Double Pyramid 2012: enabling sustainable food choices

Barilla Center FOR FOOD & NUTRITION

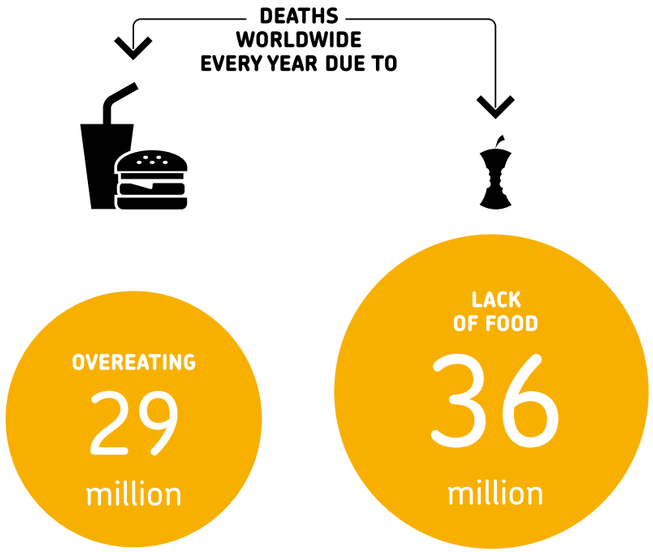
people, environment, science, economy

THE CURRENT PARADOXES ON FOOD AND NUTRITION

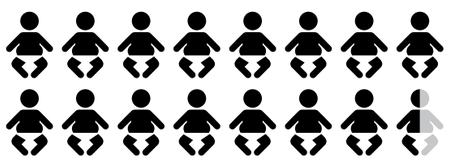
AN IN-DEPTH ANALYSIS OF THE GLOBAL SCENARIOS OF OUR TIME AND THEIR CONSTANT AND VERY RAPID DEVELOPMENT
REVEALS A WORLD FILLED WITH STRIKING PARADOXES

EXCESS OF FOOD OR ACCESS TO FOOD?

In the world today there are more than 1 billion people suffering from hunger while there is an equal number who are suffering the consequences of over-nutrition, contracting serious metabolic diseases such as diabetes, for example.
Yet, today the global food system is able to provide adequate nutrition for all the human beings on the planet.
The causes of this situation are not easy to find and remove. This should act as a stimulus to identify and propose urgent and effective solutions



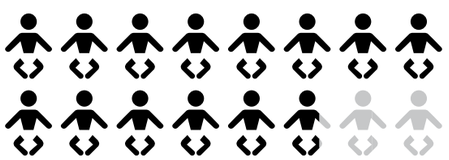
155 million
OVERWEIGHT OR OBESE PEOPLE



CHILDREN

For the first time in fifty years, the new generations will have a shorter life expectancy

148 million
UNDERNOURISHED PEOPLE



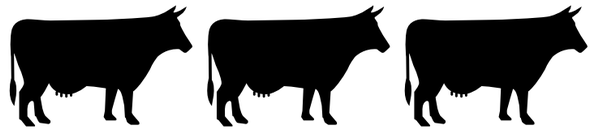
NOURISH PEOPLE OR ANIMALS?

There are about three billion farm animals on the planet. A third of the global food production is destined for their nutrition and these animals contribute significantly to climate change factors. In fact, it is estimated that they are responsible for at least **50% of the agricultural emissions**

ALMOST
1 billion
UNDERNOURISHED PEOPLE

1 billion
PEOPLE LACK ACCESS TO WATER

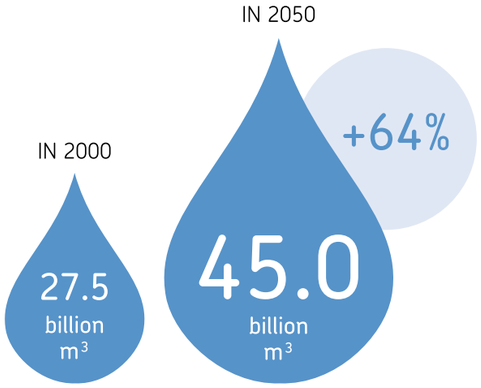
3 billion
LIVESTOCK ANIMALS



GLOBAL FOOD PRODUCTION USED FOR THEIR NUTRITION

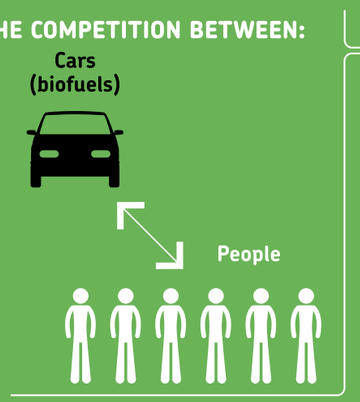
1/3

ANNUAL GLOBAL WATER DEMAND FOR LIVESTOCK



FEED PEOPLE OR CARS?

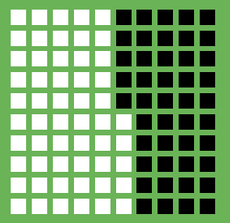
Another form of misuse of the resources of the Earth concerns the competition between biofuels and food. An increasing proportion of agricultural land is being used for the production of biofuel. In doing so, we are choosing to give water to our cars instead of food to human beings



DID YOU KNOW?

The annual consumption of corn in the United States is
390,000 cubic meters

55%
is used for food



45%
is used for the production of ethanol for fuel

THE BCFN CONTRIBUTION TO THE MAJOR ISSUES IN FOOD AND NUTRITION

The multidisciplinary analysis concerning the people, environment, economy and society has led to the definition of 4 specific lines of interconnected studies on the issues related to food and nutrition.

FOOD FOR ALL

In the area Food for All, the Barilla Center for Food & Nutrition addresses the issues of access to food and of malnutrition, with the aim of reflecting on how to promote better governance of the global food system in order to make a more equitable distribution of food possible and to encourage a better impact on social welfare, health and the environment.

FOOD FOR SUSTAINABLE GROWTH

With reference to the area Food for Sustainable Growth, the Barilla Center for Food & Nutrition aims to examine the issue of a better utilization of natural resources within the food chain. More specifically, the analyzes performed have allowed us to point out the weaknesses, to assess the environmental impact of the production and consumption of food and to formulate (a set of) proposals and recommendations concerning personal and collective lifestyles that can have a positive affect on the environment and natural resources.

FOOD FOR HEALTH

In the Food for Health area, the Barilla Center for Food & Nutrition decided to start its research work by analyzing the relationship that exists between nutrition and health. It thoroughly analyzed the various recommendations made by the most authoritative scientific institutions in the world, in addition to the themes that emerged at different stages of discussion with the most qualified experts, thus providing civil society with a concise and effective overview of concrete proposals aimed at facilitating the adoption of a correct lifestyle and a healthy diet.

FOOD FOR CULTURE

In the Food for Culture area, the Barilla Center for Food & Nutrition described man's relationship with food. In particular, the BCFN wanted to retrace the most important steps along the path that have accompanied the development of the man-food relationship, bringing (through moments of comparison) the fundamental role of the "Mediterranean-ness" and its relevant dimensions to the center of attention.

THE VISION OF BARILLA CENTER FOR FOOD & NUTRITION

The Barilla Center for Food & Nutrition (BCFN) is a center of multidisciplinary analysis and proposals which aims to explore the major issues related to food and nutrition on a global scale. Created in 2009, BCFN intends to listen to the demands emerging from society today by gathering experience and qualified expertise on a worldwide level and promoting a continuous and open dialogue. The complexity of the phenomena under investigation has made it necessary to adopt a methodology that goes beyond the boundaries of different disciplines.

These topics under study are broken down into four areas: Food for Sustainable Growth, Food for Health, Food for All and Food for Culture. The areas of analysis involve science, the environment, culture and the economy; within these areas, BCFN explores topics of interest, suggesting proposals to meet the food challenges of the future.

Barilla Center FOR FOOD & NUTRITION

www.barillacfn.com
info@barillacfn.com

Double Pyramid 2012: enabling sustainable food choices
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With the collaboration of
Carlo Alberto Pratesi (Roma Tre University), Claudio Maffeis (University of Verona),
Massimo Marino, Sonia Pignatelli and Elisabetta Redavid (Studio LCE)
and Ludovica Principato (Roma Tre University)

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adfarmandchicas

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Dear Reader,

Three years ago, with the publication of the paper dedicated to the nutritional and environmental "Double Pyramid," the BCFN contributed to launching the debate on how eating habits could be sustainable for both health and the environment, demonstrating that there is a diet that is sustainable for people in nutritional terms and, at the same time, is also sustainable for the planet, in terms of environmental impact.

The third edition of the Double Pyramid paper – the result of patiently laboring to update and add to the data collected, year after year – further confirms the scientific foundation the model is based on.

However, scientific evidence is not enough to modify people's behavior, or to generate adequate awareness of the importance of adopting positive lifestyles and eating habits. The proof is the fact that even now, in spite of all the studies produced by the scientific community and the ever more numerous alarms launched by institutions, the issue of poor diet and its consequences on health remains open.

For this reason, in addition to updating the available data and significantly enriching the reference database, in this paper, the BCFN presents an initial analysis of the variables which can foster, or hinder, the adoption of sustainable eating habits. Our aim is to promote the definition of intervention strategies which will allow us to progress from guidelines to actual conduct.

It is with this view that we initiated a brief reflection on the role that price, as the critical factor guiding purchasing behavior, plays in the choice of food consumption. The most interesting data emerging from the analysis is that choices depend on a wide range of factors, and price is only one of the variables involved. It is not even the most critical factor, considering that the adoption of a sustainable diet (for people and the planet) does not necessarily involve a higher cost for families. Just as relevant is the knowledge of dietary "best practices" which may allow each individual to adopt proper eating habits by adjusting the basket of his purchases to his budget.

Thus, in our view, the first action to be launched in order to achieve the expected results is the development of an educational project generated through a commitment from all the players in the production chain and the major social groups: families, media, institutions, producers, and distributors, who are united and coordinated in effectively channeling the arguments which support a diet that is socially, environmentally, and economically sustainable.

I hope that this new publication may contribute to reaching the goal.

Enjoy reading!

Guido Barilla
BCFN President

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INTRODUCTION TO THE THIRD EDITION

After publishing the first edition in 2010 and the second edition in 2011, we have continued working to expand and consolidate the scientific basis of the research on the Double Pyramid. New sources of data have been analyzed, increasing the number of our sources from the 120 examined in 2010 to approximately 550 for this new edition. In addition, efforts have been made to pinpoint and explain further relationships between food choices and the environmental impacts associated with them.

Starting with the 2011 edition, work on the Double Pyramid was organized into two sections. The disclosure document that we present in this paper explains the concepts which are the basis for the nutritional and environmental pyramids, and illustrate the Double Pyramid. The technical aspects, data, and relative observations are presented in a summarized fashion, for the sole purpose of providing the proper scientific rigor for the information and the conclusions contained herein.

The technical document, is, instead, addressed to experts in the field and presents the data collected and evaluated in detail. It may be downloaded from the Barilla Center for Food & Nutrition website (www.barillacfn.com).

The two documents were conceived and produced to support each other, but they may also be read separately. For this reason, you may encounter some repetition of similar or identical data in both papers.

As is now customary for the BCFN, our commitment does not end when the report is printed: in fact, the BCFN is already working on new studies that can further enrich and supplement the results we are presenting today.

In the next (fourth) edition, we will try to understand how players in communications, nutritionists, public health practitioners, environmentalists, farmers, and policy makers can, or should, act to drive food consumption toward increasingly sustainable models. In the document we are presenting to you, you will find a chapter dedicated to a preliminary analysis on the subject of promoting and marketing sustainable diets, in preparation for a future study of this topic.

Furthermore, we are well aware that a variation of the concept of a sustainable diet at the global level is still needed; namely, one which also includes countries with the lowest per capita incomes and the highest demographic development. We intend to deal with this subject in upcoming editions.

Along with the entire staff of the BCFN, Carlo Alberto Pratesi and Ludovica Principato from Roma Tre University, and Massimo Marino, Sonia Pignatelli, and Elisabetta Redavid from Life Cycle Engineering also participated in the drafting of this document.

As always, we invite our readers to share their remarks, comments, and criticism with the BCFN, because it is our goal to become a point of reference for those who are interested in learning more about sustainability in the agrifood sector.

EXECUTIVE SUMMARY

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Continuing the work which began with the first edition of the paper *Double Pyramid* published in June 2010, the BCFN strengthens its analysis to demonstrate, with the aid of increasingly complete data, the importance of paying attention to food choices, not only for people's health, but also to safeguard the environment. The comparison between the classic Food Pyramid, built on the basis of the nutritional properties of foods, and the new Environmental Pyramid, in which each food is positioned on the basis of its environmental impact, shows how the foods whose more frequent consumption is suggested are also the foods which better preserve the health of the planet.

The third edition of the Double Pyramid opens with a brief review of recent publications on the subject of nutrition, highlighting that, regardless of which dietary model is used as a reference, the basis of our diet must be foods of plant origin (fruits, vegetables, cereals, etc.), while foods of animal origin should be consumed in moderation.

HUMAN HEALTH CANNOT BE SEPARATED FROM THE HEALTH OF ECOSYSTEMS

Studies carried out in a number of countries (Italy, the United States, Australia, Sweden, China, and Turkey) and analyses conducted by international institutions underline the existing link between the production and consumption of food, dietary requirements, and nutritional recommendations, while at the same time confirming the concept that the health of human beings cannot be disconnected from the health of ecosystems. To meet the dietary and nutritional requirements of a richer, more urbanized world with a growing population, dietary systems must undergo radical transformations.

This must occur by aiming for a more efficient use of natural and production resources, in part thanks to the widespread adoption of sustainable diets.

An update of environmental data is also presented, which, as in the previous edition, is based on the entire lifecycle of foods and summarizes their impacts by taking into account the three summary indicators selected for this study: the Ecological Footprint (which measures the planet's ability to regenerate the resources used), the Carbon Footprint (which measures greenhouse gas emissions), and the Water Footprint (which measures the use of water resources). This update again shows how there is a direct relationship between nutritional balance and environmental sustainability. The concept of the Nitrogen Footprint, understood as a balance of nitrogen along the agrifood production chain, will also be presented in this edition.

THERE IS A DIRECT RELATIONSHIP BETWEEN NUTRITIONAL BALANCE AND ENVIRONMENTAL SUSTAINABILITY

Some conclusions emerge from this study in regard to the sustainability of human behavior, identifying areas for potential improvement, and therefore, some data on Italians' food consumption will be presented. Taking for example the data relative to protein-based foods, 75% of people eat beef, while only 35% eat legumes and 31% eat pork, which means that approximately 65% of individuals never eat legumes, while those who never eat beef are about 25%.

To complete the picture, the weekly shopping of typical families in France, Italy, Turkey, Great Britain, Japan, the United States, and Mexico will be analyzed, estimating their relative environmental impacts.

The newest item in this edition concerns some considerations made on the prices of the various food diets, a discussion which deserves special attention at a time of worldwide economic crisis. As was used for the analysis of environmental subjects, public information sources are also used in this section. In this manner, the prices in Italy for typical diets are estimated, demonstrating that, when they have the same nutritional value, menus rich in protein of animal origin (meat and, especially, fish) have a slightly higher cost. Comparing the results with the results of other research studies conducted in other countries (the United States, France, and Great Britain), the situation does not appear to be the same. In fact, in some countries, the sustainable diet is more expensive for families, even if this fact can be at least partially conditioned by the different calculation criteria used (price per protein, price per gram, etc.).

IN ITALY, SUSTAINABLE EATING DOESN'T MEAN SPENDING MORE MONEY

Aside from some sectors for which additional analyses would be desirable, it may in any case be affirmed that the Mediterranean diet is the cheapest, as long as the foods are selected judiciously, preferring those which have a low cost and high nutritional value, such as pasta, legumes, certain types of vegetables, oil, and dried fruit. In particular, low-fat dairy products and eggs are the least expensive source of protein. The creation of a single-course meal based on vegetables enriched with a modest addition of meat may be the best method to provide the proper caloric and nutritional intake at a limited cost.

Therefore, *sustainable eating* definitely does not necessarily mean spending more money. However, this generally requires an additional effort by families in terms of the time dedicated to the selection and preparation of food.

BCFN TRIED TO IDENTIFY THE MOST SUITABLE PATHS TO A SUSTAINABLE DIET

In this study, the BCFN wanted to try to take another step forward, by attempting to identify the most efficient paths to spread the concept of sustainable diets among people. Some research studies on eating behavior at home are analyzed, in order to understand to what extent the family today may still be the main instrument for consumer education, proposing some considerations on the role of advertising (of food products), and on other types of group education through the mass media (social communication).

Regarding meals that are eaten away from home, a study commissioned by the BCFN and other groups highlights the role of distributors in encouraging people to make more sustainable purchases. The studies found that, in general, along with food service catering (specifically, schools and company cafeterias), it would be opportune to focus on distributors when developing a food education strategy.

The family itself is no longer enough to help ensure healthy eating habits: due to lack of time and motivation and, perhaps, adequate knowledge and awareness, parents are no longer capable of providing the proper guidance, or to keep at bay or offset the effects of advertising, whose messages in terms of nutrition are often unbalanced. Thus, what is needed is a great social effort that unites institutions, producers, and distributors to effectively convey the most appropriate messages. And this can also be done by taking a cue from some interesting cases carried out in different parts of the world which are explained in brief in this report.

DIETARY MODELS: THE COST FOR PEOPLE AND THE PLANET

Ecological Footprint* Daily Weekly

15 global **m²**
100 global **m²**

Average price
€35

*Calculates the amount of land/water needed to regenerate the resources use

Vegetarian Menu

Without meat and fish for the entire week

22 global **m²**
150 global **m²**

Sustainable Menu

Vegetarian-type menu
5 days a week with meat and fish 2 days a week

Average price
€38

41 global **m²**
280 global **m²**

Meat-based Menu

Meat at least once a day during the entire week

Average price
€45

The average price of the individual menus (per person for one week) was calculated using the prices in five Italian cities (Turin, Milan, Rome, Naples, and Palermo) as reported in April 2012.
The menus in question are nutritionally comparable (15% protein, 30% fat, and 55% carbohydrate)

FOOD'S WATER FOOTPRINT

With a **meat-based weekly menu**, each individual consumes

4,000 / 5,000 liters of water daily

A **sustainable menu's** daily water consumption is

1,500 / 2,600 liters

H_2O

A sustainable menu allows about **2,500** liters of water to be "saved" every day, the equivalent of **20 bathtubs**, which equals the amount of water used daily solely for household needs by approximately

10 Italians

WATER NEEDED DURING THE ENTIRE LIFECYCLE OF 100 GRAMS OF:

tomatoes	**19** liters
bread	**133** liters
cheese	**500** liters
hamburger	**1,600** liters

Reproduced by BCFN, based on Water Footprint Network data

1. THE DIFFERENT NUTRITIONAL MODELS

James P. Blair/National Geographic Stock

1. THE DIFFERENT NUTRITIONAL MODELS

THE MEDITERRANEAN DIET HAS BEEN RECOGNIZED AS AN INTANGIBLE HUMAN HERITAGE

After more than 50 years of studies, the Mediterranean diet has been frequently defined as one of the most convincing on a scientific level, and it has been recognized by UNESCO as an intangible heritage of humanity.
The dietary section of the Double Pyramid, the result of the international combination of different nutritional guidelines, is easily traced back to the Mediterranean dietary model and simply represents a "compass" for proper diet. Regardless of the interpretation of the Mediterranean model, the various indications are consistent with each other and converge on the fact that the base of the model centers on the consumption of fruits and vegetables; followed by cereals, milk, and dairy products; with the top of the pyramid made up of products of animal origin and sweets.
In summary, the foods on the bottom of the pyramid typically have a lower impact on the environment, while those foods at the top, which should be consumed in moderation, tend to be those that are most harmful to the environment.


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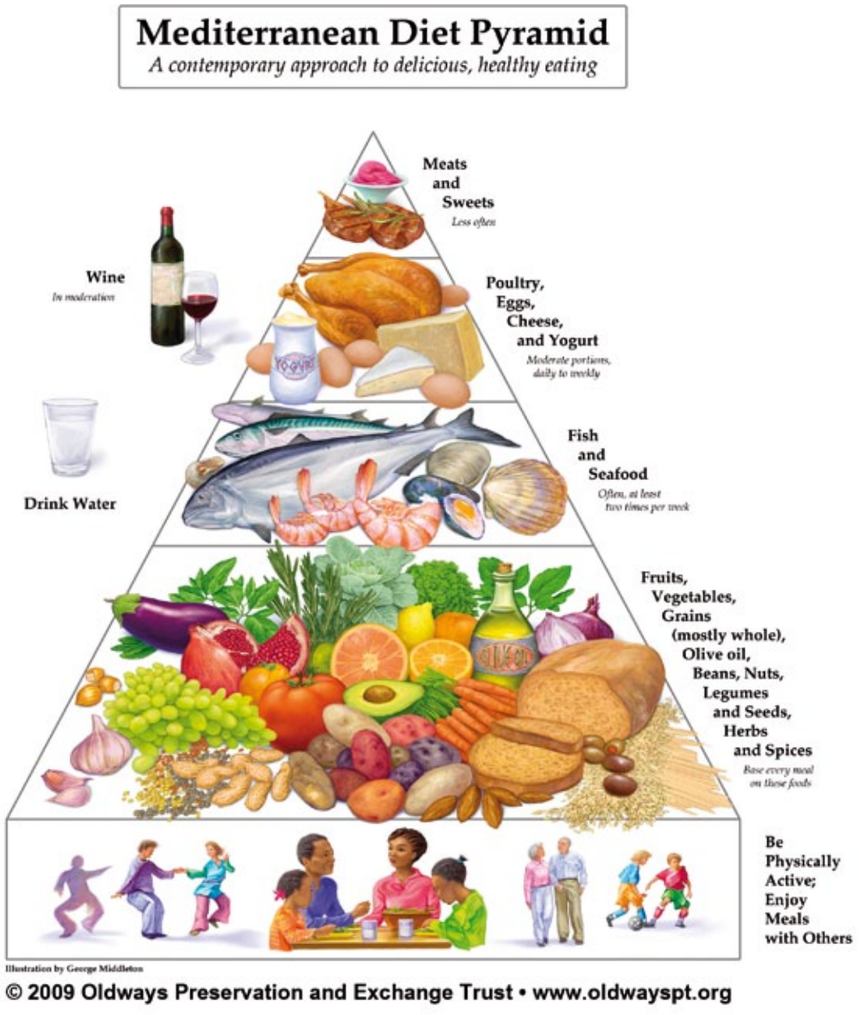
1.1 THE MEDITERRANEAN DIET

THE MEDITERRANEAN DIET'S EATING HABITS ARE ARE AMONG THOSE MOST CONSISTENT WITH NUTRITIONAL GUIDELINES

The nutritional value of the Mediterranean diet was scientifically demonstrated in the well-known "Seven Country Study" directed by Keys.[1] This study compared the diets used by different populations to verify their benefits and critical points. They were able to understand what associations existed between the type of diet and the risk of the onset of chronic diseases (particularly cardiovascular diseases). The study found that a high level of saturated fatty acids (in the diet) and cholesterol (in the blood) was a factor that could explain the differences in mortality rates, as well as predict future rates of coronary diseases in the populations analyzed.
From the first "Seven Country Study" to today, numerous research studies were conducted which analyzed the features and the associations between the type of diet and the onset of chronic diseases.[2] Furthermore, since the mid-1990s, a new stream of research has been developed to investigate the association between diets and longevity.
In general, what emerges is that the adoption of the Mediterranean diet provides a protective factor against the most common chronic diseases through the high consumption of vegetables, legumes, fruits and nuts, olive oil, and cereals (50% of which are whole grain), moderate consumption of fish and dairy products (especially cheese and yogurt), and low consumption of red meat, white meat, and sweets.[3]
The dietary habits of the Mediterranean diet are consistent with the nutritional information in the guidelines produced by the most authoritative scientific societies and international institutions dealing with the greatest non-communicable diseases in this era (especially, cardiovascular diseases, cancer, and diabetes).

Figure 1.1. **Dietary model proposed by Oldways**



Source: oldwaystable.org.

1.2 NUTRITIONAL MODELS AROUND THE WORLD

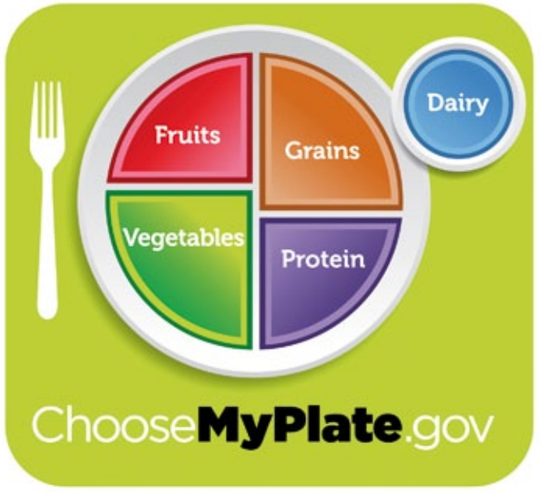
However, the Mediterranean diet pyramid is not the only graphic representation used to provide consumers with suggestions. Some alternative models will now be displayed.

ChooseMyPlate – United States

ChooseMyPlate are the guidelines for Americans, developed every five years by the United States Department of Agriculture (USDA) and by the Department of Health and Human Services (HHS) for healthy people aged 2 years and up.
American nutritionists recommend following a diet that consists mainly of fruits, vegetables, whole grain cereals, and low-fat dairy products. Meat, fish, legumes, eggs, and nuts should be consumed in smaller quantities, paying attention to food that has already been salted or sweetened and saturated fat content, as well as sugary beverages. In addition to nutritional advice, constant physical activity and more attention in calculating daily calorie requirements are also recommended.

AMERICAN NUTRITIONISTS RECOMMEND A DIET COMPOSED MAINLY OF FRUIT, VEGETABLES, WHOLE GRAINS, AND LOW-FAT DAIRY AND CHEESE PRODUCTS

Figure 1.2. **Graphic representation of dietary advice prepared by the USDA**

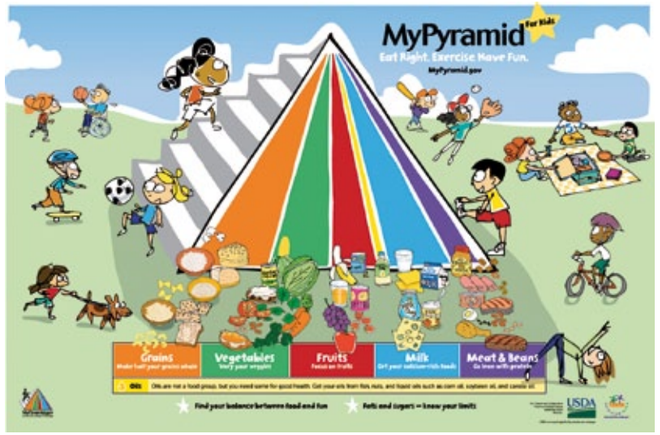


My Pyramid for kids – United States

IN THE UNITED STATES, "MY PYRAMID FOR KIDS" IS BEING PROPOSED

The Center for Nutrition Policy and Promotion is an agency of the USDA, created in 1994 to improve Americans' nutrition and well-being.
To help consumers in the direction of correct eating habits, the Center has developed educational programs according to age and on the basis of the recommendations in the *Dietary Guidelines for Americans*, published and updated every five years by the USDA and HHS.
One of these programs is *My Pyramid for Kids*, the dietary pyramid for children (from ages six to 11), which highlights, with a colorful, fun graph, the different types of foods that should be eaten every day. Although it has been superseded by the ChooseMyPlate model, this approach is interesting because it represents an example of how direct communication with children can be accompanied by suggestions for families, encouraging the correct distribution of food during the day and highlighting the fundamental role of physical exercise for healthy growth.

Figure 1.3. **The dietary pyramid for children produced by the USDA**



Guide to healthy eating – Australia

AUSTRALIA'S "GUIDE TO HEALTHY LIVING" RECOMMENDS DRINKING ABUNDANT AMOUNTS OF WATER AND LOW CONSUMPTION OF HIGH CALORIE BEVERAGES

The *Australian Guide to Healthy Eating* is a tool to inform consumers about the correct types and quantities of food that must be eaten for a balanced diet to maintain good health. In general, Australian nutritionists recommend paying special attention to diversifying diets and consuming a variety of foods daily and in the right measure.
In the guidelines, the foods are subdivided into five groups based on their nutritional resemblance and the minimum daily recommended serving for each one is indicated:
- bread, cereal, rice, pasta: 7 servings;
- fruit: 2 servings;
- vegetables and legumes: 5 servings;
- milk and dairy products: 2 servings;
- meat, fish, eggs, nuts, and legumes: 2 servings.

It is important to underline that although the number of servings recommended varies based on an individual's age, sex, and health condition, most food guides indicate the need to increase the consumption of cereals (preferably whole grain), legumes, vegetables, and fruit, while consuming meat, fish, and dairy products in lesser quantities, and to limit consumption of foods and beverages containing added salt or sugars. Furthermore, the intake of large amounts of water and a low consumption of alcoholic beverages are recommended.

Figure 1.4. **Graphic representation of Australian dietary recommendations AGTHE: with the kind concession of the Australian Governement**

The Food Circle – Sweden

The goal of the Swedish *Food Circle* is to help people consume all the nutrients and the energy they need daily. The foods are subdivided into seven groups to be eaten in the proper proportions.
Therefore, it advises that larger servings of vegetables and fruits be eaten, along with bread and cereals; a more moderate use of foods containing fat is recommended. Furthermore, it suggests always selecting seasonal fruits and vegetables, eating the vegetables preferably cooked and whole grain cereals, without omitting lesser-known cereals such as couscous or bulgur. With regard to protein, the consumption of low-fat cheeses and condiments is advised, as is increasing the consumption of fish. For meat, the Food Circle suggests rediscovering meats that are not regularly consumed, such as lamb, and other nutritious parts of animals, such as giblets.

Figure 1.5. **Graphic representation of Swedish dietary recommendations**

Pagoda – China

THE CHINESE PAGODA IS ALSO BASED ON THE SAME CONCEPT AS THE FOOD PYRAMID

The five levels of the *Pagoda* contain all the main food groups present in the Chinese diet: the position of the food and the area of each level reflect the proportions recommended for daily food consumption. At the bottom of the Pagoda are cereals (flours, rice, corn, sorghum, etc.), which represent the main source of energy and protein, especially in the diet of consumers in rural areas. Recommended consumption is listed for the various cereals and varies according to how they are combined with the legumes. Fruits and vegetables are found on the middle level, while fish, meat, and eggs, the main sources of protein, important minerals, and vitamins, are found on the third level. The Chinese Pagoda also suggests a limited consumption of meat, emphasizing more lean white meat and one egg per day, at most. Milk and its by-products, beans, condiments, and sugar are found at the top of the Pagoda. The Pagoda's recommendations were conceived for a healthy Chinese adult, but obviously vary based on age, sex, and lifestyle.

Three different diets are defined based on the calorie intake:

- 1,800 kcal/day, for the elderly;
- 2,400 kcal/day, for an adult male with a sedentary lifestyle; and 2,000 kcal/day for an adult woman;
- 2,800 kcal/day for an adult male with an intense lifestyle.

The recommended daily amounts for each food are indicated for each diet.

Figure 1.6. **Composition of the Chinese diet based on different energy levels (g/day)**

FOOD	LOW ENERGY	AVERAGE ENERGY	HIGH ENERGY
	1800 kcal/day	2400 kcal/day	2800 kcal/day
Grains	300	400	500
Garden vegetables	400	450	500
Fruits	100	150	200
Red meat, white meat	50	75	100
Eggs	25	40	50
Fish	50	50	50
Beans	50	50	50
Milk and dairy products	100	100	100
Oils and fats	25	25	25

Temel Besin Gruplari – Turkey

The Turkish guidelines, the *Temel Besin Gruplari*, explain the nutritional content of each food group, their advantages, and recommendations about how to prepare them to make the most of their nutritional potential.

For example, for protein intake, consumption of white meat and fish is recommended, along with consumption of legumes, which should be consumed along with cereals (preferable whole grain) and eaten up to six times a day. A maximum of one daily serving of eggs is recommended as a substitute for meat. For milk and dairy products (especially low-fat cheeses), two servings a day are recommended for adults; four servings of dairy products are recommended for menopausal women and children. The color of fruits and vegetables indicates the presence of different nutrients and for this reason, it is better to eat different varieties daily. Finally, it is advisable to eat fruit with its peel and raw vegetables, because the vitamins and minerals are condensed in their outside layers and are lost through cooking.

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1.3 NUTRITIONAL RECOMMENDATIONS FOR THOSE WHO ARE GROWING

In the 2011 edition, the BCFN also presented the *Double Pyramid for those who are growing*, based on nutritional information aimed at children and adolescents. This analysis, which followed the paper *Healthy Growth and Nutrition in Children*, published by the BCFN in 2010, related environmental impacts with the needs of individuals in the growth stage.

The analyses carried out in this context led to the following conclusions: significant consumption of fruits, vegetables, and cereals and limited consumption of animal proteins are needed, on the basis of nutritional criteria formulated in accordance with different ages.

During early childhood – which is characterized by very rapid growth –, the child must be supplied with an adequate quantity of energy. In the first year of life, the energy requirement for growth is remarkable compared to the total, but it decreases rapidly; in fact, it goes from 35% in the first month of life to 5% at 1 year.

THE MAJOR MACRONUTRIENTS THAT CAN PROVIDE A CHILD WITH ENERGY ARE FATS, PROTEINS, AND CARBOHYDRATES

The main macronutrients which can supply the child with energy are fats, proteins, and carbohydrates.

Fats ingested through diet represent a source of energy and essential fatty acids for the child. Structural fats are an essential part of cell membranes, nerve tissue, and the overall architecture of the cell, while stored fats – specifically present in adipose tissue, composed mainly of triglycerides – act as a long-term energy reserve for the body. Daily intake of fats is obtained by eating foods such as fish and nuts. Vegetable oils are preferred as condiments, particularly olive oil, which also allows an excellent absorption of fat-soluble vitamins (A, D, E, and K) from food.

The second essential macronutrient to ensure the child's proper and balanced energy intake is represented by proteins. Excellent sources of high-quality protein are meat, fish, cheese, milk, eggs, and some products of plant origin, such as soy, green beans, and legumes. Wheat by-products are also a source of protein, unlike most vegetables and fruits, which contain limited quantities of protein.

Carbohydrates are the body's third most important energy source (in terms of quantity). Carbohydrates (sugars, starches, and fiber) supply energy to all of the human body's tissues, especially to the brain and to the red blood cells, which use glucose as the "fuel" for cell activities.

Along with the main macronutrients, vitamins and minerals are the essential elements of a proper diet for pre-school-age and school-age children.

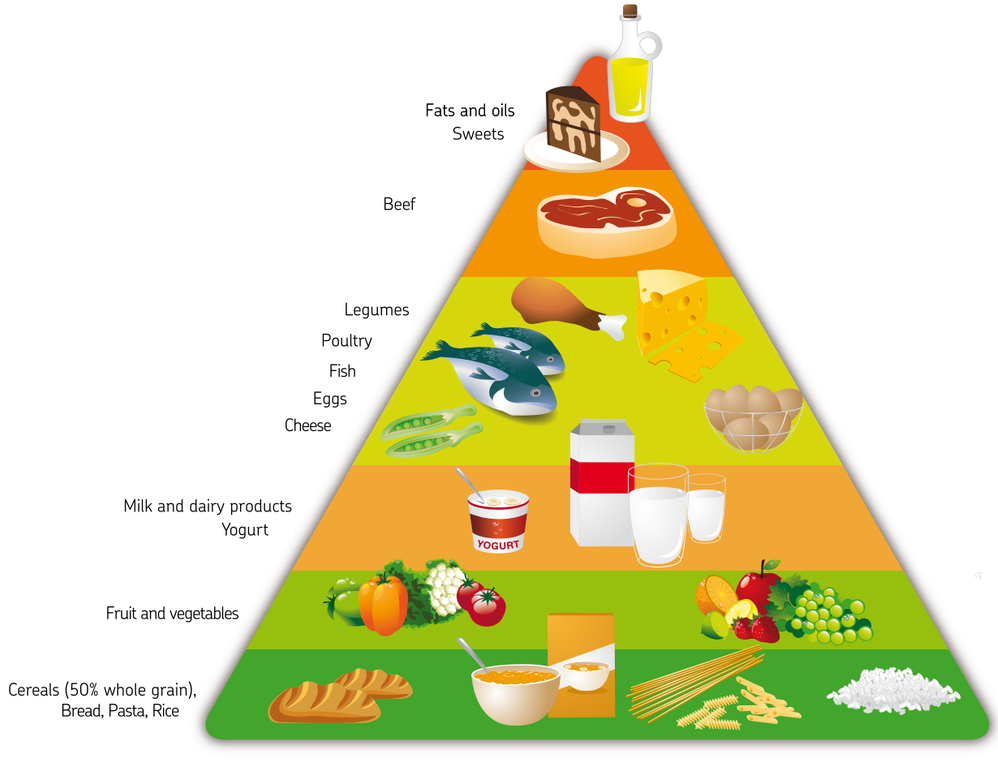
Adolescence is the stage where the child develops from a pre-pubescent state to adulthood, and is characterized by significant physical, psychological, and social changes. Physical changes linked to rapid growth and the changes brought by puberty are accompanied by greater qualitative and quantitative nutritional requirements (carbohydrates, protein, fats), vitamins, mineral salts, fiber, and water. In this phase, the most common nutritional deficiencies are iron and calcium, and irondeficiency anemia is one of the most widespread diseases associated with bad eating habits (American Academy of Pediatrics, 1999).

To overcome these problems, it is important to increase the consumption of iron-rich foods, such as lean meats and fish, legumes, dark green vegetables, nuts, and iron-enriched cereals during adolescence.

Calcium also has an essential function in the body of a rapidly growing adolescent because it is involved in bone and teeth composition. Therefore, it is important for children, especially for girls, who in the future, with the onset of menopause, will be more exposed to the risk of osteoporosis, to eat calcium-rich foods.

And finally, adolescence is the period when dietary requirements become increasingly si milar to those of adults.

Figure 1.7. *The Food Pyramid for those who are growing* published by the BCFN in 2011.



Source: *BCFN 2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

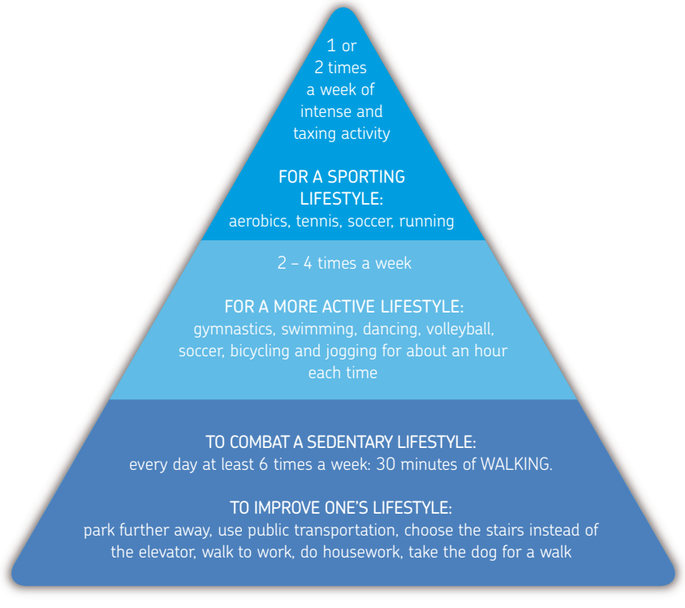
1.4 THE IMPORTANCE OF PHYSICAL ACTIVITY

A basic element which was previously dealt with in the papers published by the BCFN is adequate physical activity, which should always accompany a healthy diet.

Physical activity contributes to burning calories, releasing tension and stress, mood improvement, and psychological well-being. The practice of physical activity and sports contributes remarkable benefits to the cardiovascular and skeletal systems, as well as to the metabolism. Moreover, regular physical activity helps to maintain a healthy body weight and composition, increases strength, and encourages adolescents to adopt a lifestyle that will allow them to have better health during adulthood.

In the Italian pyramid for physical activity[4] – also valid for adults – the Wellness Quantity (WQ) of reference for physical activity is equal to 15 minutes. As shown in Figure 1.10., at least 2 WQ a day are recommended, equal to 30 minutes of walking, to combat inactivity, as well as more intense physical activity (swimming, soccer, tennis, etc.) several times a week, for a more active lifestyle.

Figure 1.8. **The Italian Pyramid of physical activity from La Sapienza University, Rome**



1.5 INSTRUCTIONS FOR "LIVING WELL"

In addition to the various ways of graphically representing dietary recommendations, it is important to note how most authoritative scientific research studies on the relationship between diet and chronic diseases highlight how the Mediterranean dietary model must be considered the benchmark for proper diet and that "healthy" lifestyles should be associated with it. A summary of these recommendations was previously published by the BCFN.

A PROPER DIET MUST BE ASSOCIATED WITH A "HEALTHY AND ACTIVE" LIFESTYLE

Figure 1.9. **Convergence of the guidelines for the prevention of cardiovascular diseases, diabetes, and cancers: summary chart**

HEALTHY EATING AND LIFESTYLE			
1. 30 minutes of physical activity per day	2. Avoid overweight conditions and obesity	3. Avoid excess consumption of alcohol	4. No smoking
5. Adopt a balanced diet	6. Increase consumption of fruits and vegetables	7. Choose complex carbohydrates and increase consumption of whole grains	8. Increase consumption of legumes
9. Eat fish once or twice a week	10. Choose vegetable-based condiments	11. Limit consumption of high-fat foods	12. Limit consumption of fried foods
13. Limit consumption of red meat and poultry to 3 - 4 times a week	14. Limit additional consumption of salt	15. Limit consumption of foods/beverages with a high sugar content	16. Avoid daily use of food supplements

Source: BCFN (2009), *Diet and health.*

CHILDREN MUST MOVE AT LEAST ONE HOUR A DAY, BETWEEN PLAY AND SPORTS ACTIVITIES

Figure 1.10. **Summary of the guidelines published by the BCFN and dedicated to children and adolescents**

SUMMARY OF THE MACRO-GUIDELINES FOR HEALTHY GROWTH
1. Adopt a healthy and balanced diet, alternating daily all the main foods, supplying all the nutrients and micronutrients (calcium, iron, vitamins, etc.) that adolescents need.
2. Avoid excessive calorie intake caused by consuming high-calorie foods or those with high concentrations of fat.
3. Start afresh to balance nutrients during the day, ensuring that there is a balance between the intake of animal protein and vegetables, which must be one to one, of simple and complex sugars (less consumption of sweets, more bread, potatoes, pasta or rice), of animal and vegetable fats (using less lard and butter and more olive oil).
4. Minimize the intake of extra salt in order to reduce risk factors for developing hypertension, especially in adulthood.
5. Distribute food intake to five times during the day: breakfast, morning snack, lunch, afternoon snack and dinner.
6. Avoid eating food outside the five times previously identified.
7. Engage in physical activity for at least an hour a day, including both sports and play.
8. Minimize a sedentary lifestyle as much as possible, particularly the time spent in front of a video (television and computers).

Source: BCFN (2011), *2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

1.6 SUSTAINABLE DIETS, ACCORDING TO FAO

In November 2010, the UN Food and Agriculture Organization and Biodiversity International organized an international scientific symposium, "Biodiversity and Sustainable Diets: United against Hunger." The conference was an opportunity to bring together the major researchers on the subject to jointly define what "sustainable diets" should be and to further develop this concept in relation to access to food and nutrition. The outcome of the meeting is the book Sustainable Diets and Biodiversity.

In the early 1980s, the term "sustainable diet" meant the set of dietary recommendations which could make people and the environment healthier. But the primary goal of feeding a starving world decreased attention paid to sustainability, and the concept of sustainable diets was neglected for many years.[5]

Despite the successes achieved by agriculture over the past three decades, it is undeniable that food systems and diets are not sustainable today. FAO's data reveals that a billion people suffer from hunger, and just as many are overweight or obese; in both cases, we are witnessing malnutrition.

The increasing deterioration of the environment, the progressive reduction in biodiversity, and agricultural production with an excessive impact on the ecosystem – practiced in many areas of the world – has again focused attention on the importance of agrifood sustainability in all its forms, including the diet.

Therefore, the international community has recognized the need to find a definition and a series of guiding principles for diets, in order to deal with the problems of access to food and nutrition, as well as the issue regarding the various phases of the food chain, with a view toward sustainability.

During the symposium sponsored by FAO and Biodiversity International, it was determined that "*Sustainable diets are diets which have a low impact on the environment, contributing to food and nutritional security as well as to a healthy life for current and future generations. Sustainable diets contribute to the protection and respect for biodiversity and ecosystems, are culturally acceptable, economically fair and accessible, adequate, secure and healthy from a nutritional viewpoint and, at the same time, optimize natural and human resources.*"

THE FAO'S DEFINITION OF "SUSTAINABLE DIET" RECOGNIZES THE INTERDEPENDENCY BETWEEN FOOD PRODUCTION AND CONSUMPTION

This definition recognizes the interdependence between food production and consumption, dietary requirements and nutritional recommendations, while at the same time confirming the concept that human beings' health cannot be disconnected from the health of ecosystems.

To meet the food and nutritional demands of a richer, more urbanized world with a growing population, it is therefore necessary for food systems to undergo radical transformations in the direction of greater efficiency in the use of resources and a more efficient and fair

SUSTAINABLE DIETS CAN REDUCE WATER USE AND MINIMIZE CO_2 EMISSIONS, PROMOTE BIODIVERSITY, AND APPRECIATE LOCAL FOODS

consumption of food, to the benefit of sustainable diets, thus preserving natural and production resources.

According to FAO, sustainable diets can decrease water use, minimize CO_2 emissions, promote food biodiversity, and value traditional and local foods thanks to their great variety, which are also rich from a nutritional point of view.

To promote sustainable diets, FAO deems it necessary to involve civil society and private individuals in the sectors of agriculture, nutrition, health, the environment, education, culture, and trade, on the supply side as well as the demand side.

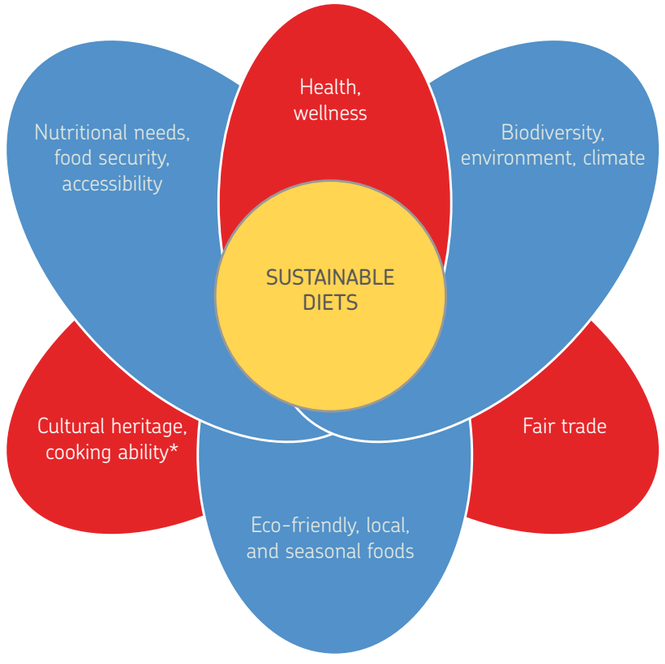
Institutions should immediately assume their responsibilities, guiding and sustaining food production and consumption which is appropriate and sustainable everywhere in the world[6].

Denis Lairon, president of the Federation of European Nutrition Societies,[7] proposes a theory of sustainable diets that are low input and composed of local and seasonal foods, as well as fair trade networks which are at a short distance from production to consumption. The cultural heritage, the quality of the foods, and culinary skills are other key aspects which determine sustainable dietary models and access to food.

Finally, it is fundamental to foster and promote nutritional education oriented to appropriate food choices throughout the world.

The key components of the sustainable diets described up to now are diagrammed in Figure 1.11.

Figure 1.11. **Diagram of key components of sustainable diets**



"Home processing of food, essentially cooking, is a cultural heritage of all people groups. Given the energy source does not compromise the ecosystem, it allows local preparation of foods of easy digestibility and of variable and enjoyable kinds. Cooking allows the use and mix of a huge variety of foods, herbs and spices. It identifies individuals and people groups around their cultural traditions, skills and way of life. Dietary patterns are acknowledged as the best descriptors of the day life food intake habits and of recommended nutrition guidelines." [8]

Source: FAO (2010), *Sustainable Diets and Biodiversity.*

AMONG EXAMPLES OF SUSTAINABLE DIETS, THE FAO CITES THE MEDITERRANEAN DIET

Among the examples of sustainable diets, FAO specifically cites the Mediterranean diet, which, according to Pier Luigi Petrillo, Italy's Minister of Agricultural, Food, and Forestry Policies, is not merely about the type of food consumed; rather, it is a diet that promotes social interaction because shared meals are the keystone of social customs and festive events in the Mediterranean area. The Mediterranean diet also incorporates a relatively new concept: *bio-cultural diversity*, the result of the many ways in which human beings have interacted with their natural environment. Their coevolution has generated a local ecological conscience and practices: an essential reservoir of experiences, methods, and skills that help the various societies to manage their resources.[9]

Some researchers from the Mediterranean Agronomy Institute of Montpellier and Bari say that the traditional Mediterranean diet can be considered sustainable under different aspects. First, for the great variety of foods it includes, which guarantee its nutritional quality and biodiversity. Second, for the variety of practices and techniques used to prepare and treat food and the numerous foods whose health benefits have been demonstrated, such as olive oil, fish, fruits and vegetables, legumes, fermented milk, and spices.

And finally, due to its strong cultural legacy and the traditions which are part of it; for its respect of human nature and seasonality; because of the diversity of the landscapes which contribute to wellbeing; and because it is a diet with low environmental impact, thanks to low consumption of animal products.[10]

The definition of a *sustainable diet* shows its multidimensional character: agricultural, food, nutritional, environmental, social, cultural, and economic variables interact, together or separately. The criteria used to obtain a sustainable food system are summarized in the chart contained in Figure 1.12. and are the result of the combination of environmental protection, nutrition, and land development with economic and social aspects along the entire food chain, from the farmer to the consumer.

The last article in the book edited at the end of the symposium on the Mediterranean diet is dedicated to the BCFN's Double Pyramid.[11]

Figure 1.12. **An example of a sustainable food system**[12]

	ENVIRONMENTAL ASPECTS	NUTRITIONAL ASPECTS	ECONOMIC ASPECTS	SOCIO-CULTURAL ASPECTS
AGRICULTURE	Substitute sustainable agricultural practices. Promote resilience of the systems of production. Develop and maintain diversity.	Promote different varieties of food. Produce food that is full of nutritional elements.	Develop convenient cultivation techniques. Promote self-sufficiency through local production.	Maintain traditional agricultural practices and promote local varieties.
FOOD PRODUCTION	Reduce the impact of production, processing and sale.	Preserve nutrients along the food chain.	Strengthen local food systems. Produce food at accessible prices.	Produce culturally acceptable food.
CONSUMPTION	Reduce the environmental impact of food consumption.	Promote a diversified, balanced and seasonal diet.	Promote economic accessibility to a varied diet.	Safeguard food traditions and culture. Meet local tastes and preferences.

Source: FAO (2010), *Sustainable Diets and Biodiversity.*

The Mediterranean Diet: UNESCO Intangible Cultural Heritage of Humanity

The United Nations Educational, Scientific and Cultural Organization (UNESCO) was founded in 1975 to encourage cooperation among nations within the fields of education, science, culture, and communication. One of UNESCO's missions is to identify a list of "heritage of humanity" locations, namely, places that are valuable from a natural or cultural point of view, and whose conservation is deemed important for the global community.

Since 2001, UNESCO has also begun to draw up a list of humanity's *intangible* cultural heritages, namely, traditions which often do not have a "written" canon, but which are handed down orally across generations. The Mediterranean diet is included in this list, which UNESCO described as follows:

"The Mediterranean diet constitutes a set of skills, knowledge, practices and traditions ranging from the landscape to the table, including the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption of food. The Mediterranean diet is characterized by a nutritional model that has remained constant over time and space, consisting mainly of olive oil, cereals, fresh or dried fruit and vegetables, a moderate amount of fish, dairy and meat, and many condiments and spices, all accompanied by wine or infusions, always respecting beliefs of each community. However, the Mediterranean diet (from the Greek *diaita*, or "way of life") encompasses more than just food. It promotes social interaction, since communal meals are the cornerstone of social customs and festive events. It has given rise to a considerable body of knowledge, songs, maxims, tales and legends. The system is rooted in respect for the territory and biodiversity, and ensures the conservation and development of traditional activities and crafts linked to fishing and farming in the Mediterranean communities which Soria in Spain, Koroni in Greece, Cilento in Italy and Chefchaouen in Morocco are examples. Women play a particularly vital role in the transmission of expertise, as well as knowledge of rituals, traditional gestures and celebrations, and the safeguarding of techniques."[13]

2. THE 2012 DOUBLE PYRAMID

Matt Propert/National Geographic Stock

2. THE 2012 DOUBLE PYRAMID

The Environmental Pyramid was revised again for this edition using only public data and information which were reorganized in a reasonable manner to guarantee the transparency of their sources.
The data, which, in some cases, was used to cover any gaps or propose more thorough analyses, can be viewed in the technical support paper that can be downloaded at www.barillacfn.com.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2.1 ENVIRONMENTAL INDICATORS

The estimate of the environmental impacts associated with each individual food was made using data calculated according to the *Life Cycle Assessment* (LCA) analysis, which takes all phases into consideration, starting from the production phase and ending with the distribution phase and, where applicable, the cooking phase.
To make the results of LCA studies understandable, some summary indicators are usually

THE LIFE-CYCLE ASSESSMENT ALLOWS ENVIRONMENTAL IMPACTS TO BE ESTIMATED THROUGHOUT THE ENTIRE LIFE-CYCLE

Figure 2.1. The LCA analysis method is regulated by International ISO standards 14040 and 14044 which define its specific characteristics

Source: BCFN (2011), *Double Pyramid 2011: A Healthy Diet for All and Sustainable for the Environment.*

employed. These indicators are defined in order to preserve the scientific nature of the analysis as much as possible and, in general, are selected on the basis of the type of system analyzed. They must also be selected in such a way that they represent, as completely and clearly as possible, the interactions with the main environmental sectors. For food production chains, the analysis of the procedures highlights how the main environmental burdens that result from agriculture are represented by greenhouse gas emissions, the use of water, and the employment of the soil to produce the resources used.

THREE SUMMARY INDICATORS WERE USED: THE CARBON FOOTPRINT, THE WATER FOOTPRINT, AND THE ECOLOGICAL FOOTPRINT

Therefore, it has been decided to continue representing these impacts with the following environmental indicators:

- the *Carbon Footprint*, which quantifies the greenhouse gas emissions responsible for climate change; it is measured in a mass of equivalent CO_2;
- the *Water Footprint* (or the *Virtual Water Content*), which quantifies the consumption and methods of use of water resources; it is measured in volume (liters) of water;
- the *Ecological Footprint*, which calculates the amount of biologically productive land (or sea) needed to supply the resources and absorb the emissions associated with a system of production; it is measured in square meters or global hectares.

As in previous editions, and because of the need to summarize, the Environmental Pyramid is built using the Ecological Footprint only. In addition, the pyramids relative to the Carbon and Water Footprint indicators will also be presented in the paper.

In any case, it is important to note how these indicators provide a view of the impacts that is sufficiently broad for the purposes of this research, although it is not complete, especially if the local scale is considered. Examples of other impacts that could be assessed include the use of chemicals in agriculture, the release of nitrogen in the soil, or emissions of other pollutants into the air.

In addition, the scientific community has engaged in the development of a new indicator, the *Nitrogen Footprint*, used to report the impacts linked to the release of nitrogen through agricultural activities.[1]

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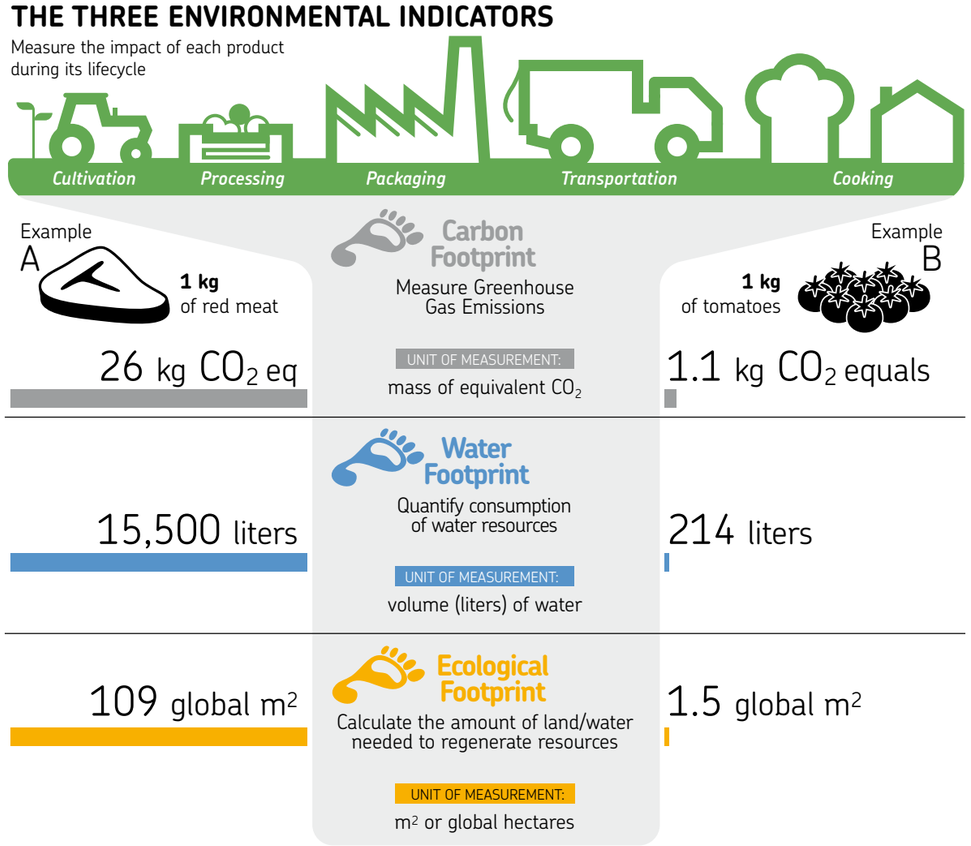

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The Nitrogen Footprint

The use of nitrogen in its reactive forms (with the exception of N_2, which is found naturally in the atmosphere) brought huge benefits to humanity, but it also has a huge impact on the environment.

Nitrogen is used mainly as a fertilizer for agricultural activities. During the last century, its use has allowed food production to expand and thus supported the increase in the global population and the improvement of living conditions in many geographic areas.

However, the efficiency of using nitrogen as a fertilizer is rather low and most of it is dispersed into the environment in the form of ammonia, nitrates, and nitrous oxide. Fertilization is the main anthropogenic cause of nitrogen emissions. The second in order of importance is combustion (production of electric energy, transportation, heating, etc.).

Once released into the environment, nitrogen moves through the atmosphere and aquatic and terrestrial ecosystems, causing a series of changes which have negative impacts on the environment as well as on the population, including the formation of smog and acid rain, the disappearance of forests, coastal pollution, loss of biodiversity, reduction of ozone in the stratosphere, and the increase in the greenhouse gas effect.

Therefore, it is necessary to develop tools used to measure how much human activities impact the nitrogen cycle to optimize food and energy production processes, and to minimize emissions of reactive nitrogen without reducing yields. As a result, the International Nitrogen Initiative has launched the development of an indicator, called the N-Print (*Nitrogen Footprint*), to calculate how much human activities interfere with the nitrogen cycle.[2]

The study of the reporting protocols for the Nitrogen Footprint is relatively recent, which is the reason why scientifically reliable calculations systems are not yet available.

2.2 ENVIRONMENTAL PYRAMIDS: STATUS UPDATE

The BCFN has continued the bibliographic collection begun in 2010 and 2011 with the publication of the first editions of the Double Pyramid, which further increases the statistical representation of the information: the sources used increased over 400% and are now 550 (Figure 2.2.).

The Environmental Pyramids presented in previous editions have been updated on the basis of these new collected and processed sources of information.

In fact, it was noted that while the variability of the data found for certain foods is fairly significant, the ranking of impacts of individual foods was confirmed: fruits and vegetables are the foods with the lowest impacts, while beef is the food that generates the greatest impacts[3].

Furthermore, it was noted that the percentile distribution of the number of studies per environmental indicator is not uniform: most of the bibliographic sources used refer first to the Carbon Footprint, then to the Water Footprint, and, finally, to the Ecological Footprint (Figure 2.3.); this is probably due to a series of reasons. The first reason is the fact that the Carbon Footprint is the indicator that "historically" has been most used by researchers; in particular, it is the one for which more consolidated and scientifically widespread calculation standards exist. A second reason is linked to the increasing number of communication initiatives which revolve around the concept of greenhouse gas emissions.

Figure 2.2. **Number of data used in the representation of foods' environmental impacts**

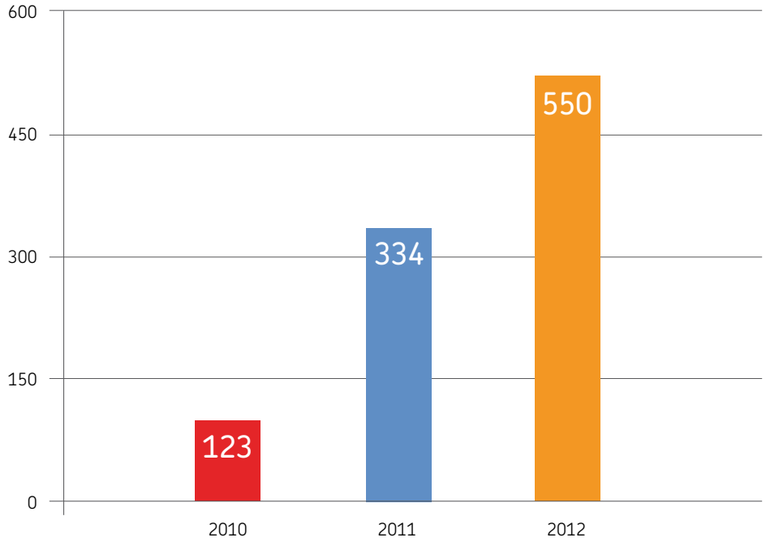
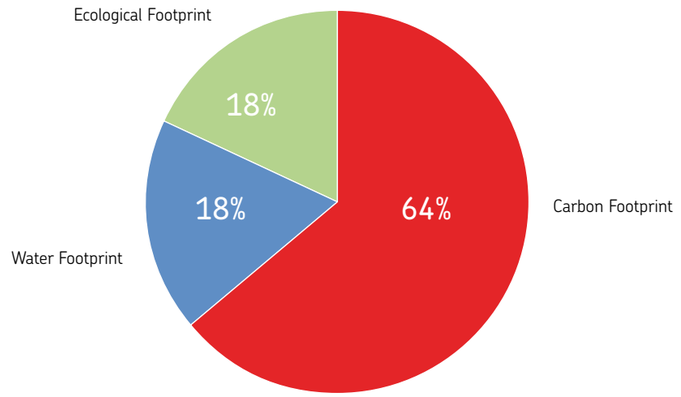


Figure 2.3. **Distribution of bibliographic sources relative to environmental impacts**



For each of the three environmental indicators, the percentile distribution of each macro-category which makes up the environmental pyramids will be indicated.

Figure 2.4. **Statistical coverage of bibliographical sources relative to the Carbon Footprint**

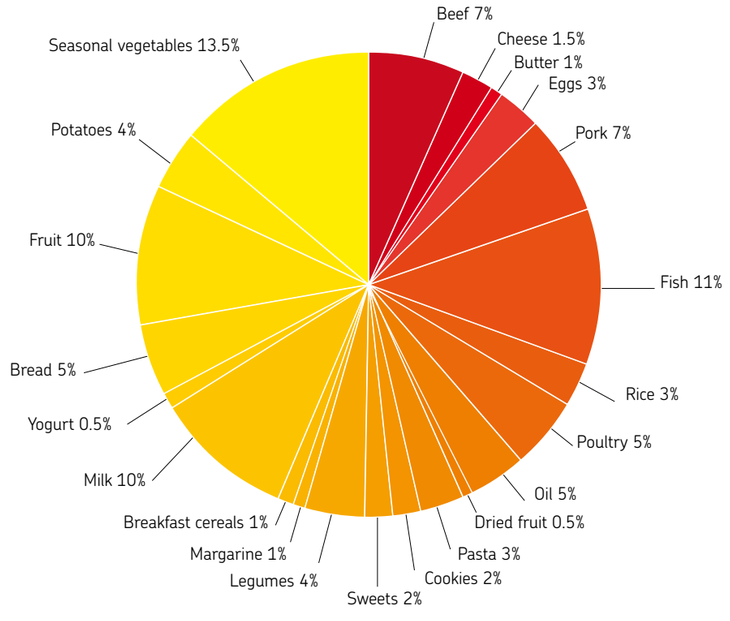


Figure 2.5. **Statistical coverage of bibliographical sources relative to the Water Footprint**

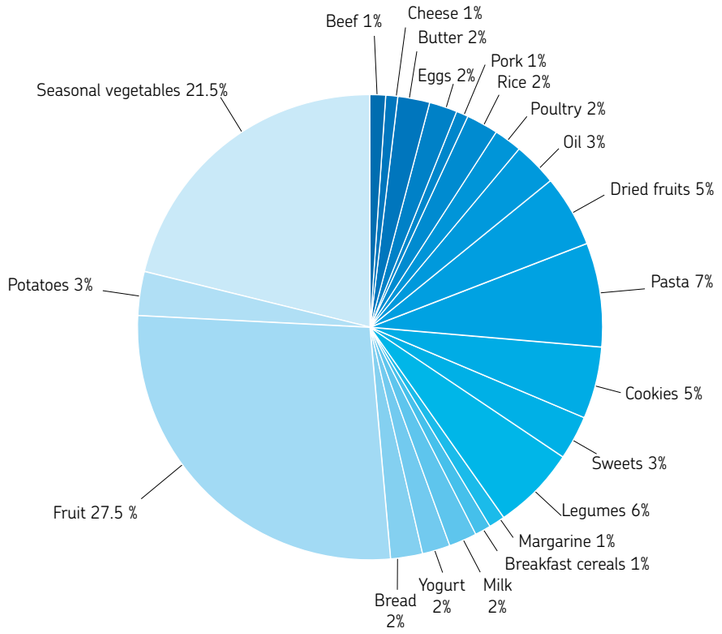


Figure 2.6. **Statistical coverage of the bibliographic sources relative to the Ecological Footprint**

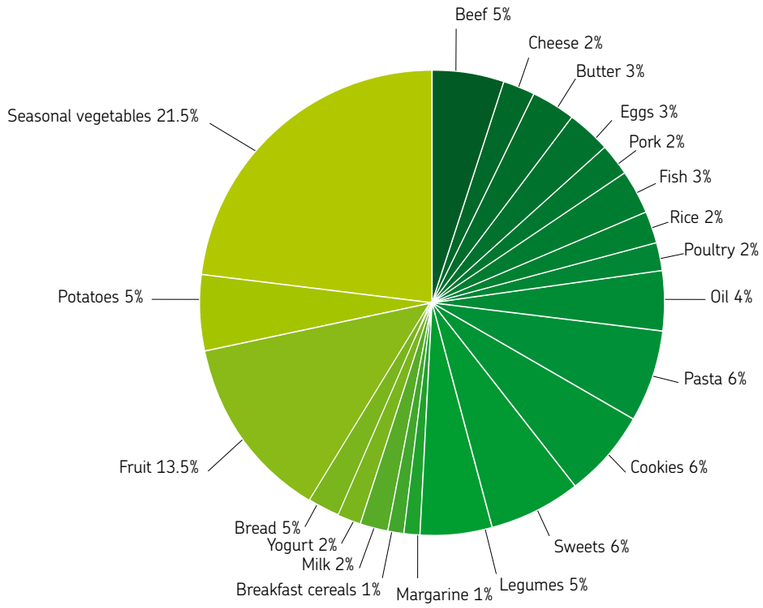


Figure 2.7. **Increase in statistical coverage and change in the environmental impact values**

FOOD	INCREASE IN STATISTICAL COVERAGE AND CHANGE IN VALUE (THE VALUES SHOWN INDICATE THE NUMBER OF DATA USED TO CALCULATE THE AVERAGE)								
	CARBON FOOTPRINT			WATER FOOTPRINT			ECOLOGICAL FOOTPRINT		
	STATISTICAL COVERAGE			STATISTICAL COVERAGE			STATISTICAL COVERAGE		
	2012 DATA	INCREASE IN DATA USED	CHANGE IN VALUE*	2012 DATA	INCREASE IN DATA USED	CHANGE IN VALUE*	2012 DATA	INCREASE IN DATA USED	CHANGE IN VALUE*
Beef	25	+5	=	1	-	=	5	-	=
Cheese	6	+3	=	1	-	=	2	-	=
Butter	5	-	=	2	+1	=	3	-	=
Eggs	10	+4	=	2	+1	=	3	-	=
Pork	24	+10	=	1	-	=	2	-	=
Fish	40	+13	↑	-	-	-	3	-	=
Rice	12	+8	=	2	+1	↓	2	-	=
Poultry	17	+8	=	2	+1	=	2	-	=
Oil	16	+6	↓	3	-	=	4	-	=
Dried fruits	1	-	=	5	+3	↓	-	-	-
Pasta	9	+2	=	7	+1	=	6	-	=
Cookies	6	+4	=	5	+3	=	6	+3	=
Sweets	7	+3	=	3	+2	↓	6	+2	=
Legumes	14	+11	=	6	+1	=	5	-	=
Margarine	3	-	=	1	+1	NEW	1	-	=
Breakfast cereals	2	+1	↑	1	-	=	1	-	=
Milk	34	+13	=	2	+1	=	2	-	=
Yogurt	2	+1	↑	2	+1	↑	2	-	=
Bread	18	+9	=	2	+1	=	5	+1	↑
Fruits	35	+22	↑	27	+7	=	14	+1	=
Potatoes	14	+11	=	3	+2	↓	5	-	=
Seasonal vegetables	50	+40	↑	21	+10	=	22	-	=
TOTAL	*350*	*+174*	-	*99*	*+37*	-	*101*	*+7*	-

* Variations were highlighted when the data changed ±15% compared to the value used in the Environmental Pyramids published in previous editions.

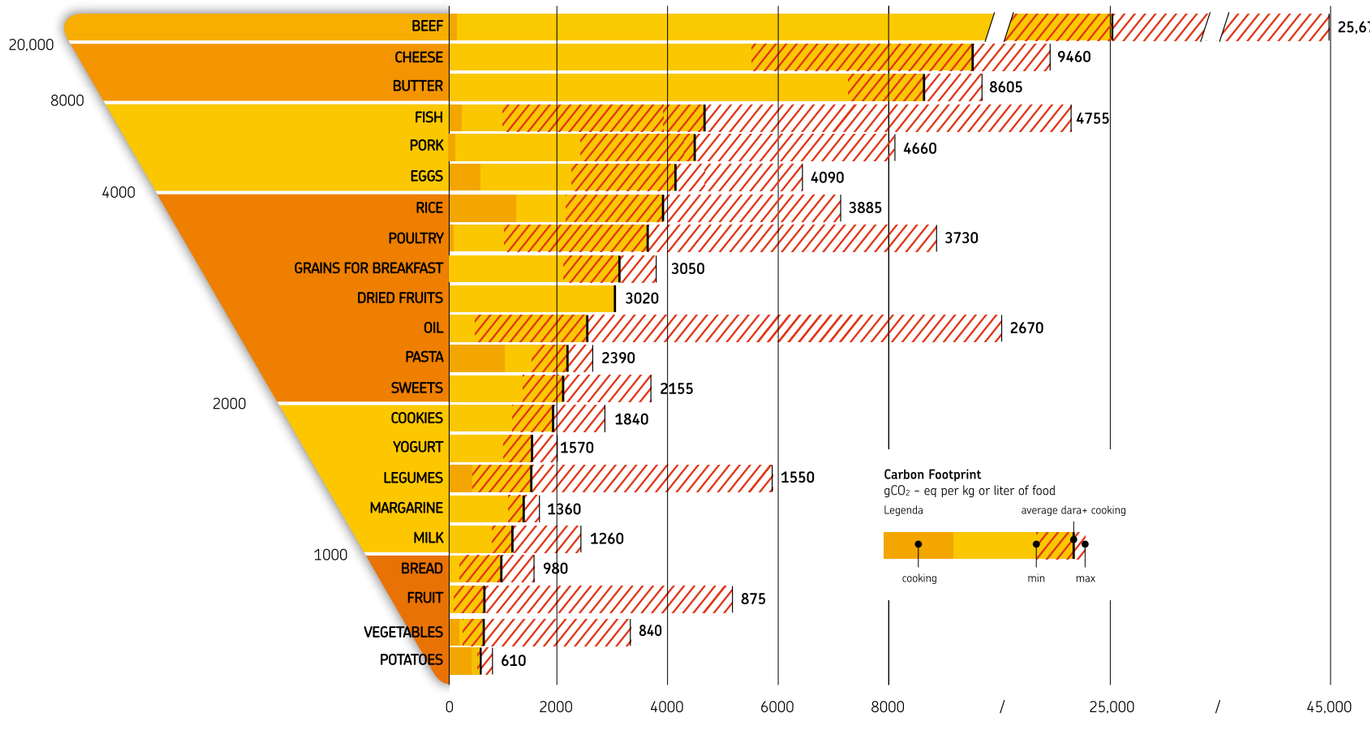


Figure 2.8. Foods' Carbon Footprint

Source: BCFN (2011), *2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

Note: for greater clarity, the data has been rounded off.

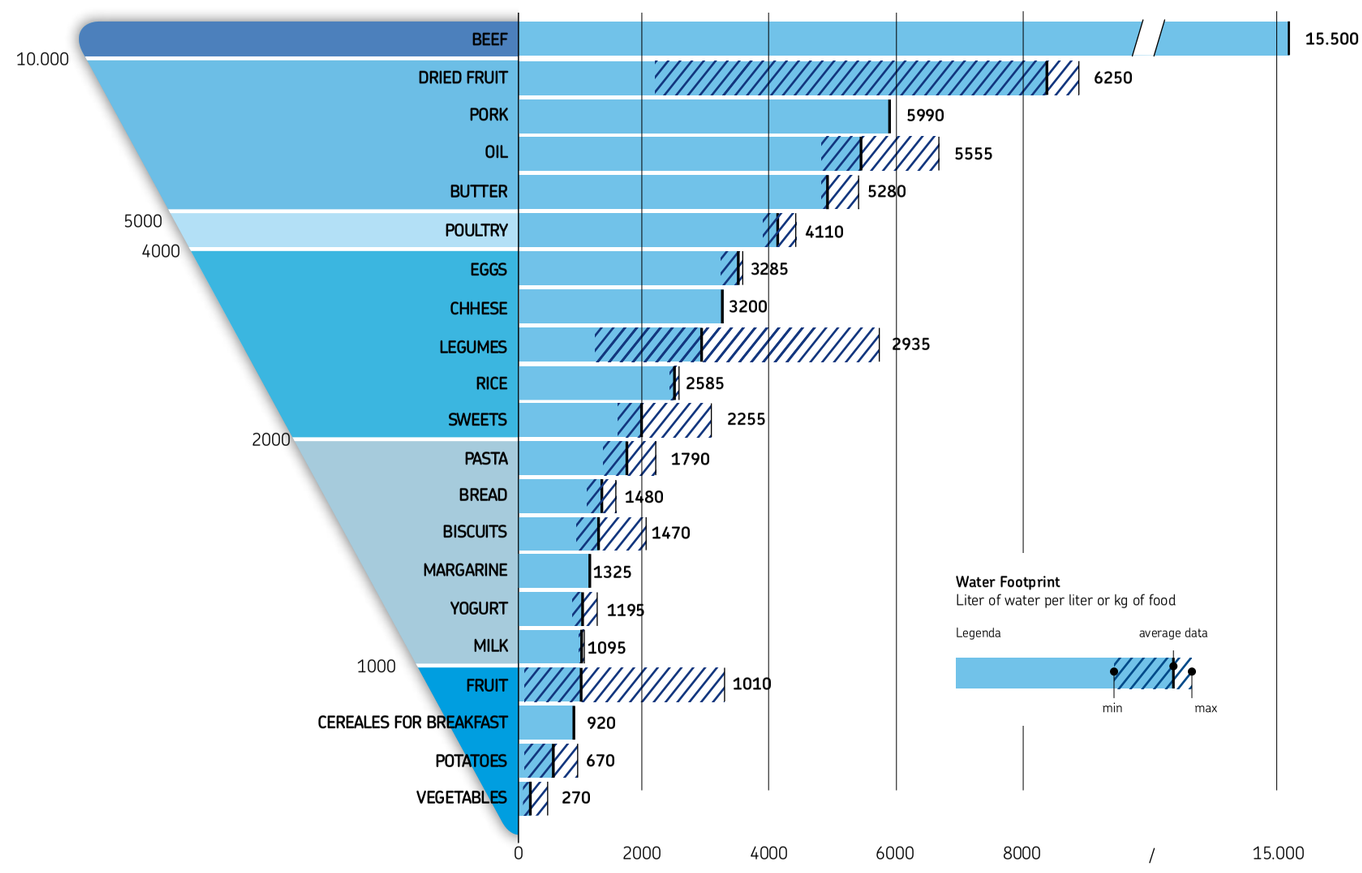
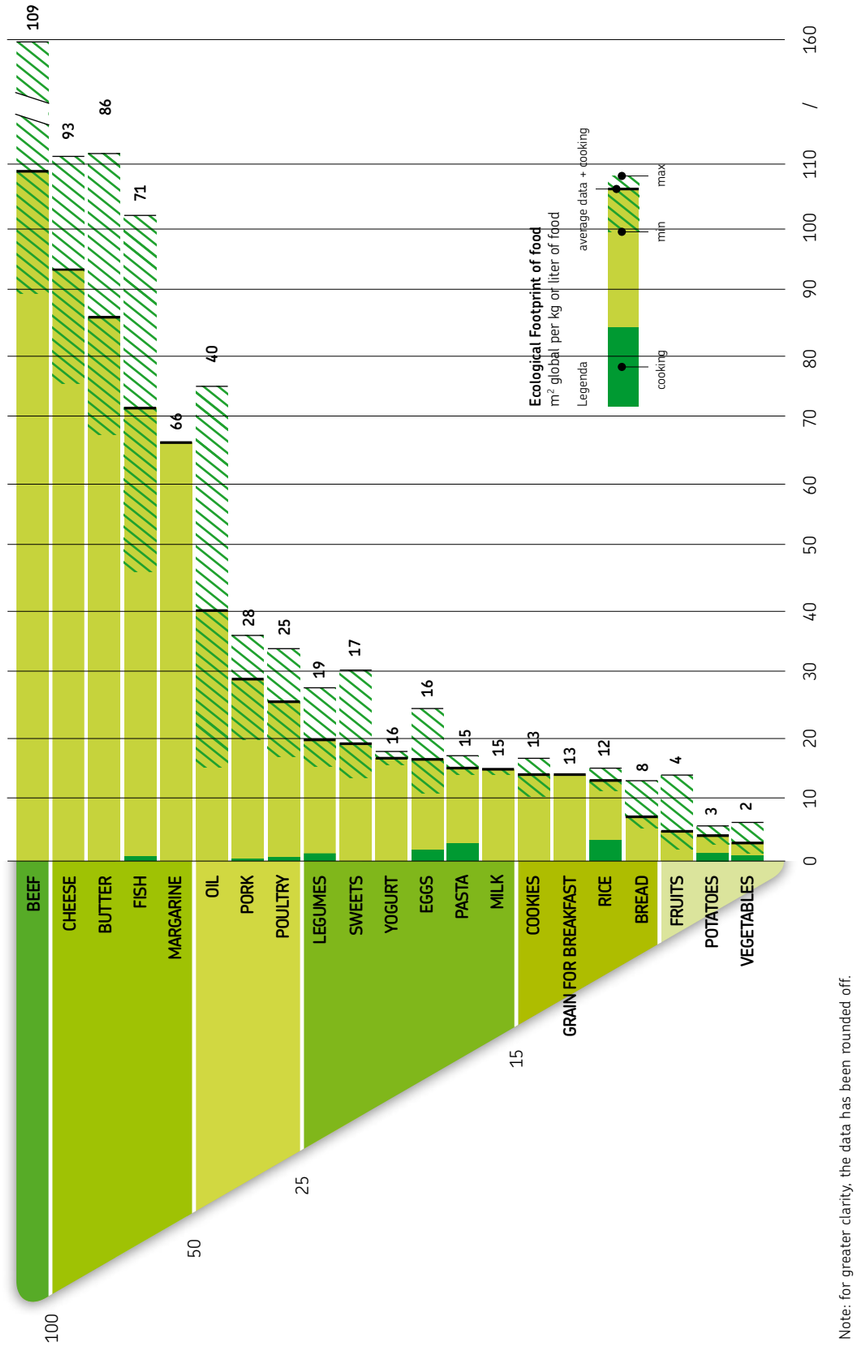


Figure 2.9. Foods' Water Footprint

Source: BCFN (2011), *2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

Note: for greater clarity, the data has been rounded off.

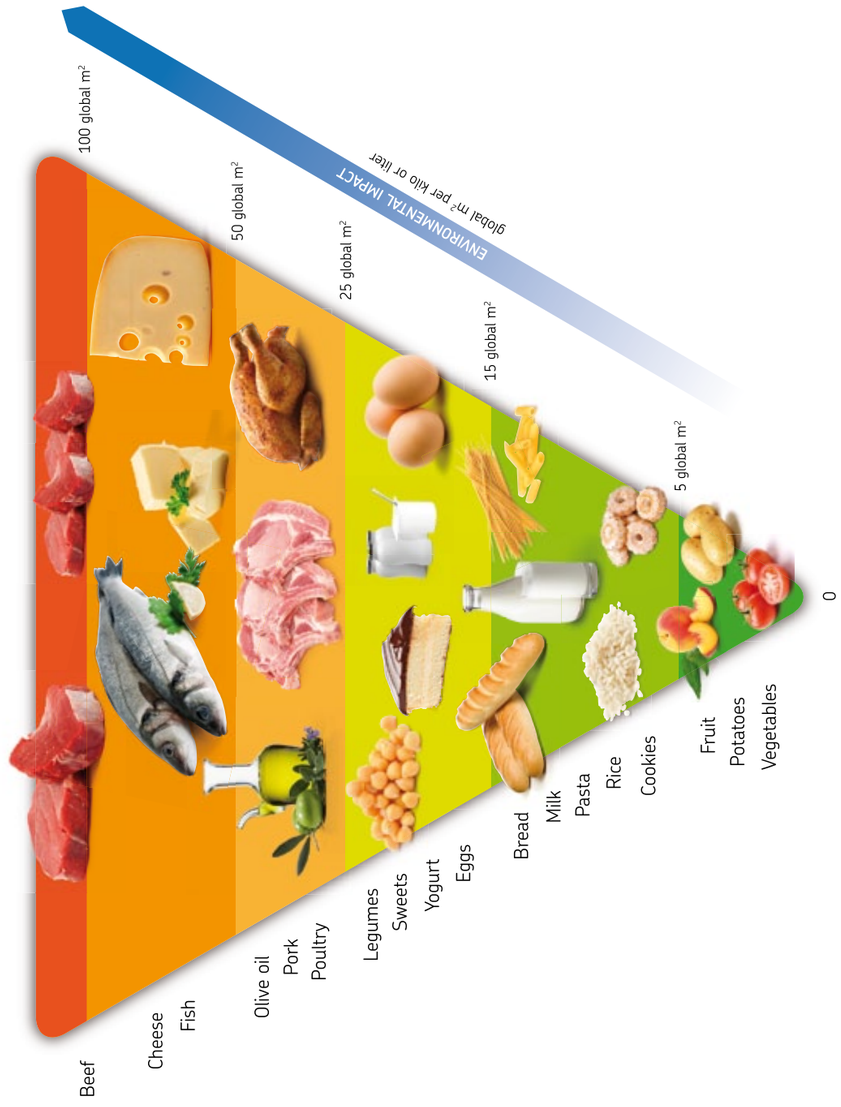
Figure 2.10. **Foods' Ecological Footprint**



Note: for greater clarity, the data has been rounded off.

Source: BCFN (2011), *2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

Figure 2.11. **The BCFN's Environmental Pyramid: its structure is based on a reclassification of environmental impacts, represented by using the Ecological Footprint**



Source: BCFN (2011), *2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

Some additional information

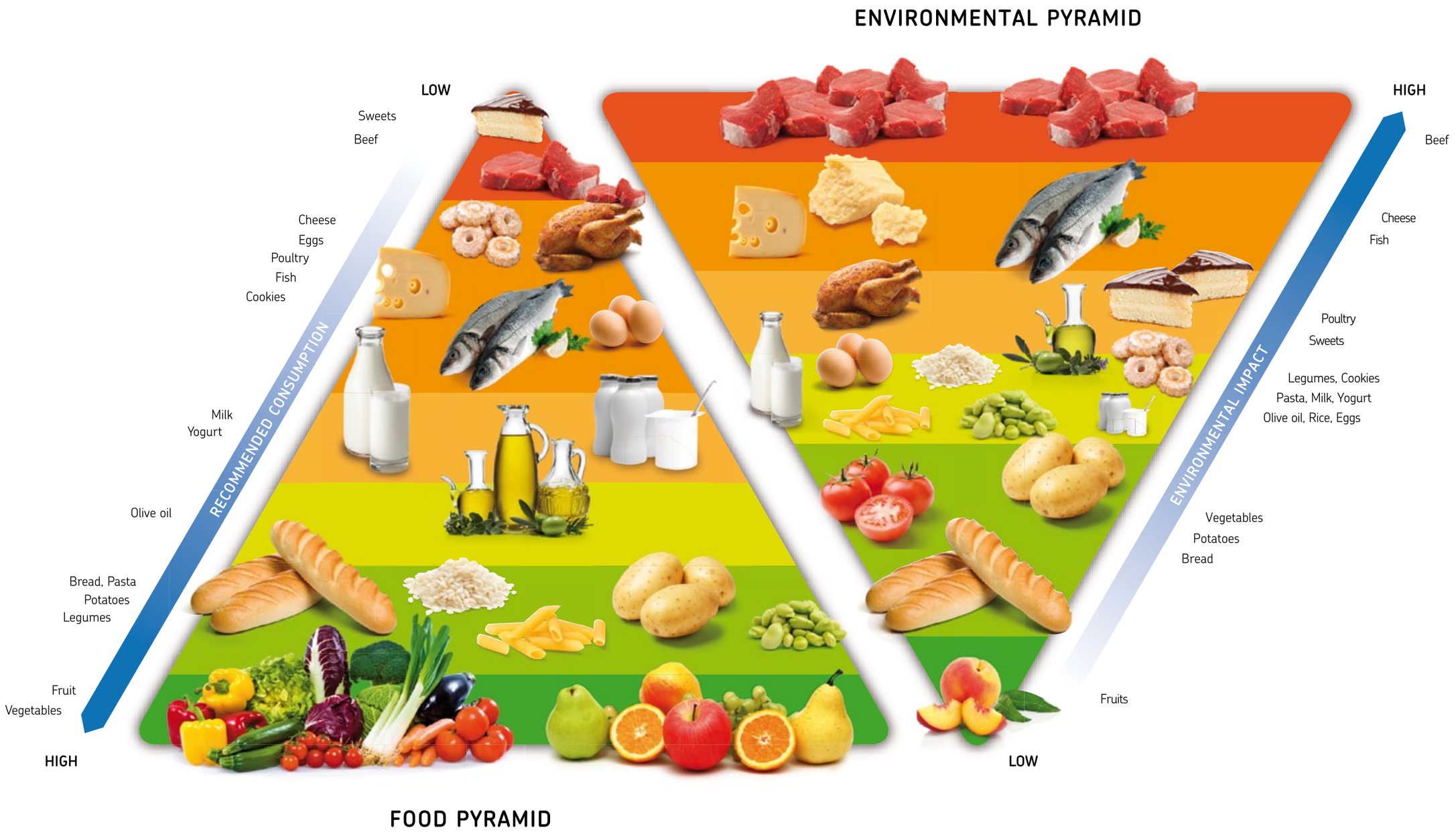
In past editions, we discussed how the environmental impact of food cannot be analyzed by attributing one single value to a food, but how different production techniques should be taken into consideration instead (for example, organic agriculture or correct crop techniques), as well as the processes which take place after the food has been produced (for example, the storage, distribution, and cooking phases, where applicable).
The results of past editions' analyses can be summarized in three points:

1) growing techniques can substantially influence impacts during farming, although in many cases the benefit is not immediately visible: a typical example of this is represented by the practices such as crop rotation or organic agriculture, which can produce significant advantages over time;
2) the distribution and storage chains have a significant effect on overall impacts only when the food has very low production impacts;
3) cooking, especially home cooking, may have some environmental impacts (basically, CO_2 emission) which are even greater compared to those of the entire production and transportation chain for the product itself.

It can be deduced that the subject of environmental impacts in food production is fairly complex, to prevent reaching simplistic conclusions.
From a simply environmental point of view, for example, it may be convenient to grow a crop far from the place it is consumed, in areas which allow for lower environmental impacts. On the other hand, it is evident that in terms of sustainability, assessments should be made that take into account the social and economic aspects which are the basis for food production and consumption.

2.3 THE FOOD AND ENVIRONMENTAL DOUBLE PYRAMID

The *Environmental and Food Double Pyramid* includes the Ecological Footprint indicator and was used to build the Double Pyramid published in 2011. It remains basically unchanged, as does the Pyramid constructed for the specific needs of younger people.



Source: BCFN (2011), *2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

2.4 THE DOUBLE PYRAMID FOR THOSE WHO ARE GROWING

The *Double Pyramid for those who are growing*: a version of the Double Pyramid dedicated to children and adolescents, published in 2011

FOOD PYRAMID

Source: BCFN (2011), *2011 Double Pyramid: A Healthy Diet for All and Sustainable for the Environment.*

3. THE IMPACT OF DIFFERENT DIETARY HABITS

3. THE IMPACT OF DIFFERENT DIETARY HABITS

In recent years, the BCFN has dealt broadly with the subject of environmental impacts connected to different dietary habits and models. In this chapter, we will present some considerations relative to dietary habits in different countries.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3.1 DIETARY HABITS IN ITALY

In order to verify the actual sustainability of Italian behavior and identify areas for potential improvement, it is useful to analyze data relative to food consumption.

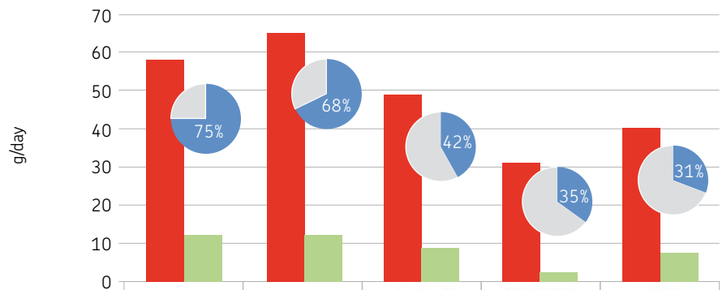
The data used for this preliminary analysis was taken mainly from the studies conducted by the Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione [Italian National Research Institute for Food and Nutrition] (INRAN), which for the past twenty years has conducted several research studies on the dietary habits of the Italian population. The most recent study, published in 2008, is based on data collected from 2005 to 2006.[1]

One of the most interesting facts concerns the percentage of people who eat (or do not eat) a specific food. Using, for example, the data relative to protein-based foods, 75% of people eat beef, while only 35% eat legumes and 31% eat pork, which means that about 65% of consumers never eat legumes, compared to the 25% who never eat beef. For the data on fish consumption, 68% of the sample eats fish, although the average per capita consumption of fish remains small.

IN ITALY, 75% OF PEOPLE EAT BEEF AND ONLY 35% EAT LEGUMES

Therefore, it seems that much remains to be done to encourage the consumption of legumes.

Figure 3.1. **Analysis of data relative to foods which contribute to protein requirements. In addition to the average daily amount consumed by the population, the analysis also shows the quantity of protein consumed through that specific food and the percentage of actual consumers**



	Red meat	Fish	Poultry	Legumes	Pork
Average consumption	57	66	49	33	41
Protein	11.6	11.4	9.5	1.9	8.4
% of consumers	75%	68%	42%	35%	31%

3.2 DIETARY HABITS IN EUROPE AND IN THE UNITED STATES

The European Food Safety Authority promoted *The EFSA European Food Consumption Database*[2] nd the project published a document summarizing the food consumption data of 22 European countries, which mostly originated from government agencies' monitoring programs and scientific studies. For the evaluations made in our study, we chose to specifically compare the habits of Italian consumers with those of French, German, and Swedish consumers, using the data gathered within the framework of the European project. Similar to what was done in this study in Europe, the American USDA conducted a research study on Americans' dietary habits in reference to the years 1994-1996, on a representative sample of all age groups.

The data from these two studies are not perfectly comparable because they used different approaches, but it is possible to propose some general considerations.

We highlight the average quantities of food consumed in Italy, France, Germany, Sweden, and the United States from seven food macrocategories, compared to the quantities recommended by INRAN:[3] the data is based on the percentage of actual consumers of that food.

In general, it is noted how in all countries legumes and fish are the foods eaten by a small percentage of the population, unlike what occurs for the other foods, which are usually consumed by over 90% of the sample analyzed.

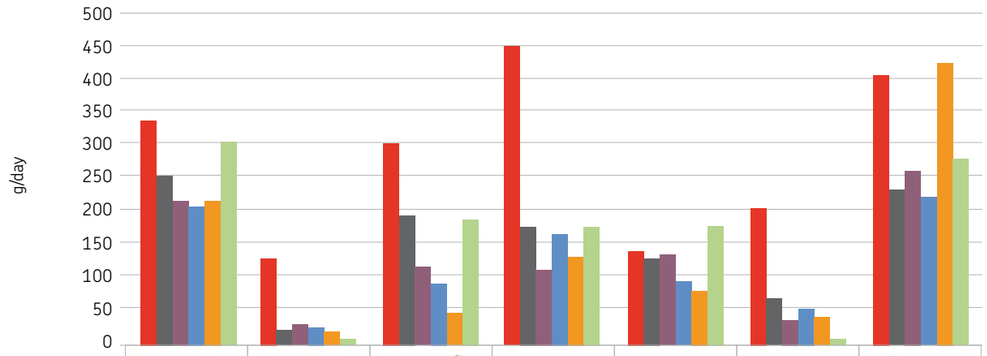
France is a specific case, as it boasts a high percentage of consumers for each food, which means that the French consumer's diet is quite varied and that, on average, individuals adopt dietary habits which include foods from all categories.

Americans are the leading consumers of meat (almost 200 g/day per capita), followed by Italy, France, Germany, and Sweden, which eat meat in smaller quantities (76 g/day).

Unfortunately, however, it is impossible to make additional considerations as breakdowns on meat consumption data (including beef, poultry, and pork) are not available.

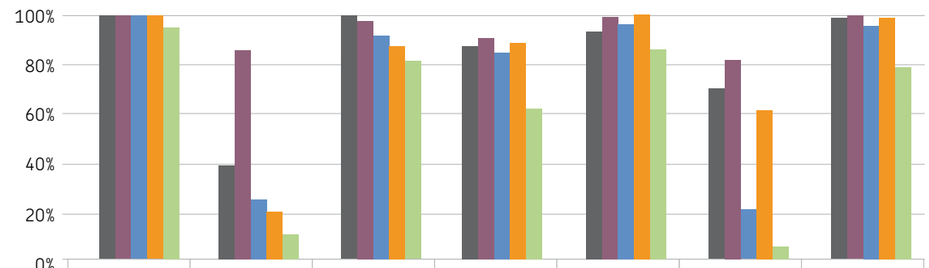
Another interesting fact relates to the very high consumption of milk and dairy products in Sweden (more than 400 g/day).

Figure 3.2. **Actual average consumption of seven main food macro-categories in four European countries**



	Grains	Legumes	Vegetables	Fruits	Meat	Fish	Milk and dairy products
Rec. by INRAN	330	130	300	450	140	200	407
Italy	252	29	190	169	112	66	227
France	214	35	112	108	116	28	258
Germany	209	26	98	159	93	51	220
Sweden	217	15	48	118	76	30	426
United States	302	14,5	189	169	187	10	274

Figure 3.3. **Percentage of actual consumers of seven main food macrocategories in four European countries**



	Grains	Legumes	Vegetables	Fruit	Meat	Fish	Milk and dairy products
Italy	100	42	100	91	99	69	99
France	100	88	99	93	100	85	100
Germany	100	29	92	83	94	23	97
Sweden	100	22	89	91	99	66	99
United States	97	12	83	54	86	8	79

3.3 EXAMPLES OF WORLDWIDE DOMESTIC CONSUMPTION

In *Hungry Planet* by Peter Menzel,[4] the weekly shopping of families from all over the world was analyzed and their per capita environmental impact was estimated using the same database as the Double Pyramid. Beverages and condiments (present in negligible amounts, in any case) were excluded from the calculation[5].
It is important to underline that the weekly shopping reported is an index of the habits of an individual family and therefore cannot be considered as representative of the average diet in a specific country, nor is it necessarily balanced from a nutritional point of view.
In addition, the families do not have the same number of family members, although the impacts were traced back to food consumption per capita.

FRANCE	The Le Moinde family purchases approximately 44 kg of food products every week, of which 36% are fruit and vegetable products, and 14% are meat, fish, and eggs. The Carbon Footprint of his weekly shopping is about 111 kg of CO_2-eq
ITALY	The Manzo family purchases approximately 53 kg of food products every week, of which 28% are fruit and vegetable products, and 26% are cereal products. The Carbon Footprint of his weekly shopping is about 114 kg of CO_2-eq
TURKEY	The Celik family purchases approximately 87 kg of food products every week, of which 52% are cereal products and 33% are fruit and vegetable products. The Carbon Footprint of his weekly shopping is about 103 kg of CO_2-eq
UNITED STATES	The Revis family purchases approximately 41 kg of food products every week, of which 28% are fruit and vegetable products, and 17% are meat, fish, and eggs. The Carbon Footprint of his weekly shopping is about 128 kg of CO_2-eq
ENGLAND	The Bainton family purchases approximately 56 kg of food products every week, of which 32% are milk and dairy products, and 27% are fruit and vegetable products. The Carbon Footprint of his weekly shopping is about 86 kg of CO_2-eq
JAPAN	The Ukita family purchases approximately 56 kg of food products every week, of which 47% are fruit and vegetable products, and 18% are meat, fish, or eggs. The Carbon Footprint of his weekly shopping is about 106 kg of CO_2-eq
AUSTRALIA	The Molloy family purchases approximately 53 kg of food products every week, of which 34% are fruit and vegetable products, and 26% is meat, fish, and eggs. The Carbon Footprint of his weekly shopping is about 136 kg of CO_2-eq
MEXICO	The Casales family purchases approximately 80 kg of food products every week, of which 43% are fruit and vegetable products, and 18% are cereal products. The Carbon Footprint for his weekly shopping is about 126 kg of CO_2-eq

Figure 3.4. **The French family**

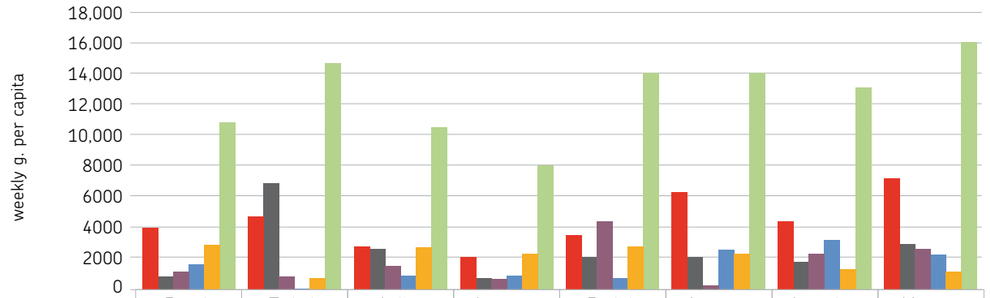
Figure 3.5. **The Italian family**

Figure 3.6. **The Turkish family**

Figure 3.7. **The American family**

This initial analysis, derived from the percentage of the composition of food macrocategories (fruit and vegetables, cereals, dairy products, etc.) leads to making some considerations: for example, that a diet composed mainly of fruits and vegetables has a smaller impact compared to a diet which uses a large quantity of meat.

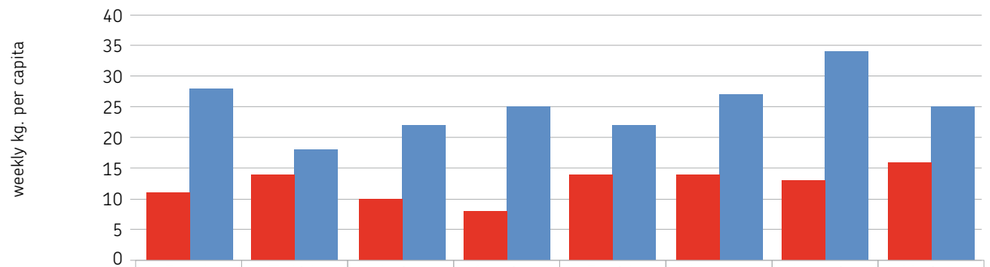
Figure 3.8. **Quantity of food consumed weekly by the members of the eight families analyzed. The data relates to personal consumption, estimated by dividing the total by the number of family members**



	French family	Turkish family	Italian family	American family	English family	Japanese family	Australian family	Mexican family
Fruit and vegetables	3948	4780	3023	2283	3699	6520	4504	6941
Grains	1166	7573	2777	927	1974	2149	1654	2948
Milk & dairy products	1443	887	1291	960	4501	335	2427	2598
Meat and fish	1552	257	975	1362	842	2551	3431	2334
Other	2981	1126	2593	2611	2895	2370	1311	1277
Total	11,090	14,623	10,659	8143	13,912	13,924	13,327	16,098

Without venturing too far into considerations of a nutritional nature, it is also interesting to evaluate how the diets analyzed featured a marked difference in terms of the food consumed. In spite of all this, however, it does not have a directly proportional effect on impacts; for example, through the observation of the Turkish family, the consumption of a lot of food, especially of plant origin, in fact implies a smaller impact on the environment.

Figure 3.9. **Environmental impact and amount of food consumed weekly by each member of the families analyzed**



	French family	Turkish family	Italian family	American family	English family	Japanese family	Australian family	Mexican family
kg of food	11	14	10	8	14	14	13	16
kg of CO_2-eq	28	18	22	25	22	27	34	25

4. THE SUSTAINABLE DIET'S CONSUMER PRICE

Joel Sartore/National Geographic Stock

4. THE SUSTAINABLE DIET'S CONSUMER PRICE

It is widely recognized that sustainability involves a lasting balance over time on several fronts: the environment, society, and economics all need to work together to achieve sustainability. For this reason, in this edition of the Double Pyramid, the BCFN has decided to address the topic of sustainability in a more structured manner, integrating the environmental and dietary variables (in terms of human health and, therefore, society) with some preliminary considerations relative to its economic aspects. We have tried to understand how much consumers' diverse food choices impact their wallets; how to verify if diets which are balanced for people and environmentally sustainable are also economically accessible; and finally, what are the potential existing limits for a correct assessment of these aspects.

Unlike environmental and nutritional issues, which tend to be rather consistent, in the case of prices, the variables are many and complex. In fact, the price of food is influenced by the type of product (for example, meat or vegetables) and by other aspects, such as its quality (actual or perceived), the point of sale (hypermarket, supermarket, retailer) where it is purchased, the geographic region, etc.

For these reasons, this chapter should be considered an initial attempt to include economic considerations within the complex topic of sustainability.

As is the BCFN's habit, the calculations which will be presented are based on public and official data taken for statistical purposes by government agencies, with specific reference to Italy.

4.1 FOOD PRICES IN ITALY

Figure 4.1. contains a table of prices taken by the Price Monitor[1] in two large sample cities, one in the north, Milan, and one in the south, Palermo, in April, 2012. Before analyzing the data, we feel that it is important to summarize the main theories which are the foundation of this study:

- the data available from the database includes prices relative to about 100 products classified into four categories: fruits and vegetables, food, household and personal care, and services. In this paper, we have chosen to report the value relative to the fruits and vegetables and food categories, and the category relative to the average price (calculated by ISTAT [Italian National Statistics Institute]) taken from a sampling of points of sale, which includes the main types of commercial establishments visited by consumers;

Figure 4.1. **Prices in euros per kg. or liter of foods in Italy**

FOOD	MILAN PRICE / kg. or liter	MILAN PRICE / kg. or liter
Sweets	€ 9.71	€ 9.47
Beef	€ 17.18	€ 13.05
Eggs	€ 4.33	€ 3.06
Farmed fresh fish	€ 13.40	€ 10.56
Packaged fish	€ 14.55	€ 15.63
Cheese	€ 13.84	€ 14.57
Pork	€ 7.50	€ 6.61
Poultry	€ 4.61	€ 4.30
Butter	€ 9.60	€ 9.48
Cookies	€ 4.43	€ 3.34
Yogurt	€ 4.48	€ 4.72
Milk	€ 1.52	€ 1.55
Oil	€ 3.66	€ 3.54
Rice	€ 2.57	€ 2.60
Potatoes	€ 1.23	€ 0.86
Pasta	€ 1.91	€ 1.24
Bread	€ 3.48	€ 2.70
Frozen vegetables	€ 3.37	€ 3.42
Fresh vegetables	€ 3.34	€ 2.17
Packaged salas	€ 10.45	€ 9.67
Fruit	€ 2.23	€ 1.67

Source: BCFN restatements of Price Monitor data relative to the month of April 2012.

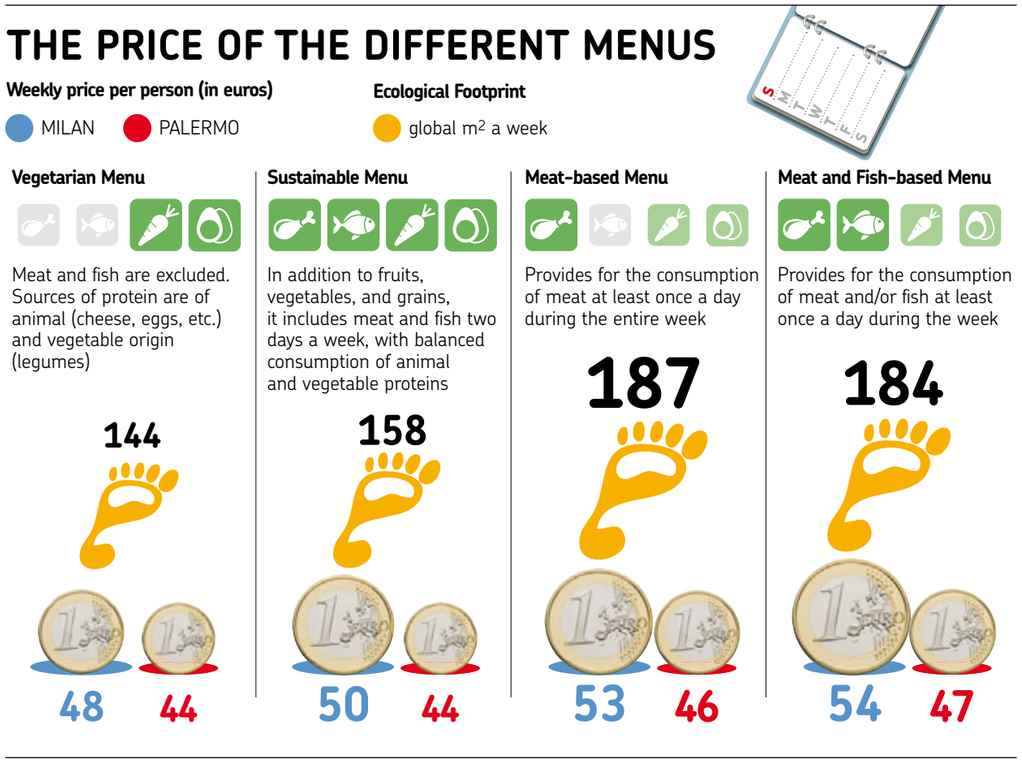
- the data was organized into macrocategories and averaged in order to get a price relative to the unit of mass (or volume) for each product considered.

For a more detailed and complete analysis, please read the technical paper.

By observing the prices chart (Figure 4.1.), it can be deduced that, although in a less striking manner than that regarding environmental impacts, an initial estimate confirms the classification suggested by nutritionists: the foods that should be eaten more often are those which cost less.

Nevertheless, there are some obvious exceptions. What is most striking, for example, is that the price for packaged salad is clearly higher compared to that of fresh lettuce, cheese, or fish, which in some cases actually cost more than beef.

However, it must be considered that the higher price, for example, of the packaged salad is due to the services (cutting and washing) involved in the product's preparation, which, in this case, should be excluded (exactly as in the case of pre-cooked foods).



Note: the economic data has been used to compare four different menus, all nutritionally balanced.

4.2 THE PRICE OF DIFFERENT MENUS IN ITALY

On the basis of these prices, we decided to propose some simple diagrams that might be helpful in understanding how people's choices can also influence their expenditures. These diagrams are to be considered merely indicative and are based on a number of food choices selected by the BFCN in order to assess their environmental impacts. In addition, just as for environmental impacts, it is also best to avoid the direct comparison of two foods, instead considering the different food pairings (in terms of quantity and categories) eaten in one day. In particular, a daily and a weekly menu will be examined, both balanced from a nutritional point of view.

The daily menu

With regard to the daily menu, the two alternatives previously analyzed in the second edition of the Double Pyramid are taken into consideration regarding environmental impacts.

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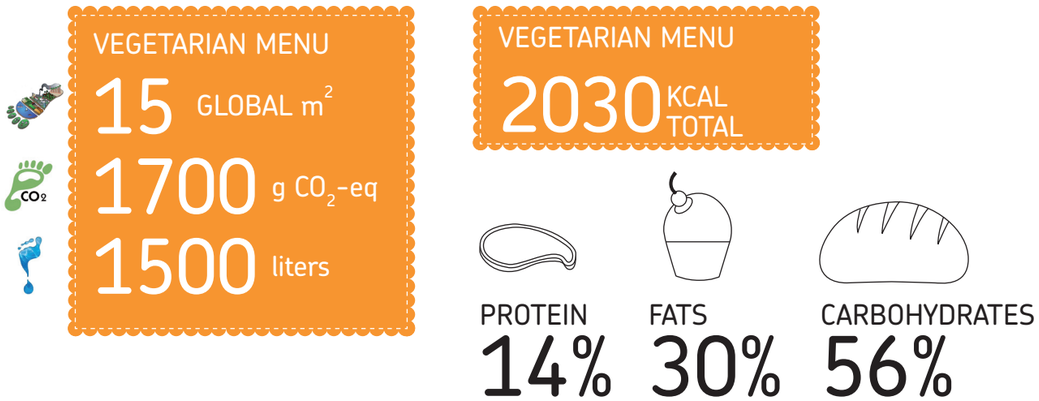
Figure 4.2. **Composition of a vegetarian menu and relative environmental impact**[2]

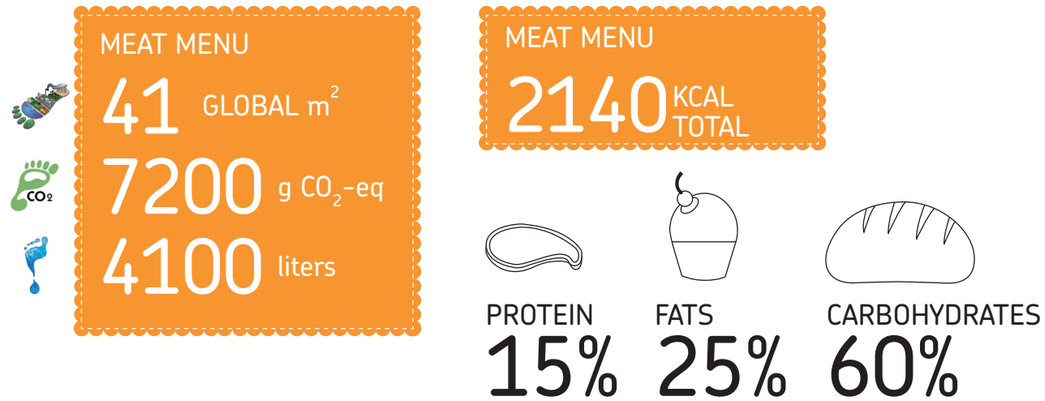


Breakfast	Mid-morning snack	Lunch
1 portion of fruit (200 g) 4 rusks	1 portion low-fat yogurt 1 fruit	1 portion of pasta with fennel 1 portion of squash and leek quiche
1 global m^2 80 g CO_2-eq 150 liters	2 global m^2 150 g CO_2-eq 180 liters	4 global m^2 580 g CO_2-eq 300 liters

Snack	Dinner
1 portion of fruit (150 g) 1 packet of unsalted crackers	1 portion of vegetables: steamed green beans (200 g) and potatoes (400 g) with grated cheese (40 g)
1 global m^2 50 g CO_2-eq 100 liters	7 global m^2 800 g CO_2-eq 780 liters

Source: BCFN (2011), *Double Pyramid 2011: A Healthly Diet for All and Suistanable for the Environment.*

Figure 4.3. **Composition of a menu with a meat dish and relative environmental impact**

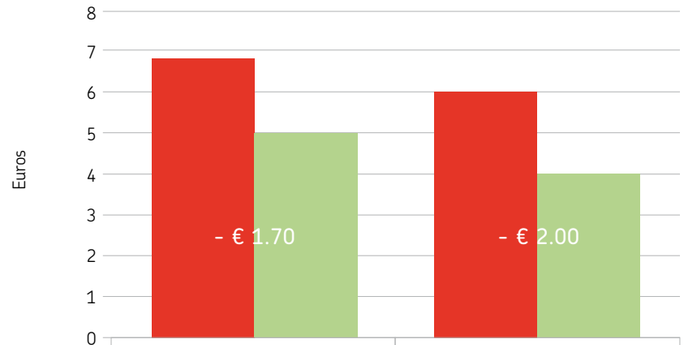


Breakfast	Mid-morning snack	Lunch
1 cup of low-fat milk 4 cookies	1 portion of fruit (200 g)	1 portion of cheese pizza, mixed green salad
3 global m^2 250 g CO_2-eq 210 liters	1 global m^2 10 g CO_2-eq 120 liters	16 global m^2 1900 g CO_2-eq 1100 liters

Snack	Dinner
1 portion low-fat yogurt	1 portion of vegetable soup/pasta with peas 1 grilled beef steak (150 g) 1 slice of bread
2 global m^2 140 g CO_2-eq 120 liters	19 global m^2 4900 g CO_2-eq 2500 liters

Source: BCFN (2011), *Double Pyramid 2011: A Healthly Diet for All and Suistanable for the Environment.*

Figure 4.4. Cost of a menu with a meat dish and a vegetarian menu, in which the food prices taken in Milan and Palermo are indicated



	Milan	Palermo
Meat menu	€ 6.80	€ 6.00
Vegetarian menu	€ 5.10	€ 4.00
Difference	- € 1.70	- € 2.00

Figure 4.5. The environmental impact of three possible weekly diets: the first diet is calculated assuming that, throughout the entire week, only the menu with one meat dish will be eaten; the second diet calculates two days with a menu featuring one meat dish, and five days following the vegetarian menu. The third diet calculates only eating the vegetarian menu[3]

	WEEKLY IMPACT			DAILY IMPACT		
	Carbon Footprint [gCO_2-eq]	Water Footprint [l]	Ecological Footprint [global m^2]	Carbon Footprint [gCO_2-eq]	Water Footprint [l]	Ecological Footprint [global m^2]
7 TIME MEAT MENU	50,300	28,900	280	7200	4100	41
5 TIME VEGETARIAN MENU + 2 TIME MEAT MENU	22,700	15,900	150	3200	2300	22
7 TIME VEGETARIAN MENU	11,700	10,700	100	1700	1500	15

Figure 4.6. The price of three possible weekly diets: the first diet is calculated assuming that only the menu with one meat dish will be eaten; the second diet includes two days of a menu with a meat dish and five days following the vegetarian menu. The third diet includes only eating the vegetarian menu[4]

	Milan	Palermo
7 days meat menu	€ 47.40	€ 42.20
2 days meat menu + 5 days vegetarian menu	€ 38.90	€ 32.10
7 days vegetarian menu	€ 35.60	€ 28.00

The weekly menu

An additional analysis was based on the calculation of the features of four different weekly menus, all balanced from a nutritional point of view, but with the only difference that their source of protein is from animal or plant origin. The *sustainable* (or BCFN) menu includes both meat and fish, with a preference for white meat, and provides a balanced consumption of protein of vegetable or animal origin. The *meat menu* and the *meat and fish menu* provide more conspicuous consumption of protein of animal origin. Lastly, meat and fish are obviously excluded from the *vegetarian menu*, and the sources of protein are animal-based (cheese, eggs, etc.), as well as of plant (legumes) origin.
From an economic point of view, the menus have some minor differences. Specifically, the vegetarian menu and the sustainable (BCFN) menu have practically the same costs, due to the absence of meat in the first diet and their limited presence in the second diet; the menus which are the richest in protein of animal origin (especially meat and fish), however, have a slightly higher cost.

MENUS THAT ARE RICHER IN PROTEIN OF ANIMAL ORIGIN HAVE A SLIGHTLY HIGHER COST

Figure 4.7. **The four weekly menus used to calculate environmental impacts**

1. SUSTAINABLE MENU

	MONDAY	g	TUESDAY	g	WEDNESDAY	g	THURSDAY	g	FRIDAY	g	SATURDAY	g	SUNDAY	
BREAKFAST	1 Cup partially skim milk	150	1 Cup partially skim milk	150	1 Glass of fresh-squeezed citrus fruit juice	130	1 Cup partially skim milk	150	1 Fruit Smoothie	200	1 Cup of Fruit Yogurt	125	1 Cup of tea	130
	5 Rusks	45	2 Slices of whole grain bread	46	1 Brioche	42	4 Dry Biscuits	36	4 Rusks	36	2 Slices of whole grain bread	46	1 Brioche	42
	1 Fruit	100	2 Teaspoons of marmalade	20							2 Teaspoons of marmalade	20	1 Fruit	100
			1 Fruit	100										
	Total	295	*Total*	316	*Total*	172	*Total*	186	*Total*	236	*Total*	191	*Total*	272
SNACK	1 Fruit Smoothie	200	1 Cup of skim Yogurt	125	1 Cup of skim Yogurt	125	1 Package of Crackers	25	1 Cup of skim Yoghurt	125	1 Fruit	100	1 Cup of skim Yoghurt	125
					3 Rusks	25			1 Fruit	100				
	Total	200	*Total*	125	*Total*	150	*Total*	25	*Total*	225	*Total*	100	*Total*	125
LUNCH	1 Serving of whole grain spaghetti with cacio cheese, black pepper and aromatic herbs	-	1 Serving of penne with tomato and basil	-	1 Serving of Risotto with apples and Parmigiano	-	1 Serving of pizza Margherita	-	1 Serving of casererecce (pasta) with sarde and fennel	-	1 Serving of whole grain fusilli with broccoli	-	1 Serving of potato gnocchi with genovese pesto	-
	1 Serving of rabbit with olives	-	1 Serving of salmon with artichoke puree	-	1 Serving of Turkey Escalope with Sage and Lemon	-	Mixed raw vegetables	60	1 Serving of pumpkin and leek flan	-	1 Serving of chicken strips with mixed vegetable	-	1 Serving of baked sea bass	-
	Mixed raw vegetables	60	Mixed raw vegetables	60	Mixed raw vegetables	60	Extra virgin olive oil	10			2 Slices of bread	46	3 Slices of whole grain bread	69
	White bread	60	White bread	60	White bread	60								
	Total	120	*Total*	120	*Total*	120	*Total*	70	*Total*	-	*Total*	46	*Total*	69
SNACK	1 Fruit	100	4 Chocolate covered cookies	24	1 Serving of fruit salad	100	1 Cup of skim Yogurt	125	1 Fruit	100	1 Fruit smoothie	200	1 Fruit smoothie	200
	1 Package of unsalted Crackers	25	1 Fruit Smoothie	200	1 Package of unsalted Crackers	25			1 Package of unsalted Crackers	25	2 Rusks	18	1 Package of unsalted Crackers	25
	Total	125	*Total*	224	*Total*	125	*Total*	125	*Total*	125	*Total*	218	*Total*	225
DINNER	1 Serving of tomato smoothie	-	1 Serving of pasta with white cannellini beans	-	1 Serving of pasta with cream of vegetables	-	1 Serving of pasta and pea soup	-	1 Serving of cream of vegetables	-	1 Serving of Vegetables Soup with Rice	-	1 Serving of pasta and legumes soup	-
	1 Serving of omelet wiht aromatic herbs	-	2 Slices of whole grain bread	46	Cured ham	60	1 Serving of beef carpaccio with shaved parmigiano, cherry tomatoes and arugula	-	Steamed Green Beans and Potatoes with Shaved Grana Padano Cheese	-	Caprese salad: tomao e mozzarella	-	1 Tomato bruschetta	-
	Steamed Swiss chard and potatoes	500	1 Serving of Strawberries with Lemon	-	Mixed raw	60					White bread	60	1 Fruit	100
	Whole grain bread	60			White bread	60	3 Slices of whole grain bread	69						
	Total	560	*Total*	46	*Total*	180	*Total*	69	*Total*	-	*Total*	60	*Total*	100

2. VEGETARIAN MENU

	MONDAY	g	TUESDAY	g	WEDNESDAY	g	THURSDAY	g	FRIDAY	g	SATURDAY	g	SUNDAY	
BREAKFAST	1 Cup partially skim milk	150	1 Cup partially skim milk	150	1 Glass of fresh-squeezed citrus fruit juice	130	1 1 Cup partially skim milk	150	1 Fruit Smoothie	200	1 Cup of Fruit Yogurt	125	1 Cup of tea	130
	5 Rusks	45	2 Slices of whole grain bread	46	1 Brioche	42	4 Dry Biscuits	36	4 Rusks	36	2 Slices of whole grain bread	46	1 Brioche	42
	1 Fruit	100	2 Teaspoons of marmalade	20							2 Teaspoons of marmalade	20	1 Fruit	100
			1 Fruit	100										
	Total	295	*Total*	316	*Total*	172	*Total*	186	*Total*	236	*Total*	191	*Total*	272
SNACK	1 Fruit Smoothie	200	1 Cup of skim Yogurt	125	1 Cup of skim Yogurt	125	1 Package of Crackers	25	1 Cup of skim Yoghurt	125	1 Fruit	100	1 Cup of skim Yoghurt	125
					3 Rusks	25			1 Fruit	100				
	Total	200	*Total*	125	*Total*	150	*Total*	25	*Total*	225	*Total*	100	*Total*	125
LUNCH	1 Serving of whole grain spaghetti with cacio cheese, black pepper and aromatic herbs	-	1 Serving of penne with tomato and basil	-	1 Serving of Risotto with apples and Parmigiano	-	1 Serving of pizza Margherita	-	1 Serving of pasta with fennel	-	1 Serving of whole grain fusilli with broccoli	-	1 Serving of potato gnocchi with genovese pesto	-
	Asparagus Bismarck oli style	- 60	Spinach pie	-	Veegtables with scamorza cheese	-	Mixed raw vegetables	-	1 Serving of pumpkin and leek flan	60	1 Serving of pumpkin and Leek Flan	-	1 Tomato bruschetta	-
	Mixed raw vegetables	60	Mixed raw vegetables	60	Mixed raw vegetables	60							3 Slices of whole grain bread	69
	White bread		White bread	60	White bread	60								
	Total	120	*Total*	120	*Total*	120	*Total*	60	*Total*	-	*Total*	46	*Total*	69
SNACK	1 Fruit	100	4 Chocolate covered cookies	24	1 Serving of fruit salad	100	1 Cup of skim Yogurt	125	1 Fruit	100	1 Fruit smoothie	200	1 Fruit smoothie	200
	1 Package of unsalted Crackers	25	1 Fruit Smoothie	200	1 Package of unsalted Crackers	25			1 Package of unsalted Crackers	25	2 Rusks	18	1 Package of unsalted Crackers	25
	Total	125	*Total*	224	*Total*	125	*Total*	125	*Total*	125	*Total*	218	*Total*	225
DINNER	1 Serving of tomato smoothie	-	1 Serving of pasta with white cannellini beans	-	1 Serving of mini farfalle with cream of vegetables	-	1 Serving of pasta and pea soup	-	1 Serving of cream of vegetables	-	1 Serving of Vegetables Soup with Rice	-	1 Serving of pasta and legumes soup	-
	1 Serving of omelet wiht aromatic herbs	-	2 Slices of whole grain bread	46	Large salad with ovoline (small mozzarella balls)	60	1 Stracchino cheese and arugula	-	Steamed Green Beans and Potatoes with Shaved Grana Padano Cheese	-	Caprese salad: tomao e mozzarella	-	1 Tomato bruschetta	-
	Steamed Swiss chard and potatoes	500	1 Serving of Strawberries with Lemon	-	Mixed raw	60	3 Slices of whole grain bread	69			White bread	60	1 Fruit	100
	Whole grain bread	60			White bread	60								
	Total	560	*Total*	46	*Total*	180	*Total*	69	*Total*	-	*Total*	60	*Total*	100

3. MEAT MENU

	MONDAY	g	TUESDAY	g	WEDNESDAY	g	THURSDAY	g	FRIDAY	g	SATURDAY	g	SUNDAY	
BREAKFAST	1 Cup partially skim milk	150	1 Cup partially skim milk	150	1 Glass of fresh-squeezed citrus fruit juice	130	1 Cup partially skim milk	150	1 Fruit Smoothie	200	1 Cup of Fruit Yogurt	125	1 Cup of tea	130
	5 Rusks	45	2 Slices of whole grain bread	46	1 Brioche	42	4 Dry Biscuits	36	4 Rusks	36	2 Slices of whole grain bread	46	1 Brioche	42
	1 Fruit	100	2 Teaspoons of marmalade	20							2 Teaspoons of marmalade	20	1 Fruit	100
			1 Fruit	100										
	Total	295	*Total*	316	*Total*	172	*Total*	186	*Total*	236	*Total*	191	*Total*	272
SNACK	1 Fruit Smoothie	200	1 Cup of skim Yogurt	125	1 Cup of skim Yogurt	125	1 Package of Crackers	25	1 Cup of skim Yoghurt	125	1 Fruit	100	1 Cup of skim Yoghurt	125
					3 Rusks	25			1 Fruit	100				
	Total	200	*Total*	125	*Total*	150	*Total*	25	*Total*	225	*Total*	100	*Total*	125
LUNCH	1 Serving of whole grain spaghetti with cacio cheese, black pepper and aromatic herbs	-	1 Serving of penne with tomato and basil	-	1 Serving of Risotto with apples and Parmigiano	-	1 Serving of pizza Margherita	-	1 Serving of pasta with meat sauce	-	1 Serving of whole grain fusilli with broccoli	-	1 Serving of potato gnocchi with genovese pesto	-
	1 Serving of hamburger with grana cheese and arugula	-	1 Serving of roast veal	-	1 Serving of beef roulades with sage	-	Mixed raw vegetables	60	1 Serving of pumpkin and leek flan	-	1 Serving of meatballs with peas	-	1 Serving of roast beef	-
	Mixed raw vegetables	60	Mixed raw vegetables	60	Mixed raw vegetables	60	Extra virgin olive oil	10			2 Slices of bread	46	3 Slices of whole grain bread	69
	White bread	60	White bread	60	White bread	60								
	Total	120	*Total*	120	*Total*	120	*Total*	70	*Total*	-	*Total*	46	*Total*	69
SNACK	1 Fruit	100	4 Chocolate covered cookies	24	1 Serving of fruit salad	100	1 Cup of skim Yogurt	125	1 Fruit	100	1 Fruit smoothie	200	1 Fruit smoothie	200
	1 Package of unsalted Crackers	25	1 Fruit Smoothie	200	1 Package of unsalted Crackers	25			1 Package of unsalted Crackers	25	2 Rusks	18	1 Package of unsalted Crackers	25
	Total	125	*Total*	224	*Total*	125	*Total*	125	*Total*	125	*Total*	218	*Total*	225
DINNER	1 Serving of tomato smoothie	-	1 Serving of pasta with white cannelli-ni beans	-	1 Serving of pasta with cream of vegetables	-	1 Serving of pasta and pea soup	-	1 Serving of cream of vegetables	-	1 Serving of Vegetables Soup with Rice	-	1 Serving of pasta and legumes soup	-
	1 Serving of omelet wiht aromatic herbs	-	2 Slices of whole grain bread	46	Bresaola (cured meat) and stracchino cheese	-	1 Serving of beef car-paccio with shaved parmi-giano, cherry tomatoes and arugula	-	Steamed Gre-en Beans and Potatoes with Shaved Grana Padano Cheese	-	Caprese salad: tomato e moz-zarella	-	1 Tomato bruschetta	-
	Steamed Swiss chard and potatoes	500	1 Serving of Strawberries with Lemon	-	Mixed raw	60	3 Slices of whole grain bread	69			White bread	60	1 Fruit	100
	Whole grain bread	60			White bread	60								
	Total	560	*Total*	46	*Total*	120	*Total*	69	*Total*	-	*Total*	60	*Total*	100

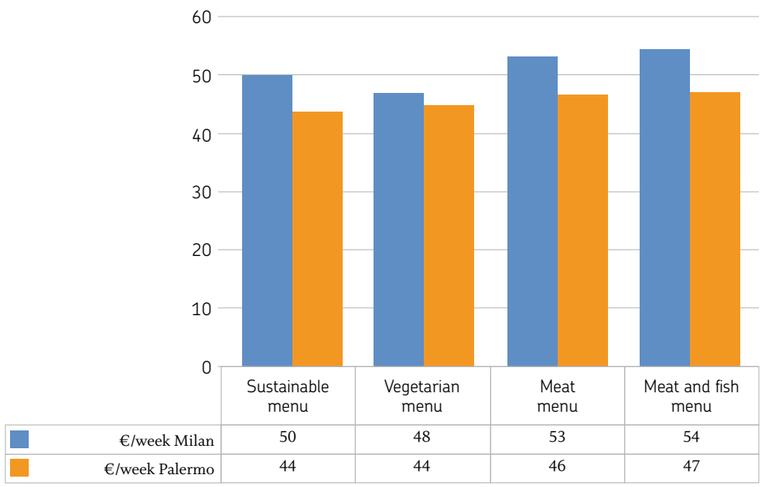
4. MEAT AND FISH MENU

	MONDAY	g	TUESDAY	g	WEDNESDAY	g	THURSDAY	g	FRIDAY	g	SATURDAY	g	SUNDAY	
BREAKFAST	1 Cup partially skim milk	150	1 Cup partially skim milk	150	1 Glass of fresh-squeezed citrus fruit juice	130	1 Cup partially skim milk	150	1 Fruit Smoothie	200	1 Cup of Fruit Yogurt	125	1 Cup of tea	130
	5 Rusks	45	2 Slices of whole grain bread	46	1 Brioche	42	4 Dry Biscuits	36	4 Rusks	36	2 Slices of whole grain bread	46	1 Brioche	42
	1 Fruit	100	2 Teaspoons of marmalade	20							2 Teaspoons of marmalade	20	1 Fruit	100
			1 Fruit	100										
	Total	295	*Total*	316	*Total*	172	*Total*	186	*Total*	236	*Total*	191	*Total*	272
SNACK	1 Fruit Smoothie	200	1 Cup of skim Yogurt	125	1 Cup of skim Yogurt	125	1 Package of Crackers	25	1 Cup of skim Yoghurt	125	1 Fruit	100	1 Cup of skim Yoghurt	125
					3 Rusks	25			1 Fruit	100				
	Total	200	*Total*	125	*Total*	150	*Total*	25	*Total*	225	*Total*	100	*Total*	125
LUNCH	1 Serving of whole grain spaghetti with cacio cheese, black pepper and aromatic herbs	-	1 Serving of penne with tomato and basil	-	1 Serving of Risotto with apples and Parmigiano	-	1 Serving of pizza Margherita	-	1 Serving of pasta with meat sauce	-	Whole wheat pasta with Tuna and Primizie	-	1 Serving of potato gnocchi with genovese pesto	-
	1 Serving of Backed sea bass	-	1 Serving of roast veal	-	Grouper fillet with citrus fruits	-	Mixed raw vegetables	60	1 Serving of pumpkin and leek flan	-	1 Serving of meatballs with peas	-	1 Serving of roast beef	-
	Mixed raw vegetables	60	Mixed raw vegetables	60	Mixed raw vegetables	60	Extra virgin olive oil	-					3 Slices of whole grain bread	69
	White bread	60	White bread	60	White bread	60								
	Total	120	*Total*	120	*Total*	120	*Total*	60	*Total*	-	*Total*	46	*Total*	69
SNACK	1 Fruit	100	4 Chocolate covered cookies	24	1 Serving of fruit salad	100	1 Cup of skim Yogurt	125	1 Fruit	100	1 Fruit smoothie	200	1 Fruit smoothie	200
	1 Package of unsalted Crackers	25	1 Fruit Smoothie	200	1 Package of unsalted Crackers	25			1 Package of unsalted Crackers	25	2 Rusks	18	1 Package of unsalted Crackers	25
	Total	125	*Total*	224	*Total*	125	*Total*	125	*Total*	125	*Total*	218	*Total*	225
DINNER	1 Serving of tomato smoothie	-	1 Serving of pasta with white cannelli-ni beans	-	1 Serving of mini farfalle with cream of vegetables	-	1 Serving of pasta and pea soup	-	Grilled swordfish	-	1 Serving of Vegetables Soup with Rice	-	1 Serving of pasta and legumes soup	-
	1 Serving of omelet wiht aromatic herbs	-	2 Slices of whole grain bread	46	Bresaola (cured meat) and stracchino cheese	-	1 Serving of beef car-paccio with shaved parmi-giano, cherry tomatoes and arugula	-	Contorno: potatoes	-	Caprese salad: tomao e moz-zarella	-	1 Tomato bruschetta	-
	Steamed Swiss chard and potatoes	500	1 Serving of Strawberries with Lemon	-	Mixed raw	60	3 Slices of whole grain bread	69	White bread	-	White bread	60	1 Fruit	100
	Whole grain bread	60			White bread	60								
	Total	560	*Total*	46	*Total*	120	*Total*	69	*Total*	-	*Total*	60	*Total*	100

MENUS THAT ARE RICHER IN MEAT AND FISH HAVE GREATER ENVIRONMENTAL IMPACTS

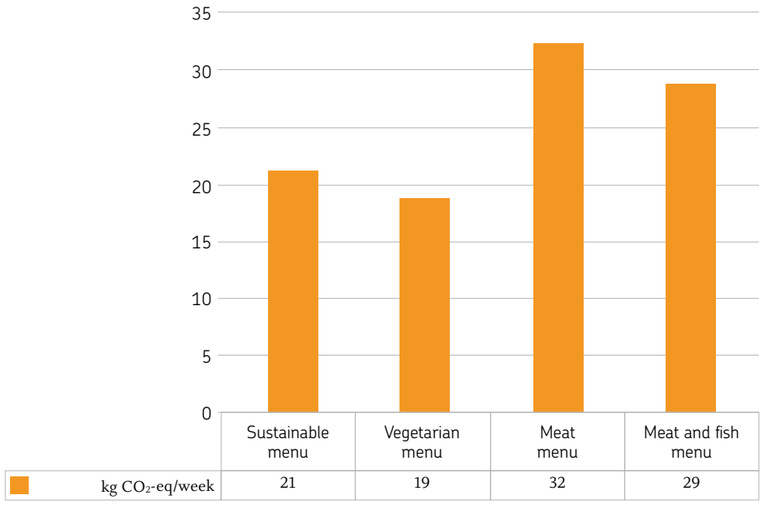
Regarding environmental impact, the two menus richest in meat and fish have values that are higher compared to the sustainable (BCFN) menu and to the vegetarian menu. For additional information, see Figures 4.9., 4.10., and 4.11.

Figure 4.8. **Economic cost of the four different menus analyzed, all nutritionally balanced**[5]



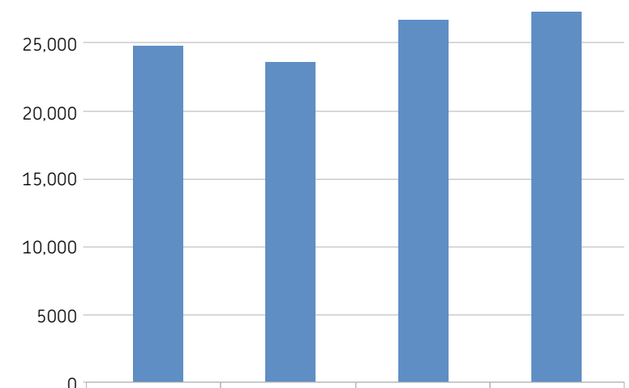
	Sustainable menu	Vegetarian menu	Meat menu	Meat and fish menu
€/week Milan	50	48	53	54
€/week Palermo	44	44	46	47

Figure 4.9. **Carbon Footprint of the four different menus analyzed, all nutritionally balanced**



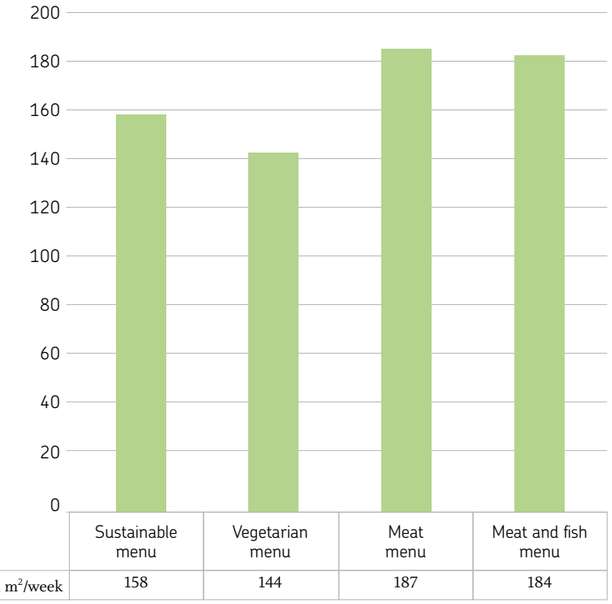
	Sustainable menu	Vegetarian menu	Meat menu	Meat and fish menu
kg CO_2-eq/week	21	19	32	29

Figure 4.10. **Water Footprint of the four different menus analyzed, all nutritionally balanced**[6]



	Sustainable menu	Vegetarian menu	Meat menu	Meat and fish menu
liter/week	16,538	14,602	23,199	20,482

Figure 4.11. **Water Footprint of the four different menus analyzed, all nutritionally balanced**



	Sustainable menu	Vegetarian menu	Meat menu	Meat and fish menu
global m^2/week	158	144	187	184

Does the Mediterranean diet cost more? Not always

In 2009, Adam Drewnowski conducted a study[7] in which he attempted to define the cost differential for families between the Mediterranean diet and the American diet, by analyzing their prices in relation to energy density and wealth of nutrients.
The traditional Mediterranean diet is rich in whole grain cereals, fruits, vegetables, and fish, all foods which at one time were convenient, but whose prices today are higher. Therefore, when consumers try to save money, the foods richest in nutrients and with the least calories (for example, legumes, fish, fruits, and vegetables) are the first foods to be eliminated from the diet. Americans' food choices, therefore, tend to go to more refined foods, high in calories and relatively inexpensive.
Drewnowski calculated the energy density contained in the main food groups, demonstrating that there is an inverse ratio between energy and water content - fruits and vegetables, for example, contain a great quantity of water but supply a limited energy intake (as opposed to nuts). He subsequently analyzed the cost of the Mediterranean diet compared to the American diet, both on a quantitative ($/100 grams of product) and a caloric basis ($/2,000-2,500 kcal/day), using the prices taken from three Seattle supermarkets in 2006.
The analysis shows strong price variability among foods from the same category. The price of fresh fruit, for example, can vary from $0.05 to $5.00 per 100 grams. Vegetables on average cost $0.75 per 100 grams, and fresh salad, can cost over $2.00. On the other hand, 100 grams of legumes or cereals cost an average of around $0.50, while the price of nuts is around $1.00 per 100 grams.
However, considering the cost of food in terms of the food's price per caloric unit intake, Drewnowski showed how foods with low energy intake (vegetables and fruits) can have a very high cost per calorie (with the exception of some vegetables, such as carrots and potatoes, which tend to be richer in energy); meat and fresh fish have a medium-high cost; dairy and cheese products and legumes, which represent an alternative source of protein, offer low energy density at moderate prices; and finally, cereals, in general, cost less than meat, but more than oils and fats.
Lastly, Drewnowski considers the price of food in relation to the wealth of nutrients, identifying a positive ratio between these two elements: the most expensive foods are, in fact, fish, fruit, vegetables, cheeses, and nuts. Nevertheless, there are some nutrient-rich foods that can also be economically advantageous, such as vegetables, legumes, cereals, and some dairy and cheese products.
Thus, the Mediterranean diet can be followed by selectively choosing food that is low in cost and high in nutritional value, such as pasta, legumes, some types of vegetables, oil, and nuts. Low-fat dairy products and eggs represent the least expensive source of protein. The creation of one-dish meals with a vegetable base and a small quantity of meat can be a way to ingest the proper caloric and nutritional intake at a limited cost.
Combining nutritious, tasty, and not very expensive foods could be a good way to combat obesity.
The Mediterranean diet, included by UNESCO on its list of humanity's intangible cultural heritages in 2010, thus becomes an actual method to increase the quality of a diet and to ingest nutrient-rich foods which are not necessarily associated with higher expense, even in the United States.

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4.3 THE PRICE OF DIETS IN SOME COUNTRIES

In addition to engaging in proper physical activity, an effective way to keep a healthy weight and maintain good health is to reduce the energy density (or the energy content per unit of weight, kcal/day[8] in diets, by eating more fruits and vegetables.[9] In fact, it has been proven that by eating more fruits and vegetables, more micronutrients per kcal are ingested, while high energy density diets, with an equal amount of caloric intake, are less rich in nutrients.[10] But if, on the one hand, the inverse ratio between the energy density of foods and the nutritional quality of the diets which contain them can now be considered,[11] there are still few studies aimed at defining the relationship between foods that are more or less energy dense (and, thus, more or less healthy) and their cost for families. The issue is highly significant, considering that the higher or lower cost of a "healthy" diet also involves its sustainability in economic terms, especially for poor families and countries.

4.3.1 United States

According to studies carried out by Drewnowski, foods with high energy content, containing refined cereals and added sugar and fat, have lower costs,[12] while the cost per calorie for lean meat, fish, whole grain cereals, fruits, and vegetables is generally higher. This information would be confirmed by the fact that diets with high nutritional quality are usually eaten by people with a higher income, while poor quality and low cost diets are usually adopted by the poorest segments of the population.[13]

The "cost" variable (and its resulting prices) could, therefore, partially explain why low-income people in the United States are usually unable to follow the guidelines for a healthy diet and have higher rates of food-related chronic diseases.[14]

However, this is a rather controversial question, since there are other American studies that can demonstrate that the healthiest diet systems are not necessarily the most expensive, and indeed, may even cost less.[15]

In a recent paper, "*Are Healthy Foods Really More Expensive?" It depends on how the price is measured*,[16] the USDA proposed a different calculation method: most studies are only based on the "cost per calorie," while the USDA uses two other measurements, the price "per edible gram" and the "average serving" price.[17]

GRAINS, FRUIT, AND VEGETABLES ARE LESS EXPENSIVE THAN PROTEIN FOODS AND "MODERATION FOODS" IF THE COST IS CALCULATED ON THE AVERAGE RECOMMENDED SERVING

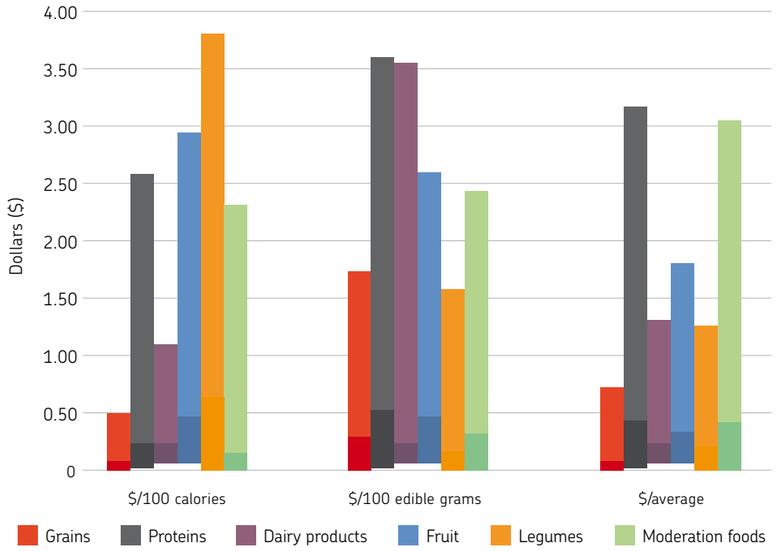
Foods with low caloric content, at the same weight, seem to be more expensive when the price is commensurate with calories: for example, fruit can cost up to almost $300 per 100 calories; and vegetables, up to $3.70. On the other hand, foods which in the report are called *moderation foods*, especially those with high saturated fat and added sugar content, tend to have a high calorie content and a low cost per 100 calories (not over $2.30).

When foods are instead measured on the basis of weight in edible grams or average servings, ereals, vegetables, fruit, and dairy products are less expensive – not exceeding $1.70 per average serving for fruit – compared to most protein foods and those rich in saturated fats, added sugars, and/or sodium, which can exceed $3 per average serving.

The results are summarized in Figure 4.12.

According to the recommendations proposed in ChooseMyPlate, cereals, dairy products, and fruit are less expensive compared to the recommended servings of vegetables or protein foods.

Figure 4.12. **The prices of food vary according to the method used to measure them**



Note: *moderation food* means those foods with high sodium, added sugars, or saturated fat content, or which do not contain foods from a food group.

Source: USDA, 2012.

4.3.2 France

Research conducted by Drewnowski and his research group on French adults reveal that every 100 additional grams of fruits and vegetables were associated with a daily increase in food costs which can vary from $0.23 to $0.38.[18]

In another study, researchers demonstrated that high energy density diets (calculated in kcal per gram of food) are poor in nutrients and generate lower costs (measured in $/kcal); while lower energy density diets and greater quantities of micronutrients are associated with higher costs. For example, if a man who follows a high energy density diet ingests on average 19,000 kcal/weekly (the equivalent of circa 2,700 kcal a day), decides to reduce his calories to 17,000 a week, he must incur additional costs (measured in $/2,000 kcal) or 25%. Therefore, consuming 2,390 kcal/day, the additional price to be paid for the lower energy density is equivalent to $764 per year.[19]

According to the researchers from the LiveWell for LIFE project, which is funded by the

ACCORDING TO THE "LIVEWELL" PROJECT, A HEALTHIER DIET, WITH LOW ENVIRONMENTAL IMPACT COSTS LESS

European Community and will be discussed in greater detail in Chapter 5, a sustainable and healthy food system that allows greenhouse gas emissions to be reduced by 25% can cost less. In fact, the average daily cost for one person's grocery shopping would go from the current €4.90 to €4.36.

4.3.3 Great Britain

Some studies carried out in Great Britain on the price of diets display contrasting results, similar to the United States. Researchers[20] studied over 15,000 women aged from 35 to 69 using a summary healthy diet indicator (*Healthy Diet Indicator*, HDI) which, on the basis of the World Health Organization's directives, contains eight levels (from the lowest "less healthy diet" to the highest "more healthy diet"). The authors estimate that the cost differential between the lower HDI level and the higher HDI level is equal to £540 per year (equal to circa €685). Therefore, according to this study, the healthier diets are associated with higher costs.

In the WWF UK's report relative to the *LiveWell* food education project (which we will discuss in detail), the price of the *LiveWell 2020* diet is estimated in comparison to the average food expense defined by the English Department for the Environment, Food, and Agriculture (DEFRA). The authors have proposed a weekly shopping list for a proper diet which, using middle category products, costs £28.40 per person (equal to €36).[21] The amount could be further reduced depending on the brand and the point of sale chosen. The results would demonstrate that the cost of the 2020 LiveWell diet is lower than families in Great Britain's average expense for food and nonalcoholic beverages (which during 2009 was about £32.12 per person weekly, or equal to €41).

Thus, according to LiveWell, a healthier diet with a low environmental impact saves money.[22]

Concluding considerations

Although there is some contrasting evidence, which is mainly due to the various price calculation criteria and the diverse situations in the various country-markets, "sustainable eating" is not necessarily more expensive, even though it requires an additional effort on the part of families in terms of choosing and preparing foods to follow the guidelines for a balanced diet. Therefore, the critical resource is not money, but the time dedicated to food, especially during the learning phase.

As a result, it would be useful to plan informational and educational campaigns, also at the institutional level, which let everyone understand (even the least well-off) the value of a healthy diet with a lower impact on the environment.

It should be kept in mind that what may initially appear to be a (slight) saving in purchasing food, risks becoming a health cost (in addition to an environmental cost) over the medium-term, which is unsustainable for the individual and for society. The alarming data on obesity and the diseases caused by poor nutrition prove this on a daily basis.[23]

Figure 4.13. **Summary of considerations on the costs of a sustainable diet**

COUNTRY	STUDY	METHODOLOGY USED	OUTCOMES	COMMENTS
Italy	BCFN, 2012	Use of Consumer Prices (Ministry of Economic Development's Price Monitor) calculated for a daily menu and a weekly menu which are balanced from a nutritional point of view	Sustainable diets cost circa 10% less. The sustainable menu costs between €2-4 ess a week compared to the menu where meat is present every day.	Sustainable diets cost less
United States	Drewnowski *et al.*, 2012	Prices per calorie	Foods with high energy content are associated with lower costs. To the contrary, the cost per calorie of lean meat, fish, whole grain cereals, fruit and vegetables, is generally higher.	Sustainable diets cost more
United States	USDA 2012	Price per calorie	Price per calorie fruit and vegetables more expensive (up to $3.7 per 100 kcal) than "moderation foods" (not over $2.3)	Sustainable diets cost more
		Price per edible gram and price per average serving	Price per edible gram and per average serving" fruit and vegetables less expensive (maximum $1.7 per average serving for fruit) and the moderation foods more expensive (over $3 per average serving).	Sustainable diets cost less
France	Drewnowski *et al.*, 2004	Additional grams per price	100 additional grams of fruit and vegetables were associated with a daily increase in food costs which varies from $0.24 to $0.38.	Sustainable diets cost more
France	Drewnowski *et al.*, 2007	$/kcal	Going from a high energy density food diet – on average, 18,798 kcal a week (which is equal to circa 2,700 kcal/day) – to one that is lower density – 16,730 weekly, equal to 2,390 kcal/day – costs circa 25% more. For a man going from 2,700 to 2,390 kcal/day, the additional cost would be equal to $764 a year.	Sustainable diets cost more
France	LiveWell for LIFE, 2012	Average daily grocery shopping cost	The average daily grocery shopping cost for one person who adopts the LiveWell diet would go from €4.90 to €4.36.	Sustainable diets cost less
Great Britain	Cade J. *et al.*, 1999	Price per Healthy Diet Indicator	The difference in costs between the lower and higher HDI food levels is equal to £540 a year (equal to circa €685).	Sustainable diets cost more
Great Britain	WWF, 2011	Price of weekly shopping list by *Livewell 2020* confontato con prezzo DEFRA	Cost of weekly shopping LiveWell 2020: £ 28.40 per person (circa €36) Average expense for food and non-alcoholic beverage shopping by families in Great Britain in 2009: £32.12 (circa €4) per person (DEFRA, 2010).	Sustainable diets cost less

5. HOW TO PROMOTE SUSTAINABLE DIETS

5. HOW TO PROMOTE SUSTAINABLE DIETS

In order to persuade people to adopt a dietary lifestyle that is consistent with the Double Pyramid, they must first be informed and educated on how the Mediterranean diet contributes to health and to the environment.

Data from research conducted by Datamonitor in 19 countries on trends and people's behavior when eating away from home reveals that 63% of the people interviewed declared they pay "very much" or "much" attention to their health and 67% make an effort to eat healthier "always" or "most of the time."[1]

The hope is that the behavior people declared is actually put into practice in daily life, but this is certainly not (yet) the norm.

In addition to healthcare, there are five main contexts that allow nutritional messages and information to be conveyed to people.

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5.1 DOMESTIC NUTRITION HABITS

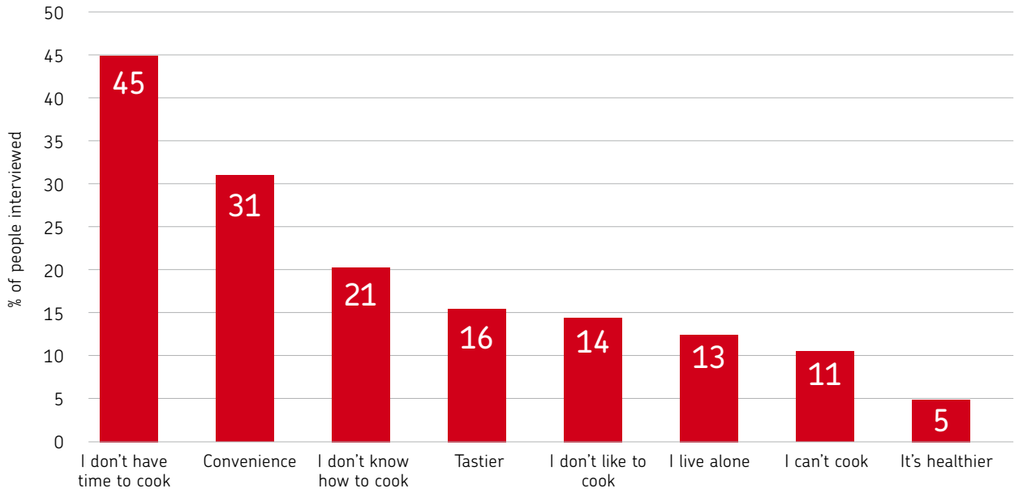
The family has always been the environment in which parents and close relatives explain the basic principles of a healthy diet to children (for example, eat more fruits and vegetables, don't overindulge in sweets and fats, etc.). According to an American research study, the presence of parents during the evening meal is positively linked to higher consumption of fruits, vegetables, and dairy products by adolescents, while young people's likelihood of skipping breakfast decreases.[2]

Children can also be more easily persuaded to adopt balanced lifestyles if parents set a good example, explicitly showing their pleasure in eating healthier foods and encouraging their children to imitate them.[3]

Unfortunately, several global trends show us how families' eating habits and their primary role in their children's dietary education are changing. The data highlights a strong increase in the consumption of snacks and ready-to-eat foods, and a Euromonitor International research study recorded increasingly less rigidity in lunch and dinner times, along with a general decrease in the time dedicated to meals and an increase in eating on the go.[4]

One of the variables which causes the dangerous fragmentation of meals is a change in lifestyles, which are more and more hectic. People often eat while performing other activi-

Figure 5.1. **Reasons that push people to buy ready-to-eat foods**



Source: Euromonitor International, 2012.

ties (for example, in front of the computer or the television). Generally, people also tend to work longer hours, to be more on the go, if nothing else in order to ensure that their children participate in the most diverse activities (from language lessons to sports, etc.). There is also an increase in "unconventional" working hours, due to more flexible work schedules (evenings and weekends). Finally, there is an increase in single people and working women, who cannot dedicate the same time to cooking and meal preparation as in the past.

Although time dedicated to cooking has decreased, according to the Datamonitor study cited above,[5] because of the global economic crisis, there is currently a greater inclination among consumers to eat at home: in particular, 39% of the people interviewed declared that they do so more often than before, and this explains the growth in the demand for more convenient and faster meal solutions. Globally, the purchase of ready-to-eat meals increased 27% from 2006 to 2011 and, according to research conducted by Euromonitor International, these meals are regularly purchased by 31% of families. However, only 16% of people interviewed declare never having purchased them, which means that more than one-third of the population eats them on the days when they are busiest. Among the reasons used by the people interviewed to justify this behavior (Figure 5.1.), the lack of time to cook (45% of people interviewed) ranked first, followed by convenience (31%), and not knowing how to cook well (21%). Lastly, 5% of the people interviewed declared that they purchase ready-to-eat foods because they are healthier.

FROM 2006 TO 2011, PURCHASE OF READY-TO-EAT FOODS INCREASED 27%

Less time at the table, less time spent eating with parents, and less time to cook are all trends which trivialize meals and lead to the loss of nutritional knowledge, which is the basis of a balanced and healthy diet, especially among the younger generations.

Tim Laman/National Geographic Stock

5.2 ADVERTISING

Another aspect that plays an important role in determining people's purchasing behavior is advertising. This instrument of communication, which transmits to families much information that is useful for learning about what is available on the market and acquiring the knowledge needed for rational choices, is also the most persuasive and effective tool for transmitting emotions to a very broad public, which is not always capable of correctly and adequately elaborating the input they receive. In this regard, it is important to keep in mind that the youngest segment of the population (Italian children aged 4 to 14) spend 2 hours and 42 minutes a day on average in front of the TV, 6 minutes more a day compared to 2009[6] and 72 minutes more compared to 2005. In particular, in Italy, through television, radio, and newspapers, a child sees over 32,000 advertisements of food products.[7]

If food advertising is not accompanied by parental monitoring, it can promote the adoption of unhealthy dietary habits, with possible negative effects on health.[8]

A research study conducted by the University of Liverpool analyzed participants' reactions – English children age 6 to 13 – to television commercials which appeared as they watched a cartoon, comparing their preferences for specific foods after food commercials were broadcast and after toy commercials. This study revealed how children who watch a lot of television are more exposed to the risk of developing poor eating habits (eating few fruits and vegetables and more high-calorie foods), since they are more inclined to want the advertised products.[9]

According to the United States Institute of Medicine, at two years of age, American children already remember the names of advertised products and convince their parents to buy their preferred products. As a result, children eat more snacks, such as cookies and sweets, in proportion to the intensity of the advertising.

After age 12, children have already developed the ability to distinguish the content of commercials, advertising strategies become much more sophisticated and, in general, tend to bind adolescents to brands.[10]

Another study conducted by the University of Texas confirms the fact that advertising has great weight on children's eating choices, noting how this has even greater weight than parents' advice: the study says it is necessary to teach children to have a more aware attitude toward advertising, which, in the final analysis, in order to be effective, should provide more educational messages.[11]

The usefulness of mass communications was also confirmed by a research study conducted by some English researchers who analyzed the media's impact on public opinion relative to three cases of altered food products: salmonella, "mad cow," and GM foods.

he risk that advertising can lead to an unbalanced diet is also due to the fact that many foods, such as fruits and vegetables, which should be eaten more, are rarely the subject of advertising com-

municications (fruits and vegetables are generally “unbranded”), while other foods, which should be eaten in moderation (snacks and sweets), are very much present in television programming.
The chart contained in Figure 5.2. estimates the advertising pressure exercised on the merchandise categories present in the Food Pyramid.
Researchers from Armstrong Atlantic State University (United States) estimated that a hypothetical 2,000 calorie a day diet containing only the food products advertised on television exceeded the daily fat content recommended by the American government 20 times over; the sugar content was 25 times higher (or an amount which would be enough for an entire month of life); and, obviously, the diet contained less than half of the daily recommended servings of fruits, vegetables, and dairy products[12].

Figure 5.2. **Advertising investments per food group**

FOOD	ADVERTISING INVESTMENTS (mil €)
Sweet	359
Beef	14
Cheeses	88
Cookies	40
Fish	26
Poultry	15
Eggs	0.9
Pork	0.0
Yogurt	76
Milk	22
Oil	12
Pasta	35
Bread	21
Potatoes	5
Rice	2
Legumes	0.1
Fruits	17
Vegetables	12

Source: Nielsen, 2011.

Advertising and children[13]

Any food or beverage having a high calorie content but poor nutritional value is defined as "junk food." The term was coined in 1972 by Michael Jacobson, director of the Center for Science in the Public Interest.

To gain better control over food product advertising in children's programs, Walt Disney America recently put itself on the front lines by deciding to eliminate junk food commercials from its television channels, web site, and radio stations, in favor of promoting healthy foods, including fruits and vegetables, with less calories, saturated fat, sodium, and sugar content.

Children's consumption of snacks has decreased in countries where laws have been passed preventing advertising to children: any food advertising to children under age 14 has been banned in Australia; in Holland, advertising of sweets to those under age 12 has been prohibited; Sweden does not allow cartoon characters to be used in advertising; and finally, Norway has banned any type of advertising directed at children.

5.3 SOCIAL COMMUNICATION

Social communication initiatives in Italy, for example, are carried out by the non-profit foundation Pubblicità Progresso, and promote the solution of moral, civil, and educational issues through campaigns (including advertising campaigns) aimed at changing people's behavior.

Due to its nature, social communication has a low success rate and the reasons for this vary:

- low investments (compared to typical commercial communications);
- extreme difficulty in identifying a message that can change group behavior.

In particular, regarding this latter point, it must be noted that, as opposed to what happens in the promotion of products (both food and non-food) which are designed to satisfy people's tastes, in the case of social communication, the desired result is the "non"-consumption of certain foods, to the benefit of other products which are often less attractive. This makes the message creation process much less intuitive, because it requires an in-depth study of the reasons for the (wrong) consumption in order to oppose them.

Furthermore, social communication does not necessarily (or only) involve advertising, although, in fact, any strategy dedicated to oversight of the media falls into this category, since the media has a very strong impact on consumers' opinions and can help bring about great changes in the consumption and purchasing habits of people.[14]

The main initiatives of social campaigns benefiting proper diet promoted in Italy and abroad are listed below.

Italy

Salute al piacere [Health as you like it] is the food education campaign launched in 2012 by the Italian Association of Diet and Clinical Nutrition, the Diabetes Specialists' Association, and Slow Food Italy. Through a series of meetings, the program's purpose is to explore the topics linked to diabetes and obesity, supplying helpful information about these diseases and, above all, to prevent them as much as possible through promoting a pleasant, healthy, and environmentally aware lifestyle and diet. At the end of the meetings, a copy of the guide "*Benessere con gusto per noi e per il pianeta*" [*Wellness with taste for us and the planet*] is distributed; it is intended to help rediscover the role of food as an element of pleasure and health. The guide offers useful suggestions without demonizing food and emphasizes the importance of adopting a varied and complete diet. *Salute al piacere* urges people to dedicate sufficient time to the purchase and preparation of meals, presenting foods' nutritional principles, their functions, and instruction on how to select good, healthy, and proper foods.

Since 2011, Slow Food has proposed seven guides on the following: meat, fish and aquaculture, legumes, food and health, dietary choices, climate change, and sustainable shopping. The guides, which can be downloaded free of charge from the association's site, are a simple and effective way to educate people and promote the purchase of seasonal, quality foods that are healthy and have a lower impact on the environment.

Children and young people are most easily influenced by advertising that proposes foods that are not very healthy; therefore, they must be educated on proper eating starting when they are small, especially because families have less time to do so. The food awareness campaign promoted by the Ministry of Agricultural, Food, and Forestry Policies *Mangia Bene, Cresci Meglio* [Eat Well, Grow Better] from 2007 to 2011 was focused on adolescents. The campaign held a contest for first level secondary school students and teachers who, through a group project, had to produce an advertisement on the topics of healthy eating and the variety and quality of our agricultural heritage. The finalist school groups, authors of the best advertisements, won a trip to an Italian location significant for its agricultural heritage. The objective of this social campaign was not only to help the youths reflect on their nutritional choices, guiding them toward greater food awareness, but also to experiment and understand the complex language of advertising, thus learning how to be critical of promotional messages.

Below we include some of the advertisements which won several editions of the contest.

MANGIA BENE CRESCI MEGLIO

Note: Two of the scripts which won the "Mangia bene, Cresci meglio" [Eat well, Grow better] contest promoted by the Ministry of Agricultural, Food and Forestry Policies, 2010. On the left, author: Gaetano Salvemini public secondary school, Naples; on the right, author: Maria Brigida public secondary school, Termoli.

France

France, a country which has always been very careful about proper dietary habits, promotes better eating habits through its *Programme national nutrition santé* (PNNS) [*National Nutrition Health Program*]. The program began in 2001 and was extended until 2006, with the goal of improving the population's health through better nutrition. The 2011-2015 PNNS *Manger Bouger* [Eat Move] was recently launched. It sets four main goals:

1) reduce obesity and overweight in the population;
2) increase physical activity and reduce inactivity at all ages;

Programme National Nutrition Santé

3) improve eating practices and nutritional intake;
4) reduce the rate of nutritional diseases.

Some of the tools they used include better information, communication, and education to best guide eating behavior.

In addition, they are thinking of adopting additional measures, such as limiting the advertising pressure on children regarding consumption of fatty, sweet, or very salty foods.

The *Programme national pour l'alimentation* [National Diet Program] "*Bien Manger, c'est l'affaire de tous!*" [Eating Well is everybody business] promoted by the Ministry of Agricultural, Food and Forestry Policies plans to reach different goals:

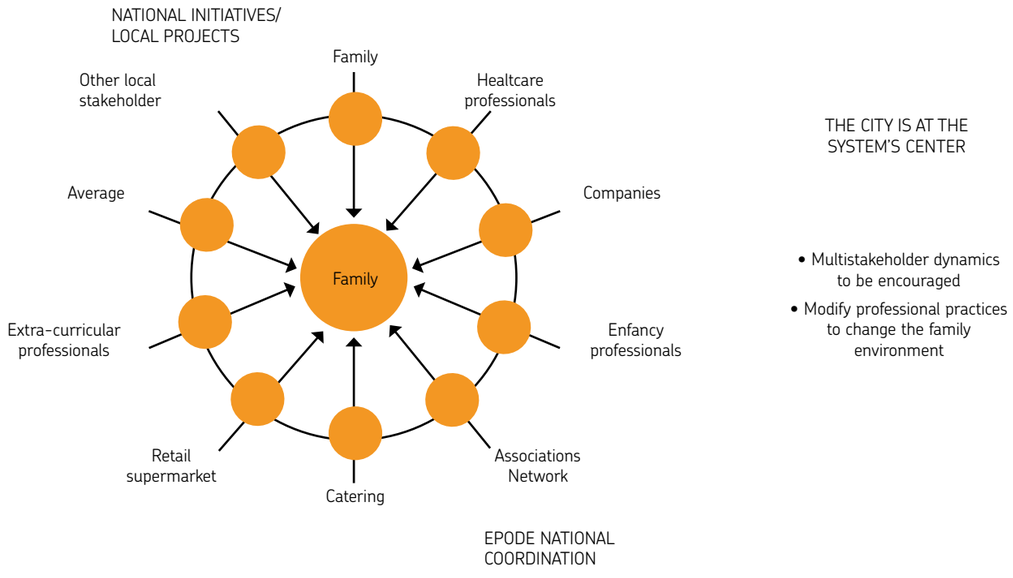
1) promote access to a quality, safe, diversified, and sustainable diet;
2) make information labels mandatory, specifying the country of origin information for all food products;
3) preserve and promote France's culinary heritage;
4) improve people's knowledge and education about foods.

They use communication to best channel positive values, avoiding discordant and anxiety-generating messages on diet and meeting consumers' expectations.

In 2003, in eight French cities, under the sponsorship of the Ministries of Family, Youth, Education, Agriculture, and Food the EPODE project (*Ensemble prévenons l'obésité des enfants*) [*Together We Prevent Children's Obesity*] was launched, which contains different initiatives to prevent and combat childhood obesity. In particular, the EPODE project intends to:

1) integrate school courses with educational campaigns on the topic of dietary education;
2) promote a dynamic and non-sedentary lifestyle;
3) adapt the food offered at school cafeterias in order to accustom children to a healthy and diversified diet;
4) involve parents in the healthy growth of their children.

Figure 5.3. **The local stakeholders involved in the EPODE project**



Source: Epode, 2012.

The project is based on two programs carried out on two levels, one national and one local: nationally, guidelines are set thanks to the interaction of three different entities (a group of independent expert nutritionists, the ministries involved, and some multinationals operating in the food industry); while at the local level, implementation and coordination of the policies identified are assigned to a project manager, who cooperates with local authorities and the principal stakeholders.

The specific nature of the project consists of involving all the local stakeholders (schools, media, associations, retail stores, supermarkets, etc.) in the creation of a long-term strategy aimed at modifying the urban environment so that it fosters correct lifestyles and eating habits for families, and for children.

Among the different initiatives, of particular relevance is the use of advertising channels as a way to make children and their families aware of the importance of a healthy diet, through social communication messages which focus attention on the importance of eating fruits and vegetables, a varied diet, and playing sports.

The success of these initiatives can be appreciated when the participation by the local stakeholders recorded in eight French pilot cities is considered: from 2003 to 2008, an encouraging reduction in children's average BMI (body mass index) was noted.

From 2008 to 2011, in collaboration with European Union General Directorate of Health and Consumers, a European plan was carried out, EEN (*EPODE European Network*), with the objective of spreading the EPODE project to other countries or implementing similar programs. Today, the EEN project involves about 4 million people in 226 French cities, 38 Spanish cities, 16 Belgian cities, and 13 Greek cities.

Great Britain

Active since 2009 and organized by the English Department of Health, *Change4Life* is the first national social campaign to reduce obesity. The program is supported by remarkable marketing made up of TV advertising with commercials created by the world's best creative agencies, print and web ads, and a website that is constantly updated and very attractive.

The goal of *Change4Life* is "*eat well, move more, live longer*" and the activities offer helpful advice to children and adults on how and where to play sports and how to eat better. In fact, healthy recipes and tips on how to understand food labels and nutritional and calorie values properly can be found on the site.

From a media point of view, a very important phenomenon is that of chef Jamie Oliver, who is known for his television cooking shows; more recently, he has come out against obesity by promoting campaigns and activities that educate on good dietary habits. His specialty is Italian and Mediterranean cuisine, which he talks about without mentioning it explicitly, in his foundation's programs operating in Great Britain, Holland, the United States, and Australia, and which will soon be broadcast in many other countries.

The main activities which Jamie Oliver has committed himself to are:

- *Fifteen apprentice programme*: a 12-month long course addressed to unemployed youth ages 18-24, where he teaches them to become professional chefs;
- *Ministry of Food*: a program of cooking courses held at various centers in Great Britain, where he teaches participants to cook fast, healthy, and economical meals;
- *Kitchen Garden Project*: a program addressed to elementary school children to teach them the joy of growing and cooking their own food.

United States and Canada

In the United States, First Lady Michelle Obama is actively working against childhood obesity in her country and has been the promoter of the *Let's Move program*, which promotes food education among children to combat obesity.
Among the key points of the program are:
1) access to healthy food for all;
2) encouragement of physical activity;
3) supplying healthier food in schools.
Michelle Obama also cooperated with *Sesame Street*, where, with the Muppets, she promoted a healthy lifestyle among children.
English chef Jamie Oliver, whose educational programs in Great Britain we mentioned above, is engaged in *Food Revolution* in the United States, a movement that he created to change American's eating habits and combat obesity, and which is rapidly spreading worldwide.
Among the activities put into operation to promote the *Food Revolution* are: cooking basics courses, the proposal to cook fresh foods in school cafeterias, and educational programs in schools for parents and companies to promote a cultural change at every level of the population.
In 2010, Jamie Oliver was awarded the prestigious TED Prize for having created a strong and sustainable movement which educates children about food, encourages and inspires families to cook, and allows people around the world to combat obesity.
In Canada, the Union des comsommateurs [Consumers' Union], came out with an appeal to the World Health Organization asking all Member States to adopt nutritional policies which limit access to products high in salt, sugars, and fats, especially in the schools, and to take the appropriate multi-sectorial measures to combat the impact of advertisements which encourage unhealthy eating habits among the youngest children.[15]

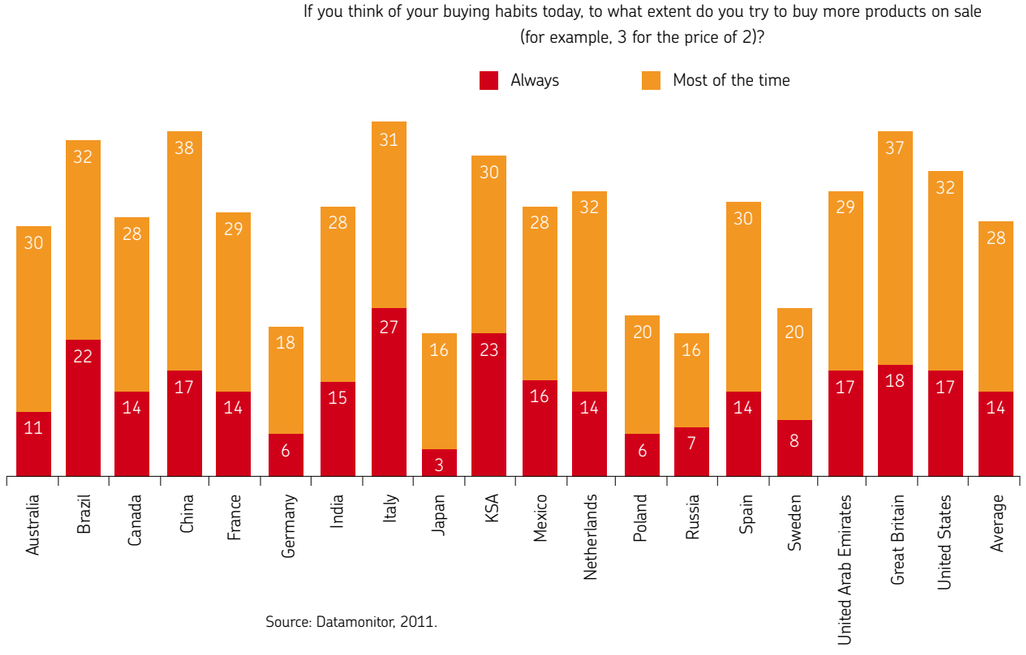
Figure 5.4. **Summary chart of social communications initiatives analyzed**

COUNTRY	INITIATIVE	PROMOTER	BRIEF DESCRIPTION
Italy	*Salute al piacere [Health as you like it]*	Italian Association of Diet and Clinical Nutrition Association of Diabetes Specialists - Slow Food Italy	The program's aim is to explore in depth topics linked to diabetes and obesity, supplying useful information about these diseases, and above all, to prevent them through promoting a pleasant, healthy, and environmentally aware lifestyle and diet.
Italy	*Guides to Responsible Eating*	Slow Food Italy	Seven guides on meat, fish and aquaculture, legumes, food and health, dietary choices, climate change, and sustainable shopping.
Italy	*Mangia Bene Cresci Meglio*	Ministry of Agricultural, Food and Forestry Policies	The campaign is based on a contest for first level secondary school students and teachers who, through a group project, must produce an advertisement on the topics of healthy eating and the variety and quality of the Italian agrifood heritage.
France	*2011-2015 Programme National nutrition santé, Manger Bouger*	Ministry of Health	The program set four main goals: 1) reduce obesity and overweight in the population; 2) increase physical activity and reduce inactivity at all ages; 3) improve eating practices and nutritional intake; 4) reduce the rate of nutritional diseases.
France	*Bien Manger c'est l'affaire de tous!*	Ministry of Agricultural, Food and Forestry Policies	The program set different goals: promote access to a quality, safe, diversified, and sustainable diet; make information labels mandatory, specifying the information on the country of origin for all food products; preserve and promote France's culinary heritage; and improve people's knowledge and education about food.
France	EPODE	Ministries of the Family, Youth, Education, Agriculture and Food	The program includes different initiatives to combat and prevent childhood obesity.
Great Britain	*Change4Life*	Department of Health	The project, promoted through advertising campaigns in mass media and on its own site, promotes physical activity and proper diet among people through tips on how and where to play sports and on healthy eating.
Great Britain	*Ministry of food*	Jamie Oliver	Cooking courses in various centers in the Great Britain to teach participants to cook fast, healthy, and economical meals.
Great Britain	*Kitchen garden project*	Jamie Oliver	The program is addressed to elementary school children to teach them the joy of growing and cooking their own food.
Great Britain	*LiveWell 2020*	WWF UK	The program's objective is to introduce the concept of a healthy and sustainable diet to the Great Britain.
United States	*Let's move*	Michelle Obama	The program promotes food education among children to combat their obesity.
United States	*Food Revolution*	Jamie Oliver	The objective of the program is to change Americans' eating habits and combat obesity; this program is rapidly expanding globally.
Europe	*EPODE European Network*	European Union General Directorate of Health and Consumers	The project's goal is to spread the French EPODE program to other countries or implement similar programs.
Europe	*LiveWell for LIFE*	European Union WWF UK WWF European Policy Office Friends of Europe	The English LiveWell project, extended to Europe with the goal of promoting sustainable and healthy diets throughout the Member States.

5.4 CATERING

Another opportunity which allows nutritional skills and habits to be acquired is eating "away from home." At the level of catering (restaurants, fast food) trends demonstrate that consumers are more careful in their choice of menus, preferring less expensive dishes, and reducing the consumption of starters and desserts (always for an economic benefit).[16]
Research conducted by Datamonitor reveals an increase in the demand for products on sale at restaurants, which benefits *quick restaurants* and fast food restaurants where food is often promoted at discounted prices (see Figure 5.5.).
The desire to spend less at a restaurant could lead people to eat meals that are less healthy and/or larger than necessary. It is evident that, especially for adolescents, the marketing by some fast food restaurants leads to an increase in eating habits which, if prolonged over time, may no longer be healthy from a nutritional point of view.[17]
As a result, the role of school or company cafeteria catering assumes greater significance because it can guide people's eating habits and promote meals that are healthy and sustainable for the environment, while conveying rather explicitly informational and educational messages.
In step with the increase of eating away from home, cafeterias, which serve millions of meals a day, have an enormous potential to direct the market toward healthy behavior and products and may become an actual educational model, as some virtuous examples throughout the world demonstrate.
FAO, which lists the three keystones for countries' development (nutrition, health, and education), admits that school activities dedicated to educating students about food, when properly carried out, include all of them.[18]
The major initiatives in catering to educate people on proper eating in Italy and abroad are listed below.

Figure 5.5. **Consumer preference to purchase products on sale**



Source: Datamonitor, 2011.

Europe

There are various public support programs for the fight against childhood obesity.
Recently, two European programs have been launched: *the School Fruit Scheme*, to encourage the consumption of fruits and vegetables among young people, and the *School Milk Scheme*, to promote milk and dairy products as important sources of nutrients.
Many Italian schools belong to the *School Fruit* program.
In addition, the European Network for Health Promoting Schools plays an active role, including Italy and in 40 other countries.

Italy

In Italy, several programs created by Slow Food are in operation, promoting good, quality food originating from production that respects the environment, safeguards biodiversity, and pays a fair price to producers. In fact, Slow Food believes that effective education is based on the idea that food means pleasure, culture, and conviviality and that the act of eating can influence people's ways of thinking and their emotions.
Slow Food at the Cafeteria is a program created to make these values a reality, working in direct contact with catering operations, service operators, and consumers. One of this program's objectives is to raise the public's awareness of proposals by the Common Agricultural Policy (CAP) to combat childhood obesity. In particular, the two European programs mentioned above, the *School Fruit Scheme* and the *School Milk Scheme*, are explained and promoted. Slow Food supplies European schools, parents, and local institutions with the tools to take advantage of the opportunities offered by the CAP and invites them to complete them using a holistic approach to food proposed by Slow Food's educational programs.
Another initiative carried out by Slow Food Italy in cooperation with Turin's Maria Adelaide CTO [Hospital] is the *Right Tastes* project, which began in 2008. This project offers a food education program to the workers of Gruppo Intesa Sanpaolo who use the company cafeterias at the Milan Lorenteggio and Turin Moncalieri branches, to promote proper eating, starting with the meals eaten at the cafeteria.
The project has two objectives: the first is to spread the culture of proper eating among workers as a factor in promoting health, while safeguarding taste, to allow conscious choices which the worker can also convey to his/her family; and the second is to add, in the medium-term, sustainability elements to the management of cafeteria supplies, aiming to contain transportation costs and CO_2 emissions, and promoting the "short production

chain" for procurement. Thanks to its extremely positive outcome, the project has been extended to all of Gruppo Intesa Sanpaolo's cafeterias in the first quarter of 2012.
In conclusion, there is also the proposal by *Salute Internazionale* [International Health] (a blog kept by doctors and industry experts) to introduce, as was done in Belgium, a meatless day in public cafeterias, during which meat and fish dishes are to be replaced by vegetable- and legume-based vegetarian dishes.

France

In France, the *Bien manger à la cantine* [Eating well at the cafeteria] is a project by the Ministry of Agricultural, Food, and Forestry Policies whose purpose is to further improve the quality of the meals served in school cafeterias. In addition, this initiative has the goal of encouraging cafeterias to plan seasonal menus and renew the link between the person eating and the food, in order to encourage everyone to take the time necessary to sit down and eat their meal at the table.
An online journal "Cantine scolaire" [School cafeteria] is also published in France, containing information on proper eating at school cafeterias.
Furthermore, the online blog kept by Mary Brighton, "*Brighton Your Health*" gives tips on how to live well, eat healthy, and eat balanced meals. In this blog, Brighton tells of the experiment she carried out to compare an American student's diet with that of a French student, documenting the meals both ate over the period of one month. The conclusion of this experiment was that there is more food education in France than in the United States.

United States

In the United States, through an order by Mayor Bloomberg, the city of New York was the first city to introduce in 2007 very strict rules on the meals served at restaurants, which cannot contain more than 0.5 grams of trans-fatty acids per serving. In addition, it was made mandatory for some categories of restaurants and fast food restaurants to report calories on the menus, something which has led all the large fast-food chains to change their recipes to comply with the new limits.
After a few years, researchers from the New York City Department of Health verified what had changed in the dishes offered to New Yorkers, in view of the fact that they, like all Americans, ingest more than one-third of their daily calories from food purchased and prepared outside the home. As reported in the *Annals of Internal Medicine*, an analysis of over 15,000 meals, made in 2007 and in 2009 (immediately before and two years after the new limits were put into effect), pointed out a significant difference in the dishes' composition. Trans-fatty acids declined 2.5 grams per serving on average, reaching 3.8 grams at some hamburger, Mexican food, and fried chicken chains. Again according to the research study, since it became mandatory to report calories on the menu, 15% of New York customers order healthier foods, ingesting 100 calories less on average compared to before the order.[19]
The *MyPlate for Kids project is still active: Make Half Your Plate Fruits and Vegetables* proposed by the Center for Nutrition Policy and Promotion, a USDA agency created in 1994 to improve Americans' nutrition and health. The poster which is the symbol of the project shows how a half of a student's tray or plate should be made up of fruits and vegetables, both at school and at home. This initiative is included in the larger project *MyPlate*, which teaches good food education using the familiar image of a plate representing a meal.

The American Center for Disease Control and Prevention has drawn up four specific information papers for four different targets: parents, teachers, and school personnel; school boards, school districts, and other school administrators; nutritionists; and students. It used the data supplied in one of its reports by the Institute of Medicine (IOM), a non-profit organization which furnishes objective information and data in the field of medicine and nutrition for decision makers and the public. These illustrative papers are used to support and develop high nutritional standards which can have an impact on students' health at school.

Education on the Double Pyramid in Barilla's cafeterias: the *Yes.Mediterranean* project

Yes.Mediterranean is a pilot project developed starting in October 2011 by Barilla's R&D Nutrition Unit, in cooperation with the Department of Clinical and Experimental Medicine at Naples' Federico II University, and with the contribution of the Barilla Nutrition Advisory Board, thanks to the collaboration of two company cafeterias at Pedrignano (the Group's headquarters, where over 1,500 people work, in the province of Parma) .

The project has two main goals:

1) increase awareness of the benefits of the Mediterranean diet and of the relationship between eating properly and safeguarding the environment, through an information campaign teaching proper nutrition in line with studies of the Double Pyramid;
2) improve eating habits through a broader, more varied offering of foods that follow the proposed nutritional guidelines.

The project provided informational activities of four weeks' duration, which used informational panels, illustrative napkins, and brochures summarizing the initiative's main messages. Then, the menus were changed, with an increase in whole grain products such as pasta and bread, legumes, vegetarian dishes, grain salads, and vegetables. Servings of fish were increased, and in general, all the meals offered reported nutritional information and environmental impacts. Even quick meals, which can be received by ordering beforehand and eaten directly at workstations, were reviewed according to the principles of the Mediterranean diet.

To verify the project's impact on the eating habits of Barilla's employees, their consumption before and after the end of the experiment was monitored.

As can be seen through the image in Figure 5.6., the results are encouraging. Food consumption at the cafeteria recorded a sharp increase in foods which were more in line with the Mediterranean diet (white meat +92%, whole grain pasta +28%, and whole grain bread +36%) and a significant decrease in the other foods (red meat -77%).

Thanks to the changes made to their diets, over 65 kg. of CO_2 (equal to the emissions of a medium-sized car traveling 500 km.) and 1,000 square meters of land (equal to about 4 tennis courts) were allowed to be saved by Barilla's employees.

At the end of the project, the participants were asked to take a survey to assess the experience and its effects. Among the main results from the more than 600 surveys collected, over 80% said they were satisfied with the initiative and 50% of the total sampling was very or very, very satisfied with the proposal.

The project is now operating regularly at the Pedrignano offices and plants and will soon be carried out at Barilla's other Italian plants and its foreign offices.

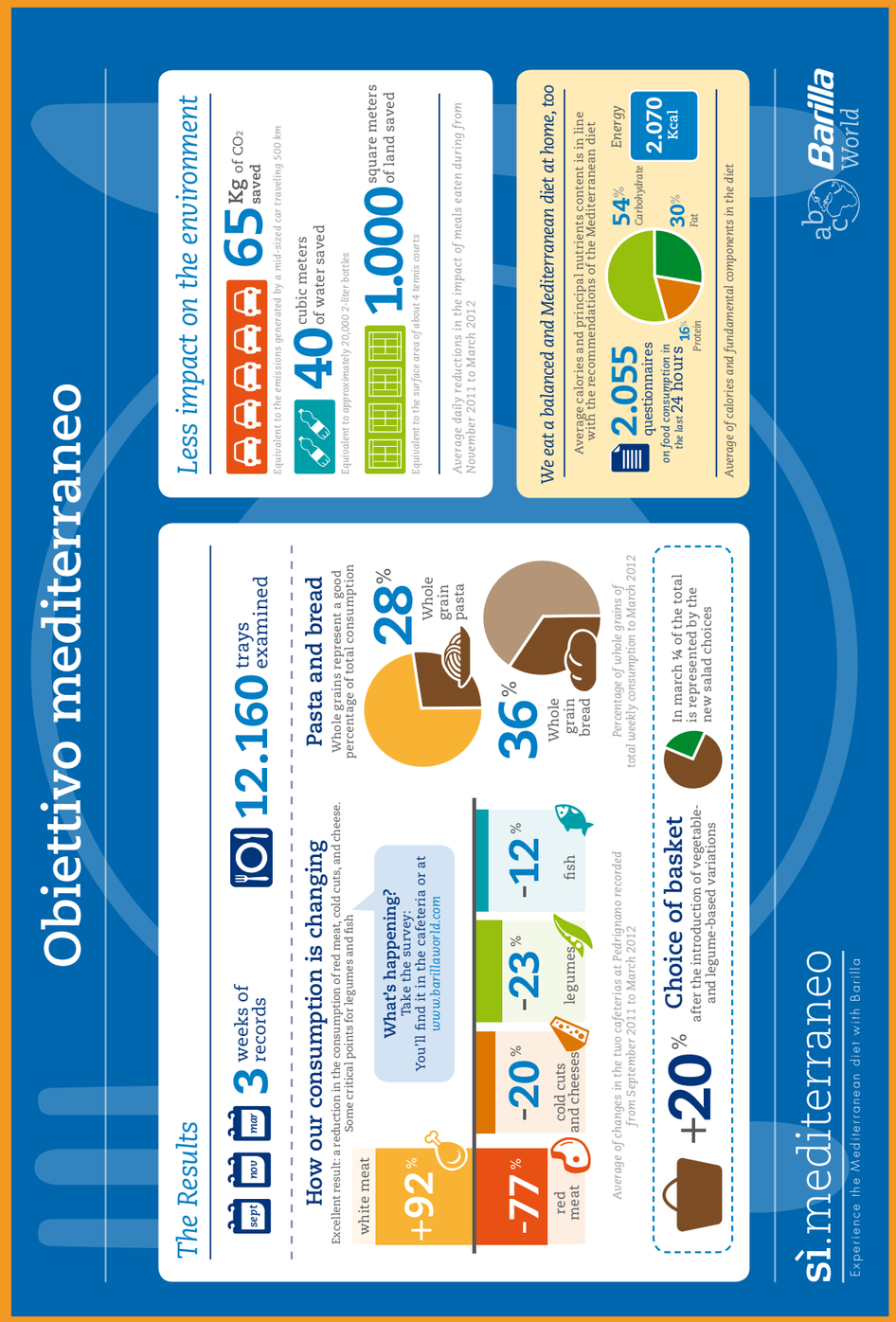


Figure 5.6. Results of Barilla's *Yes.Mediterranean* project

Source: Barilla, 2011.

5.5 MASS MARKET RETAIL CHAINS

Points of sale can play the role of "impartial educators" on the topic of sustainable diets, considering that, unlike the producer companies, they generally have no conflicts of interest regarding individual products.

According to a report commissioned by the National Heart Foundation of Australia,[20] most consumers believe that supermarkets should carry out initiatives to promote a healthy diet and that they themselves would be (at least in part) responsible for their future health.

Recently, several retail chains have implemented corporate social responsibility practices to improve their brand image: the managers of some Swedish supermarkets have pointed out that, when the point of sale promotes education toward proper nutrition, it contributes to creating a more positive brand image in the consumer's mind, in addition to promoting correct dietary behavior.[21]

A report by the Center for Food Policy at the City University of London examined the corporate social responsibility commitments of 25 of the leading food producers and retailers throughout the world, 10 of which are mass market retail chains: Ahold (Netherlands), Aldi (Germany), Carrefour (France), Ito-Yokado (Japan), Kroger (United States), Metro (Germany), Rewe (Germany), Schwarz (Germany), Tesco (Great Britain), and Walmart (United States). Most of these chains implement nutritional programs as part of their strategy and some among them, specifically Tesco, had measurable performance indicators available and have undertaken to have a line of "healthy" products.

The results produced by this research study, which are also relative to the expectations that consumers have in mass market retail chains, lead retailers to take a key role in educating and informing people toward a healthy diet that is also sustainable for the environment.[22]

A research study conducted by SCS Consulting and commissioned by the BCFN demonstrates how the large chains' commitment to communication impacts on buyers.[23]

The objective of the research, conducted for the first time in 2009 and repeated in 2011, was to investigate Italian consumers' knowledge, interest, and inclination to purchase sustainable products and to verify if and when this inclination was converted into an actual sale, assessing (together with the people interviewed) their actual purchases.

The 2011 sample was made up of 1,200 customers from eight different mass market retail chains, each with their own approach and activities on the topic of sustainability, in order to test the retailer's influence on consumers' awareness and sustainable choices.

First of all, the results reveal that consumers are increasingly aware of the context of reference and of sustainability: in fact, if in 2009, 65% of consumers were "aware of sustainability," in 2011 this percentage reached 78%.

In Figure 5.7., it can be noted that the declarations regarding interest in and the purchase of sustainable products are particularly positive before the envelope is actually opened (only 6.2% is a "declared skeptic," as opposed to 15.1% in 2009). The right-hand section of the figure illustrates the purchasing results for each group of consumers: although not totally consistent, in general the declarations match what was actually purchased.

The sample revealed that more purchases of sustainable products were made at stores which have a specific approach to sustainability, or which have a dedicated private label line and many eco-sustainable products, which have sections and additional information on their websites and in their company newsletters dedicated to the environment, and lastly, that the point of sale's own building can be "green" (thanks to the presence of photovoltaic plants, energy and water saving practices, etc.). This outcome indicates that communication at the point of sale and the simultaneous introduction of dedicated product lines promote the inclination to purchase sustainable products.

THE LARGEST PURCHASES OF SUSTAINABLE PRODUCTS WERE MADE AT STORES WHICH HAVE A SPECIFIC APPROACH TO SUSTAINABILITY

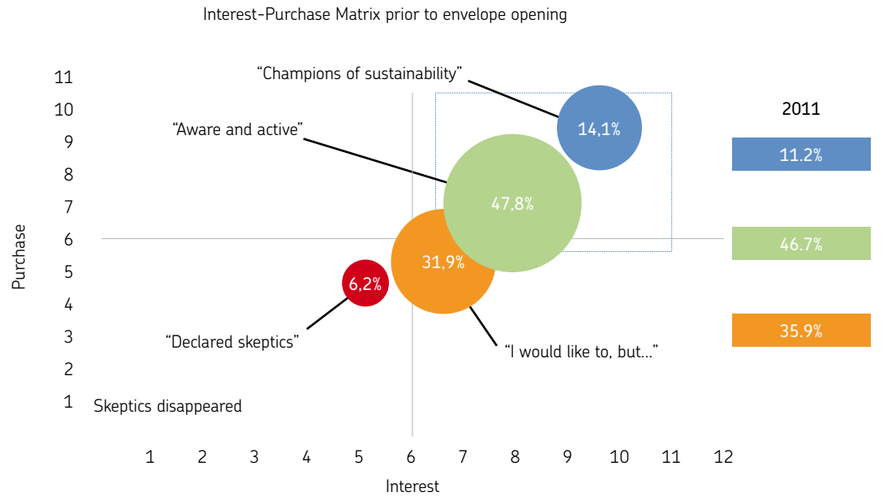
On the other hand, the lack of knowledge and communication represent the greatest obstacles for sales: 31.9% of consumers ("I would like to, but...") who did not purchase sustainable products declared that they acted this way because they do not know what these products are and 26.1% does not know where to find them.

50% of sustainable purchases are concentrated in fresh and very fresh products (milk and dairy products, fruits and vegetables, etc.). These categories offer a more ample supply of sustainable products (in particular, organic and zero kilometer products), which leads to the assumption that, if produced and effectively communicated to consumers, there are good opportunities for the sale of sustainable products in other categories as well.

A second objective of the research was to investigate how much the consumer perceives and is aware of the environmental impacts of food in relation to the Double Pyramid.

90.3% of consumers are aware that their food choices have an effect on the environment, but on average they do not know the actual impacts generated by each type of food and

Figure 5.7. **Interest - Purchase Matrix**



Note: declarations of interest in and purchase of sustainable products, before and after opening the envelope (data in the box to the right of the figure).

Source: Barilla, 2011.

have the perception of a fairly limited difference in impacts among the various foods. An interesting fact to be pointed out is that the ability to reconstruct the BCFN's Double Pyramid is directly proportional to education levels, demonstrating that education and information are positively correlated to greater awareness and care for the environment among people.

Another fact that emerged is that people who are aware of the concept of *sustainability in the food area* do not concentrate their purchases on foods in the lower levels of the BCFN Pyramid: in other words, the degree of knowledge of the Double Pyramid does not seem to significantly influence people's purchasing and eating habits.

This may be justified by the fact that eco-compatible products are purchased without necessarily taking into account the nutritional information. In any case, it seems that, in general, people are willing to take retailers' suggestions on the topic of sustainability into consideration, which shows that there are good opportunities for responsible companies.

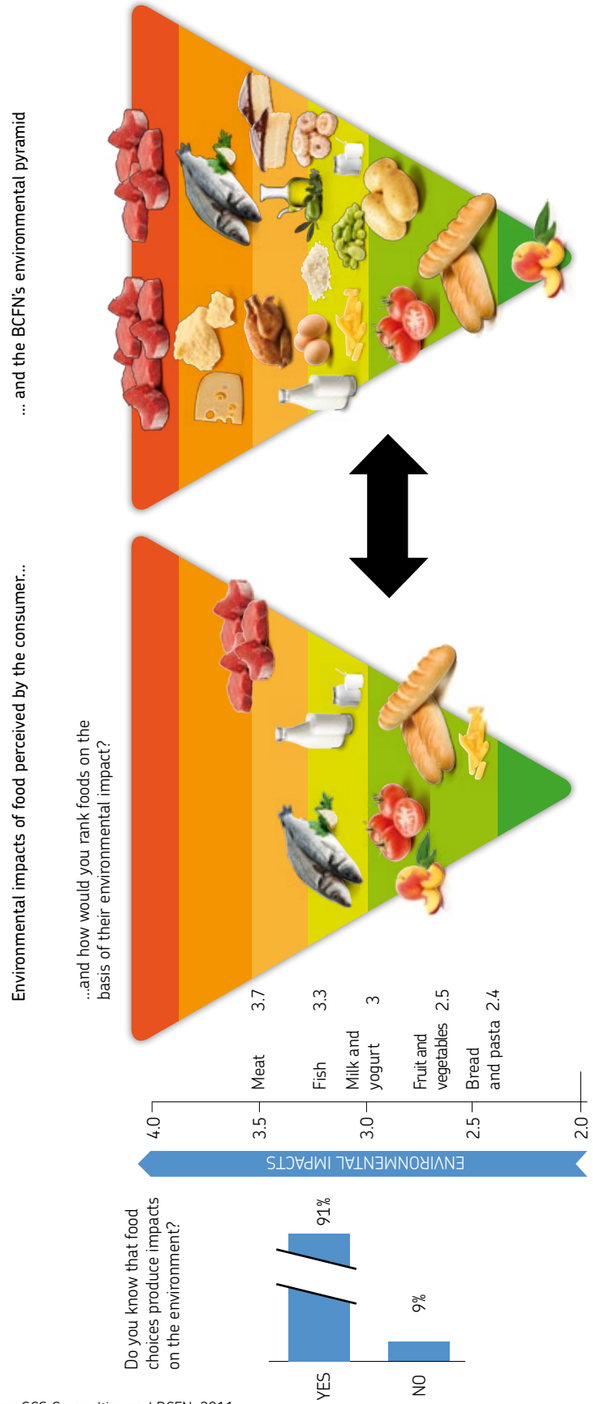
Analyzing the initiatives in the various countries, an interesting case is Walmart, which in February 2012 announced $9.5 million to be granted to organizations for promoting healthy eating habits. The funds will be allocated to nutritional education programs, cooking classes, and to teach consumers how to do healthy shopping using the budget at their disposal. Participating associations are: Action for Healthy Kids, American Medical Association Foundation, Children's Health Fund, League of United Latin American Citizens, National Black Child Development Institute, National 4-H Council, National Latino Children's Institute, Oldways, and Share Our Strength.

The French chain Carrefour has been engaging in sustainable business practices for years. In 1992, it launched its "Quality Lines," food produced in compliance with environmental and social criteria; in 1996, it began production of foods without genetically modified ingredients under its own brand; in 1997, it launched its own line of organic products; and in 2000, it produced its own company by-laws for suppliers in cooperation with the International Federation of Human Rights (IFHR). The following year, it joined the UN's Global Compact and signed an international protocol with the union entity UNI Network International.

Royal Ahold, a Dutch mass market retailer, has launched campaigns for food education; in 2011, it launched *Passport to Nutrition*, a program created on the web to educate children, parents, and teachers on healthy lifestyles, including lessons on the food pyramid and physical activity, how to read food product labels, how to eat a healthy diet, and using the right proportions.

The English retailer Marks & Spencer launched a program in 2005 for the purpose of eliminating all transfats from its products, a goal it reached in 2006. They periodically check their foods to eliminate excess saturated fats.

Figure 5.8. **Environmental impacts of food perceived by the consumer and the BCFN's Double Pyramid**



Source: SCS Counsulting and BCFN, 2011.

James P. Blair/National Geographic Stock

The European *LiveWell* project

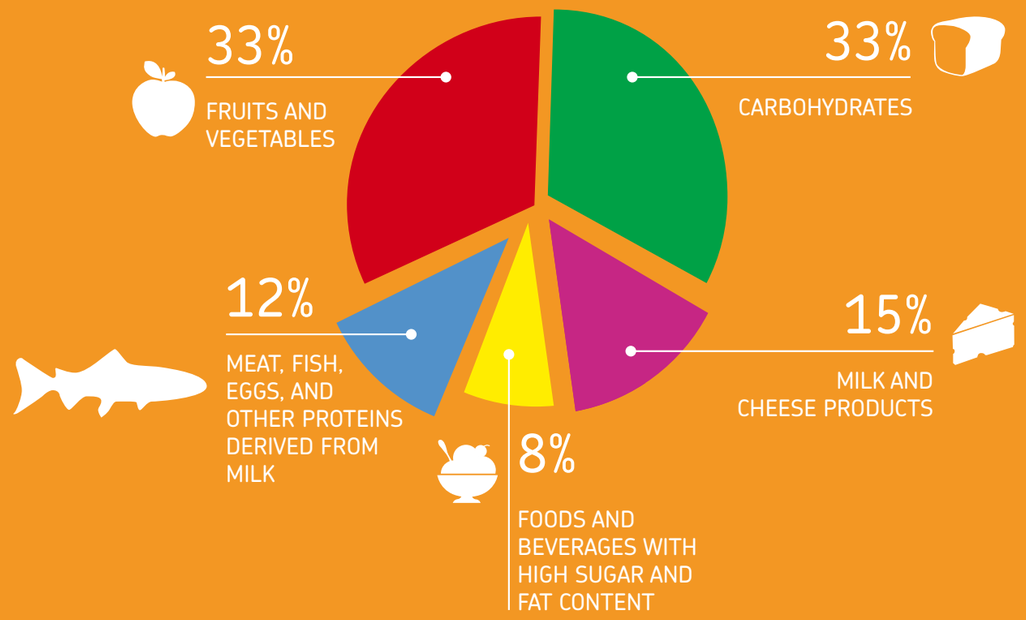
WWF UK set up the *LiveWell 2020* program. It is based on the principle that the food we eat has a huge impact, not only on our health, but also on the health of our planet. *LiveWell* starts from a statement made about the UK diet: according to FAO, in Great Britain every inhabitant consumes about 3,500 calories a day, which are over 1,000 calories more than the amount recommended by international guidelines. The conclusion which emerged is that the population tends to eat much more than it would need, causing a negative impact on their own health and on the environment where that food is produced. Changes in the Western diet, which is increasingly oriented toward greater consumption of meat and processed foods, is a very recent phenomenon and involves different issues, such as the spread of the phenomenon of obesity, Type 2 diabetes, and cardiovascular diseases. If humankind should continue to eat this amount of food, we will be able to feed ourselves for the next 40 years, but Nature would be left with nothing.

The goal of the initiative carried out by the WWF in cooperation with the Rowett Institute of Nutrition and Health at Aberdeen University, taking into account the British government's nutritional guidelines, is to change English people's eating habits by directing them toward a more sustainable diet, leading to a 25% reduction in greenhouse gas emissions by 2020 and a decrease in per capita meat consumption from 79 to 10 kg. per year. LiveWell's communication is founded on five basic principles that are healthy and respectful of the environment:

- eat more fruits and vegetables;
- waste less food (40% of the world's food is wasted);
- eat less meat (red or white meat can be used as a tasty side dish, rather than as a meal's main dish);
- eat less processed food (or those products which use resources more intensively and often contain more sugars, fats, and salt);
- eat certified foods, which follow a guaranteed standard (such as MSC for fish, RSPO for palm oil, or RSPCA Freedom Foods for meat and eggs).

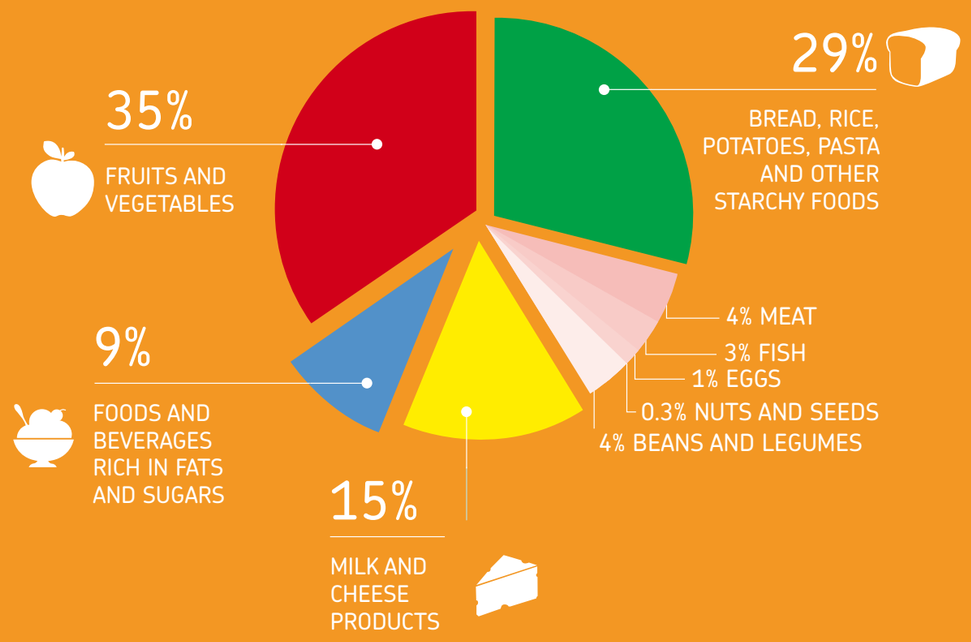
Therefore, starting from the *Eatwell plate* (Figure 5.9.), a tool proposed by Great Britain's Food Standard Agency to graphically communicate the proportions of food to eat to follow a proper diet, LiveWell's "plate" proposes a subdivision of the food groups that varies up to ± 10% with regard to Eatwell's recommendations (Figure 5.10.). This slight difference arises from the fact that to substantially reduce greenhouse gas emissions and make diets more environmentally sustainable, the consumption of animal proteins must be limited, and consequently, the quantities of protein provided by other foods, such as legumes and nuts, must be increased. Furthermore, in the *LiveWell: a balance of healthy and sustainable food choices* report, as well as in the section of the WWF's site dedicated to the initiative, a shopping list and a weekly menu are proposed, showing how easy it can be to prepare, and how good it is to eat, a sustainable diet. The initiative was extended with *LiveWell for LIFE (plate for low*

Figure 5.9. **Eatwell Plate**



Source: LiveWell WWF, 2011.

Figure 5.10 **LiveWell Plate, recommended servings**



Source: LiveWell WWF, 2011.

impact food in Europe) – a project which is partially funded by the European Union and whose objective is to spread the concept of a healthy and sustainable diet at the European level. It was launched in February 2012 by WWF UK, WWF European Policy Office, and the think tank Friends of Europe.

The program was first launched in three pilot countries: France, Spain, and Sweden, which are interesting to analyze due to the diversity of their agricultural, trade, and food culture models. For each country, researchers identified specific food trends and created an ad hoc LiveWell plate, starting with current food consumption.

The results are encouraging. In France, the LiveWell diet should reduce greenhouse gas emissions by 25% and decrease the average daily grocery shopping costs for one person from the current Đ4.90 to Đ4.36. Compared to the current French diet, the foods most consumed would be legumes and grains, while meat and its by-products would be reduced, and processed baked goods, such as cakes, would also be reduced.

The LiveWell diet for Spain might reduce greenhouse gas emissions by around 27% and would cost practically the same as the current cost of grocery shopping (an average of Đ3.48 per day per person). The LiveWell diet for Spain calls for lower consumption of meat, dairy products, sugar, sweets, and, surprisingly, fruit and fruit derivatives, and an increase in vegetables, grains, and nuts.

Finally, the LiveWell diet for Sweden would reduce greenhouse gases by 25% at a slightly lower cost than that of the current diet (from 44.64 to 44.07 Swedish kronor per day). The new diet system provides for a reduction in the consumption of meat and an increase in fruit and vegetable products.

To launch educational programs and recommendations to policymakers, a stakeholders' network representing the entire food chain has been created at the national level in the pilot countries and in the Member States of the European Community.

6. BCFN CONCLUSIONS AND RECOMMENDATIONS

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6. BCFN CONCLUSIONS AND RECOMMENDATIONS

The concept of a sustainable diet, as a food solution that can reconcile health and the environment, is now widely accepted. This third edition of the paper further reinforces the thesis set forth by the BCFN, which acknowledges that the healthy aspects of the diet have a direct relationship on its environmental impact.

It is increasingly evident that respecting the principles of a proper diet also allows the consumption of natural resources to be significantly decreased, and therefore, that the Mediterranean diet offers the best guidelines.

At this point, the BCFN's objective is to promote actual implementation of the sustainable diet, by investigating potential obstacles which would slow its spread or, in some cases, cause it to be abandoned by those who traditionally used it.

The first variable dealt with in the paper is that of *price*, rightly considered a potential obstacle, especially during the current economic crisis. The studies collected indicate that the situation is still debatable, although it would appear possible to state that the sustainable diet generally does not cost more, especially if its costs are evaluated using more appropriate criteria. The BCFN has found that the Mediterranean diet is, albeit slightly, more sustainable economically. And this cost comparison does not include the "hidden" costs of a poorly balanced diet, in terms of the environment and, especially, of people's health.

Certainly, much more research can be carried out on the topic of economic sustainability, especially if developing countries are included in the analysis (and it is indispensable that this be done) since, in these countries, the lack of resources and infrastructure, along with greater demographic growth, may render less economical that which is easily accessible in industrialized countries. How to make a sustainable diet truly accessible "to all" will be the subject of the BCFN's upcoming publications.

The times, places, and means used to convey messages for educating people (especially younger people) to adopt more sustainable dietary patterns were then evaluated. We can conclude that the family is no longer enough to teach sustainable and healthy eating habits: due to lack of time, motivation, and, perhaps, adequate knowledge and awareness, parents are no longer able to give the proper guidance, or to offset the effects of advertising, whose messages are inevitably unbalanced in terms of nutrition.

Thus, above and beyond what can be achieved through food education campaigns, enacted through the mass media (so-called "social communications"), a critical role is played by those who operate in "away from home" situations, such as cafeterias or points of sale: environments where people spend a significant part of their day and where they generally make choices on the subject of diet. It is possible to intervene in these situations and obtain significant effects.

In light of this, the BCFN's recommendations are:

1. launch social communications campaigns which, with data, explain the economic benefits of a sustainable diet (not only over the long-term and for society, but also at the present time and for individuals);
2. support the big food companies, offering arguments and data to guide the development of their products and advertising in order to encourage education on food sustainability. In particular, by promoting information for packaging and advertising which allows everyone to understand what they are eating and what the individual and social impacts of their choices are;
3. value the contribution from mass marketers as an environment where educational messages can be channeled, suggesting simple ways to communicate complex concepts, in order to reach uneducated segments of the population and push consumers toward being more consistent in linking environmental impacts and purchasing choices;
4. assist schools and company cafeterias to organize meals in such a way as to make the advantages of a healthy diet obvious and explicit;
5. research the sustainability of the diet on a global scale, also involving developing countries in the estimates.

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CHAPTER 2

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2. www.n-print.org

3. Collection of data ended in June 2012 and, therefore, the publications which were made available afterward were not analyzed, they will be collected to update the Environmental Pyramid in the next edition.

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5. For ready-to-eat foods and food eaten at restaurants (for example, fast food) the impacts were estimated by reaching almost 100% coverage with regard to the availability of data.

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2. Values are rounded off to tens or hundreds.

3. Values are rounded off to tens or hundreds.

4. Values are rounded off to tens or hundreds.

5. In calculating the economic cost, the cost of the energy used in cooking was not taken into consideration, because it is hard to estimate.

6. The water used during the cooking of food was not taken into consideration in the Water Footprint's calculations, since it is negligible.

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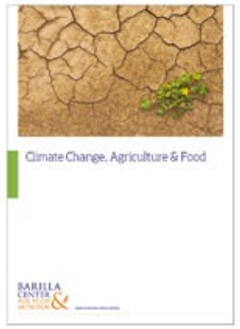
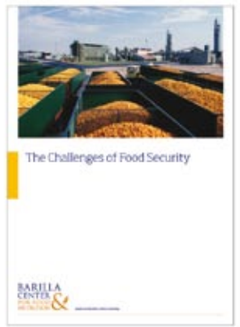


Climate Change, Agriculture & Food

Analysis of the impact that climate change will have on agricultural production and hence, on the availability of food and fresh water and the evaluation of individual and collective behavior to be implemented

Food & Health

The value of lifestyle and healthy eating habits in the prevention of chronic diseases, to ensure the widespread well-being of populations



The Challenges of Food Security

How to strengthen the mechanisms of global governance to increase agricultural productivity and manage the volatility of prices in order to ensure that everyone has equitable access to food

The cultural dimension of food

The relationship between food and religion, the conviviality and the identity of the populations within the great culinary traditions and its role in influencing lifestyle and productive and economic factors

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Healthy growth and nutrition in children

Relationship between the development of good eating habits during childhood and adolescence and the prevention of diseases in adulthood

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Illustration of the model that relates nutritional balance with the protection and preservation of the environment

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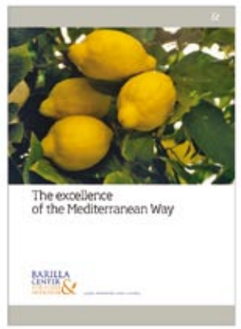
Construction of a multi-dimensional index designed to measure the level of people's well-being from the consideration that their well-being depends on several variables, not attributable only to the economic aspects



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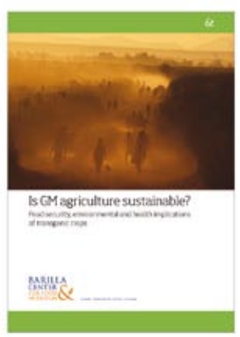

Is GM agriculture sustainable?

Analysis of the current debate on the role of GMOs in solving the problem of access to food while ensuring safety for people and the environment

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Water economy

Elaboration of the model of the food and water pyramid, which relates the traditional food pyramid with the impact of its components in terms of water consumption

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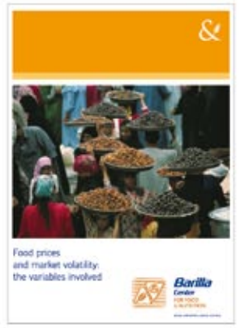

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Proposal of an interpretative model that provides a systemic view of the elements that determine the evolution of prices of food commodities

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In light of the continued aging of populations worldwide, the evaluation of the role of a healthy lifestyle and eating habits to ensure increased life expectancy in better health

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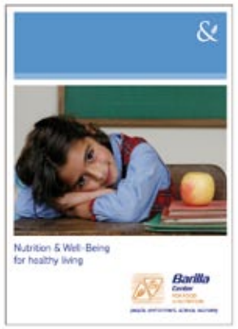

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The elaboration of the studies about the relationship between health, eating habits and lifestyles at every stage of life

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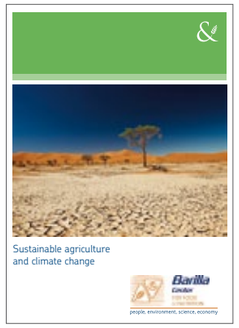

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