

Analysis of the Andalusian and Basque Country Diets as Examples of a Mediterranean
Diet

by

Paul Keegan Bluhm

A PROJECT

submitted to

Oregon State University

University Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in Nutrition
(Honors Scholar)
Honors Baccalaureate of Arts in International Studies
(Honors Scholar)

Presented on May 28, 2015
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Paul Keegan Bluhm for the degree of Honors Baccalaureate of Science in Nutrition and Honors Baccalaureate of Arts in International Studies presented on May 28, 2015.

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Abstract approved:

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In response to the growing popularity of the Mediterranean Diet, it is important to understand that there are variations between the diets of the many Mediterranean countries. This is certainly true of the diets in Spain, especially among the younger generations. Therefore, should the term “Mediterranean Diet” be universally applied to all diets of Mediterranean countries? Two such diets, from the Basque Country and Andalusia regions in Spain, were examined for their nutritional content, and then compared to the diet standards established for the Mediterranean Diet from Crete. This paper found differences in the diets from the Basque Country and Andalusia, notably when it comes to meat consumption, especially of beef and poultry products, and dairy products besides yogurt in small quantities. Because of that, it is only possible to consider the diet of Andalusia as a Mediterranean diet because of its nutrient profile that includes high consumption of grains, fruits, vegetables, and olive oil. More information is needed to understand how the nutrition profiles of the diets

affects overall health and mortality in the regions.

Key Words: Mediterranean Diet, Basque Country diet, Andalusia diet, Spanish diet,

Nutrition

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I understand that my project will become part of the collection of Oregon State University. My signature below authorizes release of my project to any reader upon request. I also affirm that the work represented in this project is my own work.

Paul Keegan Bluhm, Author

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CHAPTER 1 INTRODUCTION

It should come as no surprise that all over the world, the one thing that has often brought people together is food. Food has been a prominent staple of cultures throughout time; it is one thing to eat simply to survive, it is something completely different to create food that not only nourishes, but pleases the senses and brings about an emotional response. There is something uniquely human about the way we view food, and almost revere it in some cultures. While food in recent years has come under attack for causing issues such as obesity and cancer, there is also the possibility that food is the answer to those problems. As an international student, I enjoyed experiencing various cultures and countries, and their attitudes towards food. There are cultures that consume food for its basic function of nourishment. There are countries that cook food to comfort. Then there are countries that take immense pride in their food, preparing foods that have been passed down for generations.

As a nutrition student studying in the city of Granada, in the autonomous region of Andalusia in southern Spain, I found very early on that I was very interested in the food culture of Spain. Being an American, I was used to having many food options available to me on a daily basis; being in Spain was a time to learn more about their food culture compared to ours. It intrigued me as to what “Spanish” options for food were available. I had always heard so much about the Mediterranean Diet and how good it was for you, and with Spain being a Mediterranean country, I was

curious to see how Spanish diets embodied the Mediterranean Diet. Not surprisingly, this query did not have any one simple explanation. There are a multitude of factors that combined to contribute to the diets of everyday Spaniards: age, physical activity levels, education levels, gender...the list goes on and on.

While on an excursion to the Basque Country in northern Spain, I experienced yet another food culture, which seemingly had nothing in common with Granada other than portion sizes. How could that be? After all, I was still in Spain. Seeing all of the variation in these supposedly Mediterranean Diets had me wondering, “what, then, is their typical diet?” Or should I say, what are the typical diets of Spain?

In essence, the research question of this project comes down to this question: what are typical dietary characteristics of the Basque and Andalusian diets? This is fairly open-ended question, but it incorporates varying questions surrounding these two examples of a Mediterranean Diet, which for the purposes of this paper will be referred to as the Mediterranean Diet of Crete. For instance, what foods do they consume? How do the diets vary from the traditional Mediterranean Diet pyramid, established by Keyes as the traditional diet consumed by inhabitants on the isle of Crete? How does local culture affect food choices? Lastly, what are the key differences between generations? There are questions that become very intriguing, especially when considering how popular the Mediterranean diet has become in the last few years. The Mediterranean diet is often said to be a healthy diet for those dealing with

obesity and other metabolic problems. However, just because a diet is Mediterranean, does that make it healthier than a diet from other regions of the world? This is an important consideration to make, but it is one that is beyond the scope of this paper in the context of the Basque Country and Andalusia diets. Many other questions fall under the same category, but this allows for great future expansion of this topic. Ultimately, the nutritional quality of each diet will be examined, with the hope that a more accurate view of these two Mediterranean diets can provide insight into just how wide-ranging and encompassing a Mediterranean diet can be.

CHAPTER 2 BACKGROUND/LITERATURE REVIEW

2.1 The Mediterranean Diet of Crete

Before jumping in to examine why the Mediterranean Diet has become so popular, it is important to understand some history of the region. Traditionally, the Mediterranean area has been an important space for many cultures. Owing to its geographical borders, much of the history of the ancient Western world took place in and around the Mediterranean. It became the meeting place of people who, through their contacts, have modified cultures, customs, languages, religions, and ways of thinking about evolving lifestyles.¹ All of these evolutions, of course, included food. The typical Mediterranean Diet started with the ancient Romans, who identified bread, wine, and oil products as a symbol of rural culture and agriculture, and supplemented them with cheese, vegetables (including leeks, mallow, lettuce, chicory, and mushrooms), and a little meat, with a strong preference for seafood and fish.¹ As time passed and the world became more globally connected, a significant number of foods were added to the diet. Arabians and Moors from the Middle East and Africa passed along some foods as well as preparation techniques and recipes to the Mediterranean; with the discovery of the Americas, the tomato became the first red vegetable that enriched the baskets of plants to be integrated into the Mediterranean cuisine.¹ Ultimately, the Mediterranean Diet of Crete became a nutritional model belonging to the culture, history, society, territory, and

environment of the Mediterranean, and is closely related to the lifestyles of the Mediterranean people.¹

Often what is thought of as the Mediterranean Diet is not necessarily correct. The generic term 'Mediterranean diet' used in nutrition practice refers to the dietary patterns similar to those observed in Crete in the early 1960s and other regions where olive oil is the major fat source. By that definition, the Mediterranean Diet can be considered to be a near-vegetarian diet.² This means that diets in the Mediterranean areas, traditionally, can be characterized by a much greater intake of cereals,

vegetables, fruit, and fish, but a much smaller intake of potatoes, meat and

dairy foods, eggs, and sweets.² Further research has supported this by noting many common characteristics among Mediterranean Diets: high consumption of olive oil,



Figure 1: Map of Crete. Figure courtesy of www.d.umn.edu

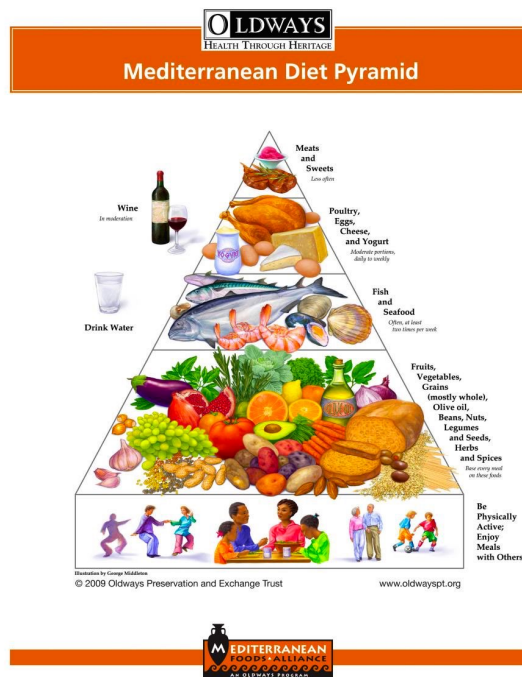


Figure 2: Mediterranean Diet Pyramid. Figure courtesy of www.oldwayspt.org

legumes, whole grain cereals, fruits and vegetables, and moderate wine drinking. Secondly, moderate consumption of fish, dairy products, and low consumption of poultry, meat, and its products is observed.^{3,4} It should also be noted that, although not related to food consumption, physical activity is also very important in the Mediterranean lifestyle. When noting the major diet pillars of the traditional Mediterranean Diet, it quickly becomes clear why it has become immensely popular in today's society: its perceived positive impact on health.

Studies performed in the first half of the 20th century showed that, for some reason, adults living in certain regions bordering the Mediterranean Sea displayed rates of chronic diseases that were among the lowest in the world, in addition to life expectancies that were among the highest in the world. However, such favorable health statistics were not readily explained by educational level, financial status, or health care expenditure. In the absence of those factors, attention was focused on the diet as the key explanatory factor.² This assertion has generally been found to be correct, as Mediterranean countries show a decrease in mortality from diseases of the circulatory system.⁵ Therein lies the root of the popularity of the Mediterranean Diet. Obesity rates, along with a slew of other metabolic disorders, have been on the rise globally in recent decades. If a solution to those problems is as simple as changing one's diet arose, it was bound to receive immense support, which is exactly what happened. Recently, the Mediterranean diet has been positively related to various

health outcomes, including coronary heart diseases, hypertension, dyslipidemia, obesity, cognitive impairment, and metabolic syndrome.⁴

Numerous studies have been performed that examine the true positive health impact a Mediterranean Diet could have on a person's health. One such Meta-Analysis of the diet's effect on Type 2 Diabetes Mellitus showed that the Mediterranean Diet could constitute a beneficial nutrition choice for the primary prevention of diabetes.⁴ Another study has shown that there is a reduced risk of being obese with higher adherence to the Mediterranean Diet of Crete,⁶ which may be due to the different amount of carbohydrates that play a role in reducing body weight. Finally, there is the notable positive impact that the Mediterranean Diet of Crete has on cardiovascular health. The same study above noted how the Mediterranean Diet lowered levels of two inflammatory markers of cardiovascular risk, showing the positive impact the Mediterranean Diet can have on heart health.⁶

It is also important to consider why the Mediterranean Diet has such positive effects on health. The true reason why is well beyond the depth of this project, and the true reason may never be fully known or understood, but there are a few important mechanisms to consider briefly. It is well-known that many foods may have synergistic or antagonistic properties that affect the food-health relationship.⁴ With the traditional Mediterranean Diet, as defined above, being a near-vegetarian diet, it can be expected to produce many well-established health benefits already

known of vegetarian diets. The added bonus is providing any lack of calories or vitamins or minerals occasionally associated with those diets with occasional meat consumption.² This produces a diet that may suspend oxidative stress accumulation, helping with insulin resistance as well as insulin secretion,⁴ which can greatly help with obesity and diabetes. Other mechanisms include the magnesium content of the diet, the fiber content of the diet, and the moderate alcohol consumption of the diet (predominantly through wine consumption) that generate health benefits for the consumer.

While the true Mediterranean Diet of Crete certainly is ideal, the global marketplace has created a tremendous impact on the cultures and lifestyles of many Mediterranean countries. This has also caused a shift in their dietary patterns in many of the nations, as food is much more abundant and varied nowadays in developed countries.⁷ Using Spain as a sample country, it becomes clear how evolved and changed their diet has become, despite being a Mediterranean country with characteristics of the Mediterranean Diet.

There is a small amount of conflicting literature, but one thing is for sure: current food patterns in Spain show high consumption for meat, fish, and dairy products, with much lower intake levels for cereals, potatoes, and legumes.⁷ One study has indicated that fresh fruit intake is much higher in Spain than any other European country,⁵ while another study notes that there has been a steady decline in

fresh fruit and vegetable intake for the last few decades.⁷ However, there is agreement that a substantial source of energy intake in Spanish diets comes from fats, and especially monounsaturated fats.^{5,7} It should come as no surprise that olive oil, very symbolic of the Mediterranean Diet, contributes greatly to this amount of monounsaturated fat. Coinciding with this large amount fat intake is a sharp increase in the consumption of meat and dairy products in Spanish diets since about the 1960s.⁵ All of the above evidence supports the notion that across the Mediterranean region, dietary patterns are changing rapidly to include more meat, fish, and cheese.²

One interesting aspect of this shift in dietary pattern in Spain is how it differs among age groups. The food consumption among elderly people in Spain still shows food patterns that more closely resemble the traditional Mediterranean Diet than for younger age groups.^{7,8} This would indicate that there has been a worsening evolution of nutrient density in children and adolescents in Spain. Much of this has been offset by a dependency on enriched food in Spain as it has emerged in the global marketplace, but the result of this is that the supposedly nutritionally adequate diet of the younger generation in Spain undermines the promotion of adequate dietary habits from the Mediterranean Diet.⁹ Much of this will be discussed further in this paper.

2.2 Basque Country Diet

Before analyzing the diet of the Basque Country, it is important to understand its geography and food culture. The Basque Country is an autonomous region in the North of Spain. Geographically, it is located on the Bay of Biscay, surrounded by mountains to the West, South, and East. For years, Basques have taken great pride in their culture, most evidenced by the preservation of their Basque language, which precedes any modern languages currently spoken. When it comes to food, the Basques are equally prideful. It is noted that per capita, the Basque Country has more Michelin stars than anywhere else in the world.¹⁰ However, it is the proximity to the sea, and greater-than-average rainfall for Spain given their oceanic climate, that have had the most profound impacts on the

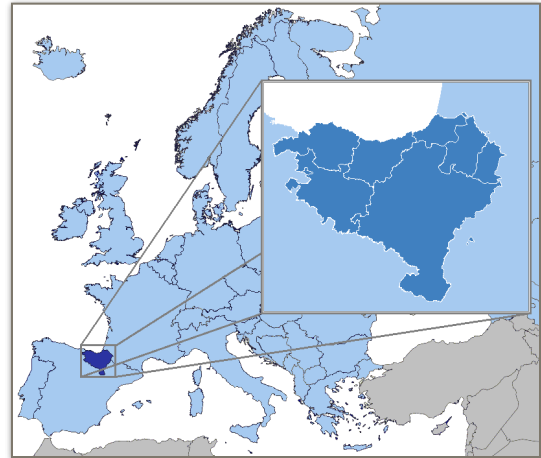


Figure 3: Map of the Basque Country. Figure courtesy of www.wikimedia.org

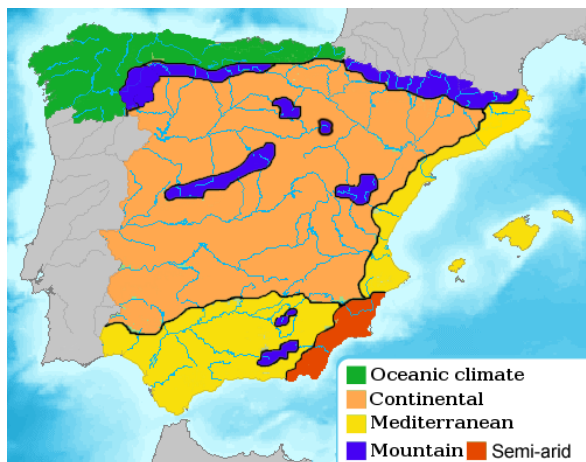


Figure 4: Climate Map of Spain. Figure courtesy of www.wikimedia.org

diet characteristics of the Basque Country.

First and foremost, the food consumption pattern is characterized by a high consumption of meat, supplied mainly by poultry, butchery

products, veal, and fish.¹¹ The meat products, along with a large quantity of dairy products, contribute to a diet that is high in total energy consumption, as well as high in saturated fats.^{12,13} It should also be noted that fish consumption was significantly higher in the Basque Country, especially in terms of lean fish.¹⁴ These fish sources typically include hake, fresh anchovies, cod, small hake, and plaice.¹¹ Despite the large amount of animal protein that is consumed in the Basque Country, the dietary pattern may still be traditional and in harmony with dietary trends in other Mediterranean countries.¹¹ However, the differences between the traditional Mediterranean Diet and the Basque Country diet does raise a question about the nutritional quality of the diet, which will be examined further in this paper.

2.3 Andalusia Diet

Much like the Basque Country, it is important to understand the geography and culture of Andalusia before analyzing the region's diet. Andalusia is Spain's southernmost region, stretching across nearly the whole of southern Spain from the Mediterranean Sea on the east to the Atlantic ocean on the west. It is similar in respect to the Basque Country in that both are on bodies of water, but that is about where the similarities end between Andalusia and the Basque Country. The



Figure 5: Map of Andalusia. Figure courtesy of www.wikimedia.org

climate of Andalusia is much more arid in addition to being warmer. Within Andalusia is actually Europe's only true desert. Andalusia's climate has had a great impact on the foods that are grown and cultivated there. Also of note is how Andalusia's cultural history differs from that of the Basque Country. While the Basque Country has kept its culture intact for millennia, Andalusia is a conglomeration of cultures that is a result of all the cultures that has claimed Andalusia as their home. Perhaps the Moors are the most important to note, because of the Middle Eastern influence that they brought to the region, especially in regards to food. While the region as a whole may not receive the same critical acclaim for their food preparation as the Basque Country, food still plays an incredibly important role in their lives and culture.

Similar to the Basque Country, there are evolutions in the Andalusian diet that differ from the traditional Mediterranean Diet of Crete. It was noted how the food intake in Andalusia departs from the average when it comes to the consumption of cereals, fruit, and dairy products,¹⁵ in that cereal and fruit consumptions were lower, while dairy consumption was higher. The Andalusian diet also displays lower consumption of vegetables, grains, and fibers, while there is a higher intake of meat products.¹⁶ Due to the climate of southern Spain, Andalusia is a major global producer of olive oil, with olive oil being a firm part of the sociocultural traditions in Andalusia. This large production of olive oil results in Andalusia having a higher intake of olive oil

than the rest of Spain.⁸ This high consumption of olive oil augments the lower intake of vegetables because of its high vitamin E and phenolic compounds that have antioxidant properties, which helps to maintain nutritional adequacy in the Andalusian diet.¹⁶ It is also the aspect of the diet that makes the Andalusia diet still resemble a Mediterranean diet. Again, much like the Basque Country, this paper will examine if this shift from the traditional Mediterranean Diet has had an impact on the nutritional quality of the Andalusian diet.

2.4 EPIC Cohort Studies

The EPIC studies, acronym for the European Prospective Investigation into Cancer and Nutrition, were a group of large cohort studies that followed over half a million participants across 10 European countries for nearly 15 years. The studies began in the early 1990s, continuing on into the 2000s, with some results still being drawn at present from data that was collected from the research. The studies were performed to look into the link between diet, nutritional status, lifestyle, and environmental factors, and the coinciding incidence of cancer and other chronic diseases among the European participants.¹⁷ The effects of the EPIC studies were wide-ranging, as a vast array of information on the diets of varying European populations was compiled and analyzed. For the purposes of this study, diet information on the cohorts from the EPIC studies of San Sebastián (in the Basque Country) and Granada (in Andalusia) was of particular interest.

A substantial amount of valuable information resulted from the EPIC cohort studies in regards to the diet characteristics of the Basque Country and Andalusia. One such study focused on the meat consumption in the EPIC cohorts. This was of particular interest because, as mentioned above, the Mediterranean Diet of Crete was a largely vegetarian diet, especially when it came to red meat. The study found that total meat intake across all of Europe was highest in Northern Spain,¹⁸ which was mainly in reference to the San Sebastián cohort. A breakdown of meat products consumption was also compiled, and are presented in the figures below:

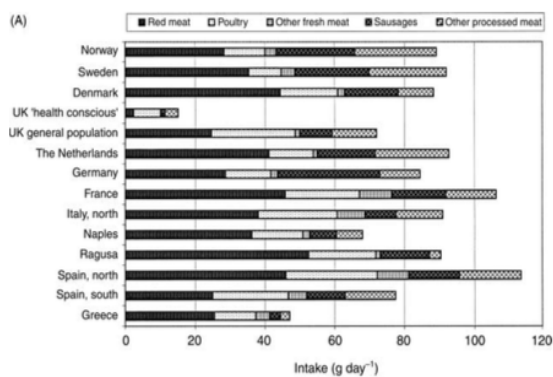


Figure 6: Meat Consumption by Women in Europe¹⁸

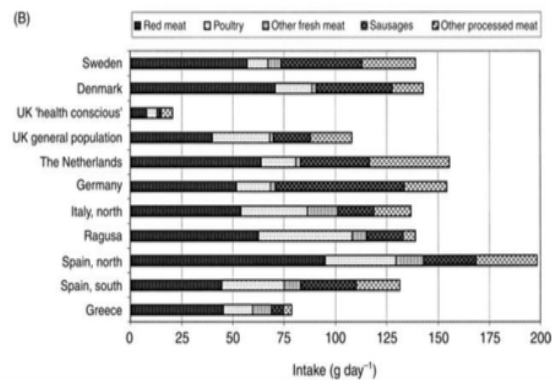


Figure 7: Meat Consumption by Men in Europe¹⁸

As can be seen in the figures, Northern Spain has, by far, the highest consumption of meat, for both men and women. It may also be noted that even for Southern Spain, of which the Granada cohort would be a part, meat intake is much higher than that of Greece, whose diet would likely be most representative of the Mediterranean Diet of Crete.

The degree of meat intake becomes of particular interest when considering fat and protein intake in the regions of interest. Unsurprisingly, another EPIC study

showed that the animal protein intake of the Basque Country was the highest of all countries that participated in the EPIC studies.¹⁹ Andalusia also had elevated levels of animal protein intake, but was still considerably lower than that of the Basque Country. The same study also showed that the plant protein intake of both regions was much more moderate compared to the animal protein intake. Therefore, it is easy to note that a rather high percentage of energy intake from protein is present in both of these diet populations.

One last EPIC study that was evaluated looked at fiber intake in the cohorts of interest, notably from whole grain sources. A characteristic of the Mediterranean Diet of Crete is the consumption of whole grains, which can confer health benefits against diabetes and cardiovascular disease. The study found that, for the entire country of Spain, about 26% of all fiber intake was the result of whole grain sources.²⁰ Compared to other countries studied, this was on the lower end, although it was not considerably lower than the whole grain consumption present in Greece, which may be most representative of the Mediterranean Diet of Crete.

Ultimately, through the participation of over a half million Europeans, the EPIC cohort studies provided incredibly valuable diet information for the citizens of Europe, and those of the Basque Country and Andalusia. The presence of the information from the studies will allow for an effective comparison and verification of the results from this paper.

2.5 Diet Survey Validity

There are a couple of methods available that enable the collection of diet information from a population. The first collection tool is a food frequency questionnaire, which is the most common tool used to collect diet information. A respondent chooses the frequency with which they consume a certain type of food in predefined categories, and a general outline of a person's diet can be attained from those answers. However, a food frequency questionnaire was not used in this study for two reasons. The first was that there was no food frequency questionnaire available that suited a Spanish diet. The second is that a food frequency questionnaire is not able to take into account foods that do not fall under the predefined categories.

Therefore, the second tool was used for this study, which was the 24 hour diet recall survey. This survey consists of a person documenting all their food and drink consumption over a 24 hour period of time. There are a few advantages to this method, in that it includes the way food is prepared, food variances by season are reported, and intake differences between a weekday and the weekend are able to be observed.²¹ The main limitations to this method of collecting diet information are how time-consuming it is, and the level of detail required by the participant. However, this level of detail is what allows such accurate diet information to be collected. The validity of this method is reinforced when it is taken into consideration that all of the EPIC cohort studies utilized a 24 hour diet recall survey to compile their diet data. For

this reason, it was decided that a 24 hour diet recall survey would be used for this study.

CHAPTER 3 METHODS

The methods of this project were broken up into two distinct processes. The first process was the compilation and analysis of academic literature regarding the Mediterranean Diet, as well as the diets of the Andalusia and Basque Country regions. The second process was the dissemination, collection, and analysis of original 24 hour diet recall surveys for use on the nutrition analysis program SuperTracker. Both processes will be outlined below.

3.1 Diet Nutrient Information

The process of reviewing literature can be broken up into two parts. The first part dealt with reviewing literature for information on the Mediterranean Diet. Pubmed, an academic journal search engine, was utilized to search for articles of interest. The search term “history of Mediterranean Diet” was used to search for relevant articles. Relevant articles were selected by title, and those distinguished were then evaluated for appropriate information. A video published by NutritionFacts.org titled “Why Was Heart Disease Rare In The Mediterranean?” was also used to identify potential sources of information. The publisher of this video provided citations of information that were utilized for that area of study. These articles were evaluated for relevancy by title, and once identified, the content was also evaluated and relevant information acquired.

The second part of the literature review was the process of compiling information on the diets of Andalusia and the Basque Country. Pubmed was once again utilized to search for articles of interest. To search for articles relevant to Andalusia, two different search terms were used: “diet Andalusia” and “nutrition Andalusia diet.” Articles that matched the two search terms were evaluated for relevancy by title. Abstracts were then read for all the compiled articles, and articles that contained useful information, such as diet history, nutritional information, and food sources/choices were ultimately read in full, and appropriate information was pulled from the articles for use.

Similarly, to search for articles relevant to the Basque Country on Pubmed, two search terms were used: “diet Basque Country” and “nutrition Basque Country diet.” Articles that matched the two search terms were also evaluated for relevancy by title. If the abstracts indicated the article contained useful information, such as information on diet history, nutritional information, and food sources/choices, the articles were saved and read in full. Appropriate information was then pulled from these articles for use in the paper. For both literature searches, journal articles published before the year 1990 were excluded.

3.2 Population Diet Collection

For the 24 hour diet recall surveys, criteria for inclusion was identified. Based on other industry-standard 24 hour diet recall surveys, the relevant information

included: height, weight, age, city of residence, day of diet recall, type of food consumed, hour food was consumed, a detailed description of the food consumed, amount of food consumed, whether the food was processed or not, where the person ate their food, and who prepared their food. The information was then divided into sections: demographic information appeared once at the top of the form; three different days of diet information appeared in table form; and cooking/eating habits appeared as two questions at the end of the form. Once all the aspects of the 24 hour diet recall survey were formatted, the questions were translated into Spanish with the help of Dr. Guy H. Wood in World Languages and Cultures at Oregon State University. This was done to ensure the accuracy and readability of the document for the Spanish participants. An example survey form can be found in Appendix A.

Upon completion of the 24 hour diet recall survey forms, a set of instructions was created to help the survey participants complete the survey. These instructions were formulated in Spanish, with minor corrections made by Dr. Guy H. Wood, and then included at the beginning of the 24 hour diet recall survey form to guide the participants.

Both the 24 hour diet recall surveys and instructions were emailed to the survey participants in Spain. Those who received the survey included known personal contacts in the cities of Bilbao in the Basque Country and Granada in Andalusia. The contact in the Basque Country was from just outside of Bilbao, referred by a friend

known to the researcher. The two contacts in Andalusia included a pediatrician in Granada and the program coordinator of the researcher's study abroad program in Granada. In addition to these contacts, further participants of the survey were acquired by the forwarding of the surveys by the initial contacts in each region to their friends, family, and colleagues. Survey forms, after full completion, were then returned via email for data collection and analysis.

The reported food intake was evaluated for nutrient content using the SuperTracker nutrient analysis program. SuperTracker was utilized because it compiled all the food intake, and was able to produce nutrition reports based on the food intake. Information from these nutrition reports included the percent of calories of the following nutrients: protein, carbohydrates, fiber, total fat, saturated fat, polyunsaturated fat, and monounsaturated fat. After the nutrient data was compiled, the data was organized based into one of four different groups: Basque diet with survey participant under the age of 40, Basque diet with survey participant over the age of 40, Andalusia diet with survey participant under the age of 45, and Andalusia diet with survey participant over the age of 45.

For each group of data, average diet values of interest were determined using the statistics software MiniTab. Proper average values were determined based on data distribution, and variations in the data were noted. Data was then interpreted graphically, and analyzed for the purposes of this paper.

CHAPTER 4 RESULTS

4.1 Diet Results from the Basque Country

The Basque Country diet was characterized by a generally well-balanced diet. All of the macronutrients fell within the general dietary recommendations of 45-60% of calories from carbohydrates, 10-30% of calories from protein, and 20-35% of calories from fats. However, fiber intake was lower than recommended, while saturated fat intakes were higher, particularly in the younger generation. It is notable that between the generational cutoff, there were no significant nutrient differences, with the exception of fiber intake. All macronutrient levels were within 5% of each other, while fiber intakes were separated by about 5 grams, with the older generation consuming more fiber. However, both populations still fell below the fiber RDA of 25 grams per day for women and 38 grams per day for men. These results can be seen in Figures 7 and 8 at the end of this section. It should be noted that the error bars relate to one standard deviation.

For the younger Basque generation, major food sources generally included fruit juices, raw fruits, cereal grains, and meat products. For the different meat products, there was a noticeable inclusion of pork and beef as meat sources. For the older Basque generation, major food sources generally included raw fruits, vegetables such as carrots, peppers, and green beans, yogurt, and meat products. Much like the younger generation, there was a significant inclusion of pork and beef as meat

sources, but chicken and fish was also as prevalent. Both generations consumed a large quantity of hard crusted bread, usually accompanying a meal.

By and large, both generations consumed the majority of their meals at home, and either prepared their own meals, or a family member prepared their meal. The notable exception was for mid-morning coffees, which would be purchased at a cafe. Other than coffee, very few meals were consumed outside of the home.

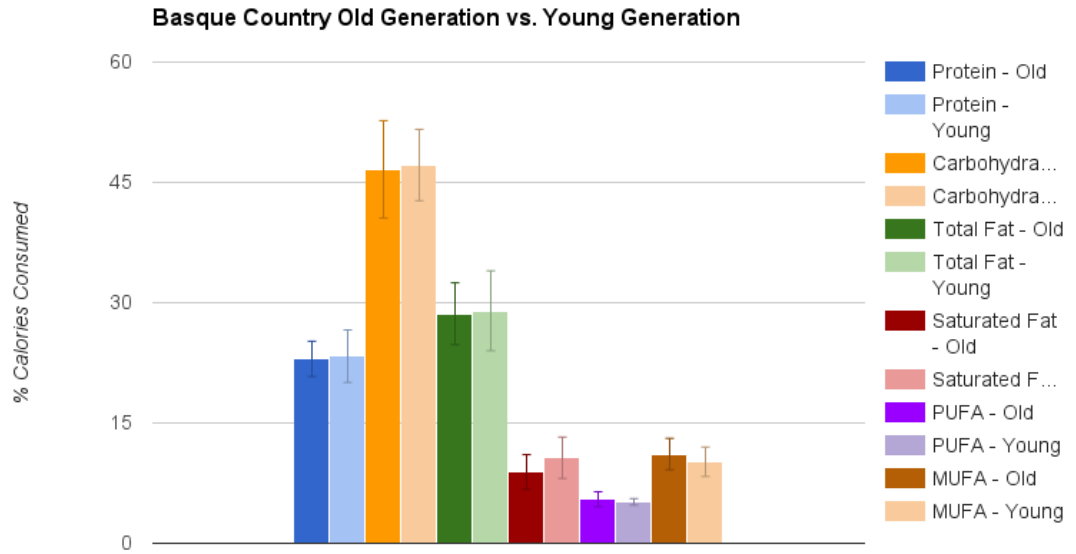


Figure 8: Nutrient Intakes of Basque Country Older Generation (in bold colors) versus Younger Generation (in shaded colors)

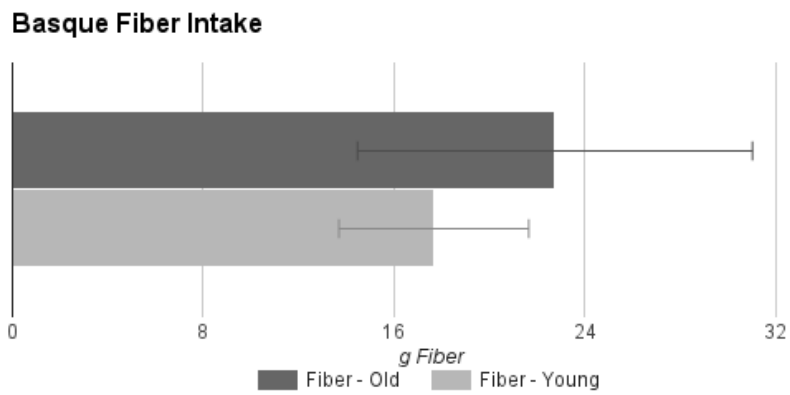


Figure 9: Fiber Intakes of Basque Country Older Generation versus Younger Generation, in total grams of fiber consumed

4.2 Diet Results from Andalusia

Compared to the Basque Country diet, Andalusia displayed lower carbohydrate intake, higher fat intake, and especially higher Monounsaturated Fat intake. The Andalusia diet was characterized overall by a high total fat intake, a low carbohydrate intake, and a normal protein intake, according to the general dietary recommendations. Fiber intake was low as well. Saturated fat intakes were acceptable, while monounsaturated fat levels were substantially high in the population surveyed. There were also notable differences between the generations for protein intake, carbohydrate intake, and fiber intake. Protein intake in the younger generation was about 5% more than the older generation, while carbohydrate intake in the older generation was about 4% more than the younger generation. The older generation consumed about 6 more grams of fiber than the younger generation, but both generations were still below the RDA of 25 grams of fiber per day for women and 38 grams of fiber per day for men. Interestingly, total fat intakes were within a couple of percentage points of each other. These results can be seen in Figures 9 and 10 at the end of this section. It should be noted that the error bars relate to one standard deviation.

For the younger Andalusia generation, food sources were characterized by high intakes of dairy products such as milk, milkshakes, and yogurt, raw fruits and vegetables, olive oil, and processed food items. Tuna was an abundant fish source. For

the older Andalusia population, their major food sources included raw fruits, bread products, olive oil, and meat and fish products. This differed from the younger generation, where more dairy and processed foods were consumed. Pork, especially, and beef were the main meats consumed, while fish types varied. Olive oil was very prevalent in both generations, and was consumed with a vast quantity of foods.

Similar to the Basque Country, both generations tended to prepare and consume the majority of their meals in the house. This includes either them or their significant other cooking the meal. However, during the weekends, more meals were consumed at restaurants or bars, particularly for plates of tapas (small portions of foods that often accompany drinks at a bar or restaurant).

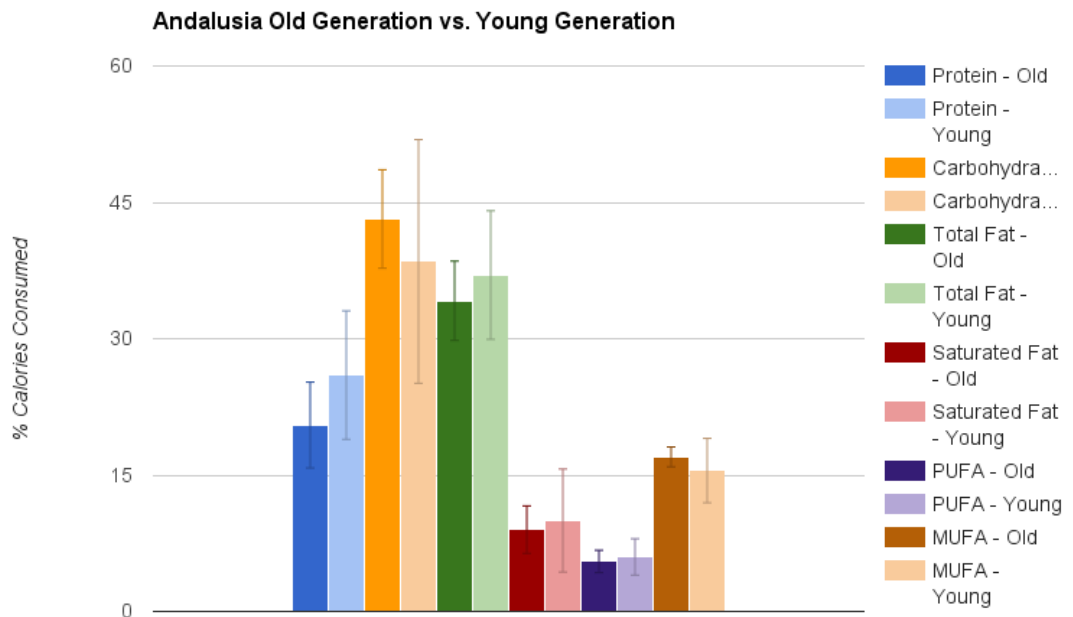


Figure 10: Nutrient Intakes of Andalusia Old Generation (in bold colors) versus Younger Generation (in shaded colors)

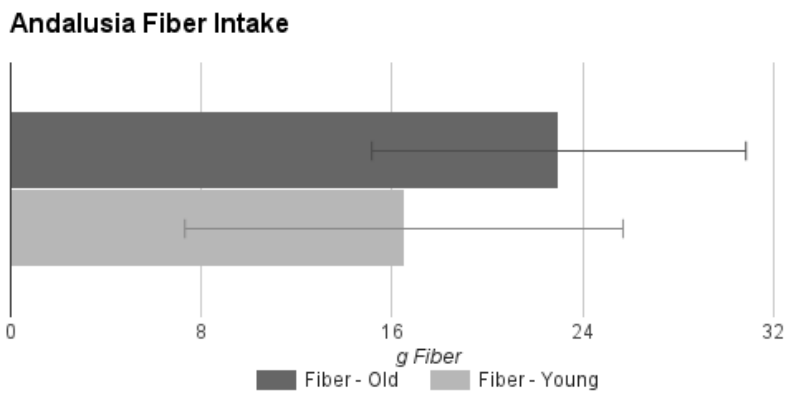


Figure 11: Fiber Intakes of Andalusia Older Generation versus Younger Generation, in total grams of fiber consumed

CHAPTER 5 DISCUSSION/ANALYSIS

The analysis of the results focused on two different dietary aspects. First, how do the nutrient profiles differ among generations, and what might contribute to these differences? Second, how do the diets of the Basque Country and Andalusia compare to the traditional Mediterranean Diet of Crete? One last component of the dietary analysis summarizes any other observations that were made regarding the diets which may be pertinent to gain a better perspective on the two diets.

5.1 Generational Differences

One interesting finding was how, between the younger and older generation, the diets in the Basque Country did not vary significantly, except for fiber intake. That is, the nutrient content of both generations was nearly the same when it came to protein, carbohydrate, and fat intakes. One thought behind this is that the Basque diet may be more protected, such that the diet is preserved as generations pass. This makes sense in the context of the homogeneity of the Basque culture. The Basque people have a unique history, culture and language that separates them from the rest of Spain. It is noted that the Basques perceive themselves as different from others, and like to be recognized as such.²² This results in intense pride for their heritage, which is evidenced in their continual push for independence against the federal government of Spain. This cultural homogeneity may result in the diets and food

choices remaining constant, even as Spanish society around them becomes more Westernized, which has also influenced the diet choices of the rest of Spain.

While the nutrient content of the two Basque Generations is similar, one notable difference in food choice was the difference in fruit consumption. Whole fruit consumption, on average, was higher among the older generation than the younger generation. Fruit juice intake, on the other hand, was fairly equal. What is interesting about this is that whole fruits will generally contribute to carbohydrate levels, because of the sugars naturally found in them. With the carbohydrate intake similar between the generations, and with the older generation consuming more whole fruit, this means that the younger generation is getting some of their carbohydrates from different sources. What remains to be seen is if these other carbohydrate sources are from other whole food sources, or from processed sources. That determination could have an important impact if the diets are evaluated for their impact on health outcomes.

Unlike the Basque Country, the Andalusian diets did vary from the older generation to the younger generation. This was most notable for protein intakes, carbohydrate intakes, and fiber consumption. The younger generation consumed about 6% more protein (as a percent of total calories consumed) than the older generation, while the older generation consumed nearly 5% more carbohydrates (as a percent of total calories consumed) than the younger generation. The older

generation also consumed about 6 more grams of fiber per day than the younger generation. Fat intakes were similar, however.

One possible explanation for the difference in protein intake is dairy consumption. A much greater amount of dairy products, including milk product, cream cheese, and ice cream, were consumed by the younger Andalusian generation than the older generation. This would make sense if the younger generation diet is considered to be more “westernized,” because a western diet relies much more on dairy intake, especially from cows. A quote from an older Andalusian stated that, “only babies and young children drink milk.” If this sentiment is common, then it would explain the much lower dairy consumption among the older generation. Therefore, the high protein content in the dairy products could explain how the protein intake in the younger generation is higher, due to the increased protein content from the dairy products consumed.

One possible explanation for the greater carbohydrate intake among the older Andalusian generation is their overall greater intake of whole fruits and vegetables. Both generations had adequate intakes of fruits and vegetables, but the older generation consumed more of them in general. Especially when viewed in terms of percent of total calories, this results in a higher percentage of carbohydrates compared to protein and fat. This is an interesting recognition for two reasons. First, there are health reasons. Like with the Basque Country diet above, the health

outcomes of the diets could be different based on those different intakes. The other aspect is seeing how much of an influence western diets have had on the younger generation. As western food has become more prevalent in Spain, it would appear that the younger generation has incorporated those foods into their diet more than the older generation. However, this would need to be confirmed with further diet analysis.

5.2 Mediterranean Diet Determination

When comparing the diets of both the Basque Country and Andalusia to the Mediterranean Diet pyramid provided by www.oldswayspt.org, it quickly becomes apparent that there are some significant differences between the two diets, and the classic Mediterranean Diet from Crete. Therefore, despite the Basque Country and Andalusia being in the Mediterranean country of Spain, it must be evaluated if the two diets can really be considered “Mediterranean” nutritionally, or if they are Mediterranean by region only.

The pillars of the Mediterranean Diet have grains, potatoes, legumes, fruits, and vegetables as the main foods consumed, with olive oil being the primary fat source. Smaller amounts of cheese and dairy products are also consumed. Meat intake, on the other hand, should be limited to only a couple times per week for poultry and fish, and only about once a month for red meat products. Using these characteristics, can the Basque and Andalusian diets be considered Mediterranean?

Looking at the Basque Country diet first, the most significant non-Mediterranean dietary aspect is meat consumption. A type of meat product was consumed with nearly every lunch and dinner meal, whether it was poultry, fish, pork, or red meat. This meat consumption pattern is much higher than what would typically be considered Mediterranean, and also backs up the findings from the EPIC studies that looked at the high meat consumption patterns in Spain. Another non-Mediterranean dietary aspect is the lack of olive oil consumption. Traditionally, olive oil is a large component of the Mediterranean Diet of Crete. However, in the 24 hour diet recall surveys from the Basque Country, very little olive oil use or consumption was indicated. Presumably, another product substituted for olive oil in the cooking process, likely either butter or a type of vegetable oil. However, which specific food product was not indicated in the 24 hour diet recall surveys collected. Ultimately, when considering the two aspects noted above, it is hard to consider the Basque Country diet a characteristic Mediterranean Diet. There are certainly some similarities to the Mediterranean Diet, like for grain, fruit, potato, and legume intakes, but the meat intake and absence of olive oil reinforced the conclusion above.

When considering the Andalusian diet, meat intake is much more frequent than the classic Mediterranean Diet, especially for pork products. Other than this, the Andalusian diet would appear to be much more Mediterranean than the Basque Country diet. Olive oil consumption is significant, as evidenced by the very elevated

Monounsaturated Fat intake levels found by the 24 hour diet recall surveys. Fruit, vegetable, grain, potato, and legume intake was typical, and usually consumed alongside any meat consumed. Therefore, despite the meat intake, it would be much more applicable to consider the Andalusia diet a Mediterranean Diet, because it follows the pillars of the Mediterranean Diet of Crete much more closely than the Basque Country diet.

5.3 Misc. Diet Observations

Yet another interesting observation about the diets of both the Basque Country and Andalusia were the interpretations of dessert. The connotation of dessert, at least in the United States, usually implies something sweet and heavy to enjoy after a meal, such as cake, cookies, or ice cream. However, in both the Basque Country and Andalusia, dessert usually consisted of either fruit, yogurt, or both in combination, consumed after lunch or dinner. This is different from the roles fruit and yogurt oftentimes take in western diets, as either snacks or accompanying a meal. It may be possible that the influence of the Mediterranean Diet, which focuses on whole fruit consumption, influenced the choice of fruit as the food that ends a meal (and to a lesser degree, yogurt).

One final observation regards the location of food preparation and consumption in both the Basque Country and Andalusia. Both regions had it in common that the majority of food was prepared in the home, and also consumed in

there. If the person did not prepare their own food, then usually a family member was the one who prepared the meal. This finding is in line with the Spanish custom that truly considers meal times as family times. This is one area where evolution looks least likely, because it is ingrained in every generation that meals should be shared as a family. Even as food choices and diet characteristics change throughout generations, it is likely that in the Basque Country and Andalusia, those foods will still be prepared and consumed in the house.

CHAPTER 6 LIMITATIONS/FUTURE STUDY

6.1 Limitations

There were a number of limitations that must be considered when it comes to this study. Resources and time definitely limited the scope and nature of this project, but other limitations also existed, which will be discussed here.

First is the limitation of study size. Unlike the EPIC Cohort studies, where more than half a million participants were surveyed to compile their data and resulting findings, this study was limited by the number of participants who completed the 24 hour diet recall surveys. With only 22 people fully completing and returning their surveys, it is not possible to make sweeping conclusions about a population. Additionally, the study sample was limited to participants that the Spanish contacts knew in their respective regions. Therefore, not all populations in the regions were represented, but rather one small subsection of the population was reached. The same is true with respect to age. Not all age groups could have been adequately or accurately represented, a function of the small study size.

The second limitation is in regard to the study design. For maximal accuracy, 24 hour diet recalls are meant to be completed face-to-face, in a multi-pass fashion. The studier should fill in the diet recalls with the participants, so that all food consumed in the 24 hour time period is remembered, and completed with great detail. By virtue of not being in Spain, it was impossible to perform the 24 hour diet

recalls in such a fashion, so a detailed set of instructions accompanied the diet recall sheets instead. However, this method likely was not as accurate as the multi-pass method, leading to results that may not have been as complete or thorough as they could have been. Another issue with the 24 hour diet recalls surveys is that the information they contain is not necessarily representative of the population being studied, which also relates significantly to the study size limitation above. 24 hour diet recalls also rely on a person's memory to be completed, and oftentimes, participants will forget a food or a portion, which ultimately affects the results of a study. Physical activity of the participants was also not considered in regards to diet, even though it is a large component of the Mediterranean lifestyle.

A third limitation of this study was the language barrier that was associated with it. While all survey forms were edited with the help of Dr. Wood of World Languages and Cultures at Oregon State University to ensure their accuracy, there was still the possibility of miscommunication. This was especially true after the 24 hour diet recall surveys were returned, as they had to be translated from Spanish to English. It is possible that some information was not translated with 100% accuracy. Not being a fluent Spanish speaker myself limited my abilities to scour literature in Spanish. This resulted in the ability to only evaluate literature in English, which may have eliminated valuable information that was only available in Spanish.

Finally, it is important to consider that in a study like this, cause and effect are

not proven. Although nutrition data was compiled, analyzed, and compared to existing data on the subject, it is not possible to say that a cause and effect was proven.

6.2 Future Considerations

Throughout the course of this project, a number of questions and considerations arose that went beyond the scope of this project. While it was unfortunate that none of those questions could be covered here, they provide a platform for future research and the expansion of knowledge on the diets of Spain and the Mediterranean region.

One such research question includes the other autonomous regions of Spain. It was shown above how the Basque Country and Andalusia regions differ from each other, and also from the Mediterranean Diet of Crete. Therefore, it would be worth investigating how the other autonomous regions of Spain differ as well. This research would also expose regional trends, which could be important in determining health outcomes of the diets, which is the next point of consideration.

This project did not include any information on the health outcomes of the two diets studied, but that does not preclude considering health outcomes of the diets in the future. For instance, do the elevated meat intakes in both regions result in greater instances of obesity, heart disease, diabetes, or other diseases? Do their meal intakes, which revolve around lunch as the main meal of the day, tend to favor the

promotion or reduction of certain diseases? Similarly, does a person's health status in either of the regions affect their dietary choices? These are questions that deserve to be considered in regards to the diets of the two regions investigated.

Related to the questions above is the need to compare the health outcomes of the Basque and Andalusian diets to that of the diet from Crete. Since the diets are all still informally considered "Mediterranean," it is relevant to compare the above health outcomes to the health outcomes of Crete. Traditionally, the Mediterranean Diet from Crete has been hailed as increasing longevity, so it would be interesting to determine if the mortality rates between the Basque Country, Andalusia, and Crete differ, and by how much they differ.

Once the health outcomes of the two diets investigated are determined, it may then be possible to make recommendations to other populations to improve the overall health of their diets. Or conversely, if the dietary patterns negatively affect overall health, then changes can be recommended. This future knowledge is important when considering the popularity of the Mediterranean Diet, to ensure that people are following a pattern of eating that does, indeed, confer health benefits.

One last future consideration is related to one of the limitations of this study, which evaluated diets based only on generational differences. However, diets could be evaluated based on socioeconomic status, or even on health literacy. This would

provide information regarding the diets in different contexts, which may help to explain confounding factors surrounding the two diets.

CHAPTER 7 CONCLUSION

This project looked at the diets of the Basque Country and Andalusia in Spain due to the growing popularity of the Mediterranean Diet. The health benefits of the Mediterranean Diet of Crete have been well documented. It has become important to understand that there are variations between the diets of many Mediterranean countries. This is certainly true of the two diets observed, especially among the younger generations. Therefore, should the term “Mediterranean Diet” be universally applied to all diets of Mediterranean countries? According to the results, compared to the diet standards established upon the Mediterranean Diet from Crete, it may not be appropriate to label all diets in the Mediterranean region as “Mediterranean Diets”. This paper found differences in the diets from the Basque Country and Andalusia compared to the classic Mediterranean Diet, notably when it came to meat consumption, especially of beef and poultry products, in addition to dairy consumption besides yogurt. Because of that, it is only possible to consider the diet of Andalusia as a Mediterranean diet because of its nutrient profile that includes high consumption of grains, fruits, vegetables, and olive oil. Caution must be taken with these conclusions due to the limitations associated with this project. More information is needed to understand how the nutrition profiles of the diets affects overall health and mortality in both regions. Other questions that merit further research also look at how the health outcomes compare to those of Crete, and also

how other determinants such as socioeconomic status, education level, and health literacy impact dietary choices.

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