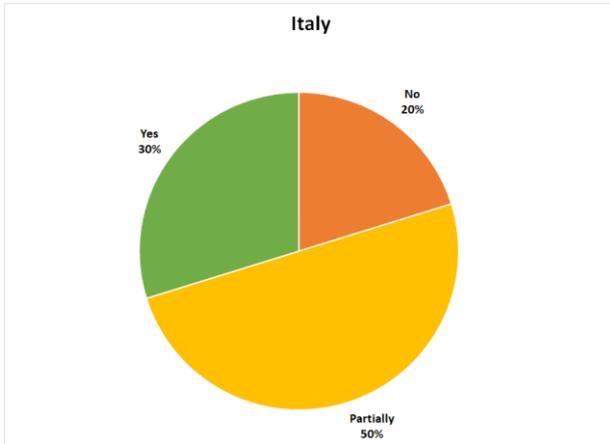


Figure 9 Adherence to the MD, Italy.

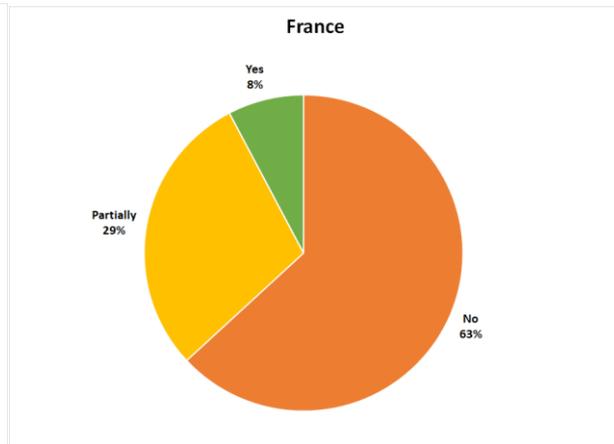


Figure 10 Adherence to the MD, France.

Figures 9 and 10 represent the adherence to the MD which again is higher in Italy than in France.

“If you are not already following the Mediterranean Diet, would you start to follow it?” ($p < 0.001$)

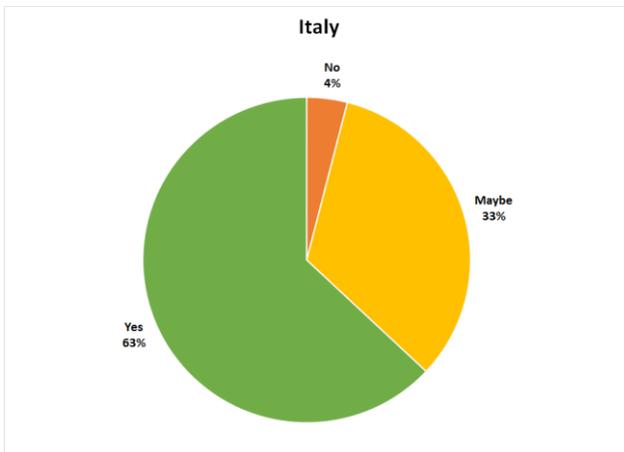


Figure 11 Interest in the MD, Italy.

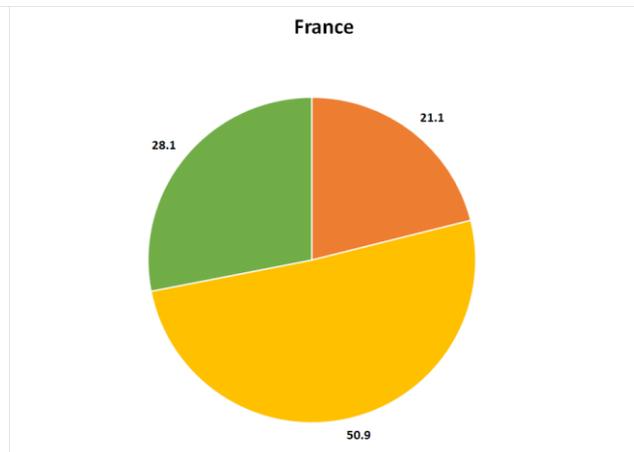


Figure 12 Interest in the MD, France.

Figures 11 and 12 represent interest in the MD, the numbers in this case as well are higher for Italy than France. These answers therefore reinforce the results from the previous figures (Figure 9 and 10).

“Do you eat alone or with other people?” (p=0.701)

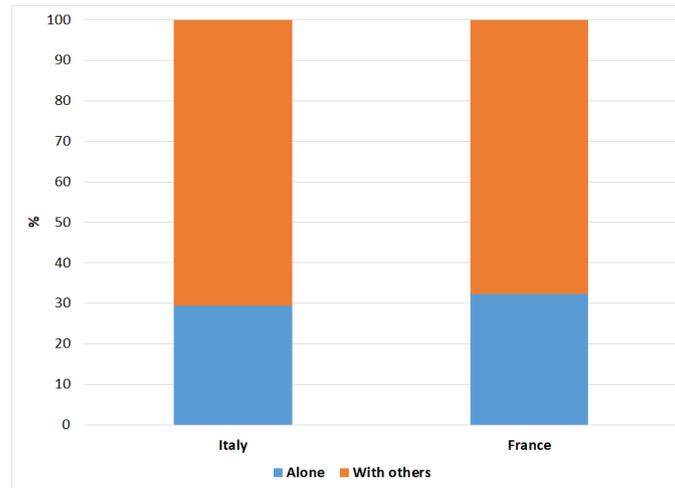


Figure 13 Meal consumption.

Figure 13 representing how meals are consumed whether alone or with people shows that in this case the difference between the countries is marginal. Most respondents eat their meals in the company of others.

“How much do you spend each month for food? (Mean; p=0.004)

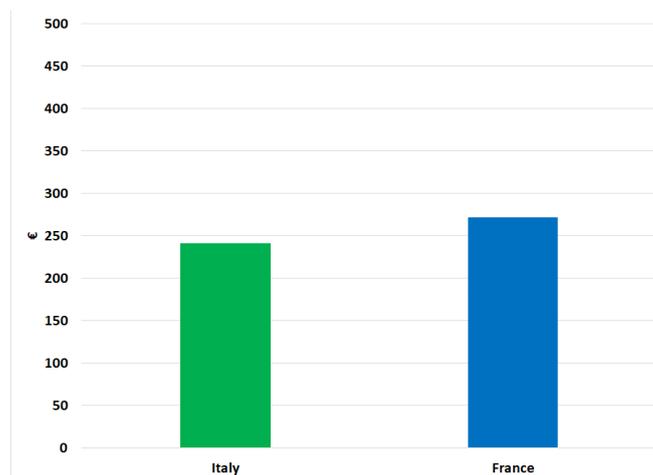


Figure 14 Money spent on groceries monthly.

Figure 14 shows the money spent on groceries in a month, France has a higher spending compared to Italy. This difference will be analyzed further on in the discussion.

4.1.3 Food frequency data

Answers to the food frequency questionnaire are presented in **Table 2**. Only 8% of the total sample reported to consume more than two portion/day of fruits, 18% more than 2.5 portion/day of vegetables, and 24% more than two portion/week of legumes. More than 30% of the participants reported a high consumption of cereals (more than 1.5 portion/day, including pasta, bread, biscuits), and only 8.9% more than 2.5 portion/week of fish. Meat and meat products were consumed more than 1.5 times per week by 16.7% of respondents, while 15% reported a high consumption of dairy products (more than 1.5 portion/day). For fruits, vegetables, legumes, cereals, fish, meat and dairy products categories, no significant differences in consumption were observed between respondent's resident in France and those resident in Italy. Borderline differences were observed for cereals (higher consumption in Italy), fish (higher consumption in Italy) and dairy products (higher consumption in France). Less than 5% of the participants had more than 2 AU/day, and alcohol consumption was significantly higher in Italy (>2 AU/day, 6% vs 3%, $p=0.035$); it should however be noted that alcohol consumption was rather limited in both groups and more than 80% of respondents had <1 AU/day. Finally, about half of the total sample regularly use olive oil, and regular consumption was higher in Italy than in France (regular use 63% vs 39%, $p<0.001$).

Table 2. Responses to food frequency questionnaire: "What is the consumption of the following food groups"? (n, %)

	Total sample (n=169)	Living in Italy (n=104)	Living in France (n=65)	p-value
Fruits (1 portion=150 g)				0.423
< 1 portion/day	78 (46.2)	46 (44.2)	32 (49.2)	
1-2 portion/day	77 (45.6)	51 (49.1)	26 (40.0)	
>2 portion/day	14 (8.3)	7 (6.7)	7 (10.8)	
Vegetables (1 portion=100 g)				0.522
< 1 portion/day	35 (20.7)	22 (21.1)	13 (20.0)	
1-2.5 portion/day	104 (61.5)	61 (58.7)	43 (66.2)	
>2.5 portion/day	30 (17.8)	21 (20.2)	9 (13.9)	
Legumes (1 portion=70 g)				0.936
< 1 portion/week	63 (37.5)	40 (38.4)	23 (35.9)	
1-2 portion/week	65 (38.7)	50 (38.4)	25 (39.1)	
>2 portion/week	40 (23.8)	24 (23.2)	16 (25.0)	
Cereals (1 portion=130 g)				0.132
< 1 portion/day	28 (16.6)	13 (12.5)	15 (23.1)	
1-1.5 portion/day	83 (49.1)	51 (49.0)	32 (49.2)	
>1.5 portion/day	58 (34.3)	40 (38.5)	18 (27.7)	
Fish (1 portion=100 g)				0.058
< 1 portion/week	85 (50.6)	47 (45.2)	38 (59.4)	
1-2.5 portion/week	68 (40.5)	44 (42.3)	24 (37.5)	
>2.5 portion/week	15 (8.9)	13 (12.5)	2 (3.1)	

	Total sample (n=169)	Living in Italy (n=104)	Living in France (n=65)	p-value
Meat and meat products (1 portion=80 g)				0.491
< 1 portion/week	74 (44.1)	47 (45.6)	27 (41.5)	
1-1.5 portion/week	66 (39.3)	37 (35.9)	29 (44.6)	
>1.5 portion/week	28 (16.7)	19 (18.5)	9 (13.9)	
Dairy products (1 portion=180 g)				0.279
< 1 portion/day	65 (38.5)	44 (42.3)	21 (32.3)	
1-1.5 portion/day	78 (46.1)	47 (45.2)	31 (47.7)	
>1.5 portion/day	26 (15.4)	13 (12.5)	13 (20.0)	
Alcohol (1 AU=1 glass of wine)				0.035
< 1 AU/day	142 (86.6)	84 (81.6)	58 (95.1)	
1-2 AU/day	14 (8.5)	13 (12.6)	1 (1.6)	
>2 AU/day	8 (4.9)	6 (5.8)	2 (3.3)	
Extra Virgin Olive Oil				<0.001
Occasional use	32 (19.1)	11 (10.6)	21 (32.8)	
Frequent use	46 (27.4)	28 (26.9)	18 (28.1)	
Regular use	90 (53.6)	65 (62.5)	25 (39.1)	

Abbreviations: AU (Alcoholic Units); SD (Standard Deviation) (in bold differences with $p < 0.05$)

The mean Medi-Lite total score among respondents was 9.0 ± 2.6 , with significant differences between respondent's resident in Italy (9.5 ± 2.6) and respondents from France (8.3 ± 2.4) ($p=0.003$) (**Figure 15**).

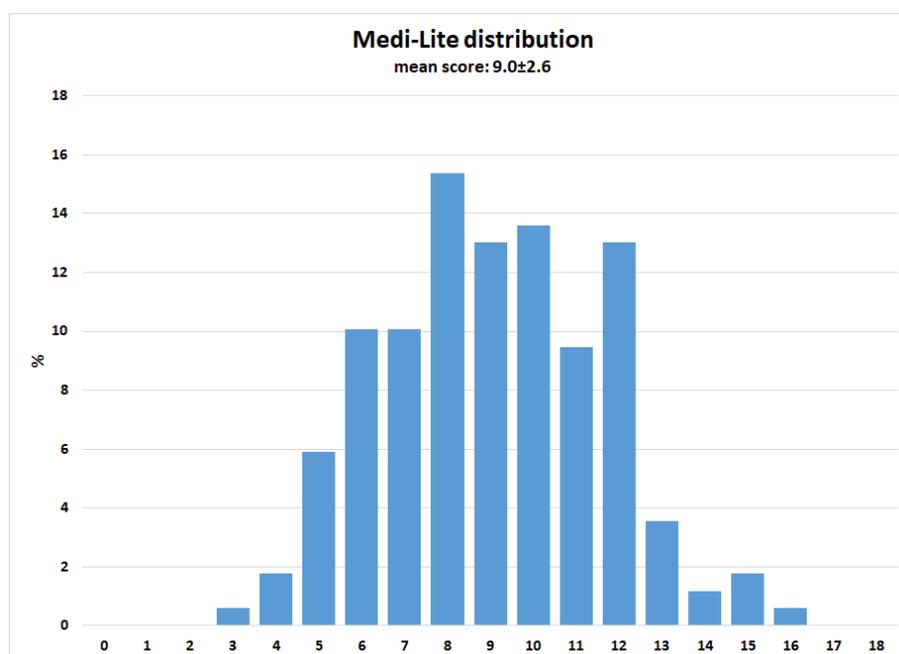


Figure 15 Medi-Lite score distribution among respondents.

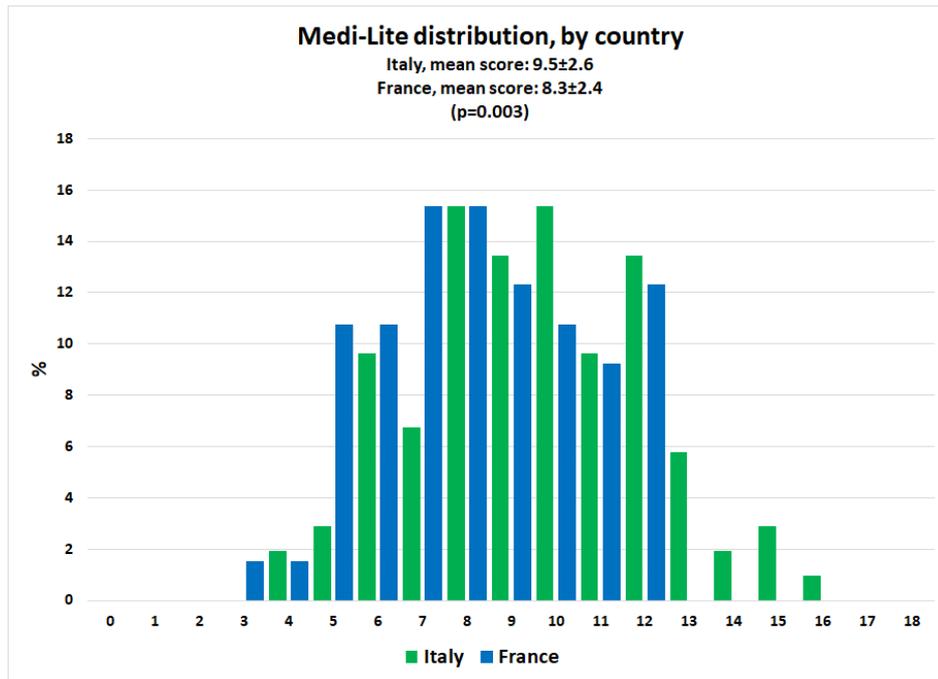


Figure 16 Medi-Lite score distribution, by country.

Through all the samples collected 43% of the respondents were found to have a positive adherence to the MD with a Medi-Lite score of >9 (**Table 3**). The score was higher in Italy compared to France with 50% obtaining a score higher than 9 compared to the 32% registered in France (p=0.024). It was observed that a higher adherence to the MD was followed by subjects with a higher education (>85% have a university degree or higher title, compared with 71% among those with lower adherence to the Mediterranean diet), and were more frequently student-workers (29% vs 12%, p=0.041).

Table 3. Characteristics of respondents according to Medi-Lite score

	Medi-Lite score ≤9 (n=96)	Medi-Lite score >9 (n=73)	p-value
Age, Years, mean ± SD	27.7±9.5	26.3±7.0	0.991
Highest educational level, n (%)			0.155
Secondary school	27 (28.4)	10 (13.7)	
University	47 (49.5)	49 (67.2)	
Higher	21 (22.1)	14 (19.1)	
Main occupation, n (%)			0.041
Housewife	1 (1.0)	1 (1.4)	
Student	50 (52.1)	31 (42.5)	
Worker	34 (35.4)	20 (27.4)	
Student-worker	11 (11.5)	21 (28.8)	
Living arrangements, n (%)			0.130
Alone	21 (21.9)	20 (27.4)	
With family	58 (60.4)	33 (45.2)	
With others, not family	17 (17.7)	20 (27.4)	
Do you practice physical activity? n (%)	43 (65.2)	44 (65.7)	0.950

Country of residence, n (%)			0.024
Italy	52 (50.0)	52 (50.0)	
France	44 (67.7)	21 (32.3)	

Abbreviations: SD (Standard Deviation) (in bold differences with $p < 0.05$)

Significant differences found among participants with higher adherence to the MD with respect to those with lower adherence, were in relation to the consumption of fruits (>2 portion/day for 14% vs 4%, respectively), vegetables (>2.5 portion/day for 32% vs 7%), legumes (>2 portion/week for 18% vs 6%), cereals (>1.5 portion/day for 40% vs 30%), fish (>2.5 portion/week 18% vs 2%), meat (>1.5 portion/week for 7% vs 24%) and dairy products (>1.5 portion/day for 6% vs 23%) (**Table 4**).

No significant differences were recorded in relation to alcohol consumption, which was very low in both groups (<1 AU/day for 85% and 88%, respectively). Regular use of olive oil was reported by almost 75% of participants with higher adherence to the MD, with respect to 38% among those with lower adherence ($p < 0.001$).

The average monthly expense for food was lower among participants with higher adherence to the MD (233€ vs 270€, $p < 0.001$).

Table 4. Responses to food frequency questionnaire by Medi-Lite score

	Medi-Lite score ≤ 9 (n=96)	Medi-Lite score > 9 (n=73)	p-value
What is the consumption of the following food groups (n, %)			
Fruits (1 portion=150 g)			<0.001
< 1 portion/day	59 (61.5)	19 (26.0)	
1-2 portion/day	33 (34.4)	44 (60.3)	
>2 portion/day	4 (4.2)	10 (13.7)	
Vegetables (1 portion=100 g)			<0.001
< 1 portion/day	34 (35.4)	1 (1.4)	
1-2.5 portion/day	55 (57.3)	49 (67.1)	
>2.5 portion/day	7 (7.3)	23 (31.5)	
Legumes (1 portion=70 g)			<0.001
< 1 portion/week	56 (58.3)	7 (9.7)	
1-2 portion/week	34 (35.4)	31 (43.1)	
>2 portion/week	6 (6.3)	34 (47.2)	
Cereals (1 portion=130 g)			0.035
< 1 portion/day	22 (22.9)	6 (8.2)	
1-1.5 portion/day	45 (46.9)	38 (52.1)	
>1.5 portion/day	29 (30.2)	29 (39.7)	
Fish (1 portion=100 g)			<0.001
< 1 portion/week	67 (69.8)	18 (25.0)	
1-2.5 portion/week	27 (28.1)	41 (56.9)	
>2.5 portion/week	2 (2.1)	13 (18.1)	

	Medi-Lite score ≤9 (n=96)	Medi-Lite score >9 (n=73)	p-value
Meat and meat products (1 portion=80 g)			<0.001
< 1 portion/week	30 (31.6)	44 (60.3)	
1-1.5 portion/week	42 (44.2)	24 (32.9)	
>1.5 portion/week	23 (24.2)	5 (6.9)	
Dairy products (1 portion=180 g)			0.002
< 1 portion/day	29 (20.3)	36 (49.3)	
1-1.5 portion/day	45 (46.9)	33 (45.2)	
>1.5 portion/day	22 (22.9)	4 (5.5)	
Alcohol (1 AU=1 glass of wine)			0.160
< 1 AU/day	82 (88.2)	60 (84.5)	
1-2 portion/day	5 (5.4)	9 (12.7)	
>2 portion/day	6 (6.4)	2 (2.8)	
Extra Virgin Olive Oil			<0.001
Occasional use	26 (81.3)	6 (18.8)	
Frequent use	33 (34.7)	13 (17.8)	
Regular use	36 (37.9)	54 (74.0)	
Do you eat alone or with other persons?			0.084
Alone	23 (25.0)	27 (37.5)	
With other persons	69 (75.0)	45 (62.5)	
How much do you spend each month for food? Mean ± SD	270±208	233±174	<0.001

(In bold differences with $p < 0.05$)

Abbreviations : AU (Alcoholic Unit) ; SD (Standard Deviation)

In a multivariable logistic regression model, Medi-Lite score > 9 was significantly associated with country of residence, main occupation, and education (**Table 5**). In particular, living in Italy vs living in France (OR=2.48, 95% CI 1.01-6.27), having higher education (University degree vs secondary school, OR=2.43, 95% CI 1.01-5.97), and being a student-worker vs being a student (OR=2.82, 95% CI 1.08-7.36) were characteristics positively associated with a higher adherence to the MD. Age, living arrangements and monthly expense for food were not associated with Medi-Lite score in the multivariable model.

Table 5. Characteristics of the respondents associated with Medi-Lite score >9.

	OR	95% CI	p-value
Age, for each 5 years	0.96	0.73-1.26	0.768
Country of residence, Italy vs France	2.48	1.01-6.27	0.045
Highest educational level			
University vs Secondary school	2.43	1.01-5.97	0.044
Higher than University vs Secondary school	2.78	0.80-9.83	0.112
Main occupation			
Worker, housewife vs Student	1.05	0.41-2.66	0.921
Student-worker vs Student	2.82	1.08-7.36	0.035
Living arrangements			
With family vs alone	0.54	0.19-1.52	0.242
With others vs alone	0.99	0.35-2.83	0.981
Usually eat with others vs alone	0.84	0.35-2.02	0.693
Monthly expense for food €	1.00	0.90-1.11	0.924

Abbreviations: CI (Confidence Interval); OR (Odds Ratio)

5. Discussion

5.1.1 Adherence to the MD

The results of the study showed a higher adherence and knowledge of the MD in Italy compared to France, when asked the question do you know the MD only 2% of respondents answered “No” in the Italian section compared to the 37% of the French. As well more French respondents admitted they would not start to follow the MD compared to Italians. This difference can be explained by the difference in government nutritional guidelines. Italian nutritional guidelines are based on the principles of the MD, a model that has gained fame and honor, being the dietary pattern that combines prevention of non-communicable chronic diseases, longevity, and health, with consumers' acceptability and sustainability (Rossi et al., 2022). On the other hand, French dietary guidelines dictated by the PNNS were based on general nutritional knowledge rather than a preexisting model. The PNNS includes nine high-priority nutritional objectives for the general population which were conceived by an expert committee on nutrition and public health (Hercberg et al., 2008).

As well, as reported beforehand the implementation of the Nutri-score label in French products has had a positive effect on food choices. This is also proven in a study by (Annunziata et al., 2019) that reading food labels affects the probability of consuming sustainable food. Indeed, regularly reading food labels increases the likelihood of consuming organic products by 17% and local food by 13%.

The Italian adherence could also be explained by the living situation of most of the respondents. It was found that a higher percentage of Italians still live at home with their family compared to the French cohort and this can influence food choices. Research demonstrated that families especially those with children follow a healthier lifestyle compared to single households (Casini et al., 2013).

On the other hand, one of the causes of lower adherence to the MD among French respondents can be related to the consumption of olive oil. Adherence to the MD calculated through the Medi-Lite questionnaire gives a higher score with the regular use of olive oil which in Italy is much higher compared to France. Even though France doesn't consume as much olive oil as Italy it still consumes more than other European countries (Siskos et al., 2001). This being said, both Italy and France face the obstacle of the rising cost of olive oil which is also why Italy has seen a diminishing adherence to the MD (Veronese et al., 2020). French olive oil consumers have the same issue as they believe

that olive oil is very healthy, makes food taste better but they find it considerably expensive (Siskos et al., 2001).

5.1.2 Socioeconomic factors

Data from our study revealed that principal factors for diet choices were socioeconomic, mainly education level and consequent income and money spent on groceries per month. As observed the cost of certain foods is rising and therefore food habits are forced to change, however there is contradicting evidence in the research. It was found that Italians spend less on grocery shopping than the French sample and have a higher adherence to the MD. This is also reported in the Med Diet 4.0 model that suggests that the MD is a sustainable diet and is more affordable (Dernini et al., 2017). However many studies still report that the MD is too expensive for the lower income households and therefore this is why the adherence is dropping. Ready-made food is much more popular in the younger generations and much more accessible, so it is being chosen more frequently (Casini et al., 2013). The economic crisis has surely led to major changes in food behavior, such as a reduction in spending, and a considerable increase in the number of “savers” families (Casini et al., 2013). It is in fact the older generation who is not part of the labor force (i.e. pensioners, housewives) that have a higher level of adherence to the MD, probably due to the greater number of meals they consume at home compared to employed people (Benedetti et al., 2016).

It was found that the French cohort had a higher education level than Italy, with more than 80% of the sample answering that they had a university degree or higher. Even though adherence in France is lower and this is probably attributed as said before, to the Government dietary guidelines and general culture, many studies in Italy support the conclusion that education level and adherence are closely related. In general, most of the Italian population only have a high school diploma and a smaller percentage have a higher education degree, therefore there is a disparity that is observed also at income level (Cavaliere et al., 2018.). Considering that, at this moment in time, the MD is a more expensive diet, this could be one of the reasons why adherence is dropping.

According to research on childhood obesity developed by Albertini et al. (Albertini et al., 2008) it was found that the child’s health was closely linked to parental education and income and parental health was proportional to the children’s health. Analysis of parental education levels showed that there was a higher percentage of university and high school graduates among parents of normal-weight children than among those of obese children (Albertini et al., 2008). As stated before, adults

tend to follow the diet they were taught as children, therefore being overweight at a young age could probably affect their weight for their whole life span and then influence the food choices made for their future children, perpetuating a cycle of unhealthy eating. In industrialized societies, adults with a medium or low level of education and less qualified occupations are not only more at risk of overweight and obesity themselves, but their influence on their family's diet and lifestyle also leads to a greater risk for their children (Albertini et al., 2008). Therefore, if healthy food is less accessible to the disadvantaged population the discussion shouldn't only be focused on nutritional knowledge but also on economic food accessibility. Given that diet quality seems to follow a socio-economic gradient, future policy intervention should consider facilitating availability and affordability of healthy food items in order to make the MD appealing for all segments of the population (Cavaliere et al., 2018.).

The economic aspect is registered also in the French cohort. The results of the survey stated that the French sample spent more on grocery shopping per month than the Italian sample (**Figure 14**), but studies show that accessing healthy food might not be possible for the whole population (Bocquier et al., 2015). This is especially true for the younger population and single households as individuals reporting household Food Insecurity (FI) were younger, more frequently women, single parents with children, non-homeowners and had lower income (Bocquier et al., 2015).

Therefore, even though Italy and France follow different nutritional guidelines they seem to face the same struggles in making healthy food accessible for the entire population. In Italy this is registered as a drop in adherence to the MD for the western diet, but the simpler answer is that high-nutrient-density foods are more expensive than high-energy-density foods, and this is applied to both countries analyzed in this thesis. In general, low-status groups spend less money on food, which may constitute a barrier to access to healthful foods (Malon et al., 2010).

6. Conclusion

The aim of this thesis was to analyze and compare food habits in Italy and France. Italy follows a diet more based on the MD while even though France is a Mediterranean country the diet was not taken very much into consideration. Even though Italy is one of the strongest representatives of the MD, adherence numbers are lowering, and this is dictated by socioeconomic factors and globalization.

The recommendation for a healthier diet that was common in both countries is to implement more nutritional education in schools. It would be important to educate children from a young age and help the parents as well. A trend seen in both countries is the obesity epidemic and other related metabolic illnesses. Studies conducted in the north of Italy demonstrated that Italian adolescents have an unbalanced diet, which could damage their health and quality of life. To prevent obesity and to avoid the disorders associated with this condition, it appears necessary not only to regulate energy intake but also to control the composition of the diet (Toselli et al., 2010).

Projects such as the Maestra Natura implemented in schools throughout Italy demonstrated that good levels of nutritional knowledge are associated with the ability to make healthy food choices (Vari et al., 2022). It was also noted that children in rural areas had a lower nutritional knowledge than children living in an urban context but thanks to this program they had caught up to the higher level. It is therefore important to educate children from an early age with specific classes on nutrition and balancing a diet. This applies to France as well, even though they have implemented various strategies to promote a healthy living, the western diet is becoming more and more prevalent, and this is a cause for concern. A study on regional food habits in France demonstrated that the relationship between educational level and nutritional habits differs according to regional factors. In northern and northeastern France, a high educational level is associated with better adherence to healthy nutrition guidelines. In southwestern France, where overall nutrition habits are healthier than in the northern regions, educational level is not related to nutritional habits (Wyndels et al., 2011). Therefore, guidelines should be more mindful of the differences found in the country itself.

The economic aspect of grocery shopping is an issue both countries face. Healthy food must be made more accessible to all the population segments. Low-income households struggle to adhere to the MD or a healthier lifestyle as it is too expensive. The government guidelines should concentrate on making healthy food more affordable and promoting physical activity. The previously mentioned regional study found that income tax level correlated with healthy nutritional habits in all three geographical

areas, and economic constraints affect nutritional habits in a more uniform way across France (Wyndels et al., 2011). In the case of Italy, even though a strong point in favor of the Med Diet 4.0 has been made, evidence is still contradictory on whether it is cheaper compared to a more western diet. Further studies should be conducted to clarify this point.

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