



## Traditional Mediterranean Diet as a Holistic Diet: A Review of Mediterranean Dietary Pattern and Lifestyle Through Pyramids

Anita Trajkovska-Broach<sup>1,2</sup>, Violeta Ognenoska<sup>3</sup>, Anka Trajkovska Petkoska<sup>4,5,\*</sup>

<sup>1</sup>MD Inspired, LLC, Blacksburg, VA 24060, USA

<sup>2</sup>Institute of Convergence Science, Korea University, Seoul, South Korea

<sup>3</sup>Logistics Department, Ministry of Defense of Republic of North Macedonia, Skopje 1000, Republic of North Macedonia

<sup>4</sup>Faculty of Technology and Technical Sciences, University St. Kliment Ohridski - Bitola, Dimitar Vlahov, Veles 1400, Republic of North Macedonia

<sup>5</sup>Department of Materials Science and Engineering, Korea University, Seoul, South Korea

**ABSTRACT:** Today, Mediterranean Diet (MD) is a globally recognized dietary pattern and public health model. In this review, traditional Mediterranean Diet (MD) is revisited: multiple aspects and facets of the diet including its history, cultural roots, food categories, lifestyle, religious traditions, physical activity and health benefits are presented through pyramids. Mindful eating of mainly plant-based and whole foods, seasonal and locally-sourced, along with the enjoyment in every step of production, preparation and consumption of the food, are the main characteristics of the traditional MD, which is presented for the first time as a *5F-diet* based on *5F-pillars*. MD is also described as a holistic diet – it is a diet that nourishes the body, the mind, and the soul through balanced and sustainable approach to food choices. The food choices and lifestyle practices provide holistic health not only for the whole body, but also yield healthy communities - the people are part of the community, have “*sense of belonging*”, and their interactions are in harmony with the environment, respecting the planetary resources and boundaries. The diet’s health benefits, including reduced risks of non-communicable diseases (NCD), such as cardio-vascular diseases, metabolic syndrome, and cancers, prevention from neuro-cognitive disorders, and increased longevity, are a result not only of the food consumed, but also the presence of commensality and conviviality, and the lifestyle leading to daily stress relief. Overall, MD is a concept that embraces biodiversity, sustainability, quality, palatability, health, cultural aspects and heritage.

**KEYWORDS:** Mediterranean Diet, lifestyle, health benefits, plant-based diet, sustainability, holistic diet

### 1. INTRODUCTION

Malnutrition, in all forms, co-existing as undernutrition and micronutrient deficiency in some parts of the world, and obesity in other parts of the world, is one of the major problems of the modern world resulting in huge social challenges and economic costs. Diets poor in nutrients are considered the main risk factor for the global burden of non-communicable diseases (NCDs) and increased mortality across countries regardless of their development status (FAO et al., 2017, 2022) [1]. On the other side, obesity represents a big burden for the society, too - it increases the risk of heart diseases, diabetes and certain cancers, in addition to the already affected lifestyle of those who are obese. According to The State of Food Security and Nutrition in the World (SOFI) Report-2025 [2] on a global level in 2024, 2.3 billion people have been moderately or severely food insecure, approx. 700 million people (~8% of the global population) have faced hunger, while child malnutrition was 23.2 %. The obesity among adults increased from 524 million in 2010 to 1.13 billion in 2025 according to the 2025 World Obesity Atlas, while UNICEF reported that obesity surpassed underweight as the more prevalent form of malnutrition in 2025, affecting 1 in 10 (or 188 million) school-aged children and adolescents. Obesity actually is a severe form of overweight and leads to a higher risk of developing insulin resistance and high blood pressure, as well as life-threatening diseases. Ultra-processed and fast foods high in sugar, refined starch, salt, unhealthy fats and additives are a major driver for obesity. Their widespread consumption has been identified as a leading public health concern [3].

Therefore, there is an urgent need to identify ways of ensuring that healthy diets are accessible, affordable, safe, equitable and culturally acceptable for all. In the quest for diets that have been proven for their health benefits and are acceptable by nations in different parts of the world, many searches are pointing toward traditional and territorial diets. These diets have been studied



intensively in the past decade, and the studies revealed numerous benefits of the diets embraced by our ancestors. It is not just the food our ancestors consumed, but the way how they produced and prepared the food seems to be important, as well [4, 5].

*Territorial* diets are food approaches emphasizing locally sourced, seasonal, and culturally relevant foods within a specific geographic area. *Traditional* diets, also known as heritage or cultural diets, are eating patterns that have been historically consumed by specific cultures or populations. They typically reflect the local environment, food availability, and cultural practices. In particular, the food in traditional diets is often intertwined with the culture, traditions and religion, reflecting the history, and the values of family and community [4,6-9]. Traditional diets are often sustainable due to their reliance on local, seasonal, and whole foods, which minimizes transportation and food waste. They promote biodiversity through variety of food, home-cooking techniques, and strong cultural connection to local food systems, thus, respecting the environment and natural resources, while providing diverse and mainly raw nutrients, and consequently, improved overall health. Examples of traditional diets are Mediterranean Diet, Nordic Diet, traditional Asian and African diets, and other indigenous diets. All of these diets have been studied and proven to result in reduced risks of chronic diseases and cancers, improved metabolic health, and longevity, among other benefits [10-16].

In this review, traditional Mediterranean Diet (MD) is revisited and various aspects including diet's history, cultural roots, food categories, lifestyle and health benefits are described through pyramids. Novel 5F-diet pyramid and 5F-pillar pyramid are proposed as integrative frameworks for modern adaptation of traditional MD. Historically, the *MD food pyramid*, originally proposed by Oldways, was the first pyramid that described the food categories consumed within the traditional MD in such order that the foods used daily are being placed at the bottom of the pyramid, followed by the foods used in moderation, while the foods consumed rarely were on the top of the pyramid [17-19]. Its presentation in form of MD pyramid solidify the evidence into a culturally grounded and scientifically supported way of living, i.e. a lifestyle approach encompassing nutrition, sustainability and community well-being. Variations of MD food pyramid were consequently suggested over the past decade by introducing different lifestyle elements, such as spirituality, or intended for particular population groups, e.g. kids [20-26]. At its core, traditional MD is known for its nutrient-dense seasonal food choices, locally-sourced, yielding palatable dishes with numerous health benefits. It also represents a dynamic and enjoyable lifestyle mixed with cultural heritage encompassing agriculture, local economies, social customs, environmental stewardship, and spirituality of different nations, living in the Mediterranean. Simply, MD defined by UNESCO "... is a set of skills, knowledge, rituals, symbols and traditions concerning crops, harvesting, fishing, animal husbandry, conservation, processing, cooking, and particularly the sharing and consumption of food. It is a reflection of a way of life based on frugality, biodiversity, and conviviality." (CIHEAM, 2012) [23,27-29].

## 2. HISTORY OF MD

The origins of traditional Mediterranean dietary pattern and lifestyle are deeply embedded in the history of nations, who lived for centuries and/or migrated to the Mediterranean region. The roots are intertwined with the cultural heritage, traditions, customs and religions of these nations, and go beyond the food categories consumed over centuries - they are defined by the interactions among the people in the region and outside of it, and the interactions with the environment. The people populating the Mediterranean area were living in a harmony with the Nature – mindfully using the available resources without completely destroying them. The nations, as well as the food systems, were resilient; people were accommodating their diet and lifestyle to what is available, locally and seasonally, often embracing frugality - planning the food production and consumption, prioritizing the activities with deliberate choices to spend less on unnecessary items, reduce food waste, and focus on food produce and experiences that add value to life [4,8,9,30].

Although MD existed for centuries, it was not until the '60's of the last century, when the MD phrase was coined by Dr Ancel Keys in his *Seven Countries Study (SCS)*. The SCS was the first long-term cohort study examining the dietary patterns, lifestyle and health outcomes, primarily protection from coronary heart disease (CHD) of the studied populations. Through its comparative and prospective design, the SCS confirmed Keys' hypothesis that diets rich in saturated fats were strongly associated with elevated serum cholesterol and CHD mortality, whereas populations adhering to more plant-based and olive oil-centric diets exhibited significantly lower the rates of these outcomes [4,31-36]. These findings from the SCS provided the empirical foundation for what later became known as the MD. This dietary pattern, high in fruits, vegetables, legumes, whole grains, moderate fish, low red meat and

predominantly using olive oil as a fat source, became globally recognized not only for its health-promoting properties, but also for its cultural and environmental sustainability [20,35-40].

The SCS did not just verify the cardiovascular benefits of MD, but it catalyzed its elevation into a globally recognized dietary pattern and public health model. Consequently, MD was not just validated through epidemiological correlations, but through decades-long follow-ups showing that individuals and cohorts adhering to the MD had lower all-cause mortality and longer survival up to 4.36 years more compared to those following non-Mediterranean diets. These outcomes also formed the basis for the Mediterranean Adequacy Index (MAI), which quantified diet quality and correlated higher MAI scores with reduced CHD risk and mortality [33,41].

Over the centuries, *religious beliefs and practices* had profound effect on the food consumed and shaped the dietary patterns in different countries around Mediterranean Sea. Various nations around the Mediterranean practiced different religions, such as Christianity, Judaism, and Islam, which actually all have their roots in the area. For instance, the “*seven spices*”, such as wheat, barley, grapes, figs, pomegranates, olives, and honey, were dietary staples in the Mediterranean. The *Bible* makes several references to these foods - with olive oil being a symbol of joy, health, and blessings, and was used to anoint kings, prophets, and priests in the *Old Testament*. Bread and wheat were symbols of sustenance and religious observance in the *Bible* and *Torah*, while fruits, like figs, grapes, and pomegranates were symbols of prosperity, peace, fruitfulness, and abundance in the *Bible* and the *Quran*. Fig. 1 presents some of the religious components of traditional MD. The religious practices of the inhabitants of the Mediterranean region impacted their food choices and the ways how the food was consumed. For instance, *fasting*, daily or for extended periods, was an integral part in some of the religions in the region. Different nations, depending on their religious beliefs, practiced different types of fasting, e.g. from abstinence from eating during the day, like in the Islam, to not consuming food of animal origin during observance of particular holidays, like Christmas, Easter, and others. It has been scientifically proven that these fasting periods in the traditional MD cleanse the body and support the health and well-being of the people adhering to this diet. There is scientific evidence of the benefits of fasting, like improved heart health, improved blood sugar levels, enhanced cellular repair, improved brain functions, mood and clarity, reduced inflammation, etc. There are recent reports that even intermittent fasting coupled with MD provides benefits for the overall health and well-being. [4,6,13,37,42-45]



**Figure 1. Some of the religious components found in the traditional MD.**

Today, different nationalities in the Mediterranean area still enjoy their lives, food, and practice their religious traditions. However, their lifestyles and dietary patterns have been significantly influenced by globalization, trade and migrations; thus, the “modern” MD has undergone significant changes, mainly embracing the Western diet and way of living.

### 3. ORIGINS OF THE FOOD IN TRADITIONAL MD

MD was originally reported as “a peasant diet” or a diet of the poor people. People in the Mediterranean worked hard to produce their own food, often in non-fruitful terrains of the Mediterranean region. The main “occupation” was *farming and gardening* - producing variety of produces and wheat, taking care of domesticated animals, such as cattle, sheep, pigs, goats, and chicken, among others, usually used for field work and for food (meat, eggs, milk). Fig. 2 depicts some of the origins of food in traditional MD.

*Family farming and gardening* enabled seasonal fruits and vegetables to be collected in the top harvest seasons, with minimum or no transportation and storage required. The natural ripeness of the produce used in the traditional MD enabled most nutrients to be present in the food, which gives the rich nutritional profile and natural flavors of the foods consumed. This is one of the reasons for the palatability and flavorful character of the traditional Mediterranean-style dishes. The excess produce was exchanged at the *farmer markets*, or was preserved for the seasons, when it is not available, usually via natural preservation methods, such as Sun drying, fermentation, smoking, etc. Thus, the *food waste* in the traditional MD was minimal; MD was indeed a diet in harmony with the nature [46-49]. The farmer markets were deeply embedded in the lives of Mediterranean people; they were not just places, where families exchange and/or buy local and seasonal fresh produces, traditionally prepared foods and fermented products, but were places for socialization, friendship, and exchange experiences.

*Hunting* for wild meat (deer, rabbit, pheasant) and *fishing* was also part of the activities of the people in the Mediterranean, not only for enjoyment and fun, but also added a food variety to the diet. [50-53]



Figure 2. Traditional MD: food origin pyramid.

### 4. TRADITIONAL MEDITERRANEAN DIETARY PATTERN

Although it differed from country to country in terms of food choices, cooking practices and traditions, which depended on the produce availability, traditional Mediterranean dietary pattern comprises common food categories that are found across different Mediterranean cuisines. MD food choices are rich in diverse nutrients and fiber, and low in added sugars, preservatives, and unhealthy fats. Whole foods, often consumed in its natural state, or minimally-processed, are characteristic for the traditional MD. Local and seasonal fruits, vegetables, legumes, nuts, seeds, and whole grains are staple foods, while animal products, which include fish, poultry, eggs, and dairy, and depending on region, culture and religion, are consumed in moderation. Red meat and sweets are

consumed even less frequently. Fermented foods and drinks, e.g. fermented vegetables and dairy products, usually prepared as a way to preserve and extend the shelf-life of the produce, are regularly consumed, as well. Extra virgin olive oil (EVOO) is the hallmark of MD – a main source of healthy fats, along with nuts, seeds and fish – which is primarily used for fresh salads preparations and for cooking. Generous amounts of alliums, herbs and spices are used in the traditional Mediterranean cuisine, which yields the unique aroma and complex flavorful character of the traditional dishes [54-58]. The foods frequently consumed in traditional MD are presented in Fig. 3.



**Figure 3. Traditional MD food pyramid.**

The main food category of MD is the dominance of *various plant-based food* over animal-based food, *balanced and consumed in moderation*. MD is colorful in nature - emphasizing abundance of various naturally- ripened fruits and vegetables, harvested in the top seasons, and thus, rich in phytonutrients, aromas and flavors [16,56]. The wide spectrum of phytonutrients present in these foods, such as polyphenols, vitamins and minerals, are responsible for the anti-inflammatory and antioxidant activities in the body [59-61]

*Seasonal and local produce*, such as *fruits and vegetables, whole grains, legumes, nuts and seeds* were consumed daily. The produce is consumed fresh, such as various vegetables in fresh salads, and ripened fruits as dessert and snacks. This provides unaltered or minimally-affected phytonutrient profile of the foods consumed in traditional MD. The traditional MD-style dishes are prepared with local and seasonal produces using traditional recipes, passed from generation to generation, and often the recipes are “forgiving” – ingredients can be easily replaced with the ones available in the particular seasons and locations. There is almost no food waste in MD – different parts of the plants, *viz.* roots, leaves, fruits and/or seeds, are being used for making soups, stews, broths, teas, pies, pastries, baked, broiled dishes, and fried food, and some are being preserved for the seasons when they are not available [46,48,59,62].

Furthermore, the richness of fruits, vegetables, grains, beans, nuts and seeds with dietary fibers promote the feeling of satiety - the feeling of being and staying full for a longer time, which is important for maintaining a healthy weight, as well as important for digestion, and gut and colon health, among other benefits [48,63-73].



Seasonal vegetables and fruits were mostly consumed in the seasons when available, while for the other seasons (e.g. winter), they are usually preserved mainly via natural processes, such as fermentation and Sun-drying. Fermentation is extensively used for extending the shelf life of food and for food preservation. *Fermented vegetables*, viz. cabbage, cauliflower, peppers, cucumbers, carrots, olives and others, rich with prebiotics and probiotics, are often used during off-season, but also all year around. Sun-dried fruits and vegetables, such as dried figs, dates, apricots, prunes, raisins, tomatoes, peppers and others, are also often used in traditional MD dishes [74-80].

*Whole grains*, such as wheat, rice, oats, cereals, and products made of whole grains, such as *variety of breads*, pastries, cereals, pasta, are used daily. Traditional pies and pastries filled with cheese, curds, variety of vegetables (spinach, leek, onions, chard) or fruits (apples, peaches, cherries, plums), are consumed frequently. Whole grains are a good source of nutrients, such as dietary fibers, minerals, vitamins, and micronutrients needed for many body functions [81].

Protein- and fiber-rich *legumes*, viz. as different types of beans, peas, lentils, chickpeas and others, are often used in numerous Mediterranean dishes combined together with herbs, spices and vegetables [62,82-85].

*Nuts*, such as walnuts, almonds, hazelnuts, pistachio, peanuts, and others are another staple food in the Mediterranean; they are being often used as snacks or ingredients in traditional Mediterranean dishes, especially in desserts. Nuts are good sources of healthy fats, proteins, vitamins, minerals and fibers [86,87].

*Seeds*, such as pumpkin seeds, sunflower seeds, flax seeds, sesame seeds and others, are low-calorie, yet rich sources of proteins, healthy fatty acids, fibers, vitamins and minerals and are often used as snacks, or for preparing appetizers, sauces (e.g. tahini), etc. [87-90].

The consumption of fresh produce is complemented with a moderate consumption of products of animal origin, viz. *dairy products, fish, poultry, and eggs*. Examples include fish (salmon, tuna, sardines), seafood, poultry, rich in healthy fats and proteins among other nutrients [74,91]. *Wild meats (rabbit, deer) and red meats* providing animal proteins, are used less often and/or in smaller quantities, often to add to the flavor of the traditional MD-style dishes than to be the main ingredients of the dish.

*Dairy products*, milk and fermented milk products, such as cheese, curds, sour cream and yogurt, rich with various probiotics are used in moderation, several times per week. They provide more than just proteins; they also provide essential micronutrients and unique bioactive compounds that support nutrient absorption. The dairy nutrients (Ca, Mg, B-vitamins) are more bioavailable in the body, because the dairy matrix enhances their bioavailability. Also, the nutrients ingested from other foods, like whole-grain pies filled with vegetables, which are traditionally consumed together with fermented dairy products, such as yogurt, curds and cheese, are with enhanced bioavailability [74,92,93].

Plenty of water, fruit juices, herbal teas, broths and soups are also consumed for hydration, with a moderate consumption of red wine, usually taken with the meals, and depending on the religious beliefs [94-96].

Processed and ultra-processed foods, when foods have undergone extreme transformation and substantial alteration of the food matrix and addition of ingredients (not naturally present in the original food matrix) are not present, or are rarely consumed in traditional MD. Examples of such ultra-processed foods include pizza, donuts, cakes, carbonated sugary drinks, frozen ready-to-use foods, and so on, which if used, are consumed rarely or for special occasions [97,98].

#### 4.1. Extra Virgin Olive Oil

Preparation of salads and food cooking in traditional Mediterranean cuisine is primarily done with extra-virgin olive oil (EVOO) - a hallmark of MD. EVOO is serving not only as a culinary tradition, but as a nutritional and functional cornerstone, it supports immune resilience, metabolic balance, and even a reduced risk of certain cancers and allergic diseases. Salad dressings often consist of EVOO, balsamic vinegar or lemon juice, alliums, spices and herbs [37,99-102].

EVOO, as a source of healthy fats in MD, plays a pivotal role in the health benefits associated with this traditional dietary pattern. EVOO is particularly rich in monounsaturated fatty acids (MUFA), especially oleic acid, which accounts for 70–80% of its fat composition and is known to improve blood lipid profiles, reduce oxidative stress, and exert anti-inflammatory effects, mechanisms that underline its protective role against cardiovascular disease [37-40]. In addition to MUFAs, EVOO contains polyunsaturated fatty acids (PUFA), such as linoleic acid (omega-6) and alpha-linolenic acid (omega-3), which are essential for immune modulation, cellular membrane integrity, and the production of eicosanoids that regulate inflammation. Saturated fatty acids (SFA), including palmitic and stearic acid, are present in lower amounts and support energy metabolism without the adverse effects commonly associated with saturated fats from animal sources. The combined lipid profile of EVOO supports a favorable n-6/n-3 ratio, closer

to 2:1 in MD compared to 15:1 in typical Western diets, which contributes to a more balanced and less inflammatory physiological environment [100].

Beyond its fatty acid composition, EVOO is abundant in minor bioactive compounds such as phenolic alcohols (hydroxytyrosol, tyrosol), secoiridoids (oleuropein, oleocanthal), tocopherols, phytosterols, and squalene, which collectively exhibit potent antioxidant, anti-inflammatory, anti-thrombotic, and immunomodulatory effects (Fig. 4). These compounds have been shown to reduce oxidative stress and systemic inflammation, and improve endothelial function, among other benefits - all of which are critical in preventing metabolic syndrome, type 2 diabetes, and cardiovascular diseases. Regular addition of EVOO to the foods consumed within MD enhances the absorption of fat-soluble vitamins and polyphenols from the plant foods, thus, amplifying the synergistic effects of this dietary pattern. Therefore, integration of EVOO into daily meals today is highly recommended and scientifically supported strategy for promoting longevity, metabolic health, and reduced risk of chronic diseases. [100-108]

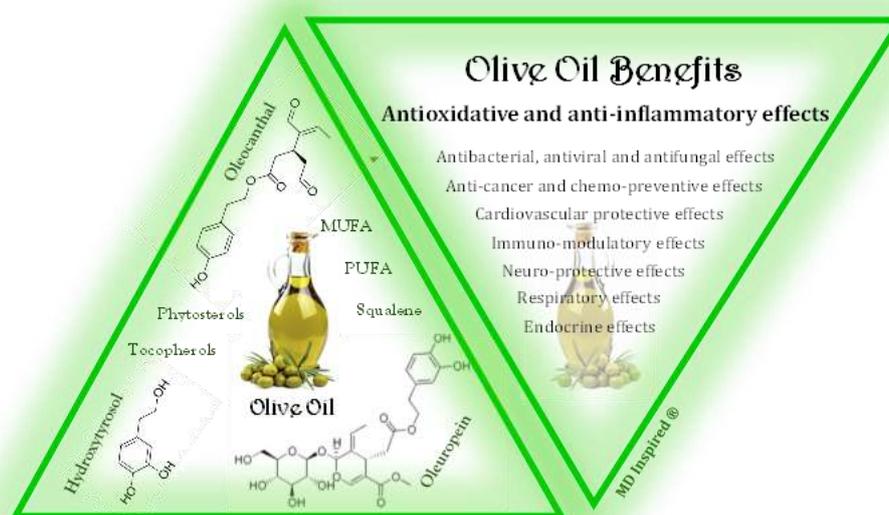


Figure 4. EVOO pyramid-phytochemicals found in EVOO and its health benefits

#### 4.2. Alliums, herbs and spices

Spices and herbs, such as rosemary, oregano, black cumin, thyme, sage, ginger, cinnamon, clove, dill, parsley, basil, mint, as well as alliums, such as garlic, leek, onions, and shallots are generously used in the Mediterranean cuisine replacing part of the salt intake. Seasoning is a distinct feature of most Mediterranean cuisine, in which alliums, herbs and spices are used fresh, or in a dried form, to introduce the unique character, flavor and aroma to traditional MD dishes and salads. In fact, the alliums, and other herbs and spices, are responsible for the distinct flavor and palatability of traditional MD-style dishes, as well as for contributing to their high antioxidant and anti-inflammatory character. In addition, the plethora of flavors and tastes, introduced by the alliums, herbs and spices, contribute to the feeling of satiety, i.e. the sense of fullness, and thus, yielding less incidents of over-eating. Moreover, since the salt intake is becoming an alarming issue in the modern diets being related to hypertension and other heart-related diseases, the use of alliums, herbs and spices has emerged as a “modern” way to overcome the problem of increased salt intake. Some of the alliums, herbs and spices, containing strong antioxidant, anti-inflammatory and anti-carcinogenic compounds, have been even categorized as functional foods yielding health properties beyond the basic nutrition, like reduction of the risks related to CVDs, cancers, obesity, diabetes, Alzheimer’s disease, etc. [57,61,62,83]

Alliums, wild plants, herbs and spices characteristic for the Mediterranean region as indigenous, or brought into the region by trade and migrations, are given in Fig. 5. Besides their roles as foods’ aroma and flavor enhancers, some of them have been used as medicinal plants in the region’s folk medicine.



Figure 5. Mediterranean herbal pyramid.

#### 4.3. Health Benefits of MD

People adhering to the Mediterranean dietary pattern and lifestyle, which will be described in section 5, have been found to be more mentally and physically resilient, experiencing less cardio-vascular diseases (CVDs), less incidences of cancers, metabolic and neuro-degenerative disorders, including Alzheimer's, Parkinson's, dementia and depression, and other diseases common for the modern society [40,56,59,60,75,108].

The mechanisms behind the protective effects of MD against these diseases are complex; however, the anti-oxidative and anti-inflammatory character of MD food constituents could explain its preventive effects against many NCDs, while the Mediterranean lifestyle and physical activity reducing the stress are found to be responsible for the good mental health and reduced risks of neuro-degenerative disorders in those adhering to MD. Many NCDs have been associated with oxidative stress causing damage to DNA, proteins and lipids in the body. MD counteracts the oxidative stress in the body via dietary antioxidants, such as antioxidant vitamins, minerals and phytochemicals present in the MD food. Furthermore, many chronic degenerative diseases, such as neuro-degenerative diseases, atherosclerosis, cancer, rheumatoid arthritis, diabetes, and obesity have been linked to inflammation. The anti-inflammatory compounds found in MD food include n-3 fatty acids, various phenolics, flavonoids and other polyphenolics. The main phytochemicals found in MD, responsible for the diet's health benefits along with the list of diseases that MD has been proven to be preventive, are depicted in Fig. 6.

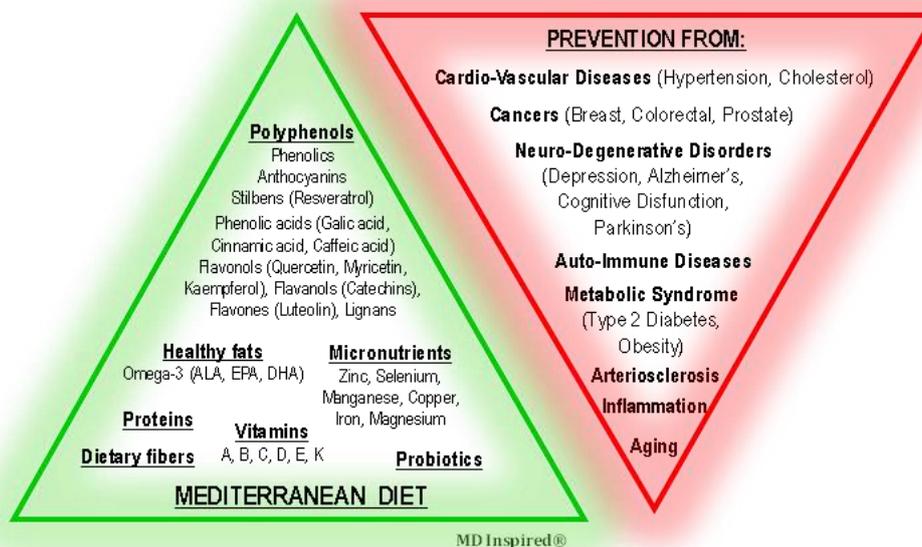


Figure 6. Main phytochemicals found in traditional MD and their disease preventive effects.

Taking into account the complex interactions between different food components in MD might further explain its protective effects. Instead of analyzing an isolated nutrient or a food category, looking at the whole dietary pattern has yielded discovering synergistic effects among different nutrients and foods (food pairings), which have been traditionally consumed together. Many of the traditional MD dishes are in fact functional foods, where their health outcome is much higher than the one based solely on the sum of nutrients present. For instance, the generous use of spices and herbs in salads (or traditional dishes) increases multi-fold the antioxidant and anti-inflammatory potential of the salad (dish) beyond that expected bases on the nutrients alone. Another example is the use of EVOO for cooking vegetables in traditional MD, which extracts and stabilizes the vegetables' polyphenols at elevated temperatures, and makes them more bioavailable; thus, significantly increasing their protective effects compared to cooking in other (not thermally stable) oils, where part of the polyphenols are being destroyed. Furthermore, having a holistic approach in analyzing the Mediterranean dietary pattern along with the physical activity associated with the traditional MD might explain how the above dietary factors coupled with the non-sedentary lifestyle improve the gut health, immunity and metabolic health, among other benefits.

This is relevant more than ever in today's modern world, which "runs" on supplements. Although supplements can be appropriate for people who are deficient in certain nutrients, studies have found that some supplements are of no benefit or might even cause a health risk, when given to people with adequate nutritional status. The reason is that some vitamin and mineral supplements due to a rapid absorption can lead to a plasma concentration "spike" that negatively affects the normal homeostasis regulating the plasma concentrations. This can result in adverse effects, particularly in those who do not have a prior nutrient deficiency. In the case of probiotics supplements, the billions of bacteria strains claimed by the manufacturers might not even survive in the actual gut environment; thus having little or no effect on gut microbiota and health [109].

#### 4.4. MD as 5F-diet

MD was known as 4F-diet (four phonetic, F's), meaning a diet with plenty of healthy Fats, dietary Fibers, Fermented foods, and Phytonutrients. In this review, for the first time, MD is presented as a 5F-diet – a diet based on Fresh fruits and vegetables, healthy Fats, dietary Fibers, Fermented food, and Fish and Fowls, which is presented in Fig 7.

The abundance of *fresh, seasonal and local ripened fruits and vegetables* provide maximum amount of phytonutrients consumed, which are not "destroyed" or diminished during the cooking processes. The fresh produce have a plethora of diverse phytonutrients – polyphenols, vitamins and minerals among the others – which have pronounced physiological and health effects. For instance,

polyphenols which are strong antioxidants, but unstable if outside of the natural matrix and/or when exposed to heat, protect the cells from oxidative stress damage and support overall health. Moreover, even the produce (vegetables) are cooked, the cooking in EVOO, as a hallmark of the MD, provide phytonutrients, especially the polyphenols, to become more stable, bioavailable and bioaccessible. [14,16,58,65,99].

*Healthy fats* are mainly originating from EVOO used for preparation of salads and cooking in MD, variety of nuts and seeds, and fatty fish, consumed daily or very often (3-5 times per week) support heart health, hormone balance, and overall well-being [37-40,87,91].

*Digestive fibers*, usually present in fruits, vegetables, beans, seeds and nuts, are crucial for digestive health. In fact, the consumption of abundant amounts of salads before the entrée fill the consumer, thus, consuming less of the entrée and feeling satiety. Also, digestive fibers “serve” as a food for the “good” bacteria in the gut and for the microbes found in the colon. Often the food pairings, common in the traditional MD, such whole grain pies and pastries filled with vegetables filling are consumed with fermented milk products, such as yogurt, kefir, curds or cheese. This pairing provides a complete blend of prebiotics (dietary fibers) and probiotics (alive bacteria) needed for optimal gut health [82,84,87].

*Fermented foods*, like olives, pickles, sauerkraut, kefir, yogurt, cheese, sour cream, kombucha and others provide beneficial live bacteria in the gut, which boosts gut health. It is not just the number of beneficial bacteria, but the diversity of microbiota is also important for the gut health. Therefore, a diverse gut microbiome is associated with better overall health and a lower risk of chronic diseases, including colon cancer, food allergies, etc. [92,93].

*Fish and fowl* (poultry) are the main sources of animal proteins in traditional MD, while red meats are used rarely and/or for special occasions [91].



Figure 7. Traditional MD as a 5F-diet pyramid.

## 5. TRADITIONAL MEDITERRANEAN LIFESTYLE

Traditional Mediterranean lifestyle usually refers to the historical way of living of the nations in the Mediterranean region, which is characterized by its diverse and adaptable nature. Key facets encompass conviviality, lifelong social connectedness, purposeful living, strong community and familial bonds, harmony with nature and the environment, profound spirituality, adherence to religious practices, preservation of local customs, resilience and frugality cultivated through adversity, and a commitment to moderation across all spheres of life. These lifestyle factors were deeply ingrained in the lives of Mediterranean inhabitants across generations and have been influenced over centuries by the people migrations and occupations of the region [22,49,95,108,110].

The Mediterranean lifestyle, rooted in millennia of traditions, rituals, and habits of the people, the physical activity and mindful living is a central and synergistic pillar alongside the rich array of mainly plant-based foods consumed, yielding the pronounced health benefits of MD [4,49,61]. Movement is not treated as an isolated health prescription, but rather as a culturally-embedded daily rhythm expressed mainly through manual labor, farming, gardening, hunting, and/or enjoying the life via communal engagement, closely interwoven with social interactions, outdoor environments and food production. Adherence to the MD has been associated with reductions in cardiovascular disease, metabolic syndrome, and mortality, not solely due to its dietary nutrients, but because of its synergistic lifestyle elements (physical activity, rest, community involvement) [19,49,111,112]. Physical activity, for instance, is integrated in the daily life of Mediterranean communities, not necessarily as a structured “gym” routine, but as part of daily activities - people often spend a lot of time outdoors together, like gardening, farming, harvesting produce, enjoying walks and social interactions at farmer’s markets, playing sports and engaging in leisure activities, family and community celebrations. These lifestyle-based daily activities contribute to muscular endurance, reduced fat mass and overall cardiovascular fitness in addition to the social interactions and engagement [9,46,113,114].

Adequate rest, e.g. relaxation/nap after the meal (“*siesta*”) and sleep, and leisure activities are important components of the Mediterranean lifestyle. Simply, the “traditional” Mediterranean lifestyle can be summarized as living and enjoying the life to the fullest. Although majority of people did not have a lot of resources, and by no means were “rich” according to today’s standards, they were content – they worked hard in not always fruitful terrains and celebrated every season, every harvest, crop. Non-communicable diseases (NCDs) and mental health issues were not common. People were resilient, gritty, mentally- and physically strong able to deal with tough life situations, although life for many was producing the food for “bare” survival [30,49,115-117]. Ceremonial practices, rooted in tradition, were prevalent stress relief methods in Mediterranean countries. *Community* events, festivals, religious celebrations, and local traditions offered opportunities for communities to come together, share joy, and temporarily escape the challenges of daily life. These events served as outlets for emotional expression, promoting a sense of belonging and connection [47,118].

The *religious communities* also played a crucial role in shaping the social image of Mediterranean societies. By providing support networks and fostering a sense of belonging, they contributed to the emotional well-being of individuals and the strength of local communities. Family and community celebrations of various life moments and milestones were also hallmarks of traditional Mediterranean society. Recognizing the significance of these communities is essential for understanding the dynamics of Mediterranean societies and their survival and resilience in the face of adversity. [6,49]



Figure 8. Traditional MD lifestyle pyramid.



## 5.1. 3C's of Traditional Mediterranean Lifestyle: Conviviality, Commensality, Community

MD emphasizes social interaction through shared meals and traditional culinary knowledge, reinforcing social cohesion and intergenerational continuity. This social and spiritual context is an integral part of the traditional eating practices, linking food with the meaning, gratitude, and identity. As Domínguez et al. (2024) argue, the MD is not just a prescription for healthy eating, but a culturally situated practice of “*eating with meaning*” [6,119].

The *food preparation and consumption* in the Mediterranean region is complemented by a philosophy of life that values personal relationships and the pursuit of happiness. The preparation of food in company with others, usually family, neighbors and friends is an integral part of how the food is prepared and consumed among the Mediterranean nations. *Mediterranean cuisine* is slow food cooking at its best; there is no rush in the food preparation, nor consuming it alone. The cooking time and consuming the meals in company with others represent moments of communication, social exchange and *conviviality* - the quality of being friendly and lively (conviviality = friendly, lively, and pleasurable social atmosphere and interaction experienced when sharing a meal). Conviviality is a mediator of health benefits. The release of neurochemicals, such as oxytocin and endorphins, might explain the health benefits of the conviviality. The food is, in fact, a symbol of identity in the “traditional” Mediterranean lifestyle – traditional recipes were family pride passed from one generation to the next. Different regions in the Mediterranean had traditional recipes and food choices depending what was available in those regions [49,118-120].

*Commensality*, which means “*the practice of eating together*” or “*a social group that eats together*” is another hallmark of traditional MD: people rarely eat alone or “*on the go*” as the modern life dynamics often requires. Commensality to be present in other cultures in different places and periods in history – it simply conveys the notion of sharing food habitually, possibly due to the dependence of one or several of the involved parties upon another, thus, bringing commensals closer. Eating together has been determined to be one of the foundations for strong families and communities. This is due to the fact that sharing the meals with family, neighbors and friends around the table is usually accompanied with long conversations, which makes them into daily celebration activities. The meals are considered and sought after as major social interactions among family members, extended family and friends. Extended family is valued. Many generations of close and far relatives are kept in touch, extended family is valued. Celebrations of different life events - birthdays, weddings, kids’ recitals and performances, graduations, career accomplishments, retirements, , newborn baby celebrations, christening, adulthood, fairs and many other social gatherings – are just some of the occasions celebrated with extended families, friends and communities [13,118-121].

Modern science have found that children and young people, who frequently share meals with their families have better nutrition indicators, are more likely to be in the normal weight range, and have healthier eating behaviors, like consuming more vegetables and fruits, and less processed and ultra-processed foods, like refined sugars, read-to-eat-meals, fast-food, and soft drinks. These children usually are more “open” to eat a wider variety of foods, and they continue to do so once they become adults. In fact, eating meals as a family is extremely important for the physical, mental, and emotional health of all involved. Family meals provide opportunities for communication, sharing of values, family bonding, and parental monitoring. Research has suggested that children and adolescents, who have had frequent family meals, have better family relationships. In fact, more family talk occurs during mealtime than during any other activity. Parents who have frequent family meals, are found to be better off in terms of their emotional wellbeing, which is very important as the parental mental wellbeing affects the health and wellbeing of their children. However, current trends in the Mediterranean, especially among the young generations, seem to have overcome this tradition with continuative snacking (“recreational eating”), quick ready-to-eat meals while watching television, or eating on-the-go, and poor communication [22,118,122-127].

## 5.2. 5F- pillars of MD

The 5 F-pillars of traditional MD, which have been already mentioned in different contexts in the previous sections, are briefly stated here. This set of pillars sets MD apart from the other territorial and traditional diets. The 5 F-pillars of MD are as follows: Food, Family, Friendship, Fitness, and Frugality, which are presented as a 5F-pillar-pyramid in FIG. 9

*Nutrient-dense food* characteristic for the traditional MD is the most popular pillar that MD is known for. The emphasis is on whole, unprocessed, and seasonally fresh fruits and vegetables, whole grains, legumes, nuts, spices and herbs, EVOO and fish. However, to fully gain the benefits of MD, the other pillars should be considered as integral parts. For example, family plays a crucial role. Food in traditional MD is prepared and consumed together with *family and friends*; this socialization and interactions have positive effects on the mental health in addition to the nutritional value of the food consumed on the physical health. Also, doing all activities

(work, leisure, celebrations) in company with others – family, friends, neighbors – gives the sense of belonging, a sense of being a part of the community [118,121]. The feeling of contributing to the community is also having positive effects on the emotional state of the people. Incorporating regular physical activity into daily routines, is a core feature of the Mediterranean lifestyle. This active lifestyle, such as work in the field or the farms producing the food, enjoying sports, games, or walks outdoors, greatly contributes to the overall health benefits and the *fitness* of the people adhering to traditional MD [71,113,114,128-132]. Furthermore, traditional MD “started” as a diet of the poor people, who worked hard to produce the food. *Frugality* was a big part of the Mediterranean lifestyle – the food was produced in harmony with the Nature, being economic and mindful of the natural resources. The food was deliberately planned for all the seasons; for this purpose, some of the produce was e.g. preserved by natural methods (fermentation, Sun-drying, smoking) for the seasons when fresh produce is not available. The food consumption was prioritizing “the needs” over “the wants”. Food waste and extravagant food consumption almost did not exist in traditional MD. The food was consumed mindfully, in small portions and balanced, where the food variety provided the needed nutrients for maintaining good health. [13,49]



Figure 9. 5F-pillars of traditional MD.

## 6. MD AS A HOLISTIC DIET

The holistic dietary approach emphasizes whole body consideration through a relationship among the body, mind, spirit, environment, nutrition and food sourcing. It is beyond the nutrition; it is a multi-dimensional and interdisciplinary approach considering the health benefits of the diet within the context of a sustainable and healthy lifestyle. Simply, a holistic diet can be defined as a balanced diet consisting of sustainable food choices that nourish the body, the mind and the soul [6].

The key principles of a holistic diet are emphasizing whole food choices, like fruits, vegetables, whole grains, beans, seeds, raw or minimally processed, thus preserving the nutrients. Processed and ultra-processed foods, containing refined carbohydrates and unhealthy fats, which yield inflammatory processes in the body, and thus NCDs, are excluded or consumed rarely in the holistic dietary concept [84,97,98,133]. Sustainable food sources are preferable. Staying active – physically and mentally - is important, but having adequate rest is crucial, too [12,69,108,134,135].

All these characteristics of a holistic diet are found in the traditional MD. MD emphasizes a wide range of nutrient-rich, mainly plant-based foods, all balanced and consumed in moderation, promoting both physical and mental well-being. It focuses on whole, unprocessed foods and encourages a sustainable, enjoyable lifestyle and conviviality. Furthermore, *moderation* is fundamental to the MD, shaping dietary and sleep habits, social interactions, and physical activities. This balanced approach not only prevent chronic diseases, but also fosters holistic well-being. Embracing moderation in all aspects allows individuals to fully enjoy the richness of the Mediterranean lifestyle, promoting longevity, vitality, and a profound appreciation for the interconnectedness of

health and happiness. Moreover, the dynamic relationship between the body and environment is enriched by a *mindful awareness* of one's habits, surroundings and community, a concept increasingly recognized in the lifestyle medicine. Recent research suggests that mindfulness not only enhances psychological well-being, but also reinforces motivation for sustained physical activity. In the context of MD, such mindfulness naturally extends to the enjoyment of meals, slower eating, appreciation of nature, and deeper social connections - all of which are protective factors against chronic diseases and burnout [73,114,128,136,137].

MD holistic pyramid is given in Fig. 10. The lifestyle in the Mediterranean is not just functional, but it is meaningful. Physical activity is aligned with values of simplicity, gratitude and intergenerational cohesion, promoting a strong sense of purpose and psychological resilience [49,138]. Healthy body is mainly a result of nourishment, activity and rest; having purpose, meaning, positive thoughts, and believing are among the factors contributing to healthy mind and kind soul.

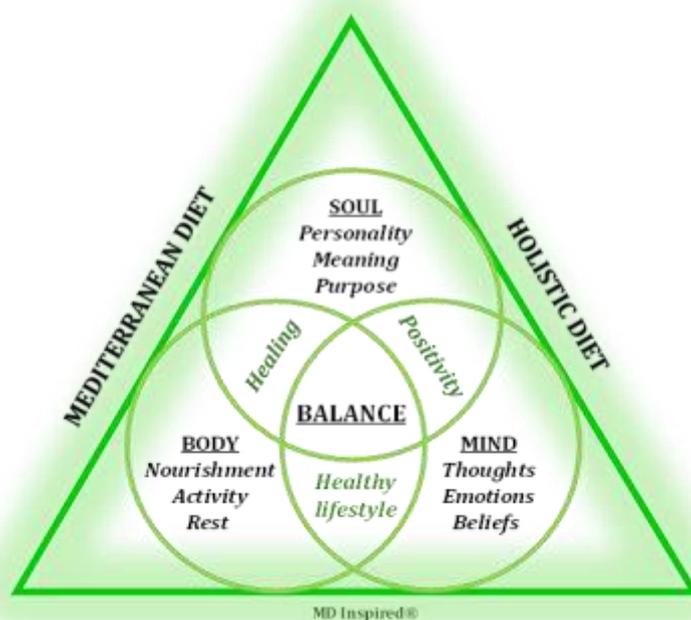


Figure 10. MD holistic pyramid.

The emphasis on communal living, healthy nutrition, outdoor activities, ceremonial practices, and cultural mindfulness collectively creates a holistic approach for stress relief. Therefore, MD can be labeled as a *holistic dietary and lifestyle model that integrates health, sustainability, family, culture and community*. This multi-faceted traditional way of life in Mediterranean societies, in fact, has evolved into a comprehensive framework promoting human and planetary well-being today [22,49,134,139]. Furthermore, the evidence from Mediterranean *Blue Zones*, like Ikaria and Sardinia, illustrates the health impact of the movement-centric and mindful lifestyle, like MD [4,14,59]. These populations exhibit low rates of obesity and cardiovascular disease and experience exceptional longevity, largely attributed to habitual movement, communal support, and adherence to traditional Mediterranean food.

### 7. MD SUSTAINABILITY

Diet and nutrition are essential in promoting good health throughout life - their role in protecting from chronic NCDs is widely recognized. The demand for healthy food further involves relevant environmental factors, which need to be accounted for on the way to achieving the 2030 UN's Sustainable Development Goals (SDGs). Besides nutrition and environmental footprint, the economy and socio-cultural variables should be taken into account, too, when trying to align with the UN's SDGs. In this context, MD is considered as a sustainable dietary pattern that promotes environmental preservation and economic resilience, while preserving the cultural heritage and traditions of different nations living in the Mediterranean region. Its emphasis on plant-based

foods, local and seasonal produce, and traditional agricultural practices contributes to lower greenhouse gas emissions, reduced land and water use, and biodiversity conservation. Consumption of seasonal and local produce has less impact on the environment by reducing the ecological impact of produce transportation and storage (temperature-controlled storage, refrigerators, freezers) [26,108,134,139-141]. Thus, the diet supports local economies by encouraging small-scale farming and reducing dependence on industrialized food systems. This results in promotion of local economic sustainability. Seasonal and local food also require less use of pesticides and alternative growing methods, thus, positively affecting the overall nutritional quality of the food products. The diet relies heavily on plant-based foods, legumes, whole grains, leading to a lower ecological footprint compared to more industrialized food systems and diets based largely on consumption of meat, and processed foods [43,142-146].

The nutritional and sustainability aspects of the traditional MD coupled with its local character enable healthy communities with solid food security [110,122-124,128,134,147]. Alignment of traditional MD with most of the UN’s SDGs is given in Fig 10, which has been extensively reviewed by Trajkovska-Petkoska et al. [4,134,140]



Figure 11. MD sustainability pyramid: alignment of traditional MD with most of the 2030 UN’s SDGs [134].

8. CONCLUSIONS

Over the centuries MD has evolved as a diet of the populations living around the Mediterranean Sea. Although not phrased as MD until the '60's of the last century, it was a diet known for its *frugality* using *local and seasonal mainly plant-based foods*, intertwined with the cultural and religious traditions and rituals of different nations in the region. Animal food choices originating from farming, hunting and fishing were used in moderation. Over the centuries, MD was influenced by other cultures due to people’s migrations and occupations, like the introduction of various spices and herbs, which becomes signature of the flavorful traditional Mediterranean dishes. The abundance and diversity of nutrients, expressed in the 5F-diet concept – fresh fruits and vegetables, healthy fats, fibers, ferments, fish and fowl – were responsible for the pronounced antioxidant and anti-inflammatory character of the diet resulting in less incidences of NCDs, cancers, and cardiovascular diseases, better mental health and longevity of the populations in the Mediterranean region. Not only the dietary patterns, but also the social, cultural and spiritual dimensions were equally vital for the well-being of these populations. Besides the food, MD’s 3C’s and 5F-pillars emphasize that social interactions through shared meals, family recipes and traditional culinary knowledge, as well as social and community gatherings giving the “*sense of belonging*” of the people living in the region. This social and spiritual context was an integral part of eating practices,



linking food with meaning, gratitude, and identity. Moreover, the traditional lifestyle promoting physical activity, adequate rest and social gatherings, all yielding to stress relief, further enhanced the quality of life of the people in the Mediterranean. Furthermore, the use of local resources supporting small-scale farming and local markets, preservation of agrobiodiversity, and seasonal eating practices, all contributed to the environmental *sustainability*.

Ultimately, the success of the Mediterranean dietary pattern and lifestyle lies in its seamless integration of movement and mindfulness into the flow of everyday life. When coupled with the nutritional profile of the “whole” raw or minimally processed food consumed, the mindful eating habits and concerns for the Nature, this synergy creates a powerful model for sustainable health promotion rooted in traditions and local cultures, and yet validated by modern science for its pronounced health impact. In fact, the traditional MD provides holistic health for the whole body, mind and soul, where the people are part of the environment and their interactions are in harmony with the environment within planetary boundaries [148]. Simply, MD represents a *holistic framework* for sustainable living offering food security and affordable nutrition for everyone, while strengthening local eco-systems and communities.

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