# A Gastronomical Exploration of the Adherence of a Traditional Mediterranean Diet to EAT Lancet's Planetary Health Reference Diet

Can a Universal Food Sustainability Framework be applied at a local level? A case study in Ikaria, Greece.

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# Declaration

I, Inés Oort Alonso, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for the award of any type of academic degree.

This thesis is submitted in fulfillment of the Master of Science degree awarded as a result of successful completion of the Erasmus Mundus Masters course in Environmental Sciences, Policy and Management (MESPOM) jointly operated by the University of the Aegean, Central European University, Lund University and the University of Manchester.

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Signature

Date

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# Abstract

The interconnection between human health and environmental sustainability on a global scale necessitates immediate action to prevent crossing planetary boundaries and align dietary practices with internationally established goals such as the Paris Agreement. Shifting to sustainable diets is the single most significant action we can take to reduce agricultural greenhouse gas emissions. However, any transition in eating habits must carefully consider the preservation of food identity and the respectful inclusion of local cultural practices. The EAT Lancet's Reference Diet, which offers recommended food choices to meet nutritional requirements while operating within ecological limits, aims to be adaptable to diverse local contexts. Exploring the degree of adherence to the EAT Lancet Reference Diet within regions that traditionally follow Mediterranean dietary patterns remains an unexplored area, yet it represents an initial step towards developing localized adaptations of the Planetary Health Diet.

To assess the adherence to the Reference Diet, this study examines recipes from the Greek Island of Ikaria, renowned for its longevity and adherence to the Mediterranean Dietary Pattern. Through an analysis of 52 traditional Ikarian recipes, the study assigns scores to food groups and recipes based on their degree of conformity to the Planetary Health Diet targets. The findings reveal that Ikarian recipes often fall short of the prescribed targets in four key categories: Beef, Lamb and Pork; Tubers and Starchy Vegetables; Whole Grains; and Dairy Foods. A comparative analysis between "Planetary Health Recipes" and typical Ikarian recipes revealed a higher inclusion of red meat, tubers and starchy vegetables, fish, and vegetables, while whole grains, legumes, and dairy foods were comparatively lower. Consequently, the thesis proposes that specific adjustments to the Greek-Mediterranean Food-Based Dietary Guidelines (FBDG), particularly pertaining to protein sources, grains, and dairy, could potentially enhance adherence to the principles of the Planetary Health Diet.

**Keywords:** Mediterranean Diet, Planetary Health Reference Diet, Food Based Dietary Guidelines, Sustainable Recipes, Planetary Boundaries

# Acknowledgements

Essentially, Ikaria's longevity diet is the Mediterranean diet of half a century ago, tailored to what was available locally and defined more by the struggle to procure food than by any contemporary sense of abundance.

#### Kochilas (2014)

Being raised in Barcelona, just a walk away from the Mediterranean sea, I have always felt curious about the mythical nature of the Mediterranean diet. In school, we were shown a pyramid of the Mediterranean diet and told that it is one of the healthiest regimes in the world. Still, when I went back home or visited friends and families, what was on the plate didn't always coincide with the voluminous vegetables and whole grains drawn on the pyramid. It wasn't until I lived on an island in Greece that I saw an actual Mediterranean food system.

In the class I took in UoAegean taught by Georgios Vasios, I learned about the history and formulation of the 'Mediterranean Diet' as a cultural heritage and health policy driver. Georgios also spoke about Med Diet 4.0, a framework characterizing the Mediterranean diet as a sustainable model on economic, social, cultural and environmental facets which I featured in the discussion section of this thesis

Perhaps my first acknowledgement will be to my childhood in the Mediterranean. I couldn't have asked for a better environment or a better family to share it with. I am beyond grateful that in my MESPOM journey I could return and experience different regions and cuisines of the basin.

I wouldn't have enjoyed the thesis journey as much without the encouragement and passion of Georgios and Maria, as well as the support and belief of Tiziana, the three of which always encouraged me to trust my ideas and the process of developing them.

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**CEU eTD Collection** 

## **Chapter 1: Introduction**

#### 1.1 The Current State of Our Food System

Current global food production and consumption patterns are environmentally unsustainable, posing significant threats to the planet's ecosystems and human well-being. This is primarily due to the overuse of natural resources such as land, water, and energy, as well as the release of greenhouse gas emissions, mainly from animal agriculture (Springmann et al., 2018; Tilman et al., 2011).

Planetary boundaries refer to the "safe operating space for humanity" within which the Earth's ecosystems can function in a stable state, maintaining the conditions necessary for human survival and well-being (Steffen et al., 2015). These boundaries represent critical thresholds or tipping points in Earth's natural systems, which, when crossed, can abrupt irreversible environmental changes. Some of the identified planetary boundaries include climate change, biodiversity loss, ocean acidification, and land use change (Rockström et al., 2009). Our present food system places significant pressure on several planetary boundaries. Notably, climate change, in conjunction with other food system processes, accounts for approximately 30% of anthropogenic greenhouse gas emissions. The food system also affects the integrity of the biosphere, biogeochemical flows, land system change (with agriculture utilizing nearly half of the world's fertile land), and freshwater use (which consumes around 69% of usable freshwater) (Springmann et al., 2018).

When incomes rise, dietary patterns change. Most notably, the consumption of animal products rises along with them: We are seeing a global increase in the demand for red meat and dairy, the foods with the most considerable measured environmental impact: of the emissions coming from agriculture, <sup>3</sup>/<sub>4</sub> are traceable to animal products (Springmann et al., 2018). What is more, working as an amplifying feedback, higher temperatures and unpredictable rainfall patterns are predicted

to decrease yields in the most fertile regions of the world (Brown & Funk., 2008). Springmann et al. (2018) thoroughly evaluates the options we had to keep the food system within environmental limits. Using models, it predicted different scenarios for the future depending on different actions (e.g. reducing waste or switching to flexitarian diets). The models of the paper made it apparent that no pathway would ensure keeping the food system within environmental limits without a significant dietary change.

Our modern food habits have not only put significant pressure on the planet but have also resulted in a surge of deaths and diseases associated with poor diets. In fact, globally, suboptimal dietary patterns are responsible for more deaths than any other risk factors, including tobacco smoking, HIV, and malaria combined (GBD 2017 Diet Collaborators, 2019).

The EAT-Lancet Commission was established to recognize the critical link between human health and environmental sustainability through diets. According to Willett et al. (2019), a dietary transformation can offer "the single strongest lever" to enhance both. The commission, consisting of the EAT Forum, a "global food system transformation" institution, and the Lancet medical journal, strives to answer the question of whether it is possible to provide a healthy diet within planetary boundaries to a population of ten billion people. To address this issue, they published a report (Willett et al., 2019), which they disseminated through various mediums, including podcasts, articles, and talks at festivals and launches in more than 40 countries. The report emphasized the need for a shift in our dietary habits by maximizing food production, closing yield gaps, and reducing food waste. The report's most notable aspect is the "reference diet" or "Planetary Health Diet," the first of its kind to provide a precise recommended daily intake in grams and calories for different food groups (Figure 1) to remain within "planetary boundaries."

# **The Planetary Health Diet**

		<b>Macronutrient intake grams per day</b> (possible range)	Caloric intake kcal per day
	Whole grains Rice, wheat, corn and other	232	811
۲	Tubers or starchy vegetables Potatoes and cassava	<b>50</b> (0–100)	39
1	Vegetables All vegetables	<b>300</b> (200–600)	78
6	Fruits All fruits	<b>200</b> (100–300)	126
•	Dairy foods Whole milk or equivalents	<b>250</b> (0–500)	153
9 %	Protein sources Beef, lamb and pork Chicken and other poultry Eggs Fish Legumes Nuts	14 (0-28) 29 (0-58) 13 (0-25) 28 (0-100) 75 (0-100) 50 (0-75)	30 62 19 40 284 291
۵	Added fats Unsaturated oils Saturated oils	<mark>40</mark> (20–80) <b>11.8</b> (0-11.8)	354 96
	Added sugars All sugars	<b>31</b> (0-31)	120

Figure 1 The Planetary Health Diet (The EAT-Lancet Commission on Food, Planet, Health., 2019)

## 1.2 The Greek-Mediterranean Diet

The Planetary Health Diet has received criticisms for aiming to standardize global diets to the point where even the World Health Organization withdrew its support (Torjesen, 2019). Critics have argued that the proposed dietary shift and production changes put forth by EAT-Lancet are not equally attainable in all regions and may lead to the loss of meaningful and sustainable cultural heritage. They further contend that EAT-Lancet's objective of designing a universally applicable sustainable food system is overly ambitious and could result in a "one-size-fits-all" approach (Verkerk, 2019b).

At the same time, the report illustrates how these targets align with multiple traditional eating patterns in regions across the world. The existence of the reference diet "on the ground" implies that the empirical food groups and ranges of food intakes provided in the study can be locally interpreted and adapted to shift cuisines and eating habits towards more environmentally sustainable and healthy directions while respecting and representing the culture, geography, and demography of the people consuming the diet.

What is more, when speaking of quantities and proportions of animal-based foods, arguably the most contested part of the report for its relatively small allocated portions, the authors emphasize that these recommendations are to be carefully considered within local contexts (e.g., shepard communities) and cuisines (Willet et al., 2019).

At the core of this thesis and the EAT-Lancet Study are the definitions of healthy and environmentally sustainable diets. Willet et al. (2019) define environmentally sustainable diets as those that, in their production phase, stay below the upper limit of six planetary boundaries, which outline the "safe operating space" for food production globally. These boundaries are climate change, land-system change, freshwater use, nitrogen cycling, phosphorus cycling, and biodiversity loss. Alternatively, the Food and Agriculture Organisation (FAO) defines sustainable diets as those with a low environmental impact that contribute to food security and well-being for the present and future generations (FAO, 2010).

When defining healthy diets, the report focuses on many reviews and meta-analyses of epidemiological studies. Recently, researchers in the medical and health sciences field have shifted from studying the health impact of individual food components to focusing on broader food patterns, an approach also visible in EAT-Lancet's process to define science-based targets for a Healthy Diet. An example of broader food patterns mentioned recurrently in the study is that of the Mediterranean Diet (MDiet), the only regime that demonstrably extends lifespan and has been extensively researched for its acclaimed health benefits (Pes et al., 2022).

The MDiet, rather than being a precise dietary pattern, represents a regime formed by the diverse heritage of the countries in the Mediterranean basin. While the food cultures of these countries differ on many grounds, their standard features, such as the high intake of vegetables, legumes, olive oil, and fish, and the moderate intake of dairy products and meats, generate the patterns that result in the acclaimed health benefits (Coats et al., 2022).

More recently, the MDiet has been recognized for its relatively low environmental impacts (Coats et al., 2022; Dernini et al., 2017). This is partly because of the production methods, which require few inputs and hence support biodiversity, but also because of the recipes and meals' ingredients, which value local and often plant-based products.

While the framework proposed by EAT-Lancet aims to connect the local nature of both food production and food consumption with their global consequences, it does not provide a plan or mandate for translating these science-based targets for a Planetary Health Diet into national and subnational governments and local actors. The MDiet is the first example given as proof of the proposed Planetary Health Diet being consistent with traditional ways of eating. Yet, no followup studies apply the framework to local contexts in Mediterranean countries.

Although the MDiet is characterized by the merging of millennia of trade in ingredients and culture around the Mediterranean Basin, some anthropologists consider Greek cuisine the mother of Mediterranean cuisine due to its historical influence around the East and West Mediterranean. Some Greek recipes go back millennia, representing the core building blocks of what we today call the Mediterranean regime (Renna et al., 2021).

Since the interest of the thesis is to investigate the sustainability of the traditional and fairly "theoretical" MDiet, I will be focusing on traditional recipes instead of individual food components consumption. By this means, if the findings indicate that traditional dishes and eating patterns prove to be sustainable, there will be policy opportunities to further promote the already accepted MDiet. In addition, it will verify the feasibility of the EAT Lancet Planetary Health Diet to work "on the ground". Through taking the creative methodological approach of using culinary

examples, I will examine the sustainability of the most characteristic dishes of Ikaria's gastronomy while considering local preferences and agricultural context. Alternatively, in the case that upon further research traditional MDiets like the one observed in Ikaria demonstrate a low adherence to the Planetary Health Reference Diet, I will try to offer modifications to recipes and eating patterns in order to align the Mediterranean Regime with the reference diet.

This thesis addresses the current discourse on sustainability at both local and global scales, with a particular focus on re-evaluating eating patterns according to healthy and sustainable reference diets. The research aims to investigate the consistency between the EAT-Lancet Reference Diet and the traditional Mediterranean Regimes in insular areas of Greece, and to explore the sustainability of the MDiet in the context of the Planetary Health Diet. Additionally, the research investigates the translation of science-based targets for a Planetary Health Diet into practical Food Based Dietary Guidelines (FBDG). These aims are translated into the following research questions:

- Are eating patterns of traditional Mediterranean Regimes seen in insular areas of Greece consistent with the EAT-Lancet Reference Diet?
  - Can we ensure that food systems are sustainable on a local level, while still meeting global sustainability goals?
- 2. How can these science-based targets for a Planetary Health Diet be translated into local or national Food Based Dietary Guidelines (FBDG)?

## **Chapter 2: Theoretical Framework**

#### 2.1 The Planetary Health Diet

The relationship between human diets, health, and environmental sustainability is deeply interconnected, and healthy diets from sustainable food systems have the potential to benefit both. The pace and magnitude of environmental change have grown rapidly since the mid-1950s, and food production has been a primary contributor to this. To be sustainable, food production must adhere to food-related planetary boundaries concerning climate change, biodiversity loss, land and water use, as well as nitrogen and phosphorus cycles. However, food production must also be intensified sustainably to meet the shifting food demands of an increasing global population.

Willet et al. (2019) developed a pathway for healthy and sustainable diets by 2050 using these boundary targets. To align with international emission reduction goals such as the Sustainable Development Goals and the Paris Agreement, adopting sustainable diets is the single biggest contribution, followed by improved food production through advanced agriculture and technology, and reduced food waste during production and consumption (UNEP, 2018).

As regards to the need for major dietary changes, Willett et al. (2019) argue that the lack of scientific targets for a healthy and sustainable diet has hindered efforts to transform the food system. Based on the best available evidence, the EAT-Lancet commission proposed a dietary pattern named the *Planetary Health Diet* that meets nutritional requirements, promotes health, and enables our food system to stay within planetary boundaries.

To achieve this, the Planetary Health Diet suggests that global consumption of red meat and sugar needs to decrease by more than 50%, while consumption of nuts, fruits, vegetables, and legumes must increase more than two-fold by 2050. The portions of animal source protein are preferably unprocessed meat of 14g/day, from dairy products 250g/day, poultry 29g/day and the portion of fish 28g/day. These targets will need to be adapted locally to accommodate varying local climates,

available agricultural products, dietary preferences and cultural traditions. The authors suggest that a healthy diet should consist of a variety of plant-based foods, low amounts of animal-based foods, unsaturated fats, and limited intake of refined grains, processed foods, and added sugars. The proposed food group intake ranges allow for flexibility in accommodating various dietary preferences, including omnivore, vegetarian, and vegan diets.



Figure 2 The Food Categories of EAT Lancet proportional in weight. Adapted from Willett et al. (2019).

The EAT Lancet Reference Diet includes eight food groups (Figure 2), namely (1) whole grains; (2) tubers or starchy vegetables; (3) vegetables; (4) fruits; (5) dairy foods; (6) protein sources; (7) added fats, and (8) added sugars. The protein sources food group is further divided into six subcategories, mainly (6.1) beef, lamb and pork; (6.2) chicken and other poultry; (6.3) eggs; (6.4) fish; (6.5) legumes and (6.6) nuts. The added fats food group is divided into (7.1) unsaturated oils and (7.2) saturated oils. In total the classification of ingredients entails 14 distinct sub-groups.

#### 2.2 MedDiet 4.0

Dernini et al. (2017) conducted an extensive literature review to showcase the various sustainable advantages of the MDiet, which resulted in a comprehensive multidimensional framework called Med Diet 4.0. The study incorporated research articles published in peer-reviewed Englishlanguage journals that addressed sustainable diets and the MDiet. The approach to developing the methodological framework involved a series of meetings, workshops, and conferences where the framework was presented, scrutinized, and eventually improved.

The authors, in contrast to Willet et al. (2019), use a four-pillar approach to the sustainable benefits of the lifestyle (Figure 3). These include (i) environment, (ii) health, (iii) society and culture, and (iv) economy. This view of sustainability looks not only at environmental sustainability, which is what EAT-Lancet touches upon when mentioning the term but also at three other pillars that actually ensure the regime is sustained throughout time. In addition, as a consequence of being developed *in the context* of the Mediterranean, Med Diet 4.0 brings forth a lot more emphasis on the locality and seasonality of diets as compared to the reference diet.



Figure 3 The Food Categories of EAT Lancet proportional in weight. Adapted from Dernini et al. (2017)

This model brings the multidimensional sustainable benefits of the MDiet to the foreground, with the aim of revitalizing the idea of the MDiet not only as a healthy diet but also a sustainable lifestyle model, with culture and country-specific adaptations. For example, there are many surfaces where growing produce could be a challenging feat, due to soil, precipitation or elevation characteristics. In many of the regions where this is the case in the Mediterranean, herding practices are part of the agricultural heritage. Producing dairy products or milk products from goats, sheep or cows tended in this way will undoubtedly differ from large-scale or "industrial" livestock farming, since the amount of land that needs to be cleared, where the feed is sourced from and the density of animals will vary. The Med Diet 4.0 framework, unlike the Planetary Health Diet, introduces additional parameters to inquire about the sustainability of the ingredients making up our diet. While the EAT Lancet framework concerns itself mostly with what is on our plate, the Med Diet 4.0 framework also questions the origin of the ingredients, method of cultivation and even cultural relevance of what is on our plates.

The justification for integrating both the MedDiet 4.0 and the Planetary Health Diet in the theoretical background of the thesis is rooted in their shared goal of promoting a sustainable food system, albeit through distinct scopes, pillars, methods, and principles that arguably complement each other for a full picture of sustainability.

While both frameworks prioritize the health and sustainability aspects of a sustainable diet, the MedDiet 4.0 framework encompasses the dimensions of "Society and Culture" and "Economy". At the same time, the Planetary Health Diet includes robust quantitative Scientific Targets for different food groups in the diet emerging from a sustainable food system, whereas the MedDiet 4.0 framework limits itself to qualitative propositions. Lastly and most evidently, the Planetary Health Diet is a large-scale attempt to transform the global food system that came with several other targets, whereas the MedDiet 4.0 framework aims to have a regenerative role for a pre-existing but often neglected Diet which has already proven to be sustainable and healthy.

This thesis endeavors to integrate and enhance these frameworks by discussing whether traditional, sustainable diets as defined by the MedDiet 4.0 align with the universal criteria set by the Planetary Health Diet. By looking closely at the sustainability of traditional recipes in this manner, a rich debate on the complex layers of a sustainable global and local food system will be introduced.

# Chapter 3: Methodology

## 3.1 Literature Review

The thesis begins by evaluating the current state of the literature around three overlapping areas deemed relevant for the research aims of the thesis:

- 1. The Sustainability of Mediterranean Diets
- 2. Implementing the Planetary Health Diet's eating guidelines locally while maintaining the cultural identity of diets
- 3. Inclusion of sustainability parameters in Food Based Dietary Guidelines (FBDG)

The literature review was done on two frequently used databases: JSTOR and Google Scholar by searching for the following keywords in accordance with each research area (Table 1)

Table 1- Research areas and keywords

The Sustainability of Mediterranean Diets	"Ikaria", "Sustainable Mediterranean Diets", "Greek Diet Sustainability", "Environmental Footprint of Mediterranean Diet"
Implementing the Planetary Health Diet's eating guidelines at a local scale while maintaining the cultural identity of diets	"adherence to planetary health diet", "EAT- Lancet Case Study", "local planetary health diet"
Inclusion of sustainability parameters in Food Based Dietary Guidelines (FBDG)	"EAT-Lancet", "nutrition guidelines", "national dietary pattern", "health policy", "nutrition policy", "sustainable food guidelines"

For each research area an average of ten potential papers were initially identified, of which 3-5 of the most relevant for the study and research questions were selected after an initial assessment of the abstract and introduction.

#### 3.1.1 Case Study: Ikaria

Willett et al. (2019) repeatedly mention the MDiet, in particular the traditional Greek diet, to accentuate the viability of the Planetary Health Diet. Given that the MDiet is highly heterogeneous and that some sources in the literature praise the Greek-Mediterranean diet for its authenticity and inclusion of archetypes of the MDiet, I will be focusing on the Greek-Mediterranean diet of the Aegean Island of Ikaria.

Having natural borders, smaller populations, and less contact with external influences, islands are appropriate places to study traditional MDiets (Foscolou et al., 2020; Tessier & Gerber, 2005). Notably, there is a Greek island that has been and is extensively researched for the exceptional longevity and low morbidity rates of its inhabitants: Ikaria (Buettner, 2012; Panagiotakos, 2011). Accordingly, as part of the literature review and contextualization chapter, Ikaria, the chosen case study, will be justified and the characteristics of a traditional Ikarian diet and lifestyle will be expanded upon. This will be done using academic literature as well as gray literature originating from an Ikarian cookbook (Kochilas, 2014) and the Ikaria chapter in Buettner (2012) the first book exploring the four regions in the world with the highest population life expectancy and lowest incidence of chronic diseases.

#### 3.2 Data Collection

The thesis will undertake an explanatory sequential design (Creswell & Creswell, 2018). Thus, there will be two parts to the data collection. Initially, quantitative data will be collected and analyzed and the results obtained in this first phase will be followed up and potentially explained in more depth by qualitative data. The quantitative data will be sourced from a well known recipe book of Ikarian Recipes and the qualitative data will be sourced from gray literature originating from Buettner (2012) and Kochilas (2014).

#### 3.2.1 Recipe Data Collection

Naturally, recipes across the Mediterranean vary greatly. Even Greek-Mediterranean Diets and hence the recipes that make them up vary too much to gather a representative recipe collection. Hence the recipes examined will be those originating from "Ikarian" gastronomy, insular areas that have maintained their culinary heritage. The empirical data source for this thesis will be recipes from the recipe book Ikaria, Lessons on Life and Longevity from the Greek Island Where People Forget to Die (Kochilas, 2014). Recipes will be used as the prototype to establish common food groups and their proportions in traditional MDiets, embodied by those in the island of Ikaria. All of the mains in the book will be studied. . Recipes which are almost identical in their ingredient profile to a previously analyzed recipe will be left out.

An additional food category named "other" was included to Willett et al. (2019)'s 14 food categories and sub-categories. The "other" category includes those ingredients that mark the local flavor of the recipe and are not significant in quantity to include in the analysis as well as those that are difficult to categorize. Some examples of ingredients fitting into this created category include zucchini flowers, lemon juice (to taste), refined-grain pasta, nutmeg, fresh oregano, salt and pepper and capers (An exhaustive list of ingredients in this category can be found in Table 5 of the Appendix).

Every food category includes scientific targets for a planetary healthy diet with possible ranges for a 2,500 kcal/day intake. The intake share of each food group is provided through a macronutrient grams consumption per day and caloric intake (kcal) per day. For this study, the weight of the individual food group targets will be used and  $\frac{1}{3}$  of it will be interpreted as equal to one meal, i.e., one recipe.

After recipes are collected, their components will be converted into grams following a systemic approach (Table 2 - Appendix) and entered into a matrix. The servings for each recipe will be another variable collected which will be used to divide the weight of each ingredient to attain a

g/serving variable. Since the Greek Diet, as many other MDiet, is rich in mezzes, and side dishes, it would be a challenge to interpret each recipe as one meal (i.e <sup>1</sup>/<sub>3</sub> of the EAT-Lancet macronutrient grams or calories) - hence, only mains in the Kochilas (2014) will be considered for this thesis.

#### 3.2.2 Grey Literature Data Collection

Kochilas (2014) includes passages about food production and eating habits in Ikaria throughout her work alongside her recipes (e.g Figure 4). These texts will be closely read and passages including keywords representing the EAT Lancet Food Categories will be extracted with Nvivo software. The same process will be followed to analyze passages relating to the Food Categories of EAT Lancet in the Ikaria chapter of Buettner (2012).

#### POTATOES ON THE IKARIAN TABLE

Potatoes and sweet potatoes were and still are basic foods on the island, something that flies in the face of current nutritional trends.

Potatoes are controversial, thanks to the way they are consumed in the United States: as fries, chips, and baked potatoes loaded with butter, sour cream, melted cheese, and bacon bits. A bit of ancient Greek wisdom could easily apply to the New World potato: *pan metron ariston*, or "nothing in excess."

Potatoes are a very good source of vitamin  $B_6$  (important in athletic performance, cardiovascular protection, brain cell and nervous system activity, and building cells), vitamin C, various other B vitamins, potassium, copper, manganese, phosphorus, and dietary fiber. They also contain a variety of phytonutrients with antioxidant activity. As a matter of fact, potatoes' phytochemicals rival those in broccoli. New research has identified 60 different kinds of phytochemicals and vitamins in potatoes, making them a healthy food worth reconsidering, so long as you cook them right. The nutrients in potatoes help lower blood pressure and so protect against cardiovascular disease and may be beneficial for staving off respiratory problems and certain cancers.

Figure 4 Example of a passage describing the gastronomical culture related to an EAT Lancet Food Category, Tubers and Starchy Vegetables. Kochilas (2014)

#### 3.3 Data Analysis

### 3.3.1. Quantitative Data Analysis

In the matrix created for the recipe analysis each ingredient is separated into a different row and classified into one of the EAT Lancet's 14 food categories or subcategories in a separate column. The quantity of each ingredient is converted into grams (See Table 2 in the Appendix to see how this was done systematically) and then divided into the amount of servings per recipe, to obtain the grams per serving of each ingredient. The g/serving for each food group is calculated as the sum of the g/serving for the ingredients of the same group per recipe (Figure 5).

Once the quantities (g/serving) of the 14 EAT Lancet food components are calculated for each recipe, food components are compared and given a score according to the EAT-Lancet Index (Stubbendorf et al., 2022). Since the thesis will be focusing on recipes of mains, two food categories present in the Planetary Health Diet, namely Added Sugars and Fruits, will be excluded. This decision is predicated on the fact that the quantities in which they are present are not deemed statistically significant. Consequently, including them as part of the study may not provide a fair basis for comparison.



Figure 5 - A visual representation of the thesis' methodology

## 3.3.1.1. EAT Lancet Index

In addition, each recipe will be given a total EAT Lancet Index score from 0-3 to evaluate its total adherence to the Planetary Health Diet. Given the absence of a common way to quantify the diet, Stubbendorff et al. (2022) developed a scoring system that rates the level of adherence to the EAT Lancet dietary guidelines for the different food groups. The criteria for the score distribution varies between food groups depending whether their intake is emphasized or limited by the diet (Table 2). Food components in the index are based on the EAT-Lancet diet as grams per day, with some modifications.

To allocate an EAT Lancet Index for food components in servings for one recipe instead of servings per day, this study will divide the "target intake" values provided by EAT Lancet (Willett et al. 2019) and used by Stubbenorff et al. (2022) by three to get a proportional target for one meal of the day. The methodology of dividing the target intake values of the daily Planetary Health Diet by 3 to estimate the values for one meal was also used by Poole et al. (2020) to explore the alignment of US School lunches with the EAT-Lancet reference diet's standards. The numerical values presented in Table 2 were derived by dividing the values from the original table, as provided by Stubbendorff et al. (2022) (Appendix - Table 3 ), by a factor of three.

Food components in the EAT-Lancet Index		Target intake (reference interval per meal)	3 points	2 points	1 point	0 points	Criteria for score distribution
Emphasized Intake	Vegetables Fruits Unsaturated Oils	100 (66.7-200) 66.7 (33.3-100) 13 (7-26.7)	>100 >66.7 >13	66.7- 100 33-67 7-13	33-66.7 16.7-33 3-7	<33 <16.7 <3	Positive Score <u>3 points</u> : intake above target <u>2 points</u> : intake meeting target or lower limit of reference <u>1 points</u> : 50-100% of lower limit of reference <u>0 points</u> : <50% of lower limit of reference interval
	Legumes Nuts Whole Grains	25 (0-50) 16.7 (0-33.3) 77.3	>25 >16.7 >77.3	12.5-25 8.3-16.7	6.25- 12.5 4.2-8.3	<6.25 <4.2 <19.3	Positive Score, adjusted <u>3 points</u> : intake above target

Table 2 - Criteria for the development of the EAT-Lancet index. Adapted from Stubbendorff et al. 2022.

Food components in the EAT-Lancet Index		Target intake (reference interval per meal)	3 points	2 points	1 point	0 points	Criteria for score distribution
	Fish	9.3 (0-33.3)	>9.3	38.7- 77.3 4.7-9.3	19.3- 38.7 2.3-4.7	<2.3	2 points: intake meeting 50-100% of target <u>1 points</u> : intake meeting 25-50% of target <u>0 points</u> : intake meeting 0-25% of target
Limited Intake	Beef and lamb Pork Poultry Eggs Dairy Potatoes Added sugar	2.3 (0-4.7) 2.3 (0-4.7) 9.7 (0-19.3) 13 (0-8.3) 83.3 (0-166.7) 16.7 (0-33.3) 10.3 (0-10.3)	<4.7 <2.3 <9.7 <13 <83.3 <16.7 <10.3	2.3-4.7 2.3-4.7 9.7-19.3 13-8.3 83.3- 166.7 16.7- 33.3 10.3- 20.7	4.7-9.3 4.7-9.3 19.3- 38.7 8.3- 16.7 166.7- 33.3 33.3- 66.7 20.7- 41.3	>9.3 >9.3 >38.7 >16.7 >333.3 >66.7 >41.3	Inverse Score <u>3 points</u> : intake below target <u>2 points</u> : intake meeting up to the upper limit <u>1 points</u> : 100-200% of upper limit of reference <u>0 points</u> : >200% of upper limit of reference interval

To illustrate the calculation of the EAT-Lancet Index for ingredients and recipes, we will examine the recipe for an Ikarian Potato Salad (Kochilas, 2014), designed to yield 5 servings.

Table 3 - Ingredients	, quantities,	and food	categories	of a	5-serving	Ikarian	Potato	Salad	Recipe	from	Kochilas	(2014)	
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Ingredients	Recipe	EAT-Lancet Food	Quantities per
	Quantities (g)	Categories	serving (g/s)
1 pound new potatoes	453	Tubers or starchy	90.6
		vegetables	
1 medium red onion, halved	150	Vegetables	30.0
and sliced			
2 medium firm-ripe tomatoes,	240	Vegetables	48.0
cut into 1-inch (2.5 cm) chunks			
2 Kirby cucumbers	170	Vegetables	34.0
1 large bunch purslane	120	Vegetables	24.0
<sup>1</sup> / <sub>2</sub> cup Greek extra virgin olive	65	Unsaturated Oils	13.0
oil			
3 tablespoons red wine vinegar	0	Other	0.0
2 teaspoons dried Greek	0	Other	0.0
oregano			
Sea salt	0	Other	0.0

Analyzing the Ikarian Potato Salad based on its ingredients, three food categories can be identified:

- Tubers or starchy vegetables (90.6 g/s), exceeding the target intake per recipe (66.67 g/s), resulting in a score of zero points.
- Vegetables (136 g/s), surpassing the target intake per recipe (100 g/r), yielding a score of three points.
- Unsaturated Oils (13 g/s), falling within the range of 6.7-13.3 g/s of the target intake per recipe, contributing a score of two points.

For the remaining food categories not present in the recipe (0 g/s):

- Beef, lamb, and pork; Poultry; Eggs; and Dairy each receive a score of three points, resulting in a total of 12 points.
- Legumes, Nuts, Whole Grains, and Fish all score zero points.

Therefore, the EAT-Lancet Index score for the Ikarian Potato Salad is calculated as the sum of points across all food categories, resulting in a score of 17 points.

### 3.3.2. Qualitative Data Analysis

Structural codes will be developed from each of the fourteen food categories and sub-categories outlined by EAT Lancet (Willett et al. 2019). Each food group will serve as code frames to conduct text search queries and sort the qualitative data. Passages in the text of Kochilas (2014) will be categorized among the different code frames (Table 3) using the NVivo software. This will give an idea on the manifold sustainability facets of a local diet in the Ikaian context.

Whole Grains	Vegetables
Added Fats	Eggs
Fruits	Unsaturated Oils

Tubers or Starchy Vegetables	Nuts
Legumes	Fish
Dairy Food	Beef, Lamb and Pork
Chicken and other Poultry	Other

## 3.3.3. Bridging Quantitative and Qualitative Data

After retrieving the processed quantitative data of the Greek-Mediterranean Regime's adherence to the EAT-Lancet diet and enriching it with passages from Kochilas (2014) obtained through qualitative analysis, the thesis will aim to evaluate the alignment of Ikarian recipes with the Planetary Health Diet more holistically and, using the MedDiet 4.0, comment on the perceived sustainability of the Ikarian food system.

In order to re-create a Planetary Health Diet localized to the Ikarian context, dishes with the highest EAT Lancet adherence Index will be emphasized and adjustments will be proposed for those recipes whose ingredients' shares diverge significantly from the proportions given by the Reference Diet. By analyzing a great deal of recipes, the main differences between a traditional MDiet and the EAT-Lancet reference diet will be detected and the gap between Ikarian Recipes and "Planetary Health Recipes" will be bridged.

In accordance with the variations and gaps between the servings of each food group in Ikarian recipes and the Reference Diet, the thesis will offer overarching recommendations to adjust the Greek-Mediterranean FBDG to fit into a safe operating space for food systems globally while bringing traditional, sustainable and healthy dishes to the foreground. The exercise of modifying and modernizing FBDG to consider present-day concerns and environmental challenges while still embracing one's culinary heritage can be later practiced across regions of the Mediterranean by scanning local recipe archives and commonly consumed ingredients.

#### 3.4 Ethical Considerations

For the literature review there are not many ethical considerations to consider. Potentially, the choice of researching an already extensively studied diet (i.e the MDiet) rather than understudied diets could be an ethical consideration, and the additional selection of Greece as the case study could be another consideration, as other countries around the basin are less well researched when it comes to their food system and might have a stronger need.

#### 3.5 Limitations and Scope

As a study focusing on eating patterns, it is important to consider the limitations of nutritional research. Reporting on food consumption always comes with a relatively high amount of human error or misreporting, which is why this study and the thesis will have a focus on 'traditional' recipes and eating patterns, which composes a large part of the food consumed in Ikaria, albeit not all of the food consumed.

One limitation is that the "other" category may have contained ingredients that could have a significant impact on the health qualities and sustainability of the dishes. For example, herbs, spices, olives, and vinegar are sometimes used in recipes and can affect the health of a recipe and its sustainability, but they do not fit into EAT Lancet categories. Thus, the exclusion of these ingredients from the quantitative analysis could have underestimated their overall impact on the recipes.

In addition, as this study makes a clear link between the Greek diet (in particular the Ikarian diet) and the MDiet, it is assuming that the former is a characterization of the latter, whereas the Mediterranean regime serves as a model that takes into account foods and dietary patterns of many regions around the Mediterranean basin; hence, no particular national or regional cuisine or way of eating is fully reflected in what we conceptualize as the MDiet.

Another limitation of the study is that the EAT-Lancet Commission's healthy reference diet was not specifically intended to assess the sustainability of recipes. To address this, I divided the quantities of each ingredient and the total weight of the recipe by the amount of servings suggested by the recipe in order to get the quantities of each food group in one serving. To compare the serving size of each recipe to the Planetary Health Diet, I divided the EAT-Lancet's daily recommendations by 3 to estimate values for a single meal.

In addition, it should be noted that the healthy reference diet goals were developed based on agricultural practices worldwide, and it is possible that some agricultural practices specific to the Greek-Mediterranean region may have differing impacts. Nevertheless, the healthy reference diet benchmarks are currently the most comprehensive set of goals for predicting optimal health and environmental outcomes.

## **Chapter 4: Contextualization**

#### 4.1 Literature Analysis

"Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems". This was the title given to the highly cited article which introduced a new way of looking at the transformation toward healthy and sustainable food systems. Beyond the realm of academia, the report gained significant media attention since its release, being featured in over 5800 articles across 118 countries and receiving over one million shares on various social media platforms (Stockholm Resilience Center (2019). Part of the impact of the report is explained by how the 'Planetary Health Diet' was the first of its kind to provide scientific targets that brought together optimal health outcomes and an environmentally sustainable food system and defined a safe operating space for food systems (Garcia et al., 2019; Willett et al., 2019).

This literature review reviews the sustainability of MDiets using a local framework (Dernini et al. 2017), to, later on, explore whether traditional eating patterns in Ikaria adhere to the reference diet of EAT-Lancet. By doing so, the thesis will explore the relevance of the scientific standards at a local scale and assess whether the MDiet, represented through traditional Ikarian recipes, can be considered a sustainable healthy diet fit to safeguard our planetary boundaries. Since the traditional MDiet could fit into the framework of a Planetary Health Diet, the pathways to incorporate and promote sustainability parameters in Food Based Dietary Guidelines (FBDG) will be studied, in particular in MDiets.

## 4.1.1. The Sustainability of Traditional Mediterranean Diets

The traditional MDiet is characterized by an abundance of plant-based ingredients such as cereals, fruits, vegetables, beans, nuts, and seeds; moderate quantities of dairy products, often originating from sheep and goat milk, olive oil as the main fat source, eggs, fish and poultry occasionally and

low consumption of red meat (Renna et al., 2021). In Ikaria, a large part of the inhabitants lead a traditional lifestyle characterized by a local adaptation of the Mediterranean regime. The diet of Ikarians is characterized by large volumes of vegetables and potatoes, olives, goat milk, and moderate consumption of cheese, fish, and meat (Pes & Poulain, 2015). While when compared to other dietary patterns, the MDiet is less sustainable than a vegetarian or a vegan dietary pattern, its cultural and social acceptance as well as its palatability arguably make it a more practical option for the region (Coats et al., 2022).

Dernini et al. (2017) developed Med Diet 4.0, a framework that characterized the MDiet through the lens of sustainability. The Med Diet 4.0 framework was developed to allow for country-specific variations while promoting the diversity of Mediterranean food cultures and systems. Each of the four pillars put forward by Dernini et al. (2017) highlights different benefits of a Mediterranean regime as a sustainable dietary pattern.

#### Health

The first pillar synthesizes the significant amount of scientific evidence linking the MDiet with the prevention of chronic non-communicable diseases. Given the rising global prevalence of obesity and diet-related diseases as well as widespread vitamin deficiencies, adopting the MDiet could serve as a cost-effective strategy for healthcare development (Ng et al., 2014).

#### Environment

The second pillar expands on the lower environmental impacts and promotion of biodiversity of the diet. This is attributable to the minimal content of animal products in the diet and its primarily plant-based nature, resulting in lower greenhouse gas emissions and smaller water footprint (van Dooren et al., 2014). Traditionally, the MDiet used indigenous knowledge regarding the use of local crops. Today, non-native species and varieties are having a negative impact on traditional food production systems and biodiversity across the Mediterranean areas (Capone et al., 2012). Preserving and promoting the MDiet, with its wide range of cereals, fruits, and vegetables, including both cultivated and wild species, is critical for conserving the region's exceptionally diverse biological richness, as the Mediterranean has been recognized as a biodiversity hotspot (Trichopoulou et al., 2006). The authors emphasize that seasonal consumption of fresh, local products, traditional culinary practices, conviviality, and frugality are all essential to preserving the MDiet's sustainable heritage (Trichopoulou, 2012).

#### Economy

The third pillar is based on the positive local economic returns of the diet, highlighting it as a catalyst for sustainable development in Mediterranean small rural areas. With its global reputation as a healthy diet, the MDiet can be leveraged to promote local Mediterranean foods, resulting in economic benefits for the region. In addition, by valuing local products and supporting their producers, the dependency on food imports is reduced (Trichopoulou et al., 2006). Another key element for these positive economic returns is the frugality in the MDiet, reflected in the importance placed on food preparation, portion control, and minimizing waste (Dernini & Berry, 2016).

#### Society and Culture

The last pillar builds on how the MDiet promotes the preservation and advancement of local customs and trades, ensuring a harmonious relationship between the traditional Mediterranean landscape and its people (Dernini & Berry, 2016). The MDiet is one of the most well-known examples of culinary heritage. It has been recognized by UNESCO as an intangible cultural heritage of Cyprus, Croatia, Spain, Italy, Morocco, Portugal and, of course, Greece. The MDiet reflects the diverse culinary traditions found throughout the region, showcasing the importance of traditional foods and their influence on cultural identity (Keramaris et al., 2022). The culinary heritage of Europe is deeply rooted in traditional foods, which have gained popularity among consumers and policymakers alike, especially within the European Union. These traditional foods hold immense importance throughout Europe (Keramaris et al., 2022). The word "traditional" refers to the intergenerational transmission of food culture. However, it is important to recognize that the diet is part of a larger, interconnected web of social and cultural factors that have

developed around food production and consumption in the Mediterranean (Trichopoulou et al., 2006). As such, the diet represents a unique example of cultural exchange and appreciation, both locally and globally.

# 4.1.2. The application of the EAT-Lancet Planetary Health Diet on a local scale

While the EAT-Lancet report (Willet et al., 2019) proposes that their guidelines are "universal for all food cultures and production systems in the world, with a high potential of local adaptation and scalability", some academics have presented different views.

Thorkildsen & Reksnes (2020), for example, claim that the diet is highly limiting for meat and other animal-based products, contradicting the dietary guidelines of many countries around the world. The authors also point out that the work by EAT-Lancet fails to account for regional discrepancies in ecological opportunities for food production and that if their recommendations were implemented, many countries would have to increase their imports and dependence on external food systems.

Verkerk (2019a) criticizes the report's definition of sustainable modes of production, mentioning that it avoids areas such as increased utilization of genetically modified (GM) crops and pesticides and frames aspects such as the intensification of agriculture as something merely positive because of crop yields. To counterbalance the critiques of Verkerk (2019a), it needs to be mentioned that Willet et al. (2019) includes greenhouse gas emissions, cropland use, water use, nitrogen application, phosphorous application, and biodiversity loss as its six pillars to define sustainable food production, aiming to weigh them according to their importance.
The same author (Verkerk, 2019a) references Van der Ploeg (2008) to state the need to zoom into regional and local solutions instead of global ones to outbalance globalization and centralization, trends affirmed to counter environmental goals. This statement is given after providing the results of an analysis showing that China, the United States, and India contribute to 67% of the global emissions originating from food, emphasizing the need to focus solutions on those countries at a local scale rather than globally.

At the same time, several studies (e.g., Cambeses-Franco et al., 2022; Kesse-Guyot et al., 2021 and Kovacs et al., 2021) theoretically modeled the reference diet in relation to eating patterns and dietary guidelines around the world to research the environmental, economic and health consequences of adhering to the Planetary Health Diet. This type of research, by comparing very different food environments and eating habits around the world, indicates the value of a global framework for sustainable and healthy diets and the ability to apply the framework locally to assess sustainability and health outcomes.

Surprisingly, while the work of Willet et al. (2019) references the Mediterranean regime repeatedly for its similarities to the proposed Planetary Health diet in terms of a plant-oriented approach and potential to protect human and environmental health (Coats et al., 2022), there is no existing literature applying this framework or comparing it to traditional Mediterranean dietary patterns.

## 4.1.3. Inclusion of sustainability parameters in dietary guidelines

Incorporating environmental concerns into food-based dietary guidelines to bridge health and sustainability goals has become a critical point of discussion among NGOs and policy makers (Dernini et al. 2017). The Food and Agriculture Organization (FAO) published a report titled Plates, Pyramids, Planet (Gonzalez & Garnett, 2016), where developments in national healthy and sustainable dietary guidelines are assessed. According to the document, National food-based dietary guidelines (FBDGs) provide "context-specific advice and principles on healthy diets and lifestyles, which are rooted on sound evidence, and respond to a country's public health and

nutrition priorities, food production and consumption patterns, sociocultural influences, and accessibility, among other factors". In contrast to the EAT-Lancet guidelines for a Planetary Health Diet, FBDGs tend to have more specific goals tailored to the population and health considerations of each country. However, despite their different scopes, both guidelines share a common objective: to offer simplified recommendations and food-group guidelines for promoting optimized dietary patterns.

On a global scale, Gonzalez & Garnett (2016) performed a comparative analysis of the carbon footprint and messages of sustainability in nutritional food guidelines in 83 different countries and found that only four countries (Qatar (Figure 6), Brazil, Sweden, and Germany) have an explicit section related to sustainability in their nutritional guidelines (e.g., reducing meat consumption and consuming local foods...).



Figure 6 - Qatar's Food-BasedDietary Guidelines (Supreme Council of Health, State of Qatar., 2015)

Serra-Majem et al. (2020), by forming international working groups and identifying relevant nutritional and sustainability indicators, proposed an updated version of the Mediterranean Diet Pyramid including sustainability parameters. The new pyramid took the Planetary Health Diet and the Sustainable Development Goals (SDGs) closely into account, fulfilling the call for a unifying framework of sustainable and healthy diets in the Mediterranean. The final pyramid illustrates that to increase the sustainability of the Mediterranean Dietary Pattern, there is a need to decrease consumption of red meat, dairy products and highly processed foods. Simultaneously, increasing the share of legumes, locally grown vegetables, fruits and nuts making up the diet is advised.

Greece's FBDG (Ministry of Health and Welfare, 1999) largely overlaps with the patterns of the MDiet, with the only figure present in the official document communicating these guidelines being a Mediterranean Diet Pyramid (Figure 7). Still, the guidelines have not been updated according to environmental concerns in the food system (FAO, n.d), and they remain very broad, making it difficult for citizens to pragmatically incorporate these recommendations into their everyday meals. This could be one of the contributing factors why the Greek MDiet is gradually being replaced with more Westernized eating habits (Mattavelli et al., 2022).



Figure 7 - Greece's Food-Based Dietary Guidelines. Translated from the Institute of Preventive Environmental & Occupational Medicine, Prolepsis (n.d)

## 4.2 Ikaria

Whilst areas with high longevity rates exist around the world, in 2000, a cluster of villages in Sardinia was found to have an exceptional number of centenarians and, overall, way below-average morbidity. After a blue felt-tip pen was used to draw up the first identified Blue Zone region in Sardinia the name came about. Demographic and epidemiological research continued and four more Blue Zones were validated worldwide, with Ikaria, a Greek island in the central-eastern part Sea being the last one discovered (Pes & Poulain, of the Aegean 2015). Interestingly, while the health constituent of the Blue Zone diets has been thoroughly researched and eating patterns have been associated with the exceptional health and longevity of the inhabitants, there is no published research exploring the sustainability of said diets. With the growing need for win-win diets (i.e., those that result in positive health and environmental outcomes), there is a research gap to be filled to see if Blue Zone diets, like the one in Ikaria, can be seen as a "win-win" reference diet.

Ikaria is a small Greek island situated in the central-eastern Aegean Sea (Figure 8), with a population of around 8000. Its inhabitants have a life expectancy similar to other long-lived populations, with one in three inhabitants making it to their 90s (Buettner, 2012). The longevity of Ikaria's residents has been documented in historical texts, such as the report of Archbishop Joseph Georgirenes from the 17th century. The report notes the exceptional health and long life of the islanders, which he attributed to the quality of the air and water.



Figure 8 - Ikaria (red) on the Greek map (Lencer, 2021).

The traditional Ikarian diet is a typical Mediterranean regimen, with the IKARIA study (Chrysohoou et al., 2015) finding a 69% adherence to the diet among the elder inhabitants of the island, a higher percentage than that in other areas of Greece. The majority of the island's inhabitants follow a plant-dominant diet rich in potatoes, vegetables such as aubergine, red peppers, lettuce, green onions, pulses like chickpeas and lentils, and fresh fruit. Locally produced olive oil is commonly used, which has a higher concentration of polyphenols, oleuropein, and ligstrosides than oils from other Aegean islands. At least 52% of the islanders consume tea made from the endemic plant *Sideritis sipylea*, which has demonstrated anti-inflammatory, antimicrobial, and gastroprotective effects. Coffee consumption is prevalent among the elderly population of Ikaria, and boiled Greek coffee is the preferred option. Although coffee has potential health benefits due to its strong antioxidant action, its pro-oxidant effects should be critically evaluated (Chrysohoou et al., 2015). The island's inhabitants consume a moderate amount of animal products, mainly goat's meat, milk, and cheese (Pes et al., 2022). The island's biodiversity-rich

ecosystem, responsible for the variety in its produce, is due to its geographical position at the crossroads of Europe, Asia, and Africa.

Buettner (2012) was the first book published, alongside a National Geographic series, on the Blue Zones. Throughout the work, the author, Dan Buettner, takes the reader across the four blue zones and shows how their inhabitants live. By including many observations and informal interviews, the aim was to gather lessons which could be transposed in other areas of the world. Given that the existing literature mainly addressed single food components (Pes & Poulain, 2015; Chrysohoou et al., 2015; Legrand et al., 2019; Pes et al., 2022), closely reading Buettner (2012)'s chapter on Ikaria will hopefully give a broader idea of typical recipes and attitudes around food in the Blue Zones and their adherence to the EAT Lancet Reference Diet.

## **Chapter 5: Results and Data Analysis**

To study the sustainability of traditionally Mediterranean dietary patterns, ingredients and recipes in Ikaria were evaluated against the Scientific Targets put forth by EAT Lancet for a Planetary Health Diet. The pie chart on the right in Figure 9 shows an average of the proportion of each food category in the 56 Ikarian recipes analyzed. The area of each slice of the pie chart represents the percentage of the food category it corresponds to, and the total area of the pie chart represents 100%, which is the sum of all the percentages of the food categories. On the left, there is a pie chart with the proportion of each food category as defined by the macronutrient (g/day) targets of EAT Lancet's Planetary Health Diet.

In the following paragraphs, a summary will be provided of the main differences between the proportions of the EAT Lancet food groups between the Planetary Health "Plate" and the Ikarian Plate. All of the ingredients studied making up each food category can be found in Table 4 of the Appendix.



Figure 9 - Average food group proportions in the Planetary Health Diet and the studied Ikarian recipes

#### Fruits and vegetables

The proportion of fruits and vegetables in Ikarian recipes is 44.8%, which is similar to the EAT Lancet reference target of 37.8%. This shows that Ikarian recipes contain a similar and even higher proportion of fruits and vegetables as the Planetary Health Diet's recommended proportion.

#### Dairy foods

In the Ikarian recipe pie chart, dairy foods make up 4.5% of the total food groups, whereas the EAT Lancet reference pie chart suggests a target of 18.9%. Surprisingly, this suggests that Ikarian recipes contain a much lower proportion of dairy foods compared to the ideal reference proportion.

### Whole grains

The proportion of whole grains in Ikarian recipes is 6.5%, which is significantly lower than the EAT Lancet reference target of 17.5%. This suggests that whole grains are not as prominent in Ikarian recipes compared to the ideal reference proportion.

## Plant sourced protein

The proportion of plant sourced protein in Ikarian recipes is 4.5%, which is lower than the EAT Lancet reference target of 9.4%. This suggests that plant sourced protein is not as prominent in Ikarian recipes compared to the ideal reference proportion. This could be, in part, because nuts are not a common element in main dishes.

#### Animal sourced protein

The proportion of animal sourced protein in Ikarian recipes is 27.1%, which is much higher than the EAT Lancet reference target of 7.2%. This indicates that Ikarian recipes rely more heavily on animal sourced protein as a source of protein compared to the EAT Lancet reference.

## Tubers or starchy vegetables

The proportion of tubers or starchy vegetables in Ikarian recipes is 9.2%, which is much higher than the EAT Lancet reference target of 3.8%, showing that Ikarian recipes contain a higher proportion of tubers or starchy vegetables compared to the ideal reference proportion.

#### Unsaturated oils

In the Ikarian recipe pie chart, unsaturated oils make up 3.4% of the total food groups, whereas the EAT Lancet reference pie chart suggests a target of 3.0%. This demonstrates that Ikarian recipes contain a similar but even higher proportion of unsaturated oils compared to the EAT reference proportion.

## 5.1 The Planetary Health Plate and the Ikarian Plate

To assess the differences between the two diets, the quantities of the 11 final subcategories, excluding fruit and added sugars, as they are not typically present in main dishes, were compared in a serving of Ikarian cuisine and a serving of the Reference Diet. These results are presented in Figure 10.



Figure 10 - A comparison of grams per serving between the daily EAT Reference Diet targets (divided by three) and Ikarian recipes from the Kochilas (2014) recipe book.

The categories of the EAT Lancet diet plan were broken down into their respective subcategories and an average was calculated for the grams per serving of each food group in the 56 recipes. A value of 0 grams was assigned to ingredients that were not present in a recipe. The average grams of each food group per recipe, or meal, were then compared to the EAT Lancet's recommended daily serving of each food group, which was divided by three under the assumption that each recipe represents one of the three meals in a day.

Figure 10 shows a similar pattern to the pie chart on Figure 9 but instead of illustrating the average proportion of each food category in EAT Lancet and Ikarian recipes it shows the absolute grams in a serving throughout more categories. There is a strong adherence in the unsaturated oils subgroup, legumes, eggs and chicken and other poultry. The categories that diverge the most with the Reference diet are Beef, Lamb and Pork; Dairy Foods; Fish; Tubers and Starchy Vegetables; Vegetables; and Whole Grains (Table 5).

	Ikaria Plate (g/serving) I	Planetary Health Plate (g/serving)	% Difference
Beef, lamb and pork	33,3	4,7	-85,9
Vegetables	174,6	100	-42,7
Chicken and other poultry	13	9,7	-25,4
Dairy foods	17,6	83,3	373,3
Eggs	1,7	4,3	152,9
Fish	36,3	9,3	-74,4
Legumes	21	25	19,0
Nuts	10,1	16,7	65,3
Tubers or starchy vegetables	37,4	16,7	-55,3
Unsaturated Oils	13,5	13,3	-1,5
Whole grains	23,4	77,3	230,3

Table 5 -	Average	serving	of different	food	groups	in	Ikarian	Plates	versus	Planetary	Health	Plates	and	their	difference
10000 2	2 10010020	sorving	0] (20)/01010	1000	Siomps	010	1/300/00000	1 101103	0015005	1 101101011	1 10000000	1 100000	UVIVUV	115001	111/10/01/00

## 5.2 The EAT Lancet Index of Ikarian Recipes and Ingredients

By comparing the ingredient proportions of an extensive archive of traditional Greek recipes with the portion of each food group prescribed by the Planetary Health reference diet, the following section will evaluate which food groups and recipes fit into EAT Lancet's guidelines and which do not. In the discussion, these results will be used to evaluate how traditional recipes could be modified to be more like "Planetary Health Meals".

Using the EAT Lancet Index, the adherence of the ingredients of the recipes was evaluated based on how their quantity in each serving compares to the recommended intake of that ingredient in the Planetary Health Diet. Figure 11 shows the distribution of EAT Lancet Index scores per each food category.



Figure 11 - EAT Lancet Index Score distribution among different food groups

The stacked bar chart on Figure 11 shows the distribution of EAT Lancet Index scores for each of the different food categories, with each score level (0, 1, 2, and 3) represented by a different

color within the chart. Categories like Beef, Lamb and Pork; Chicken and Poultry; Dairy Foods and Eggs had the highest percentage of score 3 given, which indicates that most recipes have a quantity of these ingredients that adheres strongly with EAT Lancet's Reference Diet guidelines. However, looking closely at how the EAT Lancet Index allocates its points Inversely for the food categories with a "Limited Intake", i.e., Beef, Lamb and Pork; Chicken/Poultry; Dairy Foods; Eggs and Tubers, if a recipe doesn't contain an ingredient belonging to that category or the ingredient is present in a serving below the EAT Lancet target, 3 points are allocated to the Limited Intake category in that recipe. At the same time, if a recipe contains less than half of the target of an ingredient belonging to the category "Emphasized Intake", it gets given a score of 0. This scoring system places a higher weight on the Limited Intake categories, meaning that a recipe can only receive a high overall score if it restricts the use of those ingredients. On the other hand, failing to meet the target for an Emphasized Intake category can lead to a low score, even if the recipe includes plenty of other healthy ingredients.

Lastly, to evaluate which of the recipes had most adherence to the Planetary Health Diet, the scores for the ingredients making up the recipes were added up and became a total Planetary Health Recipe Index. The recipes were classified into quartiles based on their total points and presented in a color-coded tree map (Figure 12). Table 5 in the Appendix includes the full list of recipes with their score.

Spicy Black-Eyed	Arugula, Mint, and Fresh Fava Bean							
with Smoked Herring	GARIAG							
Smoked Herring Rice								
				Ikarian Styl Stuffed Zucch		Soup Fresh Fava B 1000 Puree	ean Collar with	ds Cook Potatoe
Onion and Tomato Stew with Herring				Winter Pork	Chicken in a Pot with Okra	Tourlou: Par Roasted Potate Zucchini an Oregano	n pes, d Red G Pa	oat and ista
			Stewed Fresh Okra	Soup				
Lemony Chickness					Potatoes Braised with Wild Fenne	Goat and Vegetable Soup	Baby G with	ioat Bra h Fenne
Braised with Chard and Dill			Rabbit Stew	Soup-Stew with Bulgur and Lamb	Pork, Wild Fenn	el One Pot Pork		
ио					and Barley Rusk	and Taro	Ikarian Milk Soup	Baby with Y Avgole
Hake Boked with				Ikarian Potato Salad	Homemade Trahana	Omelet with Wild Onion Stalks	Aunt Athir Head	na's Ika Icheese

Figure 12 - Total EAT Lancet Index Score across 52 recipes analyzed

The recipe with the highest score was the Spicy Black Eyed Peas and Greens with Smoked Herring and the recipe with the lowest score was Aunt Athina's Ikarian Headcheese. All recipes in the first or lowest quartile, i.e., those with the lowest adherence to the Planetary Health Diet, had scores between 12 and 17. Examples include Baby Goat Braised with Fennel, Ikarian Milk Soup, One Pot Pork and Taro, Omelet with Wild Onion Stalks, Red Goat and Pasta and Ikarian Potato Salad. They all contain either Pork, Goat, Beef, Eggs, Dairy, Lamb or a base of Potatoes. Most contain very few vegetables or whole grains. Recipes in the second quartile had total scores between 18 and 20. Examples include Fresh Fava Bean Puree, Ikarian Fish Soup with Avgolemono, Pork and Collard Green Stew and Greek Salad with an Ikarian Touch. These often still contain an ingredient of the Limited Intake category such as Dairy or Pork but also have the presence of several Emphasized Intake ingredients. If they don't contain any ingredients from the Limited Intake category, the case is likely that the ingredient list is very short. Recipes in the third quartile have total EAT Lancet Index scores between 21 and 22. Only two out of thirteen recipes in this quartile contain ingredients from Limited Intake categories, and those are the Chicken Stifado and the Spicy Oven Braised Beans and Pumpkin. All recipes have a combination of vegetables, unsaturated oils, fish, legumes and even nuts. Some examples are Green Almonds with Onions and Tomatoes, Stuffed Tomatoes and Peppers, Cornmeal and Greens Soup and Lentil Soup With Sage and Chile Pepper. In the fourth quartile, the recipes have scores between 23 and 27, Examples include Stovetop Salt Cod with Tomatoes and Onions, Hake Baked with Okra, Giant Beans baked with Grape Molasses and Herbs and, with an exceptionally high score, Spicy Black-Eyed Peas and Greens with Smoked Herring, which has 3 EAT Lancet Index points for every food category except Nuts and Whole Grains. All of these recipes share a long list of Emphasized Intake ingredients and no Limited Intake ingredients.

## 5.3 Qualitative Data Findings

To complement and enrich the quantitative findings, this study incorporates qualitative data from sources analyzed using Nvivo. Specifically, excerpts from Kochilas (2014) and Buettner (2012) will

be presented and analyzed to help shed light on the observed variations between the EAT Lancet and Ikarian Diets, in particular in terms of their absolute grams of food per serving across various categories.

## Whole Grains

Source	Excerpt	Evidence for/against Quantitative
		Findings
Kochilas	Accounts of dinner surprised me, for	The qualitative passages provide
(2014)	almost everyone I spoke with recounted	additional context and information
	it as being mainly starch-based: matsi, a	about the types of whole grains
	kind of noodle; trahana, the fermented	consumed in Ikaria and how they are
	yogurt-or milk-based pebbly wheat	prepared and incorporated into meals.
	product	They do not directly contradict the
		quantitative findings, but they do suggest
	The type of grains they ate also came as	that whole grains are not the primary
	a surprise. Wheat, so closely associated	source of starch in the Ikarian diet, and
	with the Mediterranean diet, was less	that other types of grains, such as barley
	prevalent on Ikaria proper than barley	and rye, are more commonly consumed
	and rye. Most wheat was cultivated by	than wheat. Additionally, the passages
	Ikarians on land they owned across the	suggest that whole grains are often used
	sea in Asia Minor (Turkey), and wheat	in combination with other ingredients,
	flour was either mixed with rye or barley	such as milk or yogurt, to make porridge
	to make bread or used alone in holiday	or soups, rather than being consumed as
	breads or to make pasta and trahana.	a standalone dish. There is also an idea
	Corn was also a vital part of the diet, in	introduced that refined grains have
	soups, stuffings, and as flour. So were	become more common in the last
	carob and even acorns, both nutritionally	decades by saying "before rice became a
	dense and both milled into flour for use	common grain". Overall, the qualitative
	in fritters and even as porridge.	data helps to provide a more nuanced

Before rice became a common grain in	understanding of the role of whole grains
Greece, village cooks on Ikaria relied on	in the Ikarian diet.
wheat in all its manifestations to make	
soup more filling: bulgur or cracked	
wheat; trahana, an ancient, granular	
fermented grain product made from	
either bulgur, cracked wheat, or flour and	
whole goat's milk, buttermilk, or yogurt;	
and sometimes the local ribbon-shaped	
pasta called matsi.	
Acorns are seeing a revival in Greece. At	
least one enterprising farmer, on the	
island of Kea, has built a thriving cottage	
industry out of farming and processing	
them for food.	
Porridge made either from corn or	
trahana was eaten for breakfast, and was	
ideal for keeping bellies filled and blood	
glucose low.	
Trahana is an ancient, granular wheat	
product made with milk or yogurt that is	
used as the main ingredient in porridge	
like soups or as a way to thicken other	
soups. It is not unique to Ikaria. Indeed,	
home cooks all over the Eastern	
Mediterranean prepare trahana at the end	
of every summer, when it is hot and	
breezy enough for the pebbly grains to	
dry easily.	

Cornmeal, bobota in Greek, was the stuff	
of poor man's porridges and desserts in	
Greece until the early 1960s.	

# Vegetables (and Fruits)

Source	Excerpt	Evidence for/against Quantitative
		Finding
Kochilas	Ikarians a generation or two ago were	These qualitative passages serve as
(2014)	lucky, for even in poverty they lived (and	evidence supporting the quantitative
	still do) in a rich natural environment that	findings regarding fruits and vegetables
	provided many foods, available in every	in Ikarian recipes. The passages mention
	season, literally just for the picking:	the availability and consumption of a
	several kinds of berries; fruits from both	variety of fruits and vegetables on the
	wild and cultivated trees, among them	island, including wild greens,
	pears, apples, cherries, sour cherries, figs,	mushrooms, berries, and cultivated
	and prickly pears; dozens of different	fruits like pears, apples, cherries, and
	wild mushrooms and perhaps hundreds	figs. Passage 6 highlights that plant-
	of wild greens, certainly more than I	based dishes are a significant part of the
	could count and codify for this book.	islanders' diet, further supporting the
		high consumption of fruits and
	The sweets on Ikaria are not unlike the	vegetables. The passages also emphasize
	sweets that are made elsewhere in	the importance of seasonal and locally
	Greece, but some things stand out	grown produce in the Ikarian diet.
	because of what is on hand naturally:	
	cherries and sour cherries, walnuts,	
	apricots, peaches, young green (male)	
	figs.	
	Much has been said and written about the	
	extensive variety of wild greens on Ikaria	

ch islanders
leed, one of
ty statistics,
and by some
n 300 edible
were almost
up in dire
ia is totally
their garden
an preserve
e inordinate
ain courses,
othing so far
nce, because
n and still are

## Unsaturated Oils

Source	Excerpt	Evidence for/against Quantitative
		Finding
Kochilas	Olive oil flows in copious amounts and	These qualitative passages serve as
(2014)	mostly everyone produces their own. The	evidence in support of the quantitative
	local variety is not the Koroneiki olive,	findings regarding unsaturated oils.
	which produces some of the finest,	
	fruitiest oils in Greece, but a larger variety	

called Hondroelia, or "fat olive," which makes more rustic-flavored oils. It is all extra virgin, of course, and almost all of it, like most of the food produced on Ikaria, is organic.

A whole category of plant-based dishes is called ladera, after the Greek word for olive oil, a nod to its use not only as a cooking fat but as a flavoring agent once the food is cooked.

Olive oil has long been used in many Greek desserts, especially the sweets made during periods of fasting, when butter and dairy are prohibited. Over the years, I've learned to bake almost every imaginable cake with olive oil instead of butter.

In Ikaria, to this day, people eat very little processed food. Sure, fast food has made some inroads, mainly in the form of souvlaki joints, pizzerias, and a few places selling handheld phyllo pies, most of which are slathered with hydrogenated oils. The first passage indicates that almost everyone on Ikaria produces their own extra virgin olive oil, which is a good source of unsaturated fats. The passage also mentions that the food produced on Ikaria is organic, which suggests that the olive oil is likely to be of high quality and not mixed with other, less healthy oils.

The second passage mentions that there is a whole category of plant-based dishes called "ladera," which is named after the Greek word for olive oil. This suggests that olive oil is not only used as a cooking fat, but also as a flavoring agent in dishes.

The third passage indicates that olive oil has long been used in many Greek desserts, especially during fasting periods, which suggests that it is a common ingredient in the Ikarian diet.

The last passage brings in a category that the quantitative data analysis hasn't explored: saturated oils. While they do not seem to form a notable part of food consumption on the island, they are present in certain foods that were not included in the recipes analyzed.

Source	Excerpt	Evidence for/against Quantitative
		Findings
Kochilas (2014)	Several farmers on Ikaria mentioned to me the sweet potatoes they remember as children, in the 1940s and '50s, and that most were grown on the terraced steps in the windswept southern town of Manganitis. My neighbor Titika, for example, recalled the simplest and most desired "dessert" of her youth: "We had sweet potatoes. That's it. With nothing on them. Just baked under the ashes in the fireplace. What a treat."	The passages highlight the importance of potatoes, sweet potatoes, and taro root in the traditional Ikarian diet, with several passages emphasizing the frequency and significance of their consumption. The passages also mention the suitability of Ikaria's soil and climate for growing potatoes and the historical and cultural significance of taro root. These qualitative findings align with the quantitative findings that the proportion of tubers or starchy
	Potatoes and sweet potatoes were and still are basic foods on the island One of the surprising findings of the Ikaria study was the frequency with which Ikarians ate—and still eat— potatoes.	vegetables in Ikarian recipes is much higher than the EAT Lancet reference target, and the serving size of tubers or starchy vegetables is significantly higher in Ikarian plates compared to the EAT Lancet reference diet plate.
	Ikaria has particularly good soil and climate for growing potatoes. There are two potato sowing seasons on the island, one in April and another in August. A majority (69%) of the participants in the Ikaria study were found to adhere to a traditional Mediterranean diet, with one	

difference being their higher rates of
potato consumption.
In Ikaria, taro root is still one of the main
sources of starch, especially in the winter
months. It was the food of sustenance
during the Occupation. Taro root is
boiled for salads, stewed with goat or
pork, cooked with beans, and even
pureed for skordalia.

# Nuts

Source	Excerpt	Evidence for/against Quantitative Findings
Kochilas (2014)	Nuts were and still are part of the diet, and as a kid I recall the awe, city-kid awe, when I first discovered what the snapping sound was on the hottest summer days: pinecones bursting open! We used to spend hours in the forests meticulously fishing for the pine nuts inside the warm, rough cones.	These qualitative passages provide some evidence for our quantitative finding that nuts have a lower proportion in Ikarian recipes compared to the EAT Lancet reference diet. While nuts are part of the Ikarian diet and are used in Greek sweets, the passages do not emphasize a high consumption of nuts in the daily diet.
	Walnuts and almonds also grow well on the island, but the former are more Nuts are a basic ingredient in countless Greek sweets	

# Legumes

Source	Excerpt	Evidence for/against Quantitative
		Findings
Kochilas (2014)	Lunch, the main meal of the day, consisted of a lot of beans and pulses. "We ate beans 6 days a week, split peas, broad beans, white beans, fresh beans, you name it. And maybe some boiled greens," says Popi. Greeks eat lupine beans during times of fasting, especially during Lent, when the beans are in season. And it's no accident why. Lupine beans are made up of 38% protein, 24% complex carbohydrates, and almost 8% minerals, especially iron (twice the amount in spinach), as well as calcium, zinc, magnesium, and copper. Lupines, one of the oldest edible legumes in the Eastern Mediterranean, are still	These qualitative passages serve as evidence for our quantitative findings that legumes are a significant part of the Ikarian diet. Although the proportion of plant-sourced protein in Ikarian recipes is slightly lower than the EAT Lancet reference target, the inclusion of beans and pulses as a staple food, as described in the passages, contributes to the overall intake of plant-based protein in the Ikarian diet.
	in the Eastern Mediterranean, are still part of the Ikarian diet. Lentils are one of the oldest pulses in the Eastern Mediterranean and one of the most important in Ikaria.	

# Fish

Source	Excerpt	Evidence	for/against	Quantitative
		Findings		

Buettner	"Although they love fresh <u>fish</u> Ikarians	The first passage mentions that fish is a
(2012)	eat relatively <u>little</u> of it, perhaps	traditional part of the diet but is eaten
	because the journey to the mountains	relatively little, which serves as evidence
	from the sea traditionally took over a	against the quantitative findings showing
	day, So when the fishmonger arrived,	a higher serving size in Ikarian recipes
	his produce smelled like, well, day-old	compared to the EAT Lancet reference.
	fish"	The second and third passages do seem to
		indicate that fish is a popular ingredient in
Kochilas	Fish and game, of course, have always	Ikarian dishes and that its a highly valued
(2014)	been available if one were so inclined	ingredient.
	to catch them. The two main game	
	animals on Ikaria are partridges and	
	hares. Snails, periwinkles, sea urchins	
	are still accessible treats, too, but less	
	so, as pollution has done its job,	
	diminishing their numbers and quality.	
	Fish soups probably top the list of	
	favorite Ikarian dishes, and together	
	with the poached fish themselves and	
	boiled vegetables from the pot, make a	
	main meal.	

# Eggs

Source	Excerpt	Evidence for/against Quantitative Findings
Kochilas (2014)	Hens were more valuable for their eggs than for their meat.	The qualitative passage provided suggests that eggs were highly valued on Ikaria for their nutritional contribution. However, it does not directly relate to our quantitative findings regarding eggs. Therefore, it does not serve as evidence for or against our quantitative findings.

Source	Excerpt	Evidence for/against Quantitative
		Finding
Buettner (2012)	Their diet was also typical of the area: a breakfast of goat's milk, condensed wine, sage tea or coffee, and honey and bread. Lunch was almost always beans (lentils, garbanzos), potatoes, greens (fennel, dandelion, or a spinach-like green called horta), and whatever seasonal vegetable their garden produced; dinner was bread and goat's milk.	The qualitative passages about dairy consumption in Ikaria provide evidence that supports the quantitative finding that dairy foods make up a lower proportion of the total food groups in Ikarian recipes compared to the EAT Lancet reference target. Specifically, passages 1, 2, and 4 highlight the consumption of goat's milk and cheese in the traditional Ikarian diet, which is a
Kochilas (2014)	Breakfast for the people who are now in their golden years was almost always liquid! Goat's milk, loaded with antioxidants and much easier to digest than cow's milk, was and still is available for about half the year, during periods when the goats are not nursing. Most of the permanent residents on the island are fairly self-sufficient: They produce their own wine, milk their own goats and make cheese; pick their own volvoi (bulbs) to pickle; go foraging for greens, wild asparagus, mushrooms; they fish, and some even hunt. Almost all keep a large garden and other farm animals, like chickens.	form of dairy, but may not be consumed in large enough quantities to meet the EAT Lancet reference target. Passage 3 also suggests that Ikarians are self- sufficient in producing their own dairy products, which may explain why dairy foods are not a major component of their diet. Furthermore, none of the passages suggest that dairy is a significant source of protein or other nutrients in the Ikarian diet, which is consistent with the lower proportion of dairy foods in Ikarian recipes.

Greek salad on Ikaria often comes tossed	
with kathoura, the local goat's milk	
cheese, although feta (which is made with	
sheep's and some goat's milk) is a	
perfectly suited and more familiar	
addition for American cooks.	
Trahana is an ancient, granular wheat	
product made with milk or yogurt that is	
used as the main ingredient in porridge	
like soups or as a way to thicken other	
soups. It is not unique to Ikaria. Indeed,	
home cooks all over the Eastern	
Mediterranean prepare trahana at the end	
of every summer, when it is hot and	
breezy enough for the pebbly grains to	
dry easily.	
	Greek salad on Ikaria often comes tossed with kathoura, the local goat's milk cheese, although feta (which is made with sheep's and some goat's milk) is a perfectly suited and more familiar addition for American cooks. Trahana is an ancient, granular wheat product made with milk or yogurt that is used as the main ingredient in porridge like soups or as a way to thicken other soups. It is not unique to Ikaria. Indeed, home cooks all over the Eastern Mediterranean prepare trahana at the end of every summer, when it is hot and breezy enough for the pebbly grains to dry easily.

Beef, Lamb and Pork

Source	Excerpt	Evidence for/against Quantitative
		Findings
Buettner	"As on Sardinia and Okinawa, <u>meat was</u>	The qualitative passages provide evidence
(2012)	reserved mostly for festivals or holidays	for the quantitative findings regarding
	when they would slaughter the family	Beef, Lamb and Pork in Ikarian recipes.
	pig."	The passages suggest that animal protein,
		particularly pork and goat meat, has been
	"If we had a pig and it was pork season,	historically important as a protein source
	we added a little to the beans or	and is still prevalent in the diet. This
	potatoes," says Popi. Indeed, pork has	supports the finding that the proportion
	always been very important as a protein	of animal sourced protein in Ikarian
	source and more.	recipes is much higher than the EAT

Kochilas	Preserving the island's main source of	Lancet reference target. The qualitative
(2014)	animal protein was an end-of- summer	passages also suggest that beef, lamb, and
	job in most families, the cured goat	pork are consumed in larger serving sizes
	(which is salty, tough, and chewy)	in Ikarian plates compared to the EAT
	providing necessary protein for winter.	Lancet Reference Diet Plate, which
	It was always consumed a little at a time,	supports the finding that these meats
	usually to enhance an otherwise all-	have higher serving sizes in Ikarian
	plant-based meal of bean soups and	recipes.
	other vegetable casseroles. It was also	
	served with a few olives and bread as a	
	meze	
	Goat meat is the most prevalent animal	
	protein on Ikaria	

## Chicken and other Poultry

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Source	Excerpt	Evidence for/against Quantitative
		Findings
Kochilas	Today, of course, chicken is a much	These qualitative passages provide some
(2014)	more frequent part of the dinner table	additional context and information about
	and there is at least one commercial	the role of chicken and other poultry in
	producer of chickens on the island. You	the Ikarian diet, but they do not directly
	can find the bird at local supermarkets.	serve as evidence for or against the
	There is no comparison, as anyone with	quantitative findings about chicken and
	a chicken coop will say, between the	other poultry. However, they do suggest
	commercial bird and its garden-strutting	that while chicken is more commonly
	cousin.	eaten today than in the past, ergo the
		slightly higher serving size in Ikarian
	Almost every family keeps a chicken	plates compared to the EAT Lancet
	coop, but hens and roosters weren't the	Reference Diet Plate, it is still not a
	stuff of everyday meals. To this day,	regular part of everyday meals and is

	rooster is a special-occasion meat or	more likely to be reserved for special
major holiday fare. Occasions or holidays.	major holiday fare.	occasions or holidays.

# Added Sugars

		Evidence 101/ ugunist Quantitutive
		Findings
Kochilas (2014)	Chips, candy, and the kind of ice cream so filled with stabilizers that it doesn't melt even under an August sun [] are all now, unfortunately, part of the dietary vernacular. But so are the wild greens and tomatoes and fruits picked in season, fish just minutes out of the sea, the pigs raised in the family barn and fed leftovers from the table and acorns from the forest, the goats that are grazed or fed on clover and bramble, and the chickens that also	Whilst the quantitative analysis excluded the category of added sugars because of a lack of presence in main dishes, the qualitative passages demonstrate that added sugars are increasingly present in the diets of Ikarian inhabitants.
-	eat scraps left over from dinner. Honeyed sweets, made with Ikaria's excellent pine, heather, blossom, and thyme honey are also popular, with the best among them the loukoumades— dough puffs that are deep- fried and drenched in local honey. When it comes to dessert, in my book, there is always room for a little sinfulness, so long as one is guided by sense. Abide by those ancient Greek words of wisdom, Pan metron ariston, or "nothing in excess," and enjoy!	honey is a popular and traditional source of sweetness in local desserts and that it is often of local origin. The third passage proves that the element of frugality, common and celebrated in the Mediterranean Diet (Dernini et al. 2017) also applies for the view of desserts in Ikarian gastronomy.

### Other

In addition to the 14 food categories and sub-categories established by EAT Lancet, an "other" category was included in the analysis. This category comprises ingredients that play a significant role in defining the local flavour of the recipe but are difficult to categorize or have an insignificant weight. Interestingly, the "other" category was the most substantial one in terms of the number of ingredients (refer to Table 1 and Table 4 in the Appendix). Mediterranean cuisines are unique and distinguished by the variety of herbs, spices, and other ingredients that are locally sourced and grown. For example, the people of Ikaria have a strong tradition of drinking "mountain tea" made from a variety of herbs. Wild fennel is another herb that defines local cooking and is used in a variety of dishes.

Source	Excerpt
Buettner (2012)	"In the villages, they drink " <u>mountain tea</u> " every day, sometimes as a medicine but mostly as an end-of-the-day cocktail, usually made from whatever herbs or greens happen to be in season."
Kochilas (2014)	Ikarian cooks make most of the same traditional soups that are found all over Greece: lentil, bean, bulgur-tomato, and more. They season them with the herbs they love and have on hand, like wild sage and oregano for lentil soups, oregano or savoury for white bean soups, maybe with the addition of a heat-inducing chili pepper.
	Wild fennel is the herb that best defines local cooking and the aroma of Ikaria itself. Seawater has long been a source of great flavor to local cooks. They scooped it up in ladlefuls to make their classic fisherman's soup, kakavia. They added it to dishes like Periwinkle Pilaf. They used it as a natural brine, sometimes even storing cheese in it.

## **Chapter 6: Discussion**

The research process was initiated with the question of whether the dietary patterns of Ikaria and the wider Mediterranean region conform to the scientific targets and guidelines presented by the EAT-Lancet Commission. The analysis of the most frequently used ingredients and dishes (see Table 4 in the Appendix), shows consistency with the traditional Mediterranean Dietary Pattern. This includes the frequent use of olive oil in every recipe, high consumption of pulses and legumes, vegetables, and a moderate intake of fish while simultaneously limiting red meat. These dietary characteristics have contributed to the MDiet's favorable ecological footprint compared to industrialized countries' current dietary practices. As a result, it is often cited as an example of the Planetary Health Diet, which promotes plant-based foods, limited consumption of animal-based products, unsaturated fats instead of saturated ones, and minimal intake of refined grains and heavily processed foods.

The following pages will examine to what extent Ikarian and Mediterranean food patterns conform to the Planetary Health Diet, and whether the Reference Diet is a suitable target for the region to strive for to achieve sustainable diets. In the final section, food-based dietary guidelines (FBDGs) will be provided, offering recommendations on how Ikarian recipes can further align with the Planetary Health Plate.

# 6.1 Alignment with the Planetary Health Diet in Ikaria and the Mediterranean

At first glance, the literature (Buettner, 2012; Chrysohoou et al., 2015) and the recipes analyzed suggest that the diet of Ikarians resembles the patterns of a theoretical MDiet and, therefore, could be confirmed as a concrete example of a Planetary Health Diet.

Upon closer examination, significant differences in the proportions of various food categories were noted between Traditional Ikarian meals and recipes and the Reference Diet. Analysis of the average serving size of all recipes revealed notable deviations from recommended intakes for certain food categories in Ikarian recipes. Specifically, Beef, Lamb, and Pork were found to exceed the recommended serving size by 86 percent, while Chicken and other poultry exceeded it by 25 percent, and tubers or starchy vegetables by 55 percent (refer to Table 5 in Chapter 4). Additionally, whole grains, legumes, and nuts did not fully meet the serving target of the EAT Lancet, as their serving sizes were 230 percent, 19 percent, and 65 percent smaller than recommended, respectively. Just like in the new Mediterranean Diet Pyramid developed by Serra-Majem et al. (2020), the results of the recipe analyses suggest the need to decrease the consumption of meat, in particular red meat, as the most urgent recommendation for the MDiet to align with the Planetary Health Diet.

Ikarian recipes surpass the recommended serving size for Vegetables and Fish by 43 and 74 percent respectively but given that these belong to the group of 'Emphasized Intake' this doesn't compromise the adherence of the recipes to the Reference Diet but rather indicates positive adherence. Similarly, the recipes analysed align with the Reference Diet's recommended servings in the food categories of Dairy and Eggs, by staying below the limit target by 373 and 153 percent respectively. In the subsequent section, the factors underlying the substantial and occasionally unexpected contrasts between the meals of the Planetary Health Diet and those of Ikaria will be investigated, as well as the constraints of our research and the EAT Lancet framework, which may also offer an explanation.

# 6.1.1. Addressing the misalignment: limitations of the study and the Planetary Health Diet

A distinction should be made between healthy and sustainable diets. The EAT Lancet Commission advocates for the development of food systems that are environmentally sustainable but also that promote healthy eating habits. That does not mean, however, that lack of adherence to a parameter in the Reference Diet has to result in unsustainable food production. To illustrate, the recipe of Omelet with Wild Onion Stalks, scored in the lowest quartile in terms of adherence to the Reference Diet. Still, nearly all of the ingredients in the recipe could have been harvested from one's own garden with a minimal water and carbon footprint. While this demonstrates biases and limitations of the EAT Lancet Index scoring system, it also points at how some food categories, such as eggs, are in the Limited Intake group for their health characteristics instead of for their high environmental impact. The same goes for Tubers and Starchy Vegetables. A figure in Willett et al. (2019) showing the environmental impact of different food groups indicates that Tubers and Starchy Vegetables rank very low on most categories, particularly land and energy use. Nevertheless, this food category is still placed in the Limited Intake group due to its limited nutritional benefits.

The macronutrient intake range per day for dairy is 0-500 averaging to 250g or 250ml per day. If we add up the weight of all the food categories, the average weight proportion of milk/dairy is 18.9 percent. A factor that can explain why the portion of dairy is quite high in EAT Lancet despite it being a Limited Intake category is that the grams represent "Whole Milk or Equivalents", making it the only food group that is a liquid. That means that by-products of milk such as cheese and yogurt, would have a different weight in the Dairy food category, likely higher, as they require more milk to be produced than the final dairy. If the study would have been able to include such conversions the dairy serving in many Ikarian recipes might have been higher.

This study has a bias against ingredients that are frequently consumed outside of recipes or main dishes. These include nuts and fruit eaten as snacks, eggs for breakfast or savory, milk drunk on its own or sweet filo pastries frequently consumed in-between meals or as an appetizer (Kochilas, 2014). Thus, the food categories containing such ingredients are underrepresented and in some cases excluded from certain analyses. In addition, some assumptions were made regarding different food groups (Appendix – Table 6), such as characterizing a grain as whole grain whenever the recipe gave the option (which might have overestimated the proportion of the food group), periwinkles and snails as fish, and goat within the category of Beef, Lamb, and Pork due to their comparable environmental impact. While EAT Lancet encourages these assumptions and Willett et al. (2019) outlines specific food groups that can be substituted for one another based on their nutritional value and environmental impact, there is no systematic way of doing so or universal values for the environmental impact of an ingredient. Additionally, the self-created "other" category in this study, although not included in the EAT Lancet food categories, is a crucial part of the Ikarian plate and traditional flavor profile. The scope of this thesis will not include evaluating their environmental and health impact, but hopefully future publications will.

The EAT Lancet Index, while an innovative scoring system to quantify the adherence to the Reference Diet, brings some limitations. The EAT Lancet Index scoring system places a higher weight on the Limited Intake categories, meaning that a recipe can only receive a high overall score if it restricts the use of those ingredients. On the other hand, failing to meet the target for an Emphasized Intake category can lead to a low score, even if the recipe includes plenty of other healthy ingredients. As a result, when aiming to create dishes that score well on the EAT Lancet Index need to be mindful of how they balance different food categories and ingredients within their recipes." When it comes to the Planetary Health Recipe total score those recipes with more ingredients will score higher, while not being necessarily more sustainable by adding more ingredients.

## 6.1.2. A Mediterranean Health Diet

The idea of sustainable diets recognizes the interrelationships between food production, consumption, nutrient requirements, and human health in the context of ecosystem health. As

discussions on transitioning to more sustainable food systems and diets continue on an international level, the MDiet has emerged as a promising model for promoting sustainable dietary patterns (Dernini et al. 2017).

The Planetary Health Diet goals of Willett et al. (2019) were developed based on agricultural practices worldwide, and therefore do not take into account specific agricultural practices in certain regions such as the Greek Mediterranean region. Different agricultural practices can lead to different environmental impacts, even if the final product is the same. The cultivation of legumes and nuts and seeds of Ikaria might be more fit for local environmental conditions than the cultivation of the same food groups elsewhere and hence be more likely to be consumed sustainably. Having been developed in the Mediterranean context, the Med Diet 4.0 places greater emphasis on the locality and seasonality of diets compared to the reference diet. The Reference Diet, being a global benchmark, doesn't take these parameters into account. It is important to acknowledge that the Ikarian Diet, as a Mediterranean Diet, encompasses local sustainability values that may not be fully captured by global frameworks such as EAT Lancet.

The portrayal of the Mediterranean Diet as not only a healthy dietary pattern but also a sustainable one has been expanded to encompass its significant socio-cultural, economic, and environmental benefits. The expansion primarily involved establishing a connection between food consumption and the processes of food production and distribution, which are recognized as the key contributors of the food system to ecological pressure on the natural environment. As illustrated in Dernini et al. (2017), there can be a myriad of environmental benefits in having localized Mediterranean food systems. First, local food systems can reduce carbon emissions associated with transportation, as food is produced and consumed within the same region. Several excerpts from Kochilas (2014) and Buettner (2012) emphasize the local sourcing of ingredients such as goat, poultry, eggs, vegetables and fruits in Ikaria. This aligns with the MedDiet 4.0 framework, which emphasizes the consumption of locally sourced foods as part of a sustainable and healthy diet. Second, local food systems can promote biodiversity by supporting small-scale farmers who often grow a wider variety of crops than large-scale industrial agriculture. This is consistent with the MedDiet 4.0 framework's focus on plant-based foods and the inclusion of a wide variety of fruits, vegetables, grains, and legumes. Finally, local food systems can enhance food security by reducing reliance on global food supply chains and increasing access to fresh and nutritious foods.

Still, despite the proven benefits of a local and traditional MDiet, applying this dietary pattern in non-Mediterranean countries remains a challenge. To address this, the UNESCO Chair of "Health Education and Sustainable Development" has introduced the concept of "Planeterranean," which aims to encourage each country to rediscover its unique culinary heritage and develop healthier dietary patterns based on traditional and local foods. Through this approach, it is hoped that the principles of the MDiet can be adapted and applied to different cultures and regions, leading to improved health outcomes and greater sustainability (Colao et al. 2022).

In order to ensure sustainable food systems on a local level, it may be necessary to adapt these benchmarks to the specific context of the region (Garnett et al., 2013). This could involve incorporating local agricultural practices into the benchmarks and assessing their impacts on both health and the environment. It may also involve identifying and addressing any potential conflicts between local and global sustainability goals, in order to ensure that both are met.

In any case, significant changes in global food production will be necessary to align future diets with the reference diet. For instance, to adopt the reference diet, global legume production would need to increase by over 210%, while the production of nuts and seeds would need to increase by 170%. The EAT Lancet Commission doesn't underestimate the degree to which following a Planetary Health Diet will alter food systems around the world and will require changes beyond what's on our plate. Willet et al. (2019) repeatedly refer to nothing less than a Great Food Transformation.

EAT Lancet's Five Strategies for a Great Food Transformation	
1	Seek international and national commitment to shift towards healthy diets
2	Reorient agricultural priorities from producing high quantities of food to producing healthy food
3	Sustainably intensify food production to increase high-quality output
4	Strong and coordinated governance of land and oceans
5	At least halve food losses and waste, in line with UN Sustainable Development Goals

The EAT Lancet Commission outlines five strategies to achieve this Great Food Transformation (Table 6). The first one is 'Seek international and national commitment to shift toward healthy diets'. A course of action to achieve this is to develop dietary guidelines that integrate health and environmental sustainability considerations. To make this happen, relevant national bodies should adopt guidelines for healthy diets from sustainable food systems, supported by appropriate policies and incentives, and reflected in public procurement policies. Additionally, collaboration between public sector organizations and non-governmental organizations that are already progressing guidelines for healthy diets from sustainable food systems could be helpful. The following section will explore how we can create an Ikarian localized dietary guideline that merges traditional Mediterranean Plates with EAT Lancet's Planetary Health Plates.

## 6.2 Building a Food Based Dietary Guideline for Ikaria in line with the Reference Diet

Willett et al. (2019) offer some dietary recommendations that could be translated into a FBDG. These would suggest a diet primarily based on plant-derived proteins such as soy foods, legumes, and nuts. The diet would also include fish or alternative sources of omega-3 fatty acids several times per week, with modest consumption of poultry and eggs and low intakes of red and processed meat. The intake of fats would primarily be from unsaturated plant sources, with limited intakes of saturated fats and avoidance of partially hydrogenated oils. The diet would mainly rely on whole grains for carbohydrate intake, with restricted intake of refined grains and sugar to less than 5% of daily energy intake. Consumption of at least five servings of fruits and vegetables per day, excluding potatoes, would also be recommended, with moderate dairy consumption as an option. However, these recommendations need to be adapted to the context of Mediterranean and Ikarian cuisine, taking into account the findings of this thesis on the divergence of Ikarian plates and Planetary Health Plates.

Through examining the sustainability of the traditional MDiet using global and local sustainable food system frameworks, the thesis will provide a new visual FBDG to promote the MDiet of an Ikarian context. All in all, this will hopefully reach Mediterranean regions and beyond to embrace their gastronomical heritage and embrace local food systems to solve global health and sustainability issues.

When thinking about incorporating sustainability parameters in FBDG, the MDiet has been a case study on how feasible healthy and sustainable dietary guidelines can look like. Still, as mentioned above, Mediterranean populations have seen a loss in the consumption rates of the traditional MDiet in the past decades (Mattavelli et al. 2022). Increasing the consumption and appreciation of specific, more sustainable recipes and eating patterns that have been lost could reconcile the necessity to adopt modes of food consumption that have lower impacts on the environment while protecting the cultural and gastronomic heritage of the region.

Several studies have evaluated how closely National Food Based Dietary Guidelines around the world adhere to the Planetary Health Diet, finding a general shortcoming in the inclusion of sustainability parameters included in these (Hendrie et al. 2022; James-Martin et al. 2022). In the process of making FBDG include sustainability parameters, it is clear we have to localize the Planetary Health Diet by considering food cultures and traditions to make it more concrete and relatable for the population the guidelines are targeting. Questions remain as to whether the EAT Lancet guidelines are the most appropriate to apply when testing the sustainability of a local, in
this case Mediterranean, dietary pattern. Still, in the scope of this thesis the Scientific Targets put forward by EAT Lancet to build the Planetary Health Diet will be used as the benchmark to build a sustainable and healthy Ikarian FBDG.

After comparing the composition of 52 traditional and characteristic recipes of Ikaria to the ideal portions of different food categories put forth by the EAT Lancet Commission, the resulting FBDG was developed in order to increase the adherence of Ikarian popular meals to the Planetary Health Diet (Figure 13). They recommend limiting the consumption of red meat to special occasions, increasing plant-based protein sources such as legumes and nuts, and considering eggs or dairy as alternatives to meat. Additionally, incorporating traditional whole grains like acorn and corn found in Ikaria, being mindful of starchy vegetables, continuing to include a variety of locally grown vegetables, using locally produced Greek Olive Oil, and regularly consuming seafood from trusted sources are recommended. These guidelines emphasize the importance of a predominantly plant-based diet and the incorporation of locally sourced foods, aligning with the principles of the Planetary Health Diet and the Traditional Mediterranean Diet itself.



Figure 13 - FBDG for a higher adherence to the Planetary Health Diet in Ikaria

#### 6.2.1 Planetary Health Recipes

Given that the thesis worked with traditional recipes of the region instead of wider eating habits, the dietary guidelines originating from the lessons of the work will be prescribed in the form of recipes and meal modifications. That is, the plate will serve as the frame in which suggestions will be provided. To develop guidelines for Planetary Health Recipes adapted to the Ikarian context, emphasis will be placed on dishes with the highest EAT Lancet adherence Index while proposing adjustments to recipes whose ingredient proportions vary significantly from the Reference Diet. In order to align with the EAT Lancet guidelines (Willett et al. 2019) and local sustainability frameworks (Dernini et al., 2017 and Serra-Majem et al., 2020), meals consumed daily in Ikaria should be a combination of three elements: whole grains, vegetables and fruits, and legumes. This triad forms the fundamental components of the sustainable Mediterranean Dietary Pattern,

emphasizing plant-based foods and subsequently reducing resource consumption and greenhouse gas emissions. It is recommended to prioritize the consumption of fresh, seasonal, and minimally processed vegetables and fruits. Additionally, when available and feasible, opting for locally sourced cereal-based products and nuts not only supports the local economy but also mitigates the ecological impact associated with the production chain (Serra-Majem et al., 2020).

Animal protein sources with a lower environmental impact, namely fish, poultry, eggs, and rabbit, can be consumed in moderation. Pork and goat should be limited to once or twice a week and for special occasions.

In the context of Ikaria, it is advisable to consume a diverse range of dairy products, with a preference for those sourced from local small-scale producers and farmers. This practice contributes to mitigating the environmental consequences associated with dairy production while simultaneously supporting the local economy. Notably, sheep and goat milk, which represent the customary dairy sources in the region, exhibit a lower environmental footprint compared to cow's dairy. Emphasizing these alternative dairy sources aligns with sustainability objectives and fosters ecological resilience in the local food system.

Incorporation of herbs, spices, garlic, onion, and ingredients listed in the "Other" category (see Table 1 in the Appendix) is recommended, as they enhance the flavor profile and overall palatability of dishes. These ingredients not only contribute to the regional and cultural identities but also add uniqueness to culinary specialties.

Using the findings of the quantitative and qualitative analysis as well as the global and local theoretical frameworks on sustainable diets, the thesis came up with five general recommendations for a sustainable recipe localized to the Ikarian context. Through the adoption of these recommendations, individuals in Ikaria can enjoy sustainable meals that align with global sustainability guidelines while embracing the rich culinary heritage of the region.

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- 1. **Prioritize the "Mediterranean Triad"**: Include a combination of whole grains, vegetables and fruits, and legumes in your meals. These plant-based foods form the foundation of a sustainable Mediterranean dietary pattern, promoting resource conservation and reducing greenhouse gas emissions.
- 2. **Opt for Local and Seasonal Products**: Choose local, seasonal, and minimally processed grains, vegetables, nuts and fruits. This ensures higher nutritional quality, supports the local economy, and reduces the environmental impact associated with long-distance transportation and storage.
- 3. **Diversify Protein Sources**: Give preference to plant proteins such as legumes and nuts. Incorporate animal protein sources with a lower environmental impact, such as fish, poultry, eggs, and rabbit, in moderation. Limit the consumption of pork and goat to once or twice a week and reserve them for special occasions.
- 4. Choose Alternative Dairy Sources: Consider sheep and goat milk as alternatives to cow's dairy, as they exhibit a lower environmental footprint. Emphasizing these locally available dairy sources aligns with sustainability goals and supports ecological resilience in the local food system.
- 5. Utilize Herbs, Spices, and Culinary Ingredients: Enhance the flavor and palatability of dishes by incorporating herbs, spices, garlic, onion, and ingredients listed in the "Other" category. These additions contribute to the regional and cultural identities of the cuisine, adding uniqueness to culinary specialties and making simple plant-based dishes more palatable.

### **Chapter 7: Conclusion**

"Chips, candy, and the kind of ice cream so filled with stabilizers that it doesn't melt even under an August sun [...] are all now, unfortunately, part of the dietary vernacular. But so are the wild greens and tomatoes and fruits picked in season, fish just minutes out of the sea, the pigs raised in the family barn and fed leftovers from the table and acorns from the forest, the goats that are grazed or fed on clover and bramble, and the chickens that also eat scraps left over from dinner." (Kochilas, 2014)

Globally, our diets link human health with environmental sustainability. Urgent action is required to align our eating patterns with global targets such as the Sustainable Development Goals and the Paris Agreement (Willet et al., 2019). However, any transition in dietary habits must carefully consider the preservation of food identity and respect for local culture. The EAT Lancet's Reference Diet, which outlines the recommended food choices to meet nutritional requirements while staying within planetary boundaries, aims to be adaptable across diverse local contexts. While the EAT Lancet Report (Willet et al., 2019) highlights the Mediterranean Diet (MDiet) as a prominent example of a dietary pattern that aligns with the Reference Diet, the specific adherence to the EAT Lancet Reference Diet within regions following traditional Mediterranean eating patterns remains underexplored. Conducting research in this area serves as an initial step towards developing regional adaptations of the Planetary Health Diet.

To do so, this thesis focuses on analyzing the food composition of traditional recipes in Ikaria, an island renowned for its longevity and emblematic adherence to Mediterranean Dietary Patterns. By evaluating the proportions of 11 of EAT Lancet's food subcategories in relation to the ingredient ratios found in 52 recipes documented in an Ikarian cookbook, this study aims to examine the degree of alignment and divergence between Ikarian cuisine, representing a proxy of Greek-Mediterranean culinary traditions, and the principles of the Planetary Health Diet.

Recipes serve as a quantifiable building block in an individual's diet, and although other dietary components, such as snacks and meals without standardized recipes, also play a role, recipes provide a more structured approach for understanding and quantifying dietary patterns. The recipes analyzed for this study represent a sample of the diverse culinary traditions of Ikaria. The insights and recommendations derived from the analysis can be extrapolated to other recipes, even beyond Ikarian cuisine. By doing so, concepts and questions relating to transitioning our food consumption at a local scale and in traditional food system contexts were unleashed. In addition to utilizing recipes as a source of empirical data, this thesis also incorporated qualitative data obtained from passages within the recipe book that provide insights into gastronomical traditions. The findings of this thesis suggest that Ikarian recipes do not always meet the targets put forth by the Planetary Health Diet, particularly for four categories: Beef, Lamb and Pork; Tubers and Starchy Vegetables; Whole Grains and Dairy Foods. Compared with 'Planetary Health Recipes' typical Ikarian recipes contained more red meat, tubers and starchy vegetables, fish and vegetables and fewer whole grains, legumes, and dairy foods. Thus, the thesis suggests that certain

and dairy could contribute to an increased adherence to the Planetary Health Diet.

While the case of Ikaria is individual, we live in a world full of distinctive consumption patterns rooted in traditional food systems. Any Great Food Transformation will require a familiarity with local recipes and ways of eating and producing food. Ultimately, the key to achieving sustainable food systems on a local level while still meeting global sustainability goals will be to strike a balance between the two, and to prioritize the health and well-being of both individuals and ecosystems. This requires a nuanced understanding of the interplay between local and global sustainability goals, as well as a commitment to developing policies and practices that promote sustainability across multiple scales.

modifications to Greek-Mediterranean FBDG, especially with respect to protein sources, grains

In this regard, one of the most significant contributions of this work was a methodological framework to build localized versions of the Planetary Health Diet by using data from local recipes and subsequently creating new FBDG for them to be implemented (Figure 14). Through the

adoption of these recommendations, individuals in Ikaria can enjoy sustainable meals that align with global sustainability guidelines while embracing the rich culinary heritage of the region.

# Food Based Dietary Guidelines for Planetary Health Recipes in Ikaria, Greece



Prioritize the "Mediterranean Triad": whole grains, vegetables and fruits, and legumes Choose local and seasonal products to sustain local economy and short supply chains

Use Olive oil as the main source of dietary lipids

Add herbs, spices, garlic, onion to enhance the flavor profile of meals

Figure 14 - FBDG for recipes in Ikaria and the Mediterranean to adhere with the Planetary Health Diet.

# Chapter 8: Appendices

1 cinnamon stick Total				
1 cup chopped fresh flat-leaf parsley				
1 cup chopped fresh mint				
1 cup dry white wine				
1 cup red wine vinegar Total				
1 cup Samos muscat or other sweet white wine				
1 cup snipped fresh dill Total				
1 cup white wine				
1 fresh or dried chile pepper (optional)				
1 fresh or dried chile pepper,* such as bird's eye, Medusa, Fresno, de árbol, or cayenne				
1 garlic clove				
1 garlic clove, minced Total				
1 or 2 fresh or dried chile peppers				
1 pound Greek noodles (hilopittes or matsi), tagliatelle, fettucine, or egg noodles				
1 sprig fresh rosemary				
1 tablespoon all-purpose flour (optional)				
1 tablespoon coarse sea salt				
1 tablespoon dried Greek oregano				
1 tablespoon dried mint				
1 tablespoon tomato paste Total				
1 tablespoon tomato paste diluted in 1 tablespoon water				
1 tablespoon tomato paste, preferably from sun-dried tomatoes				
1 teaspoon cornstarch				
1/2 cup chopped fresh flat-leaf parsley leaves				
1/2 cup chopped fresh oregano leaves				
1/2 cup dry red wine Total				
1/2 cup dry white wine				
<sup>1</sup> / <sub>2</sub> cup white wine				
1/2 pound Greek hilopites				
1/2 teaspoon black peppercorns				
1/2 to 1 teaspoon cayenne pepper (optional)				
1/3 cup capers, rinsed and drained				
<sup>1</sup> / <sub>3</sub> cup fresh lemon juice				
<sup>1</sup> / <sub>3</sub> cup Greek extra virgin olive oil, plus more for drizzling				
<sup>1</sup> / <sub>3</sub> cup red wine vinegar Total				
<sup>1</sup> / <sub>4</sub> cup red wine vinegar				
10 allspice berries				
1½ cups medium sherry				

Table 1. Ingredients classified as "other".

1 <sup>1</sup> / <sub>2</sub> cups semisweet white or rosé wine			
2 bay leaves Total			
2 fresh or dried chile peppers (optional)			
2 garlic cloves Total			
2 garlic cloves, chopped Total			
2 garlic cloves, finely chopped Total			
2 garlic cloves, minced Total			
2 garlic cloves, peeled and whole			
2 large garlic cloves, chopped			
2 medium garlic cloves, minced			
2 or 3 fresh sage leaves			
2 or 3 sprigs fresh oregano			
2 or 3 sprigs fresh thyme			
2 sprigs dried oregano			
2 tablespoons all-purpose flour			
2 tablespoons chopped fresh flat-leaf parsley			
2 tablespoons chopped fresh oregano			
2 teaspoons dried Oregano			
2 teaspoons paprika			
2 teaspoons red wine vinegar			
2 to 3 sprigs fresh oregano			
2 to 3 tablespoons red wine vinegar (to taste) Total			
2 to 3 tablespoons red wine vinegar (to taste) Total			
2 to 3 tablespoons red wine vinegar (to taste) Total         2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)			
2 to 3 tablespoons red wine vinegar (to taste) Total         2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)         2 <sup>3</sup> cup dry white wine			
2 to 3 tablespoons red wine vinegar (to taste) Total         2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste) <sup>2</sup> / <sub>3</sub> cup dry white wine <sup>2</sup> / <sub>3</sub> cup good red wine vinegar			
2 to 3 tablespoons red wine vinegar (to taste) Total         2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)         2/3 cup dry white wine         2/3 cup good red wine vinegar         21/2 cups fresh lemon juice (from about 15 lemons)			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>2</sup>/<sub>3</sub> cup dry white wine</li> <li><sup>2</sup>/<sub>3</sub> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>3</sup>/<sub>3</sub> cup dry white wine</li> <li><sup>3</sup>/<sub>4</sub> cup good red wine vinegar</li> <li><sup>2</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>2</sup>/<sub>3</sub> cup dry white wine</li> <li><sup>2</sup>/<sub>3</sub> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>7</sup><sub>3</sub> cup dry white wine</li> <li><sup>7</sup><sub>4</sub> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>3</sup>/<sub>3</sub> cup dry white wine</li> <li><sup>3</sup>/<sub>3</sub> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>3</sup> cup dry white wine</li> <li><sup>3</sup> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 allspice berries</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>3</sup>/<sub>3</sub> cup dry white wine</li> <li><sup>3</sup>/<sub>4</sub> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 allspice berries</li> <li>3 or 4 sprigs fresh or dried oregano</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>3</sup> cup dry white wine</li> <li><sup>3</sup> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 allspice berries</li> <li>3 or 4 sprigs fresh or dried oregano</li> <li>3 or 4 sprigs fresh oregano</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>3</sup>/<sub>3</sub> cup dry white wine</li> <li><sup>3</sup>/<sub>4</sub> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 allspice berries</li> <li>3 or 4 sprigs fresh or dried oregano</li> <li>3 or 4 sprigs fresh oregano</li> <li>3 or 4 sprigs fresh thyme</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>7</sup><sub>3</sub> cup dry white wine</li> <li><sup>7</sup><sub>3</sub> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 allspice berries</li> <li>3 or 4 sprigs fresh or dried oregano</li> <li>3 or 4 sprigs fresh thyme</li> <li>3 or 4 zucchini flowers (optional)</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>3</sup> cup dry white wine</li> <li><sup>3</sup> cup good red wine vinegar</li> <li>2<sup>1</sup>/<sub>2</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 sprigs fresh or dried oregano</li> <li>3 or 4 sprigs fresh organo</li> <li>3 or 4 sprigs fresh thyme</li> <li>3 or 4 sprigs fresh or dried thyme</li> </ul>			
2 to 3 tablespoons red wine vinegar (to taste) Total         2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)         2% cup dry white wine         % cup good red wine vinegar         2½ cups fresh lemon juice (from about 15 lemons)         3 bay leaves Total         3 garlic cloves, chopped         3 garlic cloves, finely chopped         3 garlic cloves, minced Total         3 garlic cloves, thinly sliced         3 or 4 allspice berries         3 or 4 sprigs fresh or dried oregano         3 or 4 sprigs fresh thyme         3 or 4 sprigs fresh thyme         3 or 4 sprigs fresh or dried thyme         3 tablespoons capers			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li><sup>7</sup>/<sub>3</sub> cup dry white wine</li> <li><sup>7</sup>/<sub>3</sub> cup good red wine vinegar</li> <li><sup>7</sup>/<sub>4</sub> cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, minced Total</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 allspice berries</li> <li>3 or 4 sprigs fresh or dried oregano</li> <li>3 or 4 sprigs fresh thyme</li> <li>3 or 4 zucchini flowers (optional)</li> <li>3 sprigs fresh or dried thyme</li> <li>3 tablespoons capers</li> <li>3 tablespoons fresh lemon juice Total</li> </ul>			
<ul> <li>2 to 3 tablespoons red wine vinegar (to taste) Total</li> <li>2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)</li> <li>3 cup dry white wine</li> <li>3 cup good red wine vinegar</li> <li>2½ cups fresh lemon juice (from about 15 lemons)</li> <li>3 bay leaves Total</li> <li>3 garlic cloves, chopped</li> <li>3 garlic cloves, finely chopped</li> <li>3 garlic cloves, thinly sliced</li> <li>3 or 4 allspice berries</li> <li>3 or 4 sprigs fresh or dried oregano</li> <li>3 or 4 sprigs fresh thyme</li> <li>3 tablespoons capers</li> <li>3 tablespoons petimezi</li> </ul>			
2 to 3 tablespoons red wine vinegar (to taste) Total         2 to 3 tablespoons red wine, sherry, or balsamic vinegar (to taste)         ¾ cup dry white wine         ¾ cup good red wine vinegar         2½ cups fresh lemon juice (from about 15 lemons)         3 bay leaves Total         3 garlic cloves, chopped         3 garlic cloves, finely chopped         3 garlic cloves, minced Total         3 garlic cloves, thinly sliced         3 or 4 allspice berries         3 or 4 sprigs fresh or dried oregano         3 or 4 sprigs fresh organo         3 or 4 sprigs fresh ordried thyme         3 tablespoons capers         3 tablespoons fresh lemon juice Total         3 tablespoons red wine vinegar Total			

4 bay leaves				
4 cups dry red wine				
4 fresh sage leaves				
4 garlic cloves, minced Total				
4 or 5 sprigs fresh marjoram, oregano, or savory				
4 or 5 sprigs fresh thyme				
4 sage leaves				
4 to 5 tablespoons chopped fresh flat-leaf parsley				
4 to 6 garlic cloves, minced				
5 or 6 allspice berries				
6 bay leaves				
6 cups (or more) water or low-sodium chicken broth or vegetable broth				
6 cups live periwinkles (see Note)				
6 or 7 allspice berries				
6 or 7 black peppercorns				
6 or 7 sprigs fresh thyme				
6 to 10 allspice berries				
6 to 8 allspice berries				
6 to 8 sprigs fresh thyme				
6 whole cloves				
8 kalamata olives				
A pinch of sugar				
coarsely chopped (about 2 cups) 4 garlic cloves				
Flour, for dredging				
Fresh lemon juice, strained				
Freshly grated nutmeg				
Freshly ground black pepper Total				
Grated peel and juice of 1 lemon Total				
Juice of 1 lemon Total				
Juice of 1 lemon, strained Total				
Juice of 1 to 2 lemons (to taste) Total				
Juice of 1 to 2 lemons (to taste), strained Total				
Juice of 1 <sup>1</sup> / <sub>2</sub> lemons, strained Total				
Juice of 2 lemons Total				
Juice of 2 lemons, strained Total				
Juice of 2 lemons,* strained Total				
Lemon wedges, for serving Total				
Pinch of ground allspice Total				
Salt Total				
Salt and freshly ground black pepper Total				
Salt and freshly ground black pepper, to taste				
Salt and Freshly Ground pepper				

Sea salt Total
Sea salt and cracked black pepper Total
Sea salt and freshly ground black pepper Total

Table 2. Systematic transformation of ingredient frequently present weight given in recipes

Quantity given	Grams
1 cup extra virgin olive oil	130 g
1 white onion	150 g
1 large red onion	225 g
1 carrot	125 g
1 medium potato	200 g
1 large potato	250 g
1 large tomato	100 g
1 cup parsley	61 g
1 cup mint	33 g
1 zucchini	320 g
1 cup long grain rice	191 g
1 pound small brown lentils	453 g

## **Table 3**. Criteria for the development of the EAT-Lancet index (Stubbendorff et al. 2022).

Food compone: Lancet Index	nts in the EAT-	Target intake (reference interval per day)	3 points	2 points	1 point	0 points	Criteria for score distribution
Emphasized Intake	Vegetables Fruits Unsaturated Oils	300 (200-600) 200 (100-300) 40 (20-80)	>300 >200 >40	200- 300 100- 200 20-40	100- 200 50-100 10-20	<100 <50 <10	Positive Score <u>3 points</u> : intake above target <u>2 points</u> : intake meeting target or lower limit of reference

							<u>1 points</u> : 50-100% of lower limit of reference <u>0 points</u> : <50% of lower limit of reference interval
	Legumes Nuts Whole Grains Fish	75 (0-150) 50 (0-100) 232 28 (0-100)	>75 >50 >232 >28	37.5- 75 25-50 116- 232 14-28	18.75- 37.5 12.5- 25 58-116 7-14	<18.75 <12.5 <58 <7	Positive Score, adjusted <u>3 points</u> : intake above target <u>2 points</u> : intake meeting 50-100% of target <u>1 points</u> : intake meeting 25-50% of target <u>0 points</u> : intake meeting 0-25% of target
Limited Intake	Beef and lamb Pork Poultry Eggs Dairy Potatoes Added sugar	7 (0-14) 7 (0-14) 29 (0-58) 13 (0-25) 250 (0-500) 50 (0-100) 31 (0-31)	<7 <7 <29 <13 <250 <50 <31	7-14 7-14 29-58 13-25 250- 500 50-100 31-62	14-28 14-28 58-116 25-50 500- 1000 100- 200 62-124	>28 >28 >116 >50 >1000 >200 >124	Inverse Score <u>3 points</u> : intake below target <u>2 points</u> : intake meeting up to the upper limit <u>1 points</u> : 100-200% of upper limit of reference <u>0 points</u> : >200% of upper limit of reference interval

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Table 4. Ingredients in each category

### Ingredients in Each of the EAT-Lancet diet Food Categories

Whole grains Acorn flour, long-grain brown rice, long-grain rice Total, polenta, bulgur, whole-grain rusks for serving, barley rusks, brown or white rice, ears of corn, whole-grain bread

Potatoes	Potatoes, boiling potatoes, Yukon gold potatoes, taro root, pumpkin or butternut
Vegetables	Collard greens, long green sweet peppers, mixed mushrooms, such as oyster mushrooms, boletus, porcini, chanterelles, portobellos, chinese celery, flat-leaf parsley, carrot, peeled and whole, canned tomatoes, fresh flat-leaf parsley, fresh mint, chopped plum tomatoes, tender spring onion stalks or ramps, wild fennel fronds. chopped fresh chervil, red onion, fennel bulb with fronds, amaranth or chard, baby okra, Swiss chard, okra, zucchini, Chinese celery, boiling onions, arugula, pickled onions or shallots, Kirby cucumbers, leeks, collard greens or kale, tomato paste, beefsteak fleshy tomatoes in season, mixed aromatic greens and herbs, scallions, fresh spinach, red or green bell peppers, green beans
Fruits	Raisins, kalamata olives
Dairy	Greek Myzithra cheese, aged Ikarian kathoura, pecorino, whole cow's milk, whole goat's milk, milk, sheep's milk butter, Greek whole-milk yogurt 4 ounces Greek feta, preferably made from 100% goat's milk, crumbled goat's milk cheese, feta cheese
Beef, lamb and pork	Goat shoulder and leg, prosciutto cotto, bone-in pork chops, trimmed of fat, bone-in goat, preferably shoulder, cut into serving pieces, bone-in pork shoulder or leg, pork trotters, boneless pork shoulder, in large chunks
Chicken	Large chicken, medium rabbit, chicken thighs
Eggs	Eggs and egg yolks
Fish	Salt cod, periwinkles, whole soup fish whole grouper, fresh (live) small clams, smoked herrings, whole octopi, cuttlefish (sepia), whole hakes, snails in the shell
Legumes	Dried black-eyed peas, dried fava beans, dried Greek giant beans (gigantes), dried navy beans, small brown lentils, dried chickpeas, split dried fava beans
Nuts	Green almonds
Unsaturated oils	Greek extra virgin olive oil
Added sugars	Sugar, grape molasses

# Table 5. Recipes with their total sum of EAT Lancet Index Score

Recipe	<b>Total Score</b>
Aunt Athina's Ikarian Headcheese	12

Baby Goat with Yogurt Avgolemono	13
Ikarian Milk Soup	13
Omelet with Wild Onion Stalks	14
One Pot Pork and Taro	14
Baby Goat Braised with Fennel	15
Goat and Vegetable Soup	15
Homemade Trahana	15
Pork, Wild Fennel and Barley Rusks	15
Potatoes Braised with Wild Fennel	16
Red Goat and Pasta	16
Tourlou: Pan Roasted Potatoes, Zucchini and Oregano	16
Chicken in a Pot with Okra	17
Ikarian Potato Salad	17
Soup-Stew with Bulgur and Lamb	17
Winter Pork Soup	17
Collards Cooked with Potatoes	18
Fresh Fava Bean Puree	18
Ikarian Fish Soup with Avgolemono	18
Ikarian Style Stuffed Zucchini	18
Pork and Collard Green Stew	18
Rabbit Stew	18
Stewed Fresh Okra	18
Cooked Salad of Amaranth and Zucchini	20
Greek Salad with an Ikarian Touch	20
Mushroom Stew	20
Old Ikarian Tomato-Acorn Soup	20
Salt Cod and Celery Soup Avgolemono	20
Snails Simmered in Tomatoes, Onions and Spices	20
Summer Vegetable Stew	20
Winter Soufico with Pumpkin and Dried Chiles	20
Chicken Stifado	21
Fish Cooked over Winter Vegetables	21
Green Almonds with Onions and Tomatoes	21
Spicy Oven Braised Beans and Pumpkin	21
Stewed Peppers	21
Stuffed Tomatoes and Peppers	21
Yiannis Roussos' Crafty Octopus	21
Black-eyed Pea Salad With Spring Herbs	22
Clam Pilaf	22
Cornmeal and Greens Soup	22
Lentil Salad with Fennel, Onions, and Herbs	22
Lentil Soup With Sage and Chile Pepper	22

Periwinkle Pilaf	22
Cuttlefish braised with Fennel	23
Giant Beans baked with Graped Molasses and Herbs	23
Grouper in Natural Aspic	23
Lemony Fava Beans with Pickled Bulbs	23
Spinach Rice	23
Stovetop Salt Cod with Tomatoes and Onions	23
Arugula, Mint, and Fresh Fava Bean Salad	24
Hake Baked with Okra	24
Lemony Chickpeas Braised with Chard and Dill	24
Onion and Tomato Stew with Herring	26
Smoked Herring Rice	26
Spicy Black-Eyed Peas and Greens with Smoked Herring	27

Table 6. Assumptions with categorizing non-categorizable ingredients

Ingredient	EAT Food Category	Justification
Hilopites or Long-Grain Rice	Whole Grains	It's a main ingredient
Kalamata Olives	Fruit	Similar environmental footprint to produce than other orchard fruits
Rabbit	Chicken	Similar environmental footprint
Periwinkles and snails	Fish	Similar environmental footprint
Clams	Fish	Similar environmental footprint
Goat	Beef, lamb and pork	Similar environmental footprint
Herbs (thyme, oregano, parsley, sage)	Other	When the quantity is $<1/2$ cup not significant enough to count as a vegetable

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