



**Barilla**  
Center  
FOR FOOD  
& NUTRITION

people, environment, science, economy

# DOUBLE PYRAMID 2016

A MORE SUSTAINABLE FUTURE DEPENDS ON US



# Eat better Eat less Food for all

#bcfnforum

## 7<sup>TH</sup> INTERNATIONAL FORUM ON FOOD & NUTRITION

MILAN, BOCCONI UNIVERSITY, DECEMBER 1<sup>ST</sup> 2016

Saying “enough” is no longer enough. Our planet cannot be obese and hungry at the same time. We should not be throwing away food that would be enough to end hunger. Nor can we favor the production of biofuels to feed cars instead of people who go to bed hungry. With the presentation of the Food and Nutrition Sustainability Index, we will propose solutions to overcome these huge challenges of our time. For a better future for all. The world is hungry for people like you – let’s change the world together. To participate, sign-up online. [www.barillacfn.com/en/forum/](http://www.barillacfn.com/en/forum/)



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## BARILLA CENTER FOR FOOD & NUTRITION

SCIENCE, PEOPLE, ENVIRONMENT, ECONOMY

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The contemporary world is experiencing a major food emergency. The food we choose to eat, its production chain, the ways and places in which we consume it and its inequitable distribution in different parts of the planet have a profound effect on the mechanisms that govern our society and our times. In recent years, it has become necessary to compare the different points of view of the actors involved along the food chain, from the field to the table. Ever since its creation in 2009, the Barilla Center for Food & Nutrition has established itself as a privileged platform for this choral dialog and for a wide range of issues about food and nutrition. The BCFN’s aim is to become a collector and connector between the different voices, offering solutions and

proposals, and putting science and research in communication with policy decisions and governmental actions.

The BCFN is dedicating an area of study and research to every crucial issue related to food and nutrition, to address current and future challenges: from the problem of access to food and its distribution in the world (*Food for All*) to the rebalancing of the unstable relationship between food and health through healthy lifestyles (*Food for Health*), from reflection on the food chain and assessing the impact of production on the environment (*Food for Sustainable Growth*) to the history of the relationship between man and food, in order to find some good solutions for the present (*Food for Culture*).



# FOOD IS KEY TO BALANCE OUR PLANET

*Of all the numerous emergencies in the world, sustainability of the food system might seem to be less of a priority. But that is not the case: among the underlying causes of a global situation as complex as the current one (global warming, conflicts, migration, and economic crises), the paradoxes that plague the 'food system' occupy a place of absolute prominence. Unfortunately, there are still too few of us who know this and understand the implications. In fact, agriculture generates a large part of the CO<sub>2</sub> emissions that cause climate change. And the consequences of climate change that lead to the increased suffering of entire populations and hence their need to migrate in search of food, land to cultivate, and sources of drinking water.*

*Moreover, the current food system, based on an erroneous perception of the value of food and of a short-sighted vision of how it should be produced and consumed, has grown in a way that is unsustainable. Perhaps driven more by economic and financial reasons than the search for shared well-being, it has not sufficiently taken into account the scarcity of natural resources (water, land and air) and the damage caused by malnutrition. In fact, today the absence or scarcity of healthy food affects both those who live in the most vulnerable areas of the globe, where today there are still hundreds of millions of malnourished*

*people, and in the seemingly more affluent countries, where unbalanced diets create overweight conditions and obesity (which in turn cause illness) that affect over two billion people.*

*In order to find the right path of development and to reduce inequalities, everyone has to do their part. The first step, which is quite simple but often overlooked, can be to follow a sustainable diet, such as the one suggested by the BCFN Double Pyramid, which protects our health by reducing the environmental impact. This year too we offer the results of our research to facilitate this path for you: the studies and reflections that we have been engaged in since 2010 (the year when we published the first edition of the Double Pyramid) so as to have a better understanding of the links between nutrition and well-being and between food and the environment.*

*In particular, in this edition you'll be able to read something new on the results of the COP21 summit in Paris; about everything that is being done in the world to handle food in constantly growing cities; and about the controversial 'fad' diets, which all too often lead us to make food choices that are less sustainable, for ourselves and for the planet, than we would like. Enjoy your reading.*

*Juana Barriola*



people, environment, science, economy

# DOUBLE PYRAMID 2016

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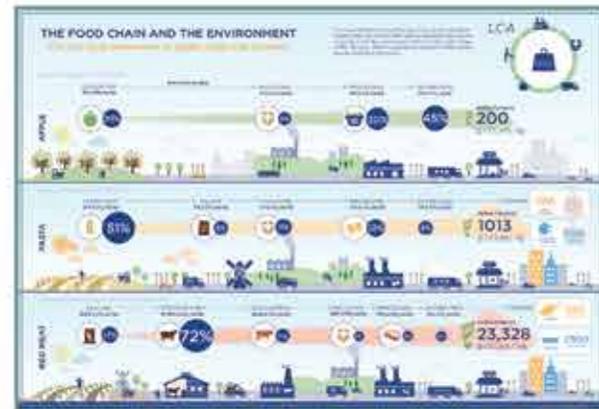
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## THE COST OF SUSTAINABLE DIETS

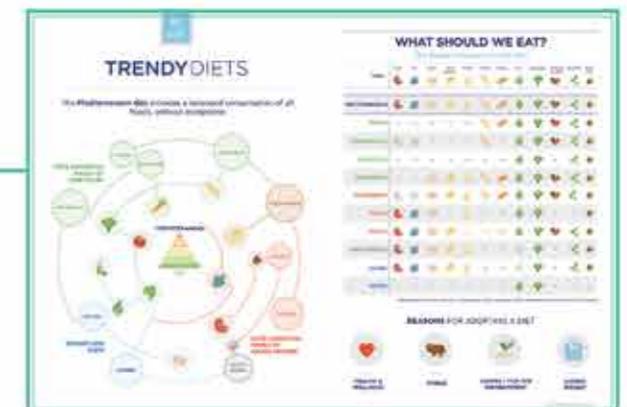
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# THE LINK BETWEEN FOOD AND THE ENVIRONMENT



We have always known that our health is strongly influenced by the food choices we make every single day. Today we also know that the production of food affects the quality of the environment around us. Awareness of this has also grown thanks to the studies by the Barilla Center for Food & Nutrition (BCFN), which since 2009 has been measuring the significance of this impact, trying to figure out how we can reduce it by adopting an eating style that is sustainable, both for people and for the planet.

Right from the BCFN's first analysis, it has been shown that the more environmentally friendly foods are the same as those for which nutritionists recommend an increased consumption, while those with the highest environmental footprint are those that should be eaten in moderation. This was an important conclusion, which is at the basis of a graphic model – now well known – which placed the classic food pyramid (the principles of which coincide with those of the Mediterranean diet) alongside the new (inverted) 'environmental' pyramid in which foods are classified according to their Ecological Footprint, i.e. the impact their production can have on the environment.

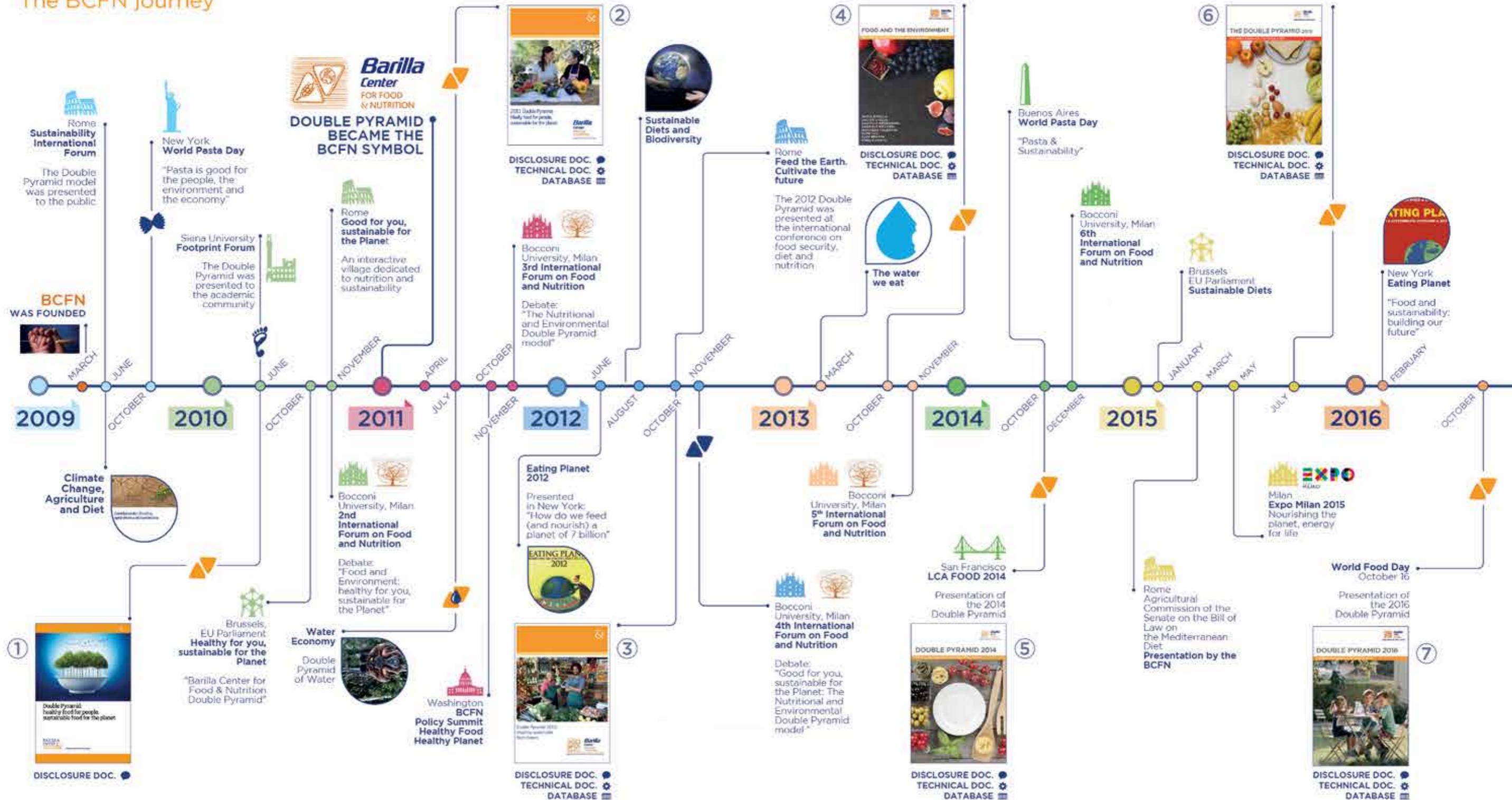
The message conveyed by the BCFN Double Pyramid is simple and straightforward: a diet that is

healthy for people is also healthy for the planet. Since 2010, the scientific foundation of the Double Pyramid has been enriched from year to year (attested to by the seven editions of this document) until it has become an international reference for anyone involved in sustainability in the agri-food sector. Each edition has delved more deeply into aspects related to the environmental impacts of food, by collecting new data and carrying out scientific research. From the analysis of the nutritional needs of children and adolescents to the evaluation of the economic viability of the diets, to the study of trends and international food policies. The Double Pyramid has appeared in many scientific publications, including those of the FAO, and has made headlines on several occasions at international level.

Bringing further evidence and studies to the seventh edition of the Double Pyramid, the BCFN wants to remind everyone – especially in light of what emerged from the COP21 conference in Paris on the impact of agricultural systems on climate change and the increasing importance that food has in the political and socio-cultural debate – just how important it is to go forward in the study and promotion of truly sustainable eating habits.

# 7 YEARS OF THE DOUBLE PYRAMID

The BCFN journey





# DIET AND HEALTH

In recent years, the awareness of the influence that nutrition has on people's well-being has led to the production of different nutritional guidelines for the prevention of chronic non-communicable diseases. The BCFN has studied them carefully over the years and found that, if compared, they converge on the principles underlying the Mediterranean diet, making it one of the most effective diets in terms of health and prevention of chronic diseases.

## THE MEDITERRANEAN DIET

The traditional Mediterranean diet is a nutritional model that is characterized by its great variety of foods and its strong nutritional balance: it consists of a high intake of vegetables, legumes, fruit and dried fruit, olive oil, and cereals (50% of which are whole grain), a moderate intake of fish and dairy

products, and a low intake of red meat, white meat, and sweets.<sup>1</sup> The nutritional value of the Mediterranean diet was discovered



The cover of TIME magazine dedicated to Ansel Keys dated January 13, 1961.

for the first time in the Seventies, by the Seven Country Study carried out by Ansel Keys,<sup>2</sup> which compared the diets of seven countries to assess their benefits and critical points. What emerged for the first time from his scientific analysis was the existence of the strong correlations between people's dietary

habits and the risk of developing chronic diseases, particularly cardiovascular diseases.



Since then, many other studies have been carried out on the connections between diet and health, and all of them have confirmed that the adoption of the Mediterranean diet is associated with a lower mortality rate,<sup>3</sup> a lower incidence of cardiovascular disease,<sup>4</sup> metabolic dysfunctions,<sup>5</sup> and some types of cancer.<sup>6</sup> More than thirty years after the first studies on the Mediterranean diet, no scientific evidence has yet emerged that contradicts the positive effects of this diet. Furthermore, as we shall see later on, according to some recent studies,<sup>7</sup> the Mediterranean diet also ensures greater longevity.

Because of its uniqueness in terms of practical knowledge and traditions, and the conviviality that characterizes it, the Mediterranean diet has been recognized by UNESCO as an Intangible Cultural Heritage of Humanity.<sup>8</sup>

This also inspired activity of nutrition information and education promoted by the U.S. Department of Agriculture starting in the early Nineties, which led to the publication in 1992 of the first edition of the food pyramid<sup>9</sup> – then republished by the FAO in 1997<sup>10</sup> – that concisely and effectively explains the scientific instructions found in the *Dietary Guidelines for Americans*, the nutritional guidelines for the population. The pyramid scheme simply and instantaneously communicates the elements that make up a balanced diet,<sup>11</sup> and their recommended portions. The scheme shows the different levels of the foods: the closer to the summit, the lower the frequency of consumption. No category of food is excluded from the pyramid, because variety is considered to be one of the cardinal principles of proper

nutrition. Over the years, various organizations and research institutes – including the WHO (World Health Organization), CIISCAM (Inter-University Centre for International Studies on Mediterranean Food Cultures), and the Harvard School of Public Health – have developed systems of communication based on the image of the food pyramid. The different versions published over time<sup>12</sup> all have a common scientific basis, which is then adjusted depending on the audience to which it is addressed. For example, different solutions are developed depending on age (there are many pyramids adapted to indicate proper nutrition for children), cultural traditions, and nutritional habits. Moreover, in recent years, the scheme has often been accompanied with recommendations for a correct lifestyle, such as the amount of water to drink, how much time to devote to physical activity, etc.

<sup>1</sup> Trichopoulou *et al.*, 2003.

<sup>2</sup> Keys *et al.*, 1970; Keys *et al.*, 1980.

<sup>3</sup> Trichopoulou *et al.*, 2003.

<sup>4</sup> Fung *et al.*, 2009; Lopez-Garcia *et al.*, 2014; Estruch *et al.*, 2013.

<sup>5</sup> Babio *et al.*, 2014.

<sup>6</sup> Couto *et al.*, 2014.

<sup>7</sup> Cros-Bou *et al.*, 2014; Sears, Ricordi, 2011.

<sup>8</sup> Saulle, La Torre, 2010; Unesco, 2010.

<sup>9</sup> USDA, 1992.

<sup>10</sup> FAO/WHO, 1997.

<sup>11</sup> OMS, 2000; CIISCAM, 2009; Harvard School of Public Health, 2011.

<sup>12</sup> EUFIC, 2009; FAO, 2014.

# HERITAGE OF HUMANITY



In addition to UNESCO's renowned list of World Heritage sites, since 2001 it has started to draw up a list of the Intangible Cultural Heritage of Humanity, those ancient traditions (representations, knowledge, objects, tools) that communities recognize as part of their cultural heritage.

Since 2010, the list also includes the Mediterranean diet, because it “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 *di-aita*, 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 [...]”<sup>13</sup>

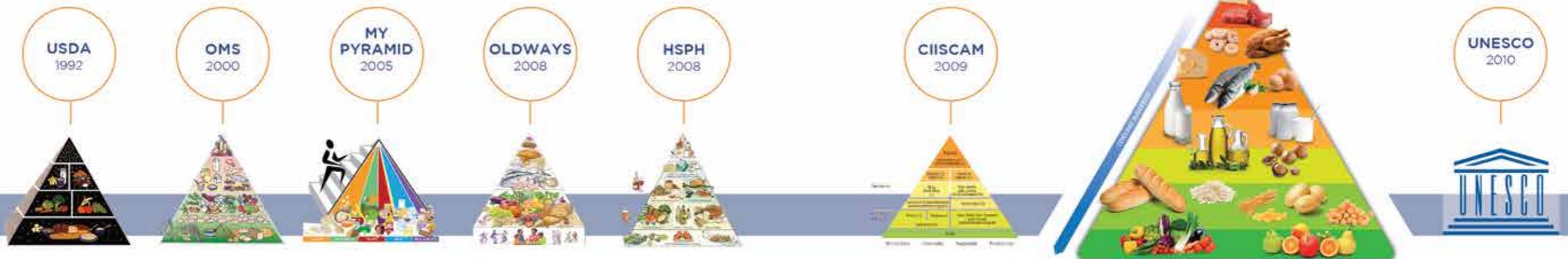
<sup>13</sup> UNESCO, Italian National Commission News Archive, “The Mediterranean diet is a World Intangible Heritage of Humanity”. [http://www.unesco.org/archives/multimedia/?s=film\\_details&pg=33&vo=2&vl=Eng&id=1680](http://www.unesco.org/archives/multimedia/?s=film_details&pg=33&vo=2&vl=Eng&id=1680).

# THE FOOD PYRAMID EVOLUTION

The Mediterranean diet and other nutrition models around the world

BCFN  
2009

"The Mediterranean diet represents a set of skills, knowledge, practices, and traditions going from the landscape to the dinner table, including the crops, harvesting, fishing, conservation, processing, the preparation and, in particular, the consumption of food"



## OTHER NUTRITION MODELS





## NUTRITION FOR GROWING CHILDREN

We know that nutrition plays a vital role in the growth of children and adolescents; for this reason, the BCFN has decided to take into account their nutritional needs, assessing whether the Mediterranean diet is also the most suitable one in this case.

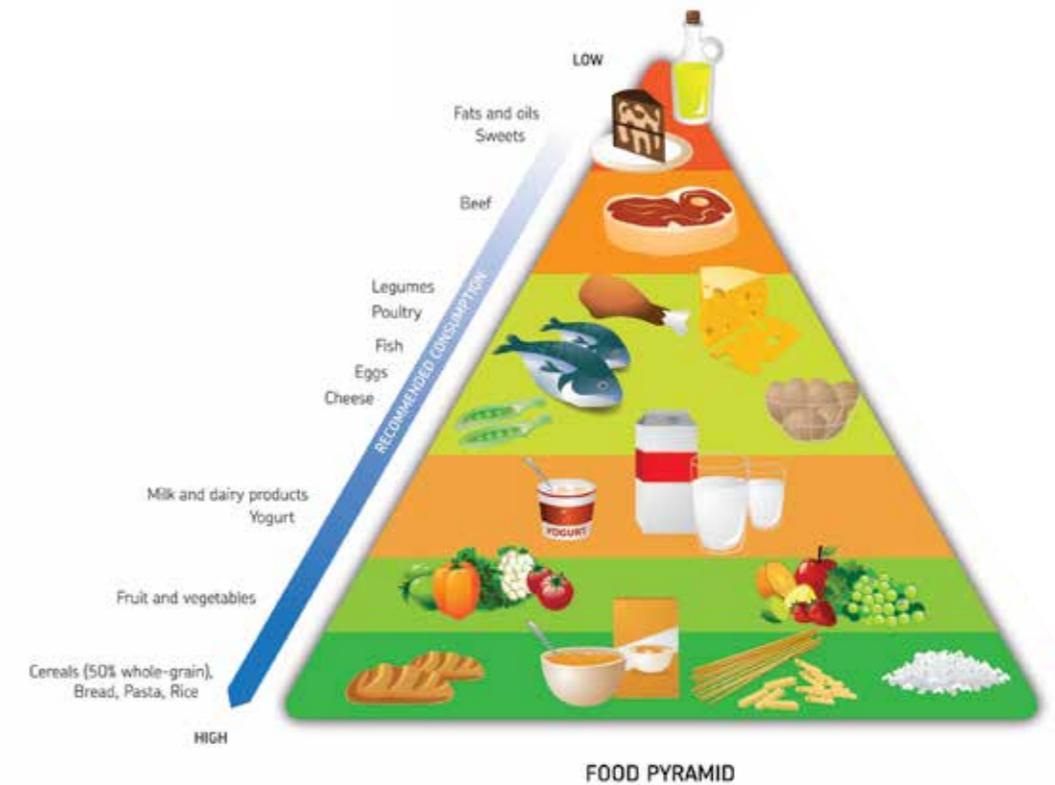
The study has clearly shown the specific needs of those whose bodies are still developing. During the period of early childhood – characterized by a very rapid growth and the synthesis of new tissues – a child must be provided with a balanced amount of energy: in the first year of life, the energy requirement for growth is substantial, but it declines rapidly, falling from 35% in the first month of life to 5% at one year of age.

In quantitative terms, carbohydrates (starches and sugars) are the first and most important energy source of the organism; they provide energy to all the tissues, especially the brain and red blood cells, that only use glucose as ‘fuel’ for cellular activities. For children, fats represent a source of energy

and essential fatty acids, and their intake should come through foods such as fish and nuts; the preferred condiment is vegetable oil, especially extra virgin olive oil, which also allows for an optimal absorption of fat soluble vitamins (A, D, E, K). Proteins are the major structural component of all body cells:<sup>14</sup> they act as enzymes, receptors on the membranes, carriers, and hormones. Optimal high-quality protein sources are milk, eggs, meat, fish, cheese, and certain products of plant origin, such as soy, legumes, and products derived from wheat. Alongside the main macronutrients, vitamins and minerals are essential for the proper nutrition for children of preschool and school age.

On the other hand, adolescence is the period in which there is the transition from a prepubertal condition to adulthood and it is characterized by major physical, mental, and social changes, accompanied by greater needs in both the quantity and the quality of nutrients, vitamins, minerals, fiber, and water.

<sup>14</sup> Institute of Medicine of the National Academic Press, 2005.



Source: the BCFN Food Pyramid for Growing Children, 2011

At this stage in life, iron and calcium deficiencies are likely: adequate levels of these are the result of balanced inputs (diet, fortified foods, and supplements) and outputs, which in the case of children and adolescents may be increased by infections as they grow and, for females, with the onset of menstruation.<sup>15</sup> It is therefore important that during adolescence there is an increase in iron-rich foods such as lean meat and fish, legumes, dark green vegetables, nuts, and iron-fortified cereals. Calcium also plays an essential function in the rapidly growing body of a teenager, because it enters into the composition of bones and teeth. So it is important that children choose foods that are rich in calcium and vitamin D, especially girls, seeing as with the onset of menopause in their future, they are more exposed to the risk of osteoporosis. Finally, adolescence is the period when the food requirements become more similar to those of adults.

In Italy, in recent decades there has been an alarming increase in the number of young people who are overweight or obese. The 2014 “Okkio alla Salute” (Eye on Health) survey shows that in Italy,

the home of the Mediterranean diet, the percentage of overweight children is 20.9% and 9.8% are obese, including the severely obese, who alone make up 2.2%,<sup>16</sup> with a higher concentration in the southern and central regions.

A major cause of this phenomenon is the spread of unhealthy eating habits that are a far cry from the Mediterranean diet and which do not promote a harmonious development of young people and makes them predisposed to gain weight.

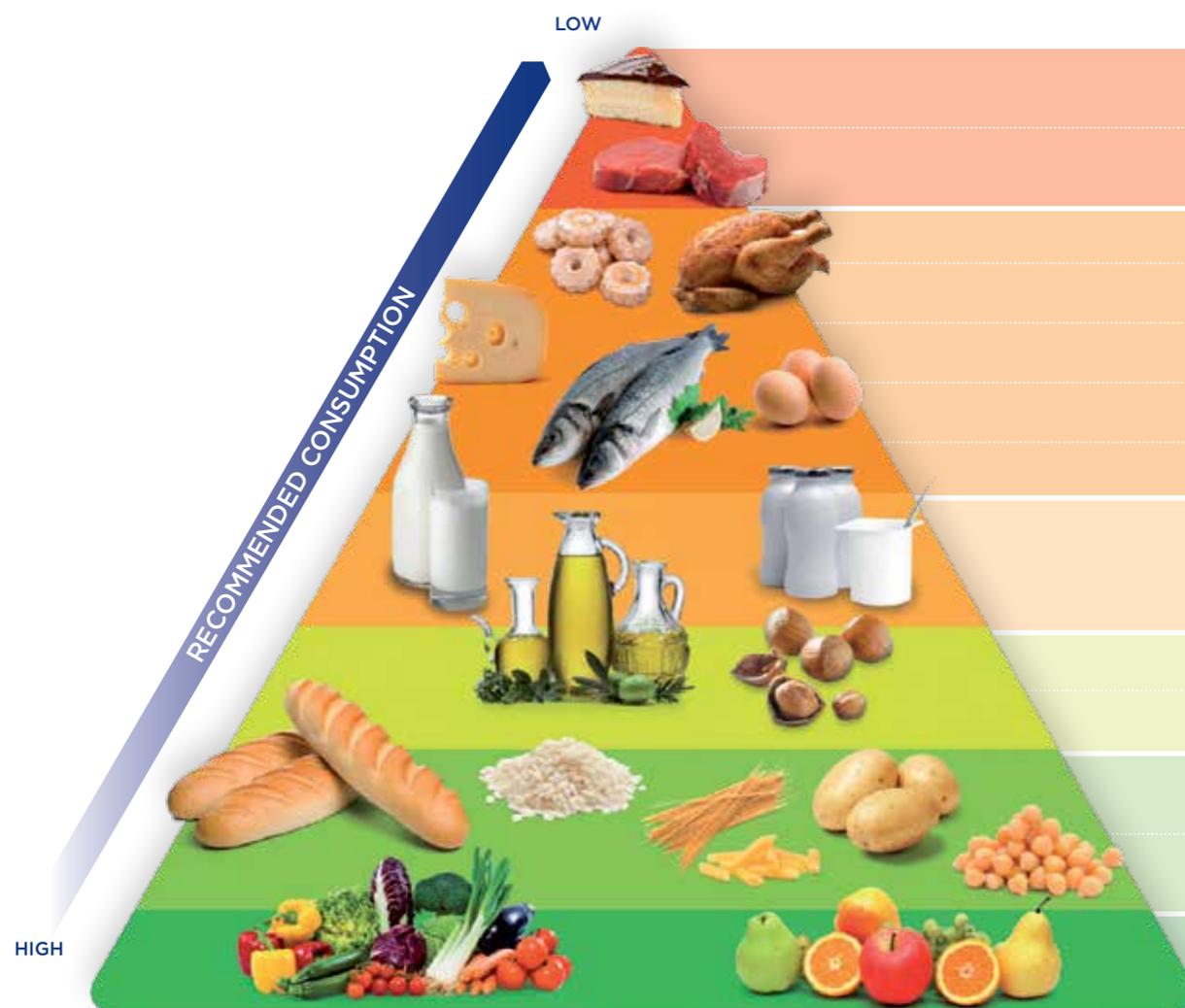
This is why it is increasingly important to promote a healthy diet during childhood and adolescence, one which promotes an optimal state of health, growth, and cognitive development, and contributes to the prevention of chronic diseases in adulthood. In line with this need, since 2011 the BCFN has developed the Double Pyramid model dedicated to those who are growing, which provides guidance in the food education of children and adolescents.

<sup>15</sup> Ramakrishnan, Yip, 2002.

<sup>16</sup> “Okkio alla Salute 2014”: [http://www.epicentro.iss.it/okkioallasalute/pdf2015/SINTESI\\_16gen.pdf](http://www.epicentro.iss.it/okkioallasalute/pdf2015/SINTESI_16gen.pdf).

# THE FOOD PYRAMID

Recommended intakes for a healthy diet



The BCFN nutritional pyramid, derived from the pooling of several international nutritional guidelines, is quite indicative of the traditional Mediterranean diet.

The message conveyed is that the basis of nutrition must consist of plant-based foods that are rich in vitamins, minerals, fiber and complex carbohydrates, water and plant proteins, all of which are typical of Mediterranean area. Whereas the foods placed at the top of the pyramid should be eaten in moderation because they are rich in fat and simple sugars.

-  Saturated and unsaturated fats, simple carbohydrates (sugars)
-  Vitamin B12, iron, zinc, protein, saturated and monounsaturated fats
-  Saturated and unsaturated fats, proteins, essential amino acids, vitamin B, selenium, copper, zinc
-  Proteins
-  Saturated and unsaturated fats, simple carbohydrates (sugars)
-  Protein, saturated fats, calcium, vitamin A
-  Protein, saturated fats, omega 3
-  Water, calcium, proteins, saturated fats, simple carbohydrates (sugars), vitamin A and B, pantothenic acid
-  Vitamin E, polyphenols, triglycerides, essential fatty acids
-  Vitamins, minerals, antioxidants, unsaturated fats, omega 3, omega 6
-    Complex carbohydrates (starch)
-  Proteins, fiber, essential amino acids, vitamin B, iron, zinc
-   Water, vitamins, minerals, fiber, simple carbohydrates (sugars)

# NUDGING AND DIET



**N**udging or choice architecture is a concept introduced in 2008 by two American researchers<sup>17</sup> based on the idea of ‘libertarian’ or ‘soft’ paternalism: people who are gently guided in their decision-making, without coercion or outright bans, are more likely to change their behavior. Nudging is also an effective way to make consumers adopt healthier and more sustainable diets.<sup>18</sup> Homes, restaurants, school cafeterias, and offices are all places where actions undertaken with the nudging method are more effective in promoting good dietary practices than more restrictive methods. This was shown by a study carried out in a Swedish school cafeteria<sup>19</sup> where a vegetarian diet was sometimes imposed on the students, which

caused a boomerang effect: on those days, the students chose to not eat at school or brought their lunch from home.

Instead, promoting interventions that *indirectly* affect our actions is often the best solution. For example, it is now known that the physical environment has a greater effect on individual choices than you’d think, and that even seemingly trivial actions such as a different arrangement of food on the shelves is an effective method to push people to make certain purchases: the products placed at eye level are purchased more often, as well as those close to the cash registers (if supermarkets placed fruit and vegetables there, more people would buy them).<sup>20</sup> The effectiveness increases in the environments



in which nudging does not coexist with other marketing interventions, for example in school cafeterias.<sup>21</sup> Professor Brian Wansink<sup>22</sup> devised ‘the smart cafeteria’<sup>23</sup> where, by changing the arrangement of the food or how it is offered, students will be led to change their eating habits. For example, moving the broccoli from the middle to the start of the self-service counter leads to a 10% to 15% increase in its consumption; putting the ice cream products in a freezer with a dark cover markedly reduced sales; promoting the use of styrofoam trays increases the consumption of vegetables (without them, 21% less are eaten); a cup of 400 grams compared to one of 500 reduces the consumption of breakfast cereals by 24%; explicitly offering a salad plate increases its consumption by one third, while placing it near the cash register triples it.

Another study carried out in the cafeteria of an English university<sup>24</sup> showed that when fruit is placed in the front rows of the buffet, before the desserts and in pre-prepared portions, its consumption increases by 26% compared to when it is displayed in baskets near the cash register. In a similar experiment in the cafeteria of a hospital,<sup>25</sup> the healthiest foods were put on the shelves at eye level and the others on the higher or lower shelves; bottles

of water were also distributed to all the refrigerators. Thanks to these small changes, consumption of less healthy foods was reduced by 5%, that of sugary drinks by 11%, and consumption of natural beverages increased by 4%. It has also been noted that, thanks to the greater visibility, purchases of bottled water have also grown by 26%. Nudging has been used widely for fighting obesity, especially in the U.S., and also to promote environmentally sustainable behavior in the food sector, in particular as regards the reduction of the consumption of meat<sup>26</sup> and containment of food waste.<sup>27</sup>

<sup>17</sup> Thaler, Sunstein, 2008.

<sup>18</sup> Sunstein, 2014; Gronow, Warde, 2001.

<sup>19</sup> Arvola, Liedgren, 2014.

<sup>20</sup> Goldberg, Gunasti, 2007.

<sup>21</sup> Lehner, Mont, Heiskanen, 2015.

<sup>22</sup> Professor at Cornell University.

<sup>23</sup> Marino, Pratesi, 2015.

<sup>24</sup> Chapman, Ogden, 2012.

<sup>25</sup> Thorndike *et al.*, 2012.

<sup>26</sup> Wellesley *et al.*, 2015.

<sup>27</sup> Chapman *et al.*, 2012.

# SUMMARY OF GUIDELINES FOR GROWING CHILDREN

- 1** Choose a **HEALTHY** and balanced **DIET**, daily alternating the main foods 
- 2** Avoid consuming excess calories, and **BALANCE** nutrition with physical activity 
- 3** **ALTERNATE** animal and vegetable proteins and fats, and simple and complex sugars 
- 4** **REDUCE** the consumption of **ADDITIONAL SALT** to a minimum, to prevent the development of hypertension 
- 5** **DISTRIBUTE FOOD CONSUMPTION** over 5 times during the day: three meals and two snacks 
- 6** Avoid eating food outside the **5 DESIGNATED TIMES** 
- 7** Engage in **PHYSICAL ACTIVITY** for at least an hour a day (sports or play activities) 
- 8** **CURTAIN A SEDENTARY LIFESTYLE** spent in front of the television and electronic devices 

## DIETARY HABITS AND LONGEVITY

Nutrition plays a crucial role in the maintenance of good health for older people, as well as during growth and development.

Over the last 200 years, life expectancy has increased by about two years every decade, thanks to a reduction in child mortality, improvement in health care, and the introduction of specific health policies for the protection of the elderly population.<sup>28</sup>

Nevertheless, aging is the major risk factor for the most common chronic diseases – including cancer, cardiovascular disease, stroke, and dementia – which, in addition to undermining the well-being of the population, pose a significant burden on the public health system. Encouraging healthy aging and reducing public expenditure associated with chronic diseases in later life has thus become one of the main challenges of our time.<sup>29</sup>

### The effects of one's diet

Aging is a biological process caused by a progressive deterioration of the macromolecules that make up our cells, such as DNA, proteins, and lipids. This natural phenomenon affects all living organisms and is irreversible, but its progress can be influenced by various factors including one's diet.

In recent decades we have found extensive evidence of the effects of nutrition on the aging process: for example, an excess consumption of food and a sedentary life are positively correlated to a higher risk of dementia,<sup>30</sup> and all of the most common chronic diseases.<sup>31</sup> According to many researchers, eating less prolongs life: a recent study of overweight individuals has shown that, with a caloric restriction of 25% (easily accessible), the health benefits are manifold.<sup>32</sup>

According to others, maintaining a low-calorie diet not only reduces the risk of diabetes and cardiovascular disease, but it also slows down the aging process by improving the productivity and

quality of life in older age.<sup>33</sup> In addition to calorie restriction, there are certain dietary factors, such as the consumption of specific nutrients and other bioactive substances that can influence and slow down the aging process.

The traditional Mediterranean diet is the strongest evidence of the correlation between diet and aging: in fact, adherence to this diet associated with a lower mortality and a reduced risk of chronic diseases such as cancer, metabolic syndrome, and depression, as well as cardiovascular and neurodegenerative diseases.<sup>34</sup> In addition, the consumption of fish, typical of the Mediterranean diet, is associated with a reduced risk of developing Alzheimer's and other forms of dementia.<sup>35</sup>

### The Mediterranean diet and telomeres length

Further evidence of the link between nutrition and longevity comes from the study of telomeres, tiny portions of DNA that are located at the ends of chromosomes. The telomeres shorten with aging, leading to senescence (i.e. progressive decay) of the cell: in other words, shorter telomeres are associated with shorter life expectancy and an increase in the rates of chronic diseases.

The rate at which telomeres shorten depends on many factors, including the state of 'silent' inflammation of the organism resulting from the adoption of incorrect eating habits and conditions of obesity, diabetes, and the presence of cardiovascular diseases.<sup>36</sup> A healthy balanced diet can reduce inflammatory processes and therefore the speed at which cellular degeneration processes occur.

<sup>28</sup> Kirkwood, 2008.

<sup>29</sup> Mathers, 2015.

<sup>30</sup> Anstey *et al.*, 2011.

<sup>31</sup> Handschin, Spiegelman, 2008.

<sup>32</sup> Changhan, Longo, 2016; Holloszy, Fontana, 2007.

<sup>33</sup> Redman *et al.*, 2014.

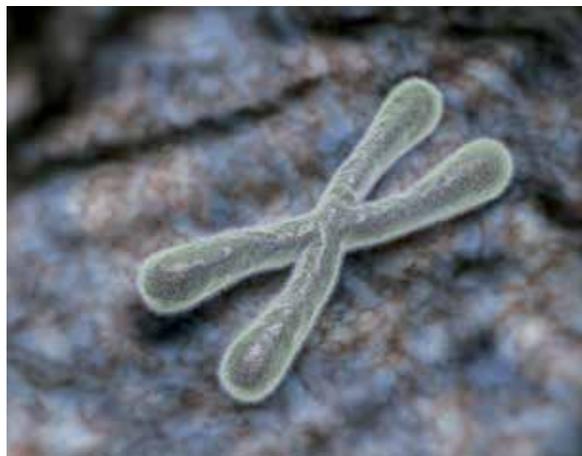
<sup>34</sup> Mathers, 2015; Chrysohoou, *et al.*, 2013.

<sup>35</sup> Uauy, Dangour, 2006.

<sup>36</sup> Sears, Ricordi, 2011.



A recent study conducted in the United States examined the association between adherence to the Mediterranean diet and the length of telomeres. The study showed that the difference in telomere length changes by one point in adherence to the Mediterranean model, evaluated with the aMED



Telomeres, marked in purple in the illustration, are small pieces of DNA at the ends of chromosomes.

scale (alternating Mediterranean Diet Score), which on average corresponds to one and a half years of aging. A change of three points in adherence to the Mediterranean model, which corresponds on average to four and a half years of aging, is comparable to the difference observed between smokers and non-smokers.<sup>37</sup>

In addition to studies on the effects of the Mediterranean diet as a whole, the effects of the individual components have also been studied.

The consumption of extra virgin olive oil, due to its concentration of polyunsaturated fatty acids, has been associated with a reduced risk of cardiovascular disease, obesity, metabolic syndrome, type 2 diabetes, and hypertension; it also improves blood circulation, thereby promoting healthy aging and longevity. A diet rich in fruits and vegetables would raise life expectancy because it contains compounds such as polyphenols, carotenoids, folic acid, and vitamin C.<sup>38</sup> An epidemiological study conduct-



ed on longevity in Ikaria, Greece, showed that the consumption of fish, thanks to its content of antioxidants and omega 3 fatty acids, has been linked to a lower prevalence of depressive symptoms and an improvement in renal function.<sup>39</sup>

### Blue Zones: the places where people live longer

Further confirmation of the link between the Mediterranean diet and the aging process comes from studies conducted since 2004 on the so-called blue zones, i.e. a group of geographic locations where people live much longer and the incidence of chronic diseases, on average, is very low. The concept was coined 12 years ago by the scholars Gianni Pes and Michel Poulain, who had discovered that the province of Nuoro in Sardinia, in Italy, was an area with a high concentration of centenarians.<sup>40</sup> However, the media coverage of the study was thanks to the reporter Dan Buettner, who in the following years,

in collaboration with Poulain himself and National Geographic, launched a project to identify the areas in the world where longevity is higher and to study their features. In time, four other natural blue zones were added to the aforementioned one in Sardinia: the island of Ikaria in Greece, Okinawa in Japan, the Nicoya Peninsula in Costa Rica, and the village of Loma Linda in Southern California.

According to Buettner, the populations of these places have some things in common,<sup>41</sup> including a diet that is very close to the Mediterranean model, daily physical activity, and a positive attitude towards life.

<sup>37</sup> Cros-bou *et al.*, 2014.

<sup>38</sup> Chrysohoou, 2013.

<sup>39</sup> Chrysohoou, 2011.

<sup>40</sup> Poulain *et al.*, 2004.

<sup>41</sup> For further information see: Buettner, 2008; Poulain *et al.*, 2013.

# INSTRUCTIONS FOR LIVING WELL

HEALTHY DIET AND LIFESTYLE FOR EVERYONE

The most authoritative scientific research on the relationship between food and chronic diseases indicates the Mediterranean diet as a reference point for proper nutrition. But this diet alone is not enough: it should be associated with a 'healthy' and active lifestyle. In fact, physical activity contributes to burning calories, easing tension and stress, and improving one's mood and psychological well-being.

The constant practice of physical activity brings significant benefits to the cardiovascular system and the skeletal system, as well as to the metabolism; it favors the maintenance of a proper weight and an optimal body composition. Physical activity is especially important for adolescents because it fortifies them and trains them in a lifestyle that will allow them to live their mature years in good health.

**1** Do at least 30 minutes of **PHYSICAL ACTIVITY** per day 

**2** Avoid reaching overweight conditions and **OBESITY** 

**3** Avoid excessive **ALCOHOL CONSUMPTION** 

**4** Adopt a **BALANCED DIET** 

**5** Increase consumption of **FRUIT AND VEGETABLES** 

**6** Choose complex carbohydrates and increase the consumption of **WHOLE GRAINS** 

**7** Increase the consumption of **LEGUMES** 

**8** Consume two to three servings of **FISH** per week 

**9** Choose **SEASONINGS OF PLANT ORIGIN** 

**10** Limit consumption of **HIGH-FAT FOODS** 

**11** Limit consumption of **FRIED FOODS** 

**12** Limit consumption of **MEAT and POULTRY** to 3 or 4 servings per week 

**13** Limit consumption of additional **SALT** 

**14** Limit consumption of foods and beverages with a **HIGH SUGAR CONTENT** 



## EATING HABITS AROUND THE WORLD

In order to evaluate the different eating habits in various countries, the BCFN has collected and analyzed data on the quantity of food available to individuals in various regions in the world in the Food Balance Sheet database of the FAO.

We have to remember that the availability of food in a country does not match the actual food consumption, but it is an estimate of it.<sup>42</sup>

In general, we see that the consumption of plant proteins is very low in every country considered, as well as that of fish (with the exception of South Korea and Japan, countries that consume more fish due to cultural traditions and geographical

significance). The levels of meat consumption are fairly high, especially in Australia (354 g/day), the United States (323 g/day), Brazil (261 g/day), and Italy (241 g/day).

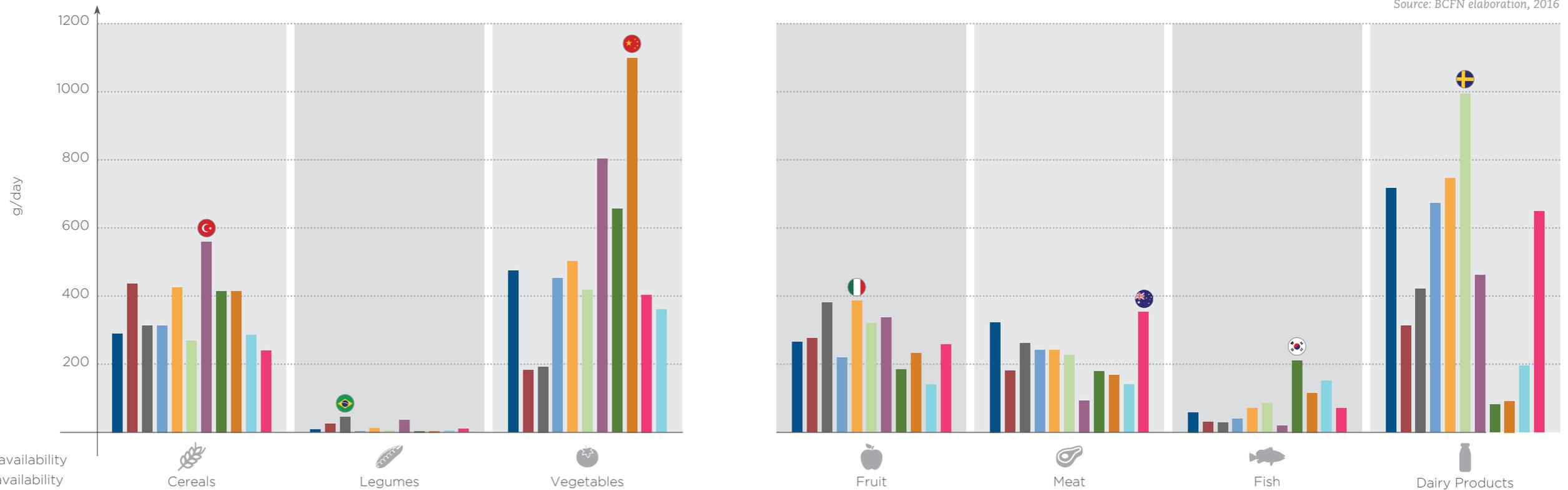
China, Turkey, and South Korea have the distinction of vegetable consumption, while cereal consumption is fairly uniform in all countries.

Sweden is renowned for its high consumption of dairy products.

<sup>42</sup> To calculate the real consumption, subtract from the food availability the amount of waste that occurs in the home, where food waste means both the inedible waste and the edible food that becomes waste, not having been used by end users. The above data may overestimate the actual consumption by up to 50%.

# FOOD AVAILABILITY

Source: BCFN elaboration, 2016



■ maximum availability  
■ minimum availability

Country	Cereals	Legumes	Vegetables	Fruit	Meat	Fish	Dairy Products
United States	290	9	474	266	323	59	717
Mexico	436	25	183	276	181	30	313
Brazil	313	46	193	381	261	29	422
Germany	314	3	452	220	241	39	672
Italy	426	13	502	386	241	71	746
Sweden	269	5	417	321	227	85	994
Turkey	560	37	803	337	94	20	462
South Korea	415	4	656	184	180	211	82
China	415	4	1099	232	168	116	92
Japan	286	5	361	140	141	151	195
Australia	239	11	404	258	354	71	649

Daily availability per capita of eight macro food categories (g/day) in various countries in the world, ranked geographically from the West to the East.

# THE UNITED STATES: FROM THE FOOD PYRAMID TO HEALTHY EATING PLATE



The nutrition pyramid is not the only graphic representation that provides recommendations for consumers. In recent decades, national governments of various countries have developed other images to inform and educate people on how to maintain a balanced diet for a healthy life. Aside from the graphic appearance, it is interest-

ing to note that, despite some specific differences due to cultural aspects or the dissemination of certain foods, all the nutritional models have some basic recommendations in common: a greater consumption of fruit, vegetables, cereals (especially wholegrain) and legumes, and a lower consumption of animal proteins and fats, and simple sugars.

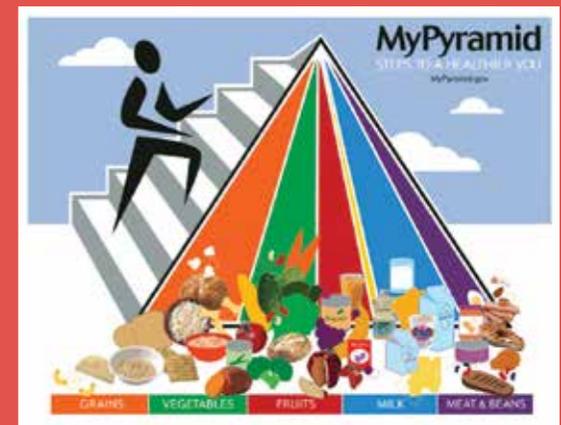
The first American food pyramid was issued by the U.S. Department of Agriculture (USDA) in 1992 and it has been widely recognized in the international scientific world. MyPyramid, published by the USDA in 2005, is an updated version of the first pyramid, and was conceived as an educational tool in addition to the *Dietary Guidelines for Americans*,<sup>43</sup> addressed to all people (starting at two years of age) in normal health conditions.

The recommendations conveyed by MyPyramid relate mainly to eating habits, but it also encourages regular physical activity as an essential requirement for psychological well-being and a healthy body weight.

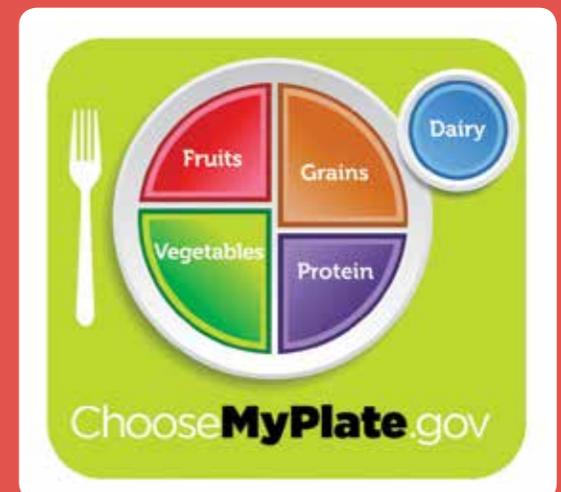
In June 2011, MyPlate replaced MyPyramid as part of a broader initiative<sup>44</sup> through social media, to help consumers to make better food choices. At its inauguration, the first lady Michelle Obama said: “Parents don’t have the time to measure out exactly three ounces of chicken or to look up how much rice or broccoli is in a serving [...]. But we do have time to take a look at our kids’ plates. [...] And as long as they’re eating proper portions, as long as half of their meal is fruits and vegetables alongside their lean proteins, whole grains and low-fat dairy, then we’re good. It’s as simple as that.”<sup>45</sup>

MyPlate represents, with the depiction of a plate and a glass, five groups of foods. The plate is divided into four sections: 30% vegetables, 30% cereals, 20% fruit, and 20% protein; a small circle (like a cup or a small bowl) represents dairy products.

However, the inclusion of dairy products at every meal has raised criticism by the Harvard School of Public Health which published a variant of the nutritional plate called the Healthy Eating Plate in 2011. Here dairy products are included among the protein sources and the glass is filled with water. In addition, it explicitly recommends the consumption of wholegrain cereals instead of refined cereals and using vegetable oils such as extra virgin olive oil.



Source: [www.mypyramid.gov](http://www.mypyramid.gov), 2005



Source: [www.choosemyplate.gov](http://www.choosemyplate.gov), 2011



Source: <http://www.health.harvard.edu/healthy-eating-plate>, 2011

<sup>43</sup> U.S.D.A. e U.S.D.H.H.S., *Dietary Guidelines for Americans*, 2005.  
<sup>44</sup> U.S.D.A. e U.S.D.H.H.S., *Dietary Guidelines for Americans*, 2010.  
<sup>45</sup> <https://www.whitehouse.gov/the-press-office/2011/06/02/remarks-first-lady-food-icon-announcement>.

# U.S. NUTRITIONAL GUIDELINES

Every five years, the Department of Health and Human Services (HHS) and the Department of Agriculture (USDA) cooperate to update the *US Dietary Guidelines for Americans*, to keep abreast of the latest scientific research. The upgrade process starts with the work of the Advisory Committee, a group of 15 experts that reviews the guidelines and publishes a scientific report with suggestions on the formulation of new ones. The USDA is responsible for translating the technical content of the report into educational recommendations.

The eighth edition of the *Dietary Guidelines* was published in December 2015 and offers a broad view of food that emphasizes the maintenance of a healthy body weight for the prevention of chronic diseases such as diabetes, cardiovascular disorders, and certain types of cancer. Unlike the previous editions, which were more focused on individual nutrients, the 2015 *Dietary Guidelines* focuses on the diet as a whole, which must be varied and balanced.

To meet the needs of the population, instead of illustrating a single nutritional model, the *Dietary Guidelines* offers different models: the traditional North American diet, the Mediterranean diet, and the vegetarian diet. The decision to elevate the Mediterranean diet and the vegetarian diet to nutritional reference models is due to the numerous scientific studies that have shown their benefits.

In short, here are the messages of the 2015 guidelines for the North American population:

- 1 Maintain a healthy and balanced diet, one that is suitable to your needs.
- 2 Pay attention to what and how much you eat: opt for variety and moderate portions.
- 3 Eat less food that is high in added sugar, saturated fat, and salt.
- 4 Make the right choice: choose nutritious and healthy food and beverages, avoid 'empty calories.'
- 5 Change your eating habits with small steps: it will seem less difficult!
- 6 Remember to exercise regularly.
- 7 Promote healthy food choices among the people around you (in the workplace, school, etc.).



# THE FOOD CHAIN AND THE ENVIRONMENT

There are more and more scientific studies confirming that what we eat has an effect not only on our health, but also on our environment. This environmental impact can be calculated in different ways, by using specific indicators and analyzing the characteristic aspects of the individual food chains.

## LIFE CYCLE ANALYSIS AND THE ENVIRONMENTAL INDICATORS

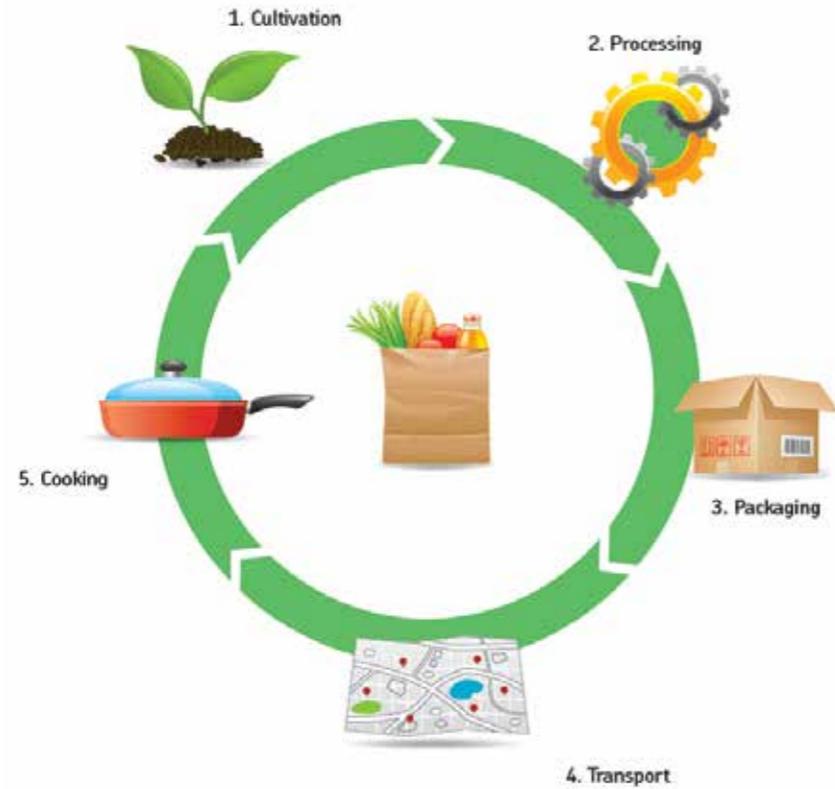
Among all the valuation methods, the Life Cycle Assessment, LCA<sup>1</sup> is the one that has aroused the most interest in recent years, and this is because it calculates the impact of the supply chain in all its

phases, thus drawing an overall picture of the environmental impact of a food.

The analysis of the life cycle includes studying all the phases of the supply chain: from the agricultural phase to that of distribution and consumption, and if necessary, even cooking.

*Summary indicators* were used in order to make the results of LCA studies more understandable and communicable, allowing for a simple and global representation of the environmental impacts.

In the case of the agri-food supply chain, the most significant impacts come from greenhouse gas emissions, water use, and the land area required to produce the resources. Therefore the BCFN has decided to use the following summary indicators:



Representation of the life cycle of a food

 **The Carbon Footprint**, which assesses the emissions of greenhouse gases responsible for climate change, measured in CO<sub>2</sub> mass equivalent.

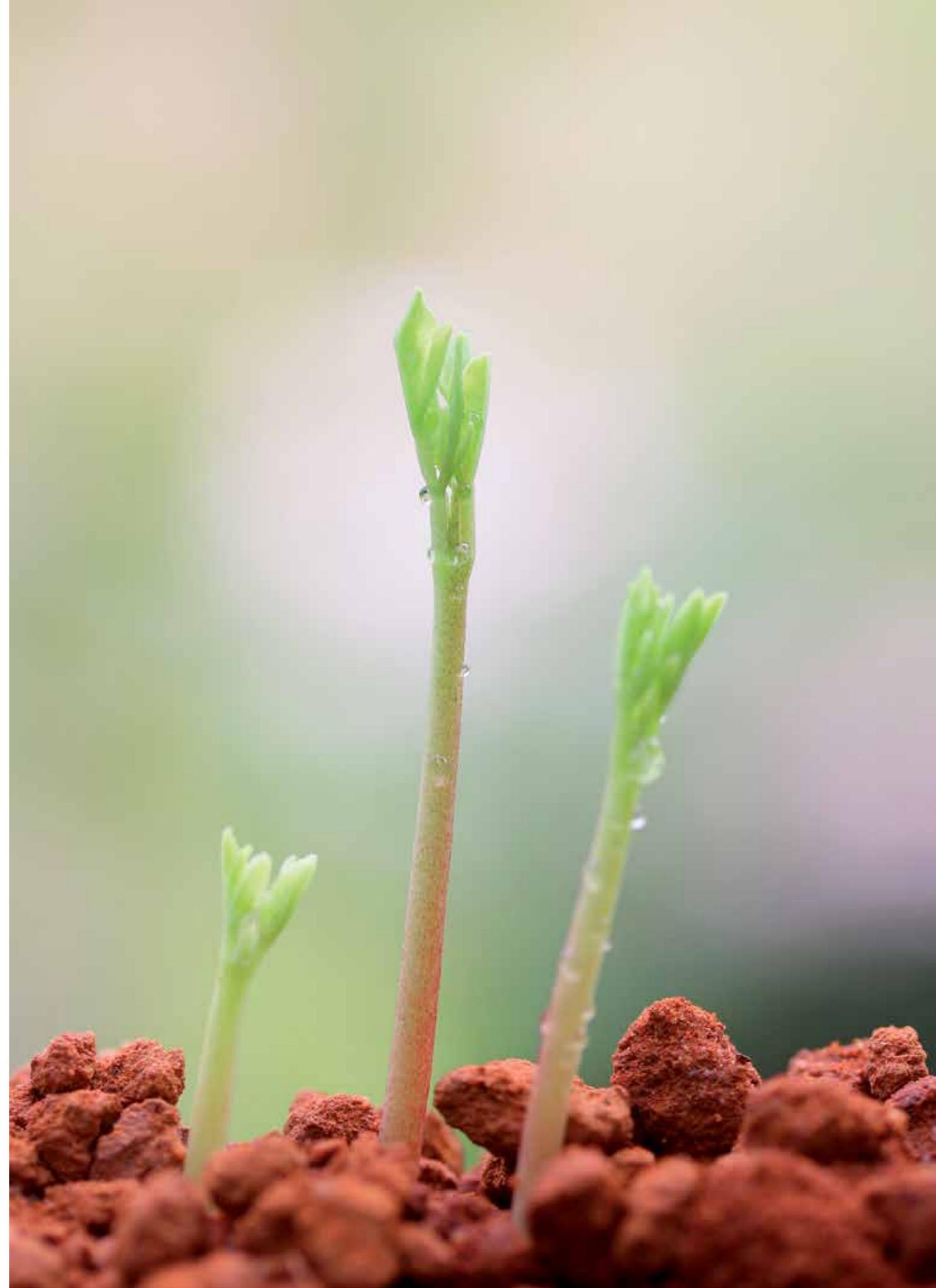
 **The Water Footprint**, which calculates the volume of fresh water used directly and indirectly to produce a food along the different stages of the production chain, also distinguishing the source, the amount needed to dilute pollutants, and the place where the removal occurred, measured in liters or cubic meters.

 **The Ecological Footprint**, which calculates the area of biologically productive land (or sea) necessary in order to provide resources and absorb the emissions associated with a production system; it is measured in square meters or global hectares.

Please note that these indicators do not provide a comprehensive view of the environmental impact, especially at the local level, where the use of chemicals for crops and nitrogen used on the ground also have significant effects.

Due to the need for brevity, the environmental part of the Double Pyramid was made using only the *Ecological Footprint*. However, in order to provide a comprehensive vision this document also shows the calculated environmental impacts with two other indicators: the *Carbon Footprint* and the *Water Footprint*.

<sup>1</sup> Regulated at the international level by the UNI EN ISO standards 14040:2006 and 14044:2006.



# THE INDICATORS USED IN THE DOUBLE PYRAMID



## CARBON FOOTPRINT



The Carbon Footprint is the calculation of the impact – expressed in terms of carbon dioxide equivalent emissions (kg CO<sub>2</sub>eq) – associated with the production of a commodity or a service throughout its entire life cycle is also known as the Carbon Footprint.<sup>2</sup> The calculation is made considering the emissions of all greenhouse gases, the extent of which is determined by two variables: the amount emitted and its impact factor in terms of Global Warming Potential (GWP). In fact, the emissions are converted to a value of CO<sub>2</sub> equivalent, as if only CO<sub>2</sub> were emitted by the system, through fixed parameters defined by the Intergovernmental Panel on Climate Change, IPCC,<sup>3</sup> a body which operates under the aegis of the United Nations.

[www.ipcc.ch](http://www.ipcc.ch)

## WATER FOOTPRINT



The Water Footprint is an indicator of water consumption used for the production of a commodity or service throughout its life cycle. It takes into consideration both the withdrawals that occurred in the production phase (recognized through direct consumption), and those used to produce the necessary raw materials (indirect consumption), also distinguishing the source in which the withdrawal occurred.<sup>4</sup> It is measured in liters or cubic meters.

The method was developed by the Water Footprint Network<sup>5</sup> and considers three basic components:<sup>6</sup>

- *Green Water Footprint*, i.e. the volume of rainwater evapotranspiration. It represents the most significant item in the agri-food chain and it is water that becomes steam through transpiration by plants or evaporation from the soil;
- *Blue Water Footprint*, the volume of fresh water from surface or underground water courses taken and not returned to the basin of subtraction;
- *Grey Water Footprint*, the volume of water needed to dilute pollutants and to restore the water to above the standards of acceptable quality.

[www.waterfootprint.org](http://www.waterfootprint.org)

## ECOLOGICAL FOOTPRINT



The Ecological Footprint makes it possible to measure the (biologically productive) land or sea surface required to produce the resources that mankind consumes and the waste produced, in relation to the Earth's ability to regenerate natural resources and absorb emissions.

The methodology was individuated by the Global Footprint Network<sup>7</sup> and the calculation includes the following areas:

- *Energy land*, land needed to absorb the CO<sub>2</sub> emissions generated by the production of a good or service;
- *Crop land*, land needed for the cultivation of agricultural products and feed for breeding;
- *Grazing land*, land needed to support the grazing of farm animals;
- *Forest land*, land used for the production of wood intended for the production of raw materials;
- *Built-up land*, land occupied by the facilities used for productive activities;
- *Fishing ground*, the area required for the natural breeding or raising of fish products.

These six components are added together after being normalized by using *equivalence factors* and performance or *yield factors*, which take into account the different productivity of different types

[www.footprintnetwork.org](http://www.footprintnetwork.org)

of land with regard to the average productivity of the primary global biomass in a given year.

Therefore the Ecological Footprint is a composite indicator that, through conversion factors and equivalence specifications, measures the different modes of use of the environmental resources through a single unit of measurement: the *global hectare*, gha.

<sup>2</sup> To calculate the carbon footprint of the product, the new single legislative reference at the international level was published in 2013: ISO 14067.

<sup>3</sup> The most recent version was published in 2013 (IPCC, 2013).

<sup>4</sup> Hoekstra, 2013.

<sup>5</sup> The database is available for consultation and can be downloaded at [www.waterfootprintnetwork.org](http://www.waterfootprintnetwork.org).

<sup>6</sup> For more information: Hoekstra *et al.*, 2011.

<sup>7</sup> For details on the hypothesis, see [www.footprintnetwork.org](http://www.footprintnetwork.org).

## THE ENVIRONMENTAL IMPACT OF THE FOOD CHAIN

In recent years, agri-food chains have become the subject of increasing interest for two main reasons: the quality of food and the assessment of the impacts it generates.

In particular, it is the structure of the production chain that determines the intensity of the impacts associated with a specific food: the more complex the chain, the more the raw material undergoes handling and processing before reaching the consumer, and the more the impact grows.

Conversely, a food that needs minimal processing,

such as a vegetable or a fruit, normally has a minor impact.

In general, agri-food chains have articulated structures which can be summarized in seven phases, each of which are associated with specific environmental impacts.

### Cultivation

In the agricultural phase, raw materials are grown for human consumption or to become feed for livestock. In most cases, the environmental impacts of a food are largely attributable to the agricultural phase: this is especially true for grains, fruit, and vegetables.



The impacts resulting from this phase are due to several factors: the production of seed; the use of *fertilizers* (chemical or natural); the *agricultural chemicals* used to protect crops; *diesel fuel* for agricultural operations; and the *water* for irrigation. The relevance of these factors on the overall impact varies greatly depending on the crop and the agronomic techniques implemented by farmers.

The adoption of more sustainable agricultural practices may considerably limit the impacts of the agricultural phase although, in many cases, the benefit is not immediate: a typical example is crop rotation which, according to studies concerning durum wheat, can reduce the total value of the environmental impacts by up to one-third, is due to a more efficient and targeted use of fertilizers or organic farming, which guarantees benefits on soil fertility and ecosystem biodiversity over the years.<sup>8</sup> The seasons also affect the impacts on crops: raw materials grown out of season have greater environmental impacts caused by the use of heated greenhouses that consume energy. In addition, the yields may drop significantly, up to a half.

### The first transformation

Many agricultural products require an initial processing: the classic example is cereal grains, which must first be ground in a mill.

### Production

In the second part of the chain, the raw material is transported to the plant to be converted into the end product. The impacts derive from the production plant's consumption of energy and water, and vary according to the volume and type of product treated, and the efficiency of the plant. The consumption includes both the energy used by the production lines and that required for any refrigeration.

### Packaging

There are various different materials used to package food: the most common are paper and cardboard, plastic, and glass. The environmental impact is usually related both to the phase of the packing production itself (type of material and quantity) and the stage of final disposal, while the

actual packaging activity normally generates a limited effect.

### Distribution and sales

At this stage of the supply chain, the packaged product is transferred from the processing plant to the point of distribution and sale. The impacts depend on the type of means of transport used and the number of kilometers traveled. This stage may also affect the cold chain, i.e. the one which ensures a constant temperature of refrigerated and frozen products all the way from production to sale. Its impact depends on the storage temperature (4°C or -18°C), on the retention time, and on whether a home refrigerator or an industrial refrigeration cell is used.

The cold chain is only relevant when it concerns the freezing of products that are simple and have a low environmental impact, such as vegetables, and whose times of preservation at low temperatures are relatively long.

On the other hand, the impact of the cold chain becomes irrelevant for 'fresh' products, i.e. with very short storage times in the refrigerator, and for foods that have a high environmental impact, such as meat.

<sup>8</sup> The studies available on the impact of organic agriculture highlight the limit of the LCA methodology. The indicators commonly used to assess environmental impacts do not allow comprehensively quantifying the benefits of organic practices because the impact values, although lower, are distributed over productions typically with lower yields than organic farming. Instead, the benefit may be valued by using the indicators of agronomic practices, such as the measurement of soil fertility (especially if reckoned over a ten-year time span), the evaluation of the human and environmental toxicity, and the level of ecosystem biodiversity.

# ZERO KILOMETER FOOD



In recent years, the concept of zero kilometer food has become widespread and it is associated with the simple equation: a zero kilometer product = a low environmental impact product. In fact, the contribution of transport to the total impact is usually quite modest; it becomes relevant only for foods with a simple chain and very low production impacts, such as fruit and vegetables, if transported over long distances or with vehicles with high emissions, such as airplanes. For more complex foods such as meat or cheese, the environmental impact associated with their transport and distribution is almost irrelevant. In fact, although the use of a truck involves a high level of CO<sub>2</sub> emissions per kilometer, the amount of trans-

ported goods is high, and therefore the impact per kilogram of product is fairly limited.

In short, zero kilometer products do not necessarily always have a lower environmental impact. On the contrary, it may be even more sustainable to cultivate a food at a distance from the place of consumption, in areas which by their nature (for example, intrinsic moisture in the soil or average temperature) enable the least invasive agricultural practices, which generate lower environmental impacts.

As well as the environmental impacts, there are also the social and economic aspects to be taken into account: for example, the consumption of zero kilometer food creates economic benefits in the area and supports local agriculture.



## Preparation and cooking

It is not easy to quantify the environmental impact of cooking, because the techniques used for the preparation of food can vary a lot according to the recipes, habits, and tastes of the consumer. Not only that, another crucial factor is the place where the food is cooked, whether at home or in a professional kitchen. Cooking, especially if domestic, may be the phase with the greatest environmental impact (measured in equivalent CO<sub>2</sub> emissions) throughout the food life cycle and is conditioned mainly by the energy mix of the supplier (and therefore of the country where the person is located), and the type and duration of cooking.

## Disposal of packaging

The waste produced by packaging materials must also be considered, as well as properly calculating their impacts. The assessment of the disposal of packaging at the end of its life is particularly complex, since it is necessary to take into account both the amount and the type of material used, and the end user's behavior, as well as the disposal processes (recycling, energy recovery, or landfill).

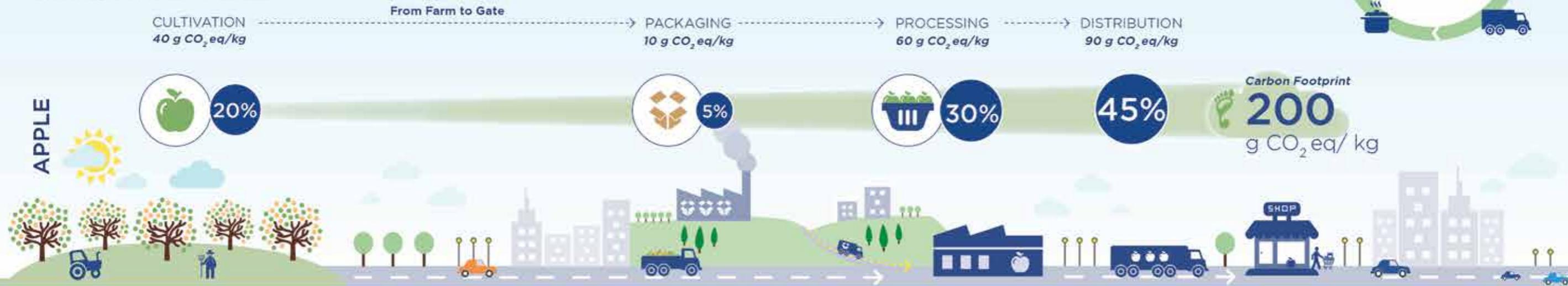
# THE FOOD CHAIN AND THE ENVIRONMENT

## The Life Cycle Assessment of apples, pasta and red meat

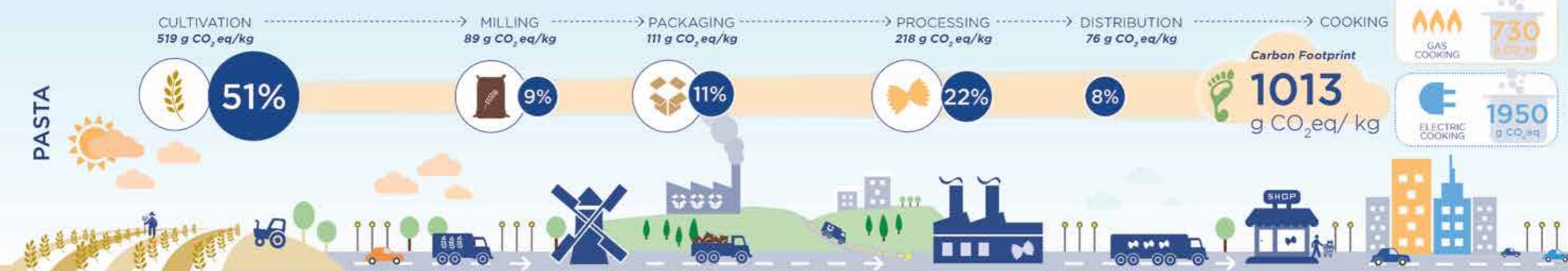
For these three foods the CO<sub>2</sub> emissions of the specified supply chain are shown both with an absolute value per kg of product and the percentage relative to the single stage of the life cycle. Where required, an estimate of the impact due to cooking is also given.



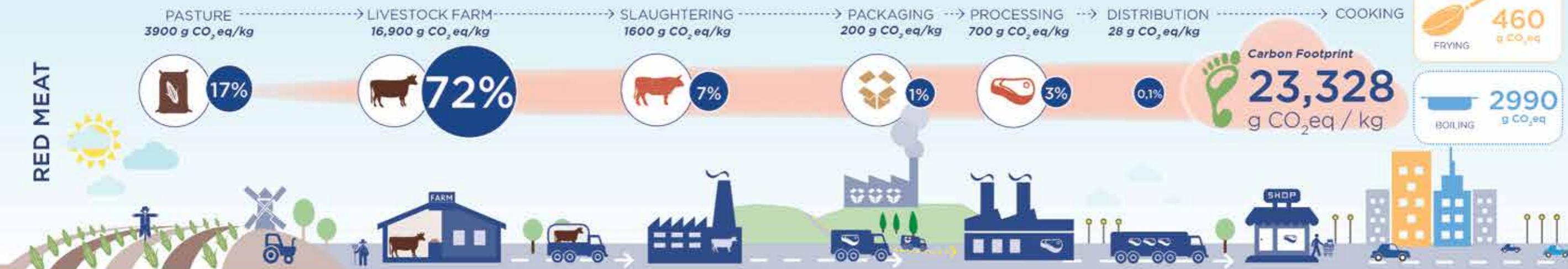
Source: EPD Appels S-P-00369, 2015



Source: EPD Pasta Barilla S-P-00217, 2014



Source: EPD Carne di Bovino Adulto COOP S-P-00495, 2015



# PEF: EUROPE CALCULATES THE ENVIRONMENTAL IMPACT OF PRODUCTS

In order to communicate the environmental performance of products, including foods, companies can use different schemes and certifications to obtain a trademark or an environmental label. The problem is that there are too many proposals today: on the European market alone, there are more than 130 sustainability labels for food products.

This means that companies need to know how to juggle the different calculation and communication methods, which are often very different even within the EU itself. And the consumers, who may not always understand the differences between the various labels and messages, find it difficult to make choices.

To overcome these problems, in 2008 the European Commission launched a project for the creation of a European method of calculating the environmental impact of products, based on their life cycle and a large number of environmental indicators. The initiative, which is part of a broader strategy aimed at creating a single European market for 'green products', has led to the development of two meth-

ods (published in 2012) applicable in all Member States. The first relates to the environmental footprints of products (Product Environmental Footprint – PEF); the other relates to the environmental footprint of organizations (Organization Environmental Footprint – OEF).

In 2013, a pilot phase was launched, involving some companies in the food sector and its main objectives are to:

- a) develop specific calculation rules for each product category;
- b) make the application of the method simple and accessible to all businesses;
- c) identify the mode of communication of results that is understandable and appropriate to different categories of users.

The ongoing pilot project will culminate with testing the tools for communicating the environmental footprint of both the product and the organization.

The complete list of the food categories involved in the pilot phase is available at the website: <http://ec.europa.eu/environment/eussd/smgp/>.

FOODS ANALYZED BY THEIR PEF		SOME ENVIRONMENTAL LABELS	
	BOTTLED WATER		
	BEER		
	COFFEE		
	BEEF, PORK, AND MUTTON		
	PET FOOD		
	FEED FOR LIVESTOCK		
	OLIVE OIL		
	PASTA		
	FISH AND SEAFOOD PRODUCTS		
	DAIRY PRODUCTS		
	WINE		



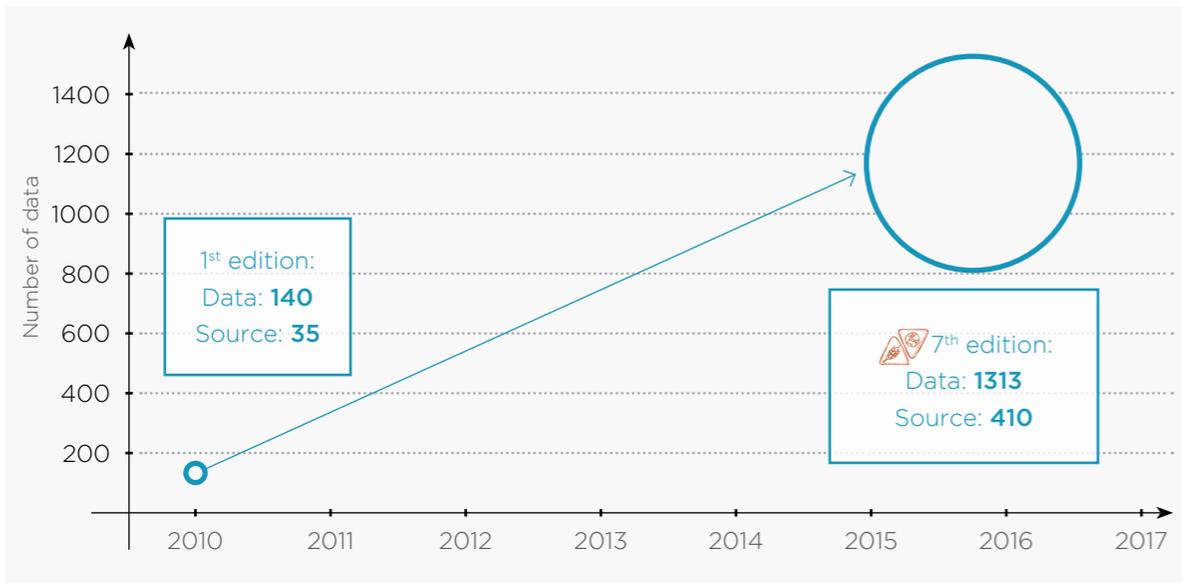


# A DIET THAT RESPECTS THE PLANET

Since the first edition in 2010, the environmental impacts of food have been quantified through three environmental indicators (Carbon Footprint, Water Footprint, and Ecological Footprint), made available by open-access databases and many scientific publications. BCFN wanted to pursue an objective of maximum transparency, by using public studies which allow anyone to reconstruct the data source. The data used in the various editions has been collected by the BCFN Foundation in a database in which the values of the three environmental indicators per kg (or liter) of food were calculated as the arithmetic average of the search results. The data refers to studies based on the method of analysis of the food life cycle (LCA) and therefore allowed us to quantify the overall impacts of individual foods.<sup>1</sup> The number of scientific data on which the Double Pyramid model is based has increased over the

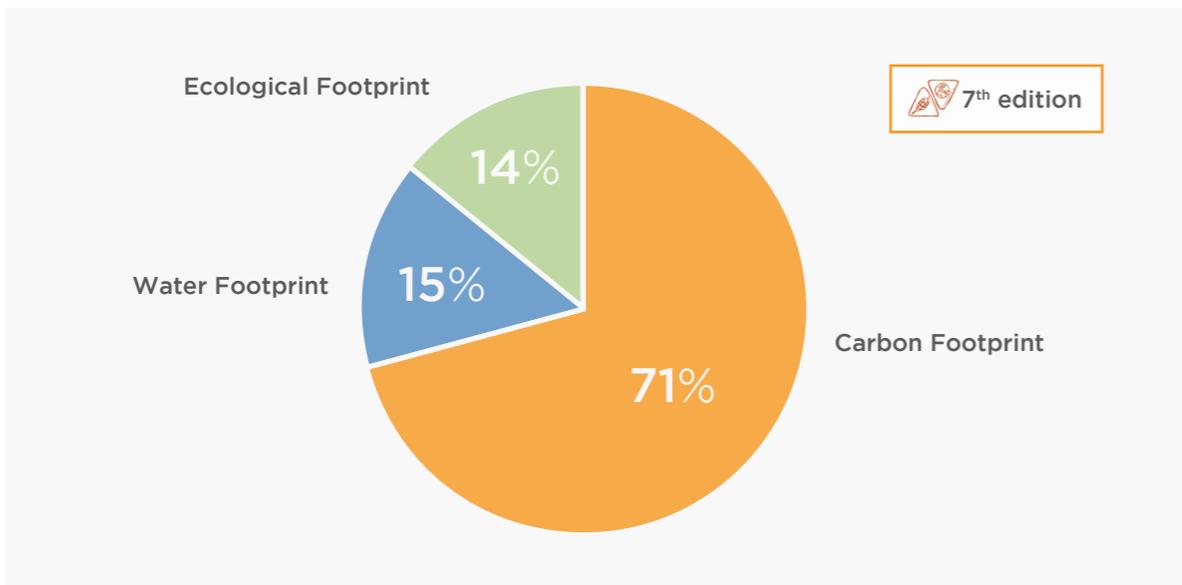
years: from 140 in the first edition in 2010, there are now more than 1,300 data in this seventh publication. Therefore the reliability of the assumptions made in the first edition of the Double Pyramid has been strengthened, further confirming its scientific validity.

It is important to note that the percentage distribution of the studies is different for each of the three environmental indicators. Most of the bibliographical sources used are related to the Carbon Footprint, followed by the Water Footprint, and the Ecological Footprint. This is due to the fact that the Carbon Footprint is the indicator historically used the most by scholars and, above all, it is the one for which there are more established standards, widespread at the scientific level, for calculating it; moreover, there are more and more communication initiatives on the issue of greenhouse gas emissions.



Data: individual values of impact  
Source: Bibliographic material with the data

Increase in pieces of data used for calculating the average of the environmental impacts of food since the first edition of the Double Pyramid. The size of the sphere indicates the number of sources, the height indicates the number of the pieces of data.



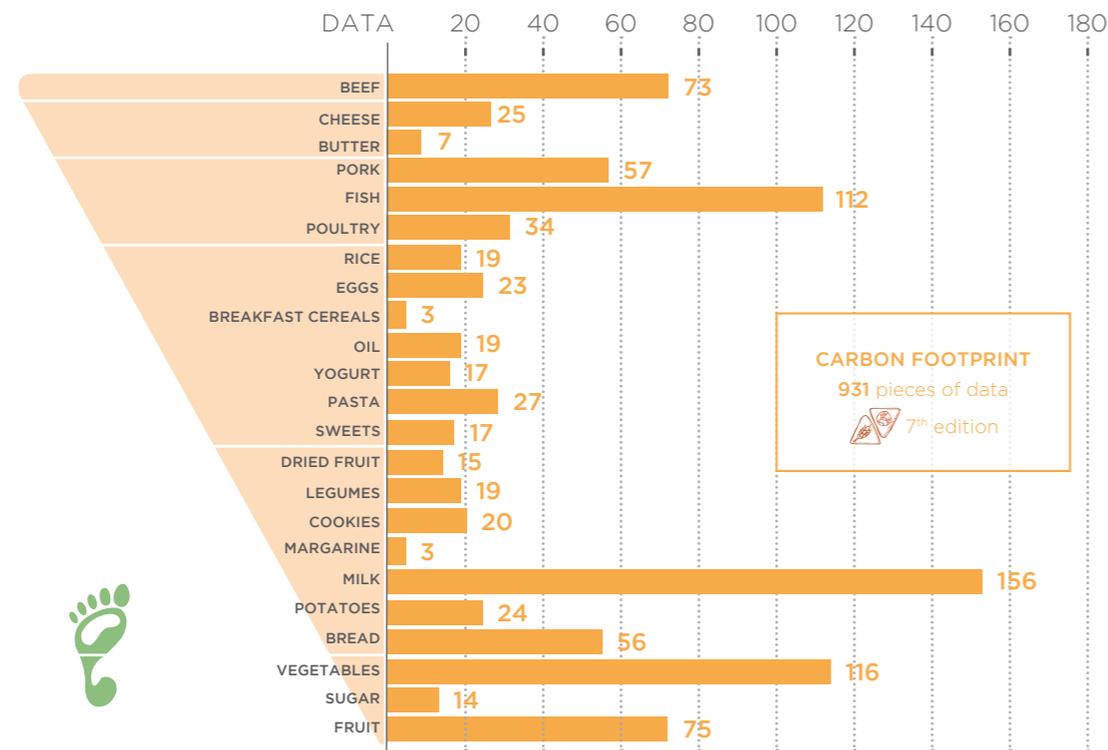
Distribution of bibliographical sources regarding environmental impacts on the total data.

<sup>1</sup> This work does not claim to provide absolute valid values or to substitute more rigorous scientific publications; however, the resulting statistical coverage (1,310 pieces of data from more than 410 sources) and the aggregation method used always result in increasingly reliable values.

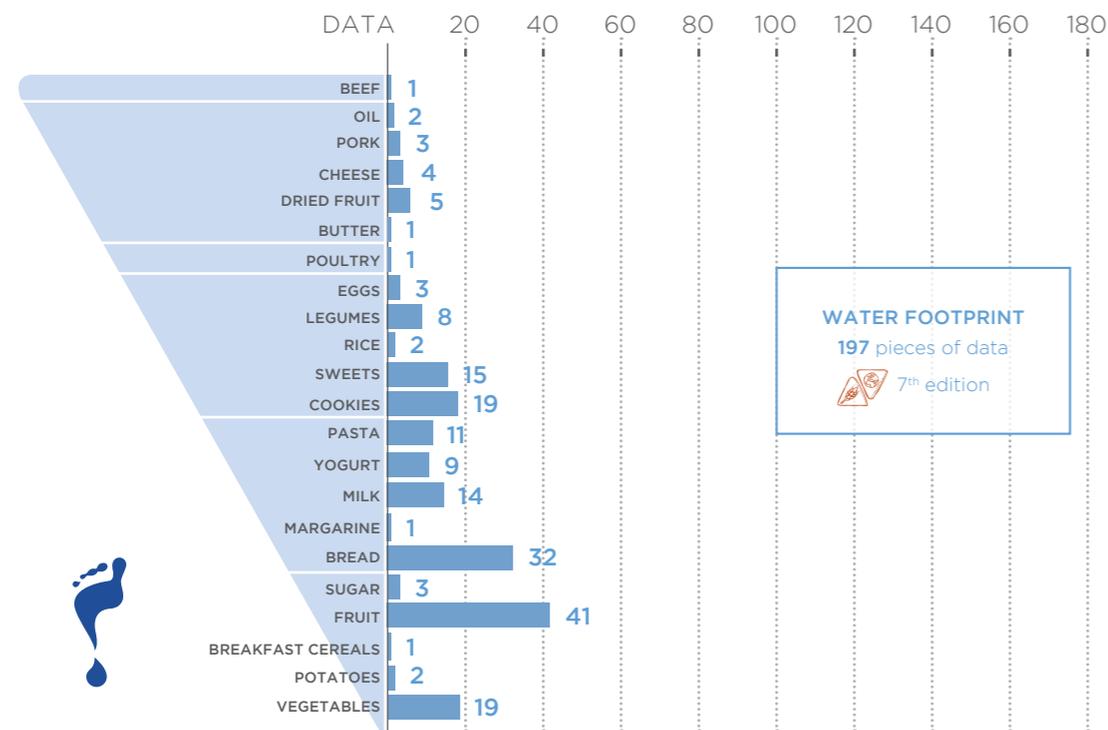
Further information is available in a supporting document that explains in detail how the BCFN database of the Double Pyramid is structured. The database and its document can be downloaded from the BCFN website: [www.barillacfn.com](http://www.barillacfn.com).



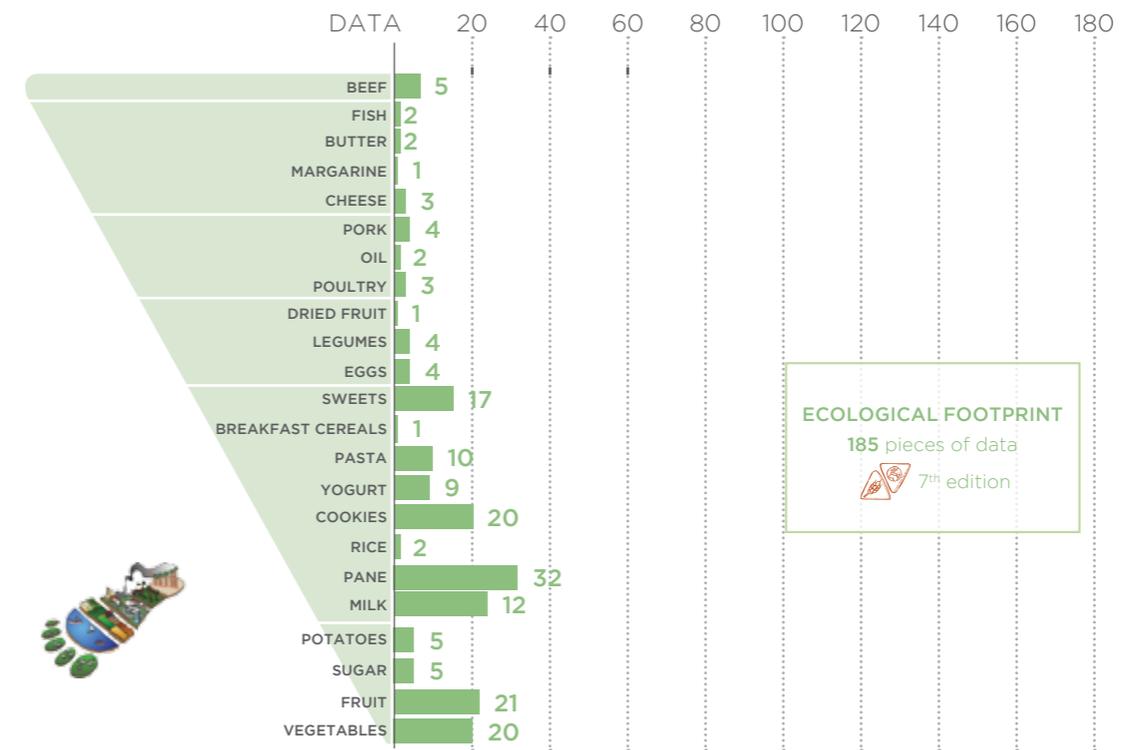
In the figures below, the percentage distribution of the scientific data related to each of the major food categories that make up the environmental pyramids is shown for each of the three environmental indicators.



Number of pieces of data related to the Carbon Footprint.



Number of pieces of data related to the Water Footprint.



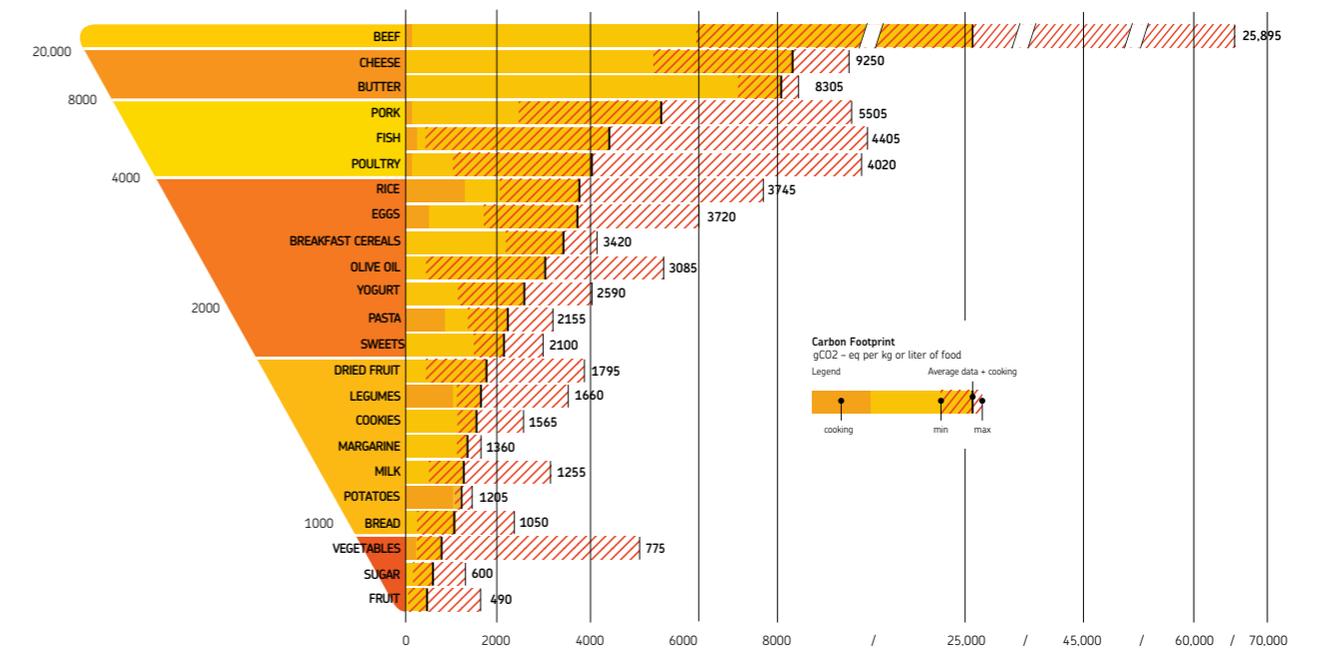
Number of pieces of data related to the Ecological Footprint.



The sources and data are accessible in the Database of Double Pyramid downloadable from the website [www.barillacfn.com](http://www.barillacfn.com)



# CARBON FOOTPRINT



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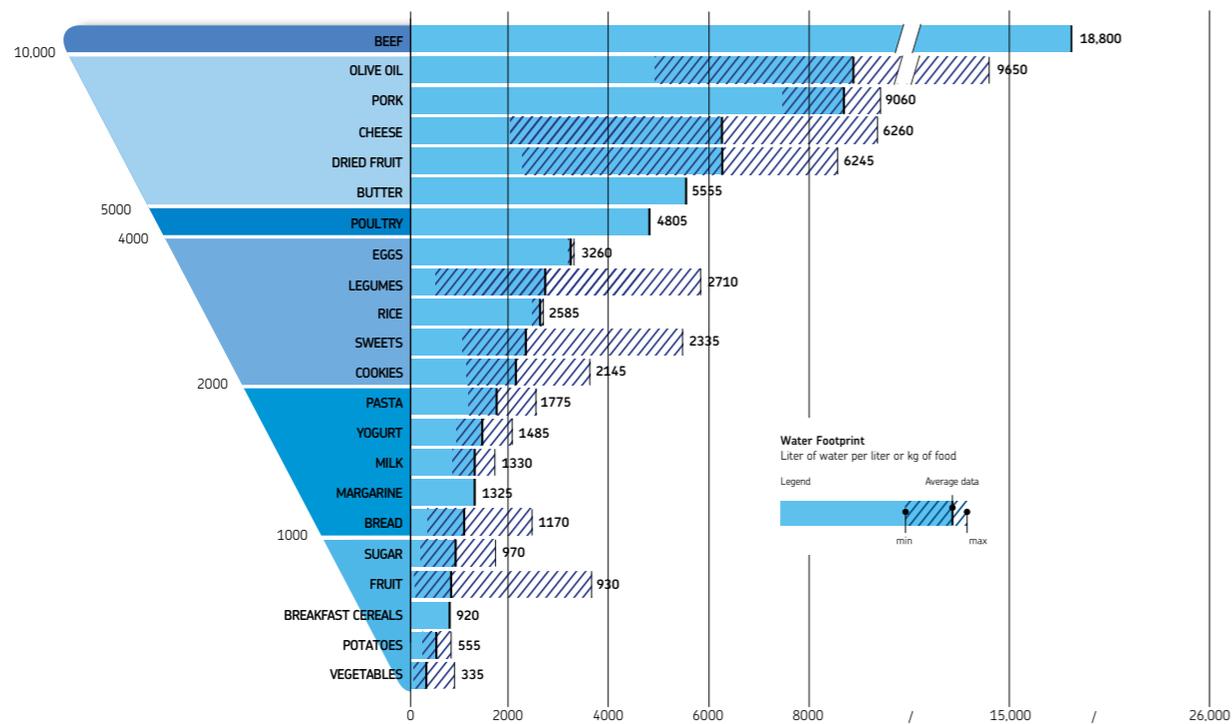
## THE THREE ENVIRONMENTAL PYRAMIDS

The environmental impacts of food were presented in three different pyramids, one for each environmental indicator. But only the one relating to the ecological footprint was used for the construction of the BCFN Double Pyramid. It is important to emphasize that the three environ-

mental pyramids shown below are still very similar to those in the first edition: the more extensive statistical coverage has changed the numerical values only marginally. Therefore, the considerations made since the first edition still hold true even for the seventh edition: meat and cheese are the foods that are characterized by the highest impact per kilogram, and fruit and vegetables are the foods with the lowest environmental impact values.

The Carbon Footprint measures the greenhouse gas emissions during the entire life cycle of a food and is calculated in grams of CO<sub>2</sub> equivalent (gCO<sub>2</sub> eq) per kilogram or liter of food. For each group of foods, the reported value is the average of the various sources used, while the hatched lines mark the distance between the minimum and maximum values. When a food is normally cooked, the impact of the cooking was added. The average score determines the order of foods from the top (high impact) to the bottom (low impact).

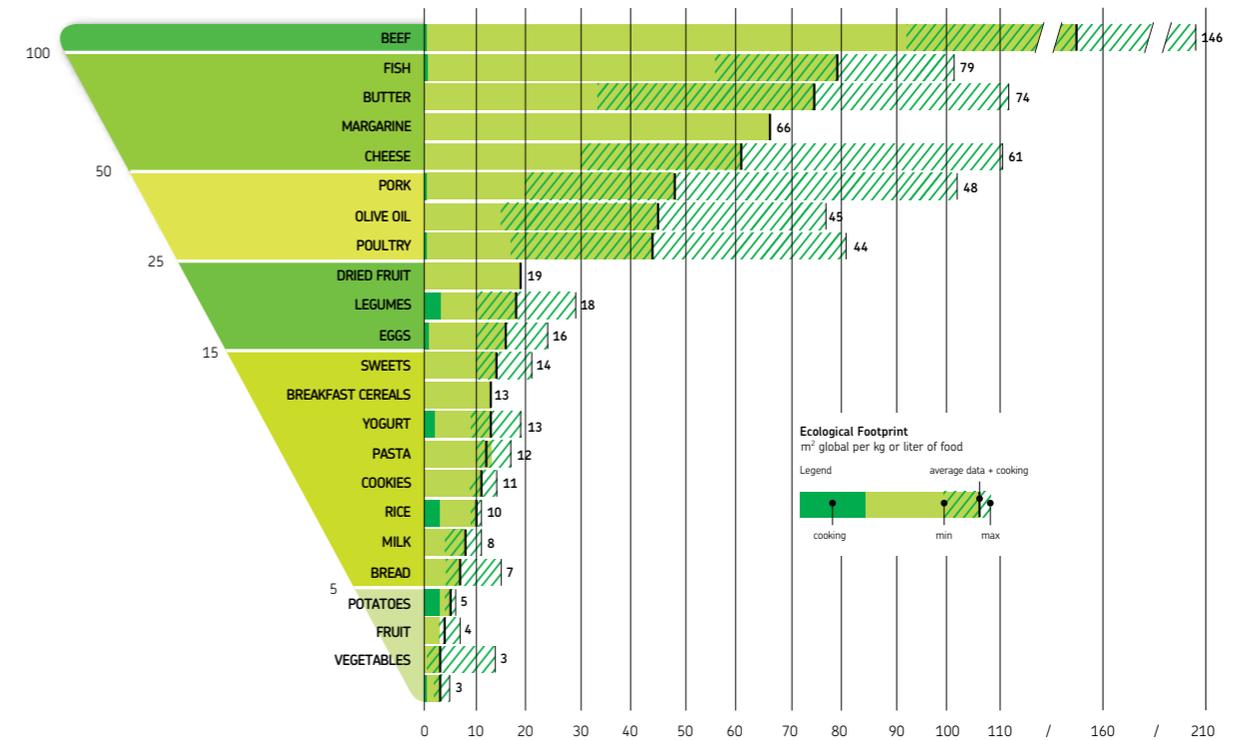
# WATER FOOTPRINT



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The Water Footprint quantifies the consumption and mode of use of water resources, and is measured in liters of water per kilogram or liter of food. For each group of foods, the reported value is the average of the various sources used, while the hatched lines mark the distance between the minimum and maximum values. When a food is normally cooked, the impact of the cooking was added. The average score determines the order of foods from the top (high impact) to the bottom (low impact).

# ECOLOGICAL FOOTPRINT



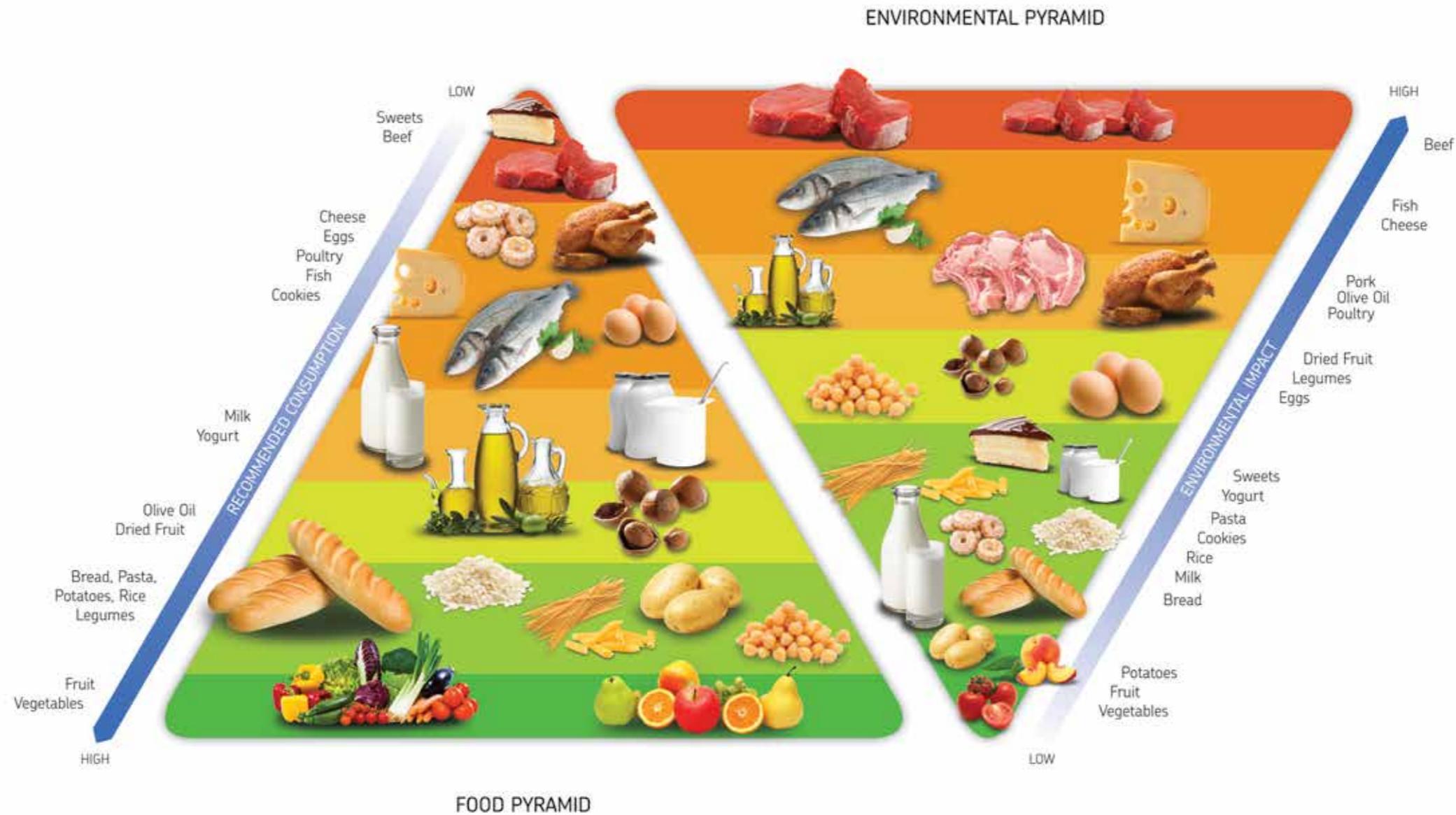
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The Ecological Footprint calculates the Earth's capacity to regenerate resources and absorb emissions, and is measured in global square meters per kilogram or liter of food. For each group of foods, the reported value is the average of the various sources used, while the hatched lines mark the distance between the minimum and maximum values. When food is normally cooked, the impact of the cooking was added. The average score determines the order of foods from the top (high impact) to the bottom (low impact).

# THE DOUBLE PYRAMID

The Double Pyramid, presented here in its seventh edition, has become a useful tool for the communication of sustainable diets which reminds us of the importance of our food choices in terms of health and the environment. When the traditional food pyramid, made by distributing foods according to the principles of a

Mediterranean diet, is placed alongside an environmental pyramid, which assesses the carbon footprint of each food, this shows that the foods recommended by nutritionists for greater consumption are also the foods with a lower environmental impact.

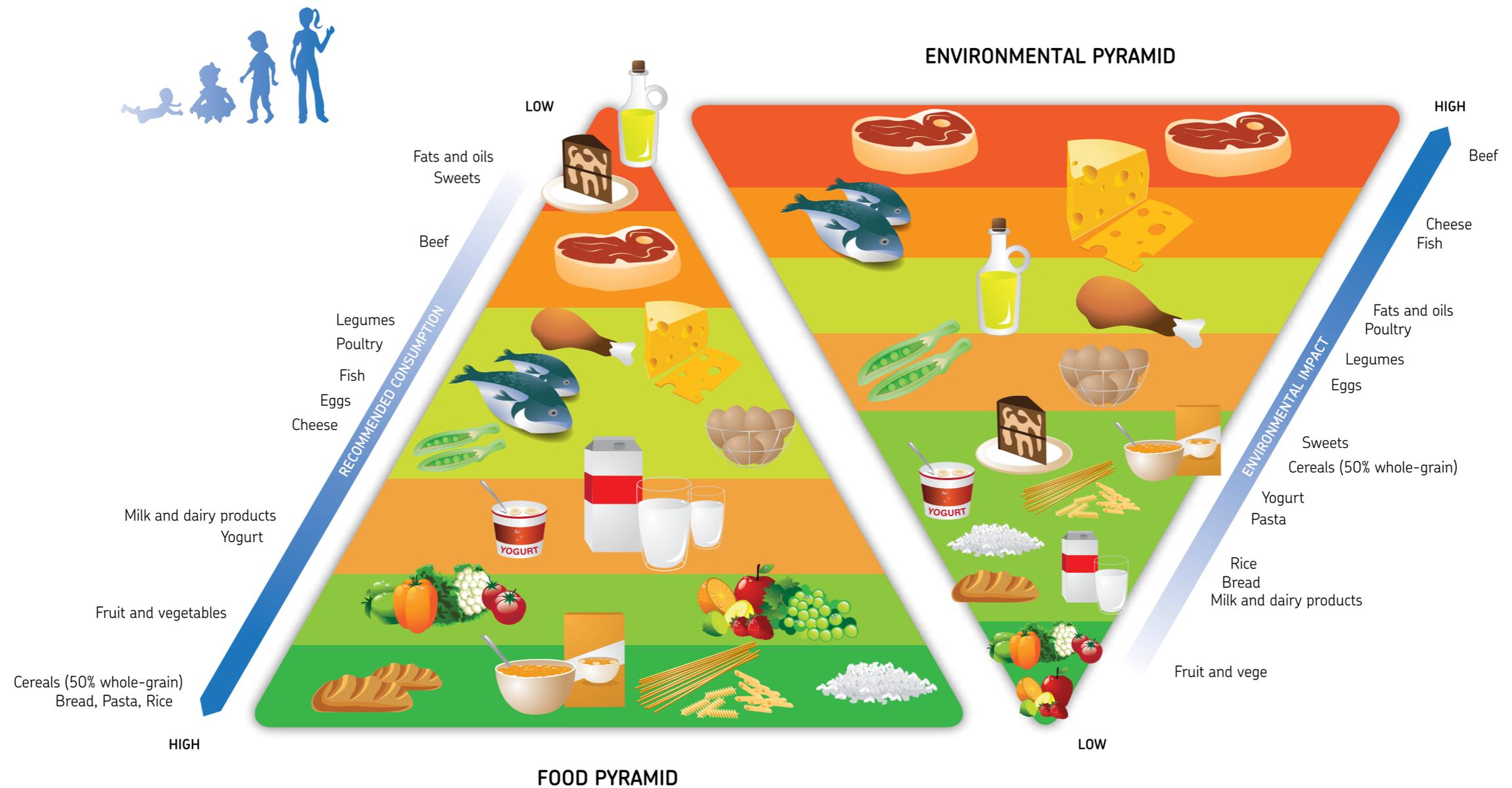


SOURCE: BCFN, RECOMMENDATIONS FOR A SUSTAINABLE DIET, 2016

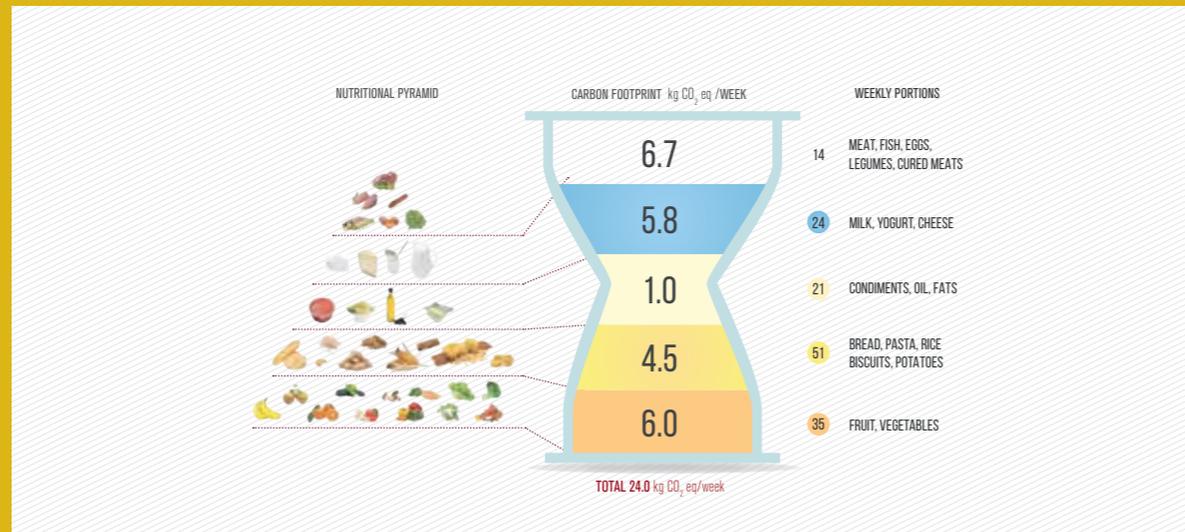
# THE DOUBLE PYRAMID FOR THOSE WHO ARE GROWING

Although it is a well-known fact that a close relationship exists between poor nutrition, excessive body weight, and the incidence of chronic diseases in adults, we cannot say the same with regard to children and adolescents: a great investment must be made in order to spread the awareness that incorrect eating habits and lifestyles adopted during the period of growth can result in a significant increase in the risk of disease later in life, from cardiovascular diseases to diabetes and several types of cancer.

For this reason, the BCFN also proposed a Double Pyramid for those 'who are growing'. A varied and balanced diet is even more important during growth. In this delicate phase, the hierarchy of the foods in the food pyramid undergoes minor changes to ensure proper growth. Compared to the model aimed at adults, the analysis of foods from the point of view of the environment and their nutritional value is stable, but the distribution of the portions varies and has been adapted to the needs of children and adolescents.



# THE ENVIRONMENTAL HOURGLASS MODEL



In November 2013, COOP Italia published a report on the sustainability of beef marketed under its own brand. It also presented the Environmental Hourglass, a model that represents the environmental impact (Carbon Footprint) of a one-week Mediterranean diet according to the National Research Institute for Food and Nutrition guidelines (formerly INRAN, now CRA-NUT). The Hourglass model is obtained by multiplying the environmental impacts of foods for the weekly amount suggested by the Italian national guidelines for a healthy and balanced diet. This diet model recommends limiting the consumption of red meat to just two portions of 70 grams (= 140 grams) a week and calls for a more frequent consumption of fish, with 3 portions of 100 grams per week, along with legumes, with 3 portions of 30 grams (90 grams per week), currently infrequently found on Italian din-

ner tables, and 52 servings of bread, biscuits, pasta, rice, and potatoes. The Hourglass model suggests that the balanced consumption of food is also balanced from the environmental point of view. Both the Hourglass and the Double Pyramid valorize the Mediterranean diet as a way of eating that is sustainable for the environment, but whereas the BCFN model provides the environmental impacts of food per kilogram which, if multiplied by the quantities consumed, allows assessing the environmental impact of what is consumed. The Environmental Hourglass is based on the assumption that the CRA-NUT directions were followed. A valid formulation is when the suggested amount (specifically, no more than 140 grams of meat a week) is respected, which unfortunately, does not always happen, with the consequent risk of underestimating the impacts.





# THE CLIMATE ON OUR DINNER PLATES: MUSINGS IN THE LIGHT OF THE COP21

Today we know what the causes of global warming are. And we also know that it is time to act quickly to prevent the situation from deteriorating even further. Agriculture and food account for a very substantial share of climate-altering emissions: reducing them is the responsibility of all the actors in the supply chain, from farm to fork. From the households, called upon to have balanced diets, to the farmers, who can combine ancient traditions and technological innovation in order to reduce the impact of farming; from the manufacturers, who have to invest to develop a truly sustainable food offer, to the institutions and policy makers, now aware that the protection of natural resources and environmental protection are at the top of their priorities.

## CLIMATE NEGOTIATIONS SINCE 1992

Climate change is one of the greatest problems that

humanity has ever faced: rising temperatures, melting ice, the increased frequency of extreme weather events (such as hurricanes, floods, droughts, and heat waves) are some of the signs that the climate of our planet is changing faster than ever recorded before. Scientists agree that, at the origin of these changes, are the greenhouse gas emissions produced by human activity, the constant increase of which is causing a rise in the global temperature. According to the Intergovernmental Panel on Climate Change (IPCC),<sup>1</sup> the effects on our ecosystem will be irreversible unless there is a global commitment to implement concrete measures of lowering the temperature. The temperature could increase to a level between 3.2 and 5.4°C by 2100 whereas, to avoid disaster scenarios (such as the melting of ice, rising water levels, the extinction of many plant and animal species, etc.), the increase in average temperatures has to be kept to a maximum of 2°C.



# THE EVOLUTION OF THE INTERNATIONAL AGREEMENTS ON CLIMATE CHANGE

## COP21: THE COMMITMENT TO REDUCE GREENHOUSE GASES

In order to achieve the Paris Climate Agreement, signed in December 2015, it was necessary for diplomats to carry out demanding preparatory work beforehand. In fact, the UNFCCC asked the individual participating States to present a proposal for a national climate plan, called the INDC (Intended Nationally Determined Contribution), to reduce their greenhouse gas emissions. There were 162 INDC plans, representing 189 countries, covering almost 99% of global greenhouse gas emissions,<sup>2</sup> and the reductions that have been achieved.

Several countries have proposed an ambitious long-term reduction of greenhouse gas emissions. For example Europe will strive to reduce them by 40% below the 1990 levels by 2030; the United States by 17% by 2020 and 26-28% by 2025 (compared to 2005); Canada plans a reduction of 30% by 2030 (compared to 2005), and Australia is committed to a 26-28% reduction by 2030 (compared to 2005). Russia has a goal of 70-75% by 2030 (compared to 1990).

Other countries have set targets that will have indirect positive impacts on emissions, such as China, whose INDC includes the commitment to a 20% increase in the use of energy from zero-emission sources by 2030. Argentina has also proposed a use of renewable energy equal to 8% by 2017, and 20% by 2020.

The COP21 agreement was signed in New York on April 22, 2016, International Earth Day, by 174 countries and the European Union; the same day 15 countries also ratified.<sup>3</sup> To enter into force, it must be ratified by at least 55 countries, which are responsible for 55% of greenhouse gas emissions. Then, after 30 days it will be considered in force and every five years the objectives will be reviewed and modified according to the evolution of the global scenario.

<sup>1</sup> WMO, UNEP, 2007.

<sup>2</sup> World Resource Institute, Climate Data Explorer, 2016.

<sup>3</sup> To monitor the number of countries that have signed the agreement, see [unfccc.int/paris-agreement/items/9485.php](http://unfccc.int/paris-agreement/items/9485.php).

**1** In 1992 the UNFCCC (United Nations Framework Convention on Climate Change) was signed. Since then, the signatory nations meet annually at the Conference of the Parties (COP) in order to deal with climate change and to propose solutions.

**2** In 1997 the Kyoto Protocol (COP3) was drafted, which requires the developed countries (37 including the EU, Japan, Russia) to reduce greenhouse gas emissions by an average of 5.2% by 2012,<sup>4</sup> as compared to the levels in 1990. Almost 60% of the countries involved (including France, Great Britain, and Germany) have met or exceeded the target. Italy has recorded a reduction of 4.6%.<sup>5</sup>

**3** The COP13 (Bali, 2007), the COP15 (Copenhagen, 2009), the COP16 (Cancún, 2010), the COP17 (Durban, 2011), and the COP20 (Lima, 2014) were the first important steps towards a

shared agreement on greenhouse gas emissions management, without any concrete actions being foreseen.

**4** The COP21, held in Paris from November 30 to December 11, 2015, became the first conference to establish a concrete, long-term plan to reduce greenhouse gas emissions that involved not only the most advanced countries, but also the developing countries. For the first time in 20 years of negotiations in the United Nations, a legally binding, universal agreement on the climate was signed, with the ambitious goal of keeping global warming below 2°C and, in the longer term, to be low 1.5°C.

<sup>4</sup> UNFCCC, 2011.

<sup>5</sup> ISPRA, 2014.



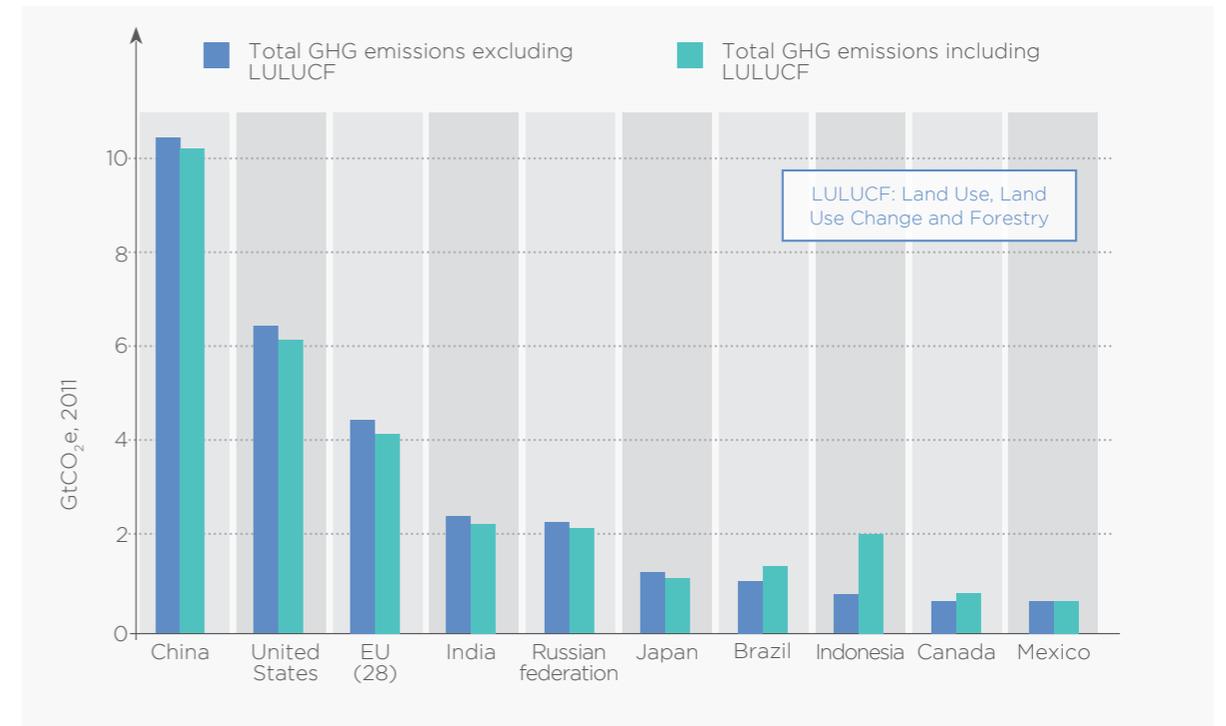
# OPINIONS ON THE COP21



According to research carried out by the UNFCC<sup>6</sup> on a sample of 10,000 people belonging to 79 developed and developing countries, 78% of respondents want their country to implement policies to reduce greenhouse gas emissions, and 70% are not satisfied with the results of the climate agreements prior to the COP21. And there is more: nearly 90% are in favor

of a carbon tax (tax on energy sources that emit carbon dioxide into the atmosphere), 56% are in favor of the use of renewable energy, and 46% are in favor of the development of environmentally friendly technologies.

<sup>6</sup> UNFCC, 2015.



The ten largest emitters of CO<sub>2</sub> (World Resources Institute WRI, 2014).

## CLIMATE AND FOOD: MUSINGS IN THE LIGHT OF THE INTERNATIONAL COMMITMENTS OF THE COP21

With a total of 76%, production of energy, industry, and transport are the biggest emitters of greenhouse emissions. But agriculture, which was included in AFOLU (Agriculture, Forestry, and Other Land Use, i.e. in the agricultural and forestry sector), also plays a crucial role and is responsible for about a quarter of the total emissions. In Europe,<sup>7</sup> food production is actually the human activity that contributes the most to climate change (31%), surpassing the heating of buildings (23.6%) and means of transport (18.5%).

Reforestation, sustainable forest management, and reduced deforestation are essential for mitigating emissions from the forestry sector, whereas in agriculture, what counts above all are the management of cropland and pastures, and the restoration of soil fertility.

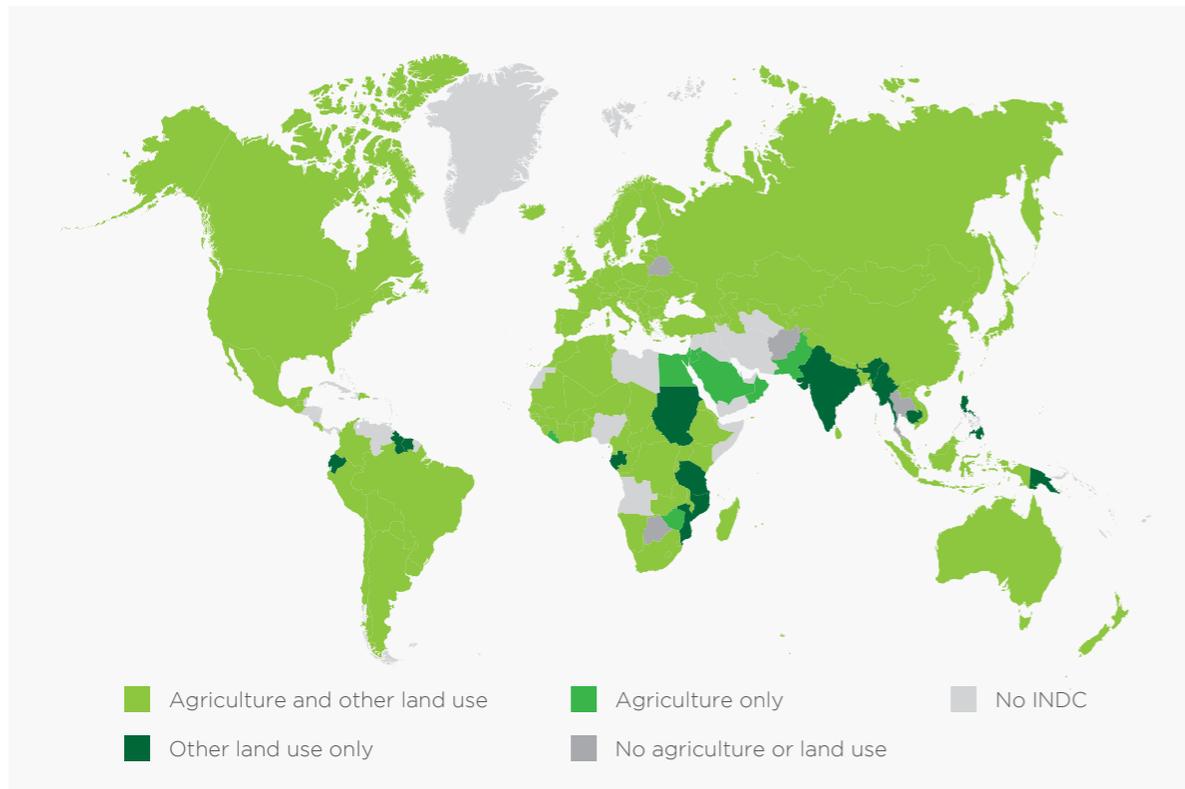
The COP21 underlined just how vulnerable the food production systems are and how affected they are by the negative effects of climate change,<sup>8</sup> which

in turn is a major cause of undernourishment and malnutrition in developing countries. Therefore it is crucial that resilient agricultural systems are adopted, which can also give the least developed countries access to an adequate supply of food.

To comply with the limits imposed by the COP21, substantial action on mitigation (technological change and policies to reduce greenhouse gas emissions) and adaptation (anticipatory and reactive initiatives to reduce the vulnerability of climate change effects) in the agricultural sector will be necessary. There are 103 countries that have included the issue of agriculture in their INDC, developing medium and long term strategies to improve the sustainability and efficiency in the agri-food sector (see details in the table 1 in the following page). An example of these measures is the methodology developed by the IRRI – Rice Science for a Better World – to produce rice in Asia: a 30% decrease in water usage and 48% decrease in methane emissions, with no impact on the yields.

<sup>7</sup> Tukker, 2006.

<sup>8</sup> UN, 2016.



The agricultural sector in the INDC of only mitigation targets (CAAFS – Research Program on Climate Change, Agriculture and Food Security, 2015).

Main adaption measures	n° of countries	Mitigation measures	n° of countries
Livestock management	54	Livestock	54
Crop management	51	Croplands	51
Fisheries and aquaculture management	48	Grasslands	48
Irrigation management	46	Rice	48
Water management	45	Manure management	46
Knowledge transfer (e.g extension)	35	Agricultural residue management	41
Agricultural diversification	32	Fertilizer	17
Soil and land management	31	Agroforestry	15
Climate-smart agriculture	29	Climate-smart agriculture	11
Early warning systems (e.g. seasonal forecasts)	28	Agricultural intensification	6
Agroforestry	22	<b>Total parties including agricultural mitigation</b>	<b>103</b>
Agro-ecology	20	<b>Total parties including at least one measure</b>	<b>84</b>
Indigenous knowledge	19		
Financial mechanisms (e.g. crop insurance)	18		
<b>Total parties including agricultural adaption</b>	<b>102</b>		
<b>Total parties including at least one measure in agriculture</b>	<b>94</b>		

Table 1. The number of Parties whose national policies include mitigation and adaptation measures that impact the agricultural sector (CAAFS, 2015).



A careful examination of the individual national INDC plans prepared in Paris<sup>9</sup> reveals different approaches. The most advanced agricultural economies – such as the United States,<sup>10</sup> Australia and Canada – do not explicitly mention interventions to reduce greenhouse gas emissions in the agricultural sector, but they do state that the sector will be considered. Instead, in the developing countries, where agriculture has the greatest impact in terms of greenhouse gas emissions, most of them propose specific action plans. For example, in Ethiopia, where the agricultural sector (inserted in the AFOLU) accounts for 85% of total emissions, very ambitious plans have been prepared: a total reduction of 64% of greenhouse gas emissions by 2030, with 86% of inventions regarding precisely the agricultural sector.<sup>11</sup> Even India, which employs over half of its labor force in agriculture and which is the second country in the world in terms of greenhouse gas emissions from this sector, has included different mitigation and adaptation projects in its INDC plans that will affect the AFOLU, such as the development of new technologies with a lower impact on the climate, more sustainable cultivation practices, or reforestation.<sup>12</sup>

The country mainly responsible for greenhouse gas

emissions globally is China, which has set different goals and actions for 2020 and 2030, including the promotion of *low carbon agriculture*, to maintain the same degree of utilization of fertilizers and pesticides until 2020 and prevent their increase, and the development of agriculture which allows the reuse of discarded materials from the agricultural sector.<sup>13</sup> In its INDC plan, the European Union set a target to reduce greenhouse gas emissions by the Member States by 40% (compared with 1990) by 2030, and by 80% by 2050.

All the aspects relating to the agricultural sector and the plans of each country were analyzed by the UFCC-SBSTA (Subsidiary Body for Scientific and Technological Advice),<sup>14</sup> which will present a separate study in November 2016 to be used as the basis for a concrete program of intervention in the agricultural sector.

<sup>9</sup> Brookings, 2015.

<sup>10</sup> UNFCC, 2015. US INDC. The target set by the United States is to reduce greenhouse gas emissions by 26%-28% by 2025, compared to 2005.

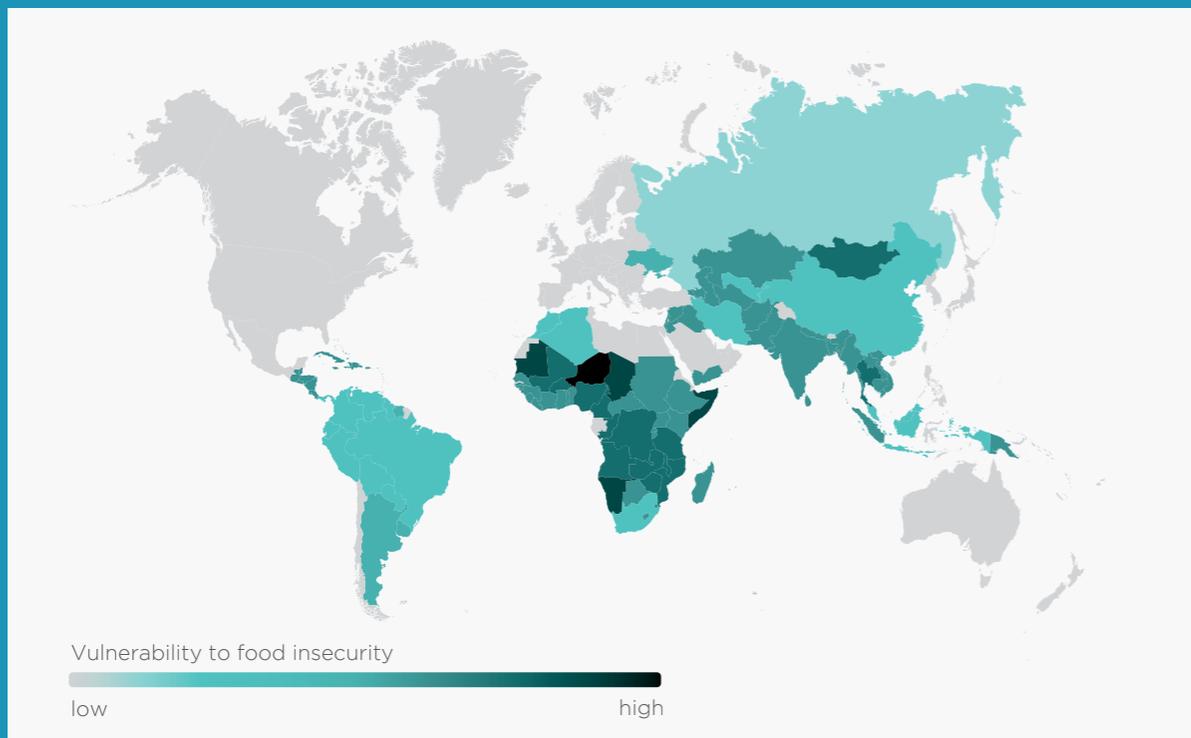
<sup>11</sup> UNFCC, 2015. Ethiopian INDC.

<sup>12</sup> UNFCC, 2015. Indian INDC.

<sup>13</sup> UNFCC, 2015. Chinese INDC.

<sup>14</sup> Technical-scientific body of the UNFCC.

# ACCESS TO FOOD AND VULNERABILITY TO CLIMATE CHANGE



An interactive online map (launched during the COP21 conference and produced by the UN World Food Program and the Met Office Hadley Center<sup>15</sup>), allows visualizing some possible global scenarios between now and 2080. In particular, it relates the levels of greenhouse gas emissions (high, medium, low); the degree of adaptation, understood as the level of interventions implemented in agriculture (high, low, nil); and vulnerability to climate change and vulnerability to

food insecurity of the planet. The map clearly shows that intense efforts are needed for adaptation and mitigation in order to avoid climate change endangering the survival of millions of people. For more information: [www.metoffice.gov.uk/food-insecurity-index/](http://www.metoffice.gov.uk/food-insecurity-index/).

<sup>15</sup> MetOffice, WFP (World Food Program), 2015.

## SUSTAINABLE DIETS AND CLIMATE CHANGE

Reducing emissions of agricultural production alone will not be enough. We must also change people's eating habits, by trying to reduce the consumption of products throughout their life cycle – from their cultivation to preparation and subsequent disposal – that have major impacts on the environment.<sup>16</sup> In fact, the more complex the supply chain is, the more the raw materials must be processed before reaching the consumer, thus increasing their impact.

The Intergovernmental Panel on Climate Change (IPCC) pointed out that families' behavior plays a

key role in reducing greenhouse gas emissions.<sup>17</sup> As advised by the World Health Organization, if by 2050 the global population were to adjust their food consumption to a diet based on a calorie intake of 2,100 calories a day (of which only 160 are from the consumption of meat), it would be possible to save around 15 gigatonnes of CO<sub>2</sub> equivalent, a third of the global emissions of greenhouse gases in 2011.<sup>19</sup>

<sup>16</sup> European Commission, 2012.

<sup>17</sup> IPCC, 2014, chapter 11: Agriculture, Forestry and Other Land Use (AFOLU).

<sup>18</sup> UNHCR, UNICEF, WFP, WHO, 2011.

<sup>19</sup> WHO.

# WHAT ARE SUSTAINABLE DIETS?



The focus on sustainable diets (a term coined in the early Eighties to indicate those eating patterns that can make the environment and people healthier) has grown in recent years. In November 2010, FAO, together with Biodiversity International, organized the scientific symposium “Biodiversity and Sustainable Diets: United against Hunger”, which reformulated the definition of a sustainable diet in relation to access to food and biodiversity. “Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security, as well as to a healthy life for present and future generations. They contribute to the protection and respect of biodiversity and ecosystems, are culturally acceptable, economically fair and affordable, adequate, safe and healthy nutritionally, and simultaneously optimize natural and human resources.” Therefore, it acknowledges the interdependence between the production and consumption of food, and dietary and nutritional recommendations needs, but at the same time, reiterates that the health of human beings cannot be detached from that of the ecosystems. In order to meet the food and nutritional needs of a world that is richer, more urbanized, and with a growing population, it is also necessary for the food systems to undergo radical changes towards greater resource efficiency and a more equitable food consumption. According to FAO,

sustainable diets contribute to reducing the use of water and minimizing CO<sub>2</sub> emissions, defend food biodiversity, and help defending food biodiversity and promote traditional and local foods. Among the examples of sustainable diets, FAO mentions the Mediterranean diet in particular, the merits of which go beyond just nutritional aspects. It is actually a dietary model that fosters social interaction through the sharing of meals (both at home and during traditional festivals)<sup>20</sup> and – as some scholars at the Mediterranean Agronomic Institute in Montpellier and the Institute in Bari claim<sup>21</sup> – it promotes biodiversity, thanks to the numerous food preparation techniques, its strong cultural heritage, its respect for traditions, and seasonality; the Mediterranean diet also involves a low environmental impact thanks to the limited consumption of animal products. Finally, it incorporates a relatively new concept: bio-cultural diversity, which comes from the many ways in which humans have interacted with their natural environment.<sup>22</sup> Their coevolution has generated a local ecological knowledge: an essential reservoir of experiences, methods, and skills that help local communities manage their resources.

<sup>20</sup> Petrillo in FAO, 2010.

<sup>21</sup> Padilla *et al.*, in FAO, 2010.

<sup>22</sup> *ibidem*.



## Are we willing to change our eating habits in favor of the environment?

In terms of eating habits, it should be noted that, in the face of global population growth, the demand for meat is expected to increase by up to 70% by 2050.<sup>23</sup> This consumption is high in developed countries and increasing in many developing countries, especially in Asia and South America.<sup>24</sup> Considering that reducing the consumption of meat and adopting a sustainable diet can decrease greenhouse gas emissions generated by the food industry by about a quarter,<sup>25</sup> in the near future, the challenge will be to contain the consumption of animal products. This is especially important for developing countries where these foods are considered an aspirational food,<sup>26</sup> that is to say, a symbol of economic well-being. On the other hand, there has been a reduction in meat consumption in some developed countries,<sup>27</sup> such as the United States, where people are increasingly aware of the impact that meat consumption has on their health and the environment; or in France, where a positive relationship between the level of education of the household head and a lower consumption of meat has been shown.<sup>28</sup> However, despite these and other encouraging signs, the road to the adoption of sustainable diets in developed countries is still long: in the United States and the United Kingdom meat consumption per capita, respectively, is triple and double the worldwide average.<sup>29</sup>

However, a recent study pointed out a certain moral

disengagement of individuals on the topic: despite awareness of their responsibility towards personal health, the surrounding environment, and animal welfare, they seem to lack a genuine intention to change their eating habits.<sup>30</sup> As Macdiarmid has shown,<sup>31</sup> meat is still associated with cultural and social values, and there is still little awareness of the link between diet and climate change.<sup>32</sup> A survey carried out among university students in the United States showed that less than 10% of respondents associated meat with the issue of climate change.<sup>33</sup> In Australia, too, only 22% of the people believe that eating less meat can reduce environmental impacts, compared to 90% who see the reduction of food packaging as the road to sustainability.<sup>34</sup>

<sup>23</sup> FAO, 2012.

<sup>24</sup> Allievi *et al.*, 2015

<sup>25</sup> Macdiarmid *et al.*, 2012; Chun Yip *et al.*, 2013; Soret *et al.*, 2014; Biesbroek *et al.*, 2014; Wellesley *et al.*, 2015.

<sup>26</sup> Popkin, 2006; Smil, 2002.

<sup>27</sup> Vranken *et al.*, 2014.

<sup>28</sup> Allais *et al.*, 2012.

<sup>29</sup> FAOSTAT, 2014.

<sup>30</sup> Graça *et al.*, 2014.

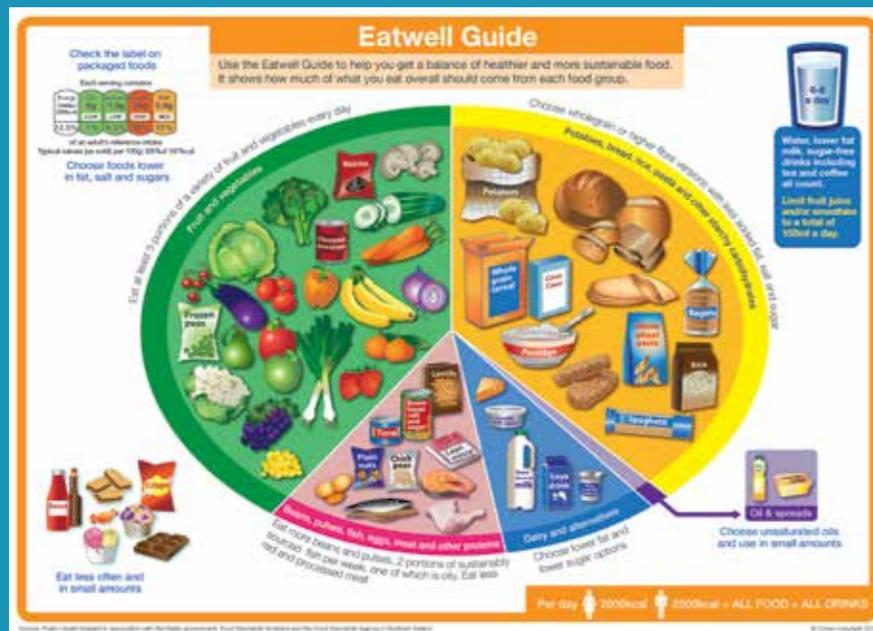
<sup>31</sup> Macdiarmid, 2016.

<sup>32</sup> Vanhonacker *et al.*, 2013; Lea & Worsley, 2003; Tobler *et al.*, 2011; Truelove & Pardi, 2012, Bailey, 2014.

<sup>33</sup> Truelove & Pardi, 2012.

<sup>34</sup> Lea & Worsley, 2008.

# SUSTAINABLE DIETS: THE EATWELL GUIDE AND OTHER POINTERS FROM GREAT BRITAIN



In 2016, the British *Eatwell Guide*,<sup>35</sup> which explains how to adopt a healthy and sustainable diet for our planet, was updated and the Scientific Committee on Nutrition (SACN) published a report<sup>36</sup> that stresses the importance of the consumption of carbohydrates, considered the largest source of energy in our diets, and analyzes the impacts of different diets on our health. In particular,

to pursue a healthy lifestyle, we should minimize the consumption of sweetened drinks and sugary foods, and eat more high-fiber foods.

<sup>35</sup> UK Government, 2016.

<sup>36</sup> SACN, 2015.



## CAN CHANGING OUR DIET MAKE A DIFFERENCE? THE BCFN MENUS

In order to put the concept of sustainable diet into practice, the BCFN compared a series of menus that are equivalent both from a nutritional point of view (therefore all balanced in proteins, carbohydrates, and fats) and in terms of caloric intake, but differing in the choice of ingredients that provide proteins of animal and plant origin.<sup>37</sup> These menus, which can be weekly or daily, are used in the BCFN publications to estimate the environmental impacts of food choices. However, it is better to avoid the simple direct comparison between two foods, and an elaboration based on all the courses (in terms of quantity and types) consumed in a day or in a week is preferable.

### The daily menu

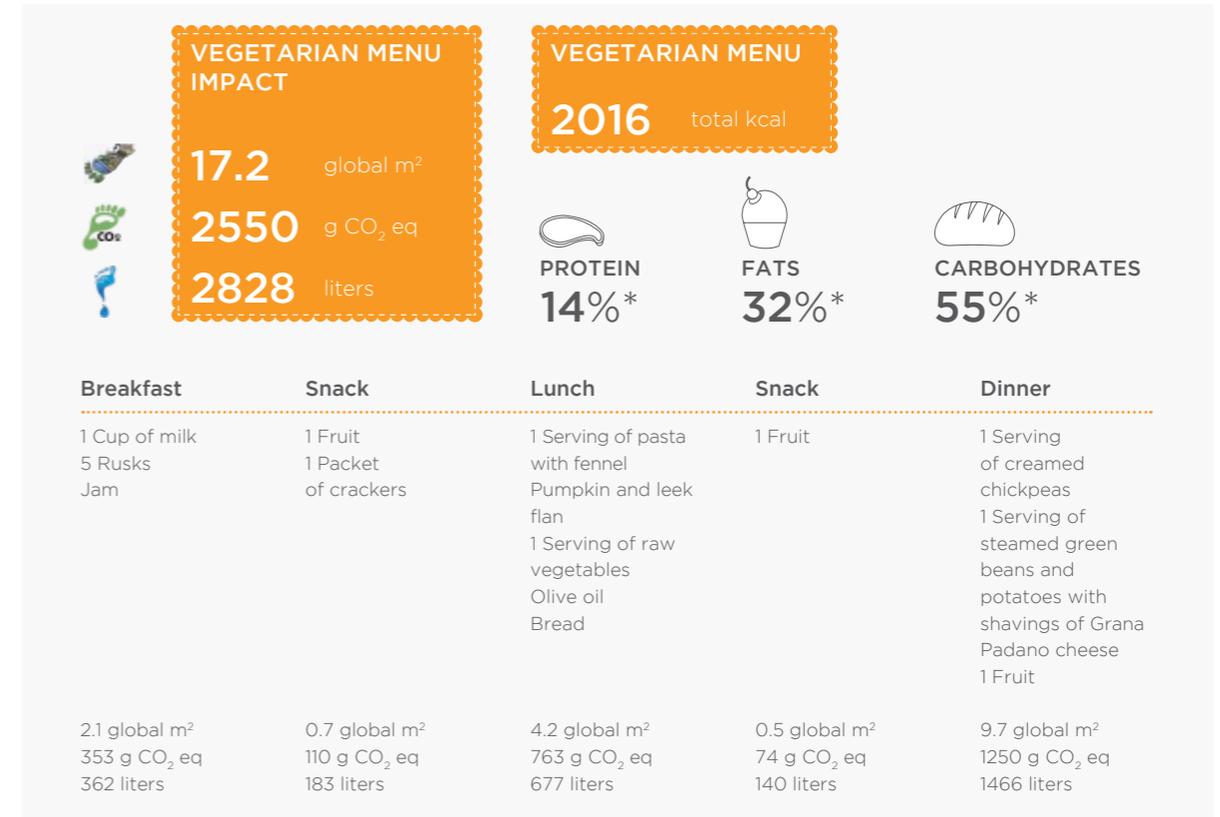
In the first menu (vegan), the proteins are of plant origin and any kind of meat and animal derivatives (such as dairy products and eggs) have been excluded. In the second menu (vegetarian), there is no meat, but the consumption of dairy products

and eggs is included. Finally, the third (menu with meat) is omnivorous, with proteins of mainly animal origin.<sup>38</sup>

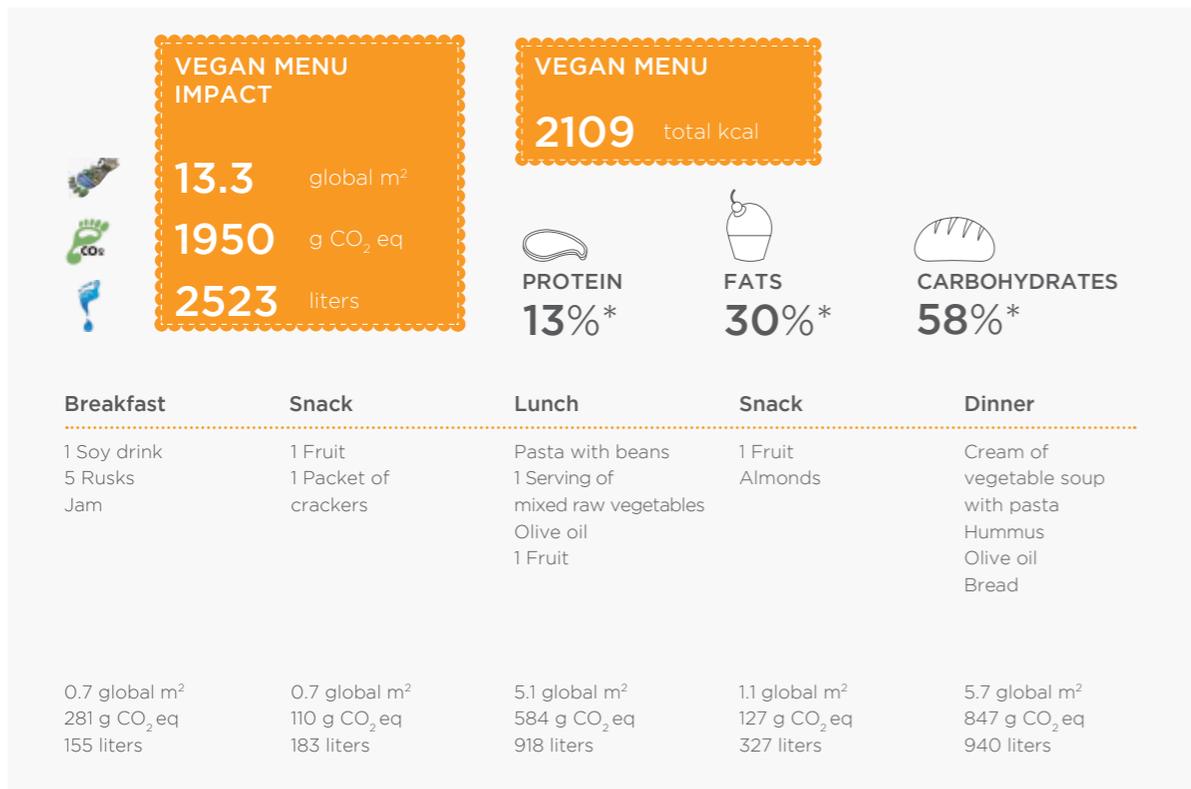
As can be seen, the vegan and vegetarian menus have an almost similar environmental impact; however, the menu with meat has an impact that is twice as high as the vegetarian menu: a significant burden on the daily impact of an individual. Based on this data, the reduction of the environmental impacts of an individual simply by changing their eating habits can be calculated. Taking as an example the food eaten by a person in one week, three different diets can be hypothesized, based on how many times they choose a vegetarian menu. Limiting meat consumption to twice a week, in line with nutritionists' recommendations, can also 'save' up to a global 10 square meters a day.

<sup>37</sup> This elaboration is to be considered purely indicative and is based on some of the food choices used as an example by the BCFN for feedback regarding environmental impacts.

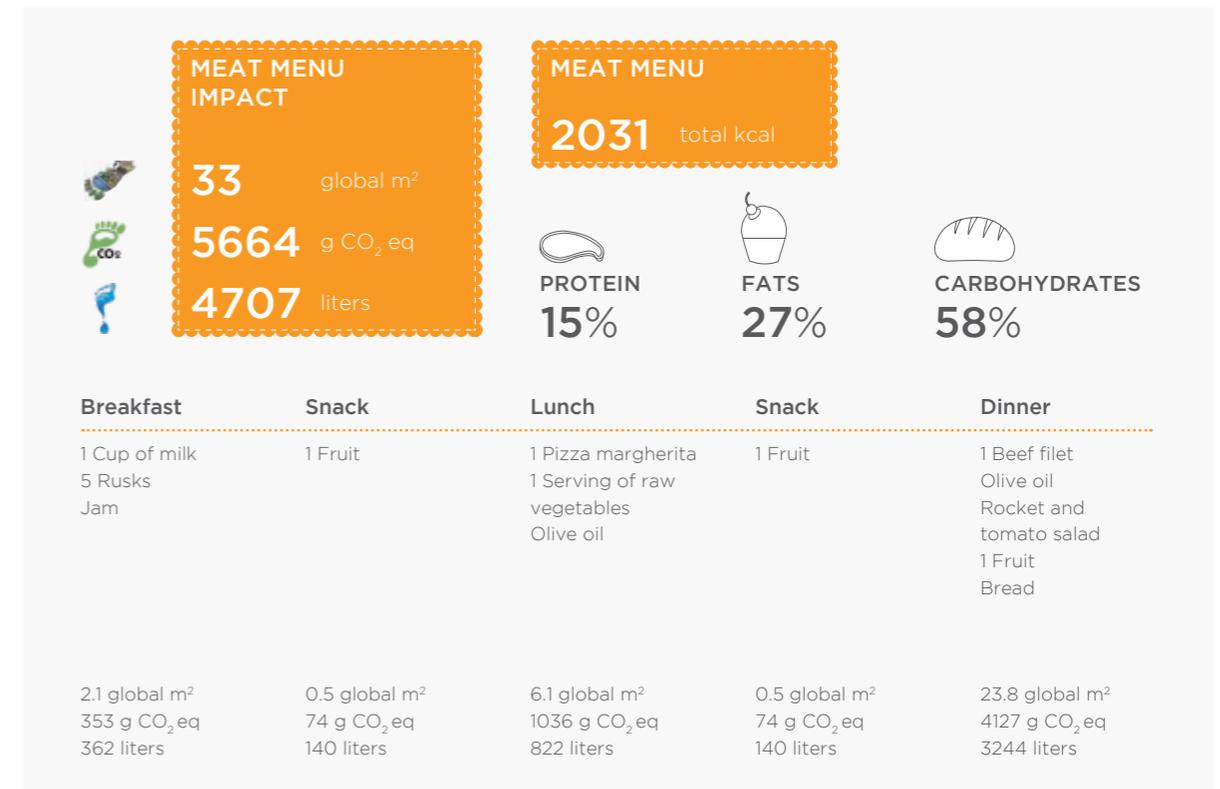
<sup>38</sup> For details of the recipes used in the menus, see the supporting technical document.



Composition of a vegetarian menu and its relative environmental impact.



Composition of a vegan menu and its environmental impact.



Composition of a meat menu and its environmental impact.

\* Any shifts in the total sum are due to a rounding off of the unit rates of the individual components.



### The weekly menu

As can be seen, the analysis of the different daily menus confirms that the environmental impact of our diet can vary, even significantly, depending on what we put on our plates. With this in mind, the BCFN decided to analyze the impacts of four weekly menus, all of which are balanced from a nutritional point of view and have an equivalent caloric content, by adding to the vegan, vegetarian, and meat menus, the BCFN sustainable menu, which includes both meat (preferably white meat) and fish, and also provides for a balanced consumption of plant and animal proteins.

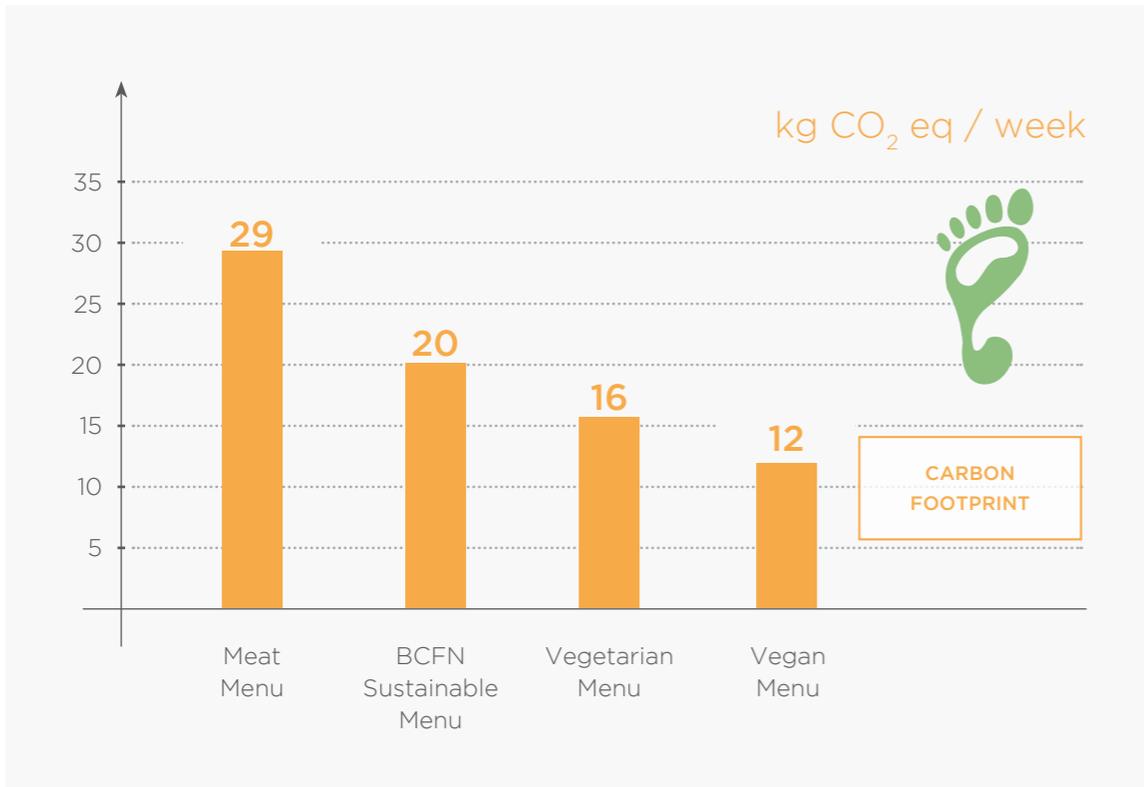
There are not many differences between the BCFN sustainable menu and the vegetarian menu, whereas the meat menu has an impact of significantly higher values. On the other hand, the vegan menu is associated with the least environmental impact: this result is in line with many scientific studies that have shown the benefits on the environment of an exclusively vegetable diet.<sup>39</sup>

However, according to some specialists, the vegan diet cannot be considered a 'sustainable' diet within the meaning given by FAO, since sustainability is dependent on other factors in addition to the environmental impact, such as cultural acceptability and the ability to assimilate all the nutrients needed to maintain good health. In fact, even if it is balanced from the nutritional point of view, the adoption of a vegan diet requires a series of features and knowledge that is unlikely to make it acceptable to most people, in addition to attention required in the preparation of individual meals to prevent the development of nutrient deficiencies over time.

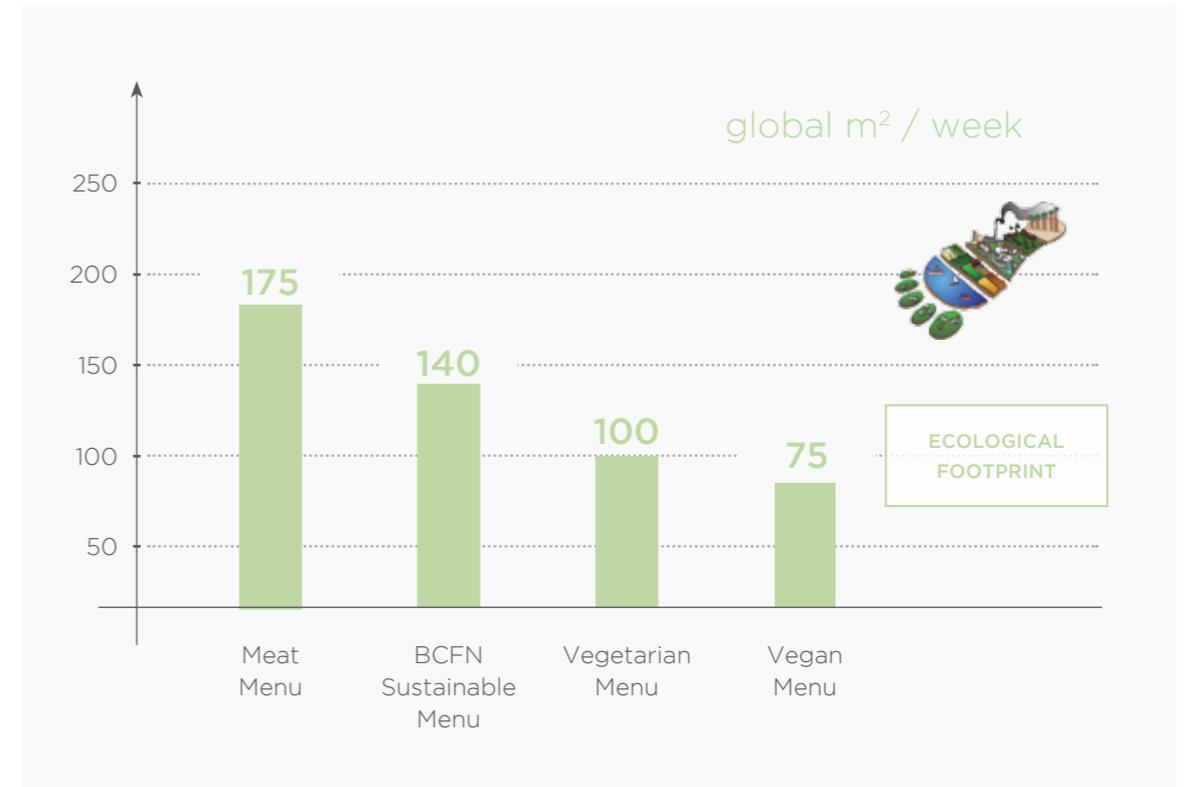
A Mediterranean-type diet (such as the one defined in the BCFN sustainable menu) could be the perfect alternative for people's health and the environment, without having to make sacrifices in their choice of food or drastic changes in their eating habits.

<sup>39</sup> Tilman and Clark, 2014; Sáez-Almendros *et al.*, 2014; Westhoek *et al.*, 2014; Van Dooren *et al.*, 2014; Baroni *et al.*, 2006.

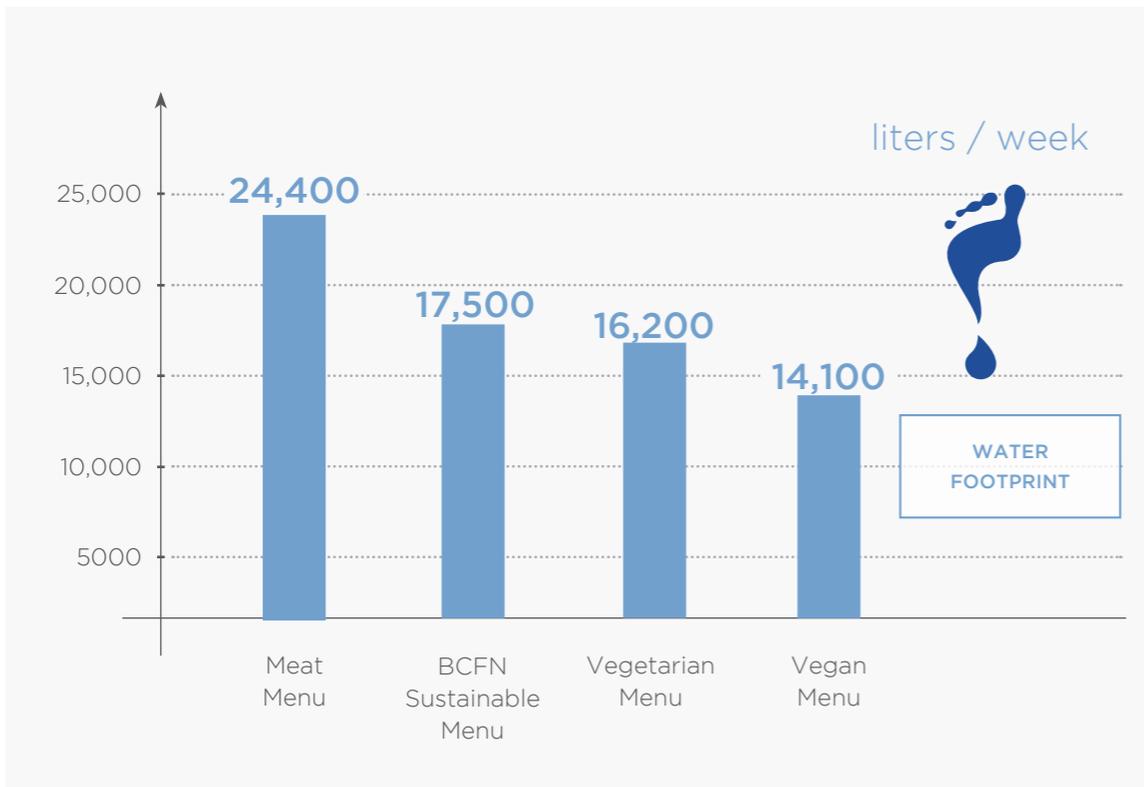




The Carbon Footprint of the four menus analyzed, all balanced from the nutritional point of view.



The Ecological Footprint of the four menus analyzed, all balanced from the nutritional point of view.



The Water Footprint of the four menus analyzed, all balanced from the nutritional point of view.





## FEEDING THE CITIES

There is no place where the problems of the global food system are more obvious than in cities.<sup>40</sup> In an era when more than half of the world's population lives in cities and the urbanization rate is the highest in history,<sup>41</sup> enormous challenges related to food security must be dealt with in both the industrialized and the developing countries. In the latter, more than half of the household income is for the purchase of food;<sup>42</sup> even in the industrialized countries, the most vulnerable sectors of the urban population cannot meet their food needs: the number of undernourished people has reached 15 million, an increase of 54% between 2007 and 2010.<sup>43</sup> Testifying to this is the proliferation of food banks, soup kitchens, and charitable meals on wheels services set up in cities around the world.

Taking care of the cities is a priority, in that they play a key role in the transition to a more sustainable food system. In fact, cities are where there is a concentration of unsustainable food practices and challenges such as food insecurity and malnutrition, overweight conditions, and obesity.<sup>44</sup> A city is also the ideal environment for inducing changes in daily practices, namely purchase, preparation, and consumption.<sup>45</sup>

For some time now, there has been talk about *smart cities*, urban areas where economic activities, mobility, environmental resources, inter-personal relationships, and housing policies are conducted in a smart way. Today we also speak of a *food smart city*, the city that, through food, tries to combine public health, environmental sustainability, social justice, respect for the land, knowledge, and innovation. In other words, in urban contexts, food can facilitate the integration of economic, social, and environmental sustainability.<sup>46</sup> The initiatives promoted in different cities around the world can be classified on the basis of the goals pursued:

- ensuring food security and the availability of healthy food;
- strengthening the local economy;
- reducing environmental impacts;
- improving public health<sup>47</sup> (table 2).

These objectives can be achieved through an 'urban food strategy', i.e. a process in which the city

changes its approach to food (from procurement to distribution in different urban areas, from the management of urban markets to the redistribution of food waste), by creating synergies between the various stakeholders (local institutions, civil society, and the private sector).<sup>48</sup> A food strategy is innovative when it changes the value attributed to food by the community, and intervenes through legal and regulatory frameworks, and prepares tangible or intangible infrastructures to facilitate food management.<sup>49</sup> However, the elaboration of a food strategy is a complex process, because directly or indirectly, food involves all of the major policies of local municipalities. Not only that, the initiatives related to food and diet have to ensure the achievement of long-term objectives that affect all of society; for example, they can aim for the reduction of overweight conditions and obesity through the promotion of a balanced diet or taxing certain types of foods (such as those high in sugar).<sup>50</sup> Therefore, public health, the environment, and society are the three components that a food policy must integrate.<sup>51</sup>

### Food security

Among the initiatives to *ensure food security and access to food*, we can mention the creation of the Food Policy Councils, or more simply, Food Boards, responsible for coordinating the efforts of different stakeholders in the urban context and accompanying the development of food policies. The activities of the Food Policy Councils in many cities have played an important role in the evolution of the citizens' food strategy.

<sup>40</sup> Sonnino, 2009.

<sup>41</sup> UNFPA, 2015.

<sup>42</sup> FAO, 2011.

<sup>43</sup> FAOSTAT, 2015.

<sup>44</sup> Morgan and Sonnino, 2010.

<sup>45</sup> Cohen and Ilieva, 2015.

<sup>46</sup> Moragues, 2013.

<sup>47</sup> Antonelli *et al.*, 2015.

<sup>48</sup> Moragues *et al.*, 2013.

<sup>49</sup> Di Iacovo, 2013.

<sup>50</sup> Mah and Thang, 2013.

<sup>51</sup> Lang, 2009.

For example, the strategy of Toronto was drawn up on the basis of its Board's history and experience with food policies.<sup>52</sup> In Vancouver as well, the Council played a key role in defining its food strategy, based on the principles of health, accessibility, and the sustainability of the local food system.<sup>53</sup> The initiatives to improve the logistics have specific targets, depending on the context, that range from the approach of bringing producers closer to the consumers, to projects for solving the typical supply problems of the so-called *food deserts* in cities such as Belo Horizonte, New York, and Dar es Salaam (Tanzania).<sup>54</sup> Among these initiatives, there are also some social projects such as “Fa Bene” in the city of Turin, which recovers unsold surplus food and spontaneous donations from buyers in the local markets, and manages the redistribution to families in economic difficulty, who will then ‘return’ the support received through time, effort, and skills donated to the community. Urban farming is included in this category because, in some cities of the world, its role has been recognized as increasingly important in ensuring the regular and sufficient supply of food in cases of market failure.

### Supporting the local economy

These are projects that promote the supply of local food by public bodies in contexts such as canteens and schools, and initiatives to strengthen the alternative food networks, such as farmers’ markets, joint purchasing groups, etc. For example, the city of Beijing has provided an area of three million cubic meters on the roofs of buildings to create space for urban farming.<sup>55</sup> In the city of Dar es Salaam (Tanzania), 74% of the population own cattle and 60% of all milk sold is produced in the city.<sup>56</sup>

### Reduction of environmental impacts and waste

These are actions that include social campaigns, food education, and initiatives for food waste prevention. For example, many cities in the UK give support to the WRAP campaign “Love Food, Hate Waste” and host events like “Feeding the 5,000” to turn waste into a resource and feed the more vulnerable sections of society (Feedback 2015).<sup>57</sup>

### Improvement of public health

Initiatives in this category include nutrition education and conducting campaigns to raise citizens’ awareness of the benefits of a balanced diet and an active lifestyle, and the health risks associated with an excessive consumption of fats, sugar, and alcoholic beverages. “Pouring the pounds”, a campaign, aimed at discouraging excessive consumption of sugar, promoted by the Health Department of the City of New York and nutritional education imparted to the students of 26 high schools in Daegu, South Korea, are examples of this type.<sup>58</sup>

An essential step in accelerating the process of transition to a more sustainable food system is the possibility of using the experiences of different countries and cities that have already implemented change processes locally as a common factor. The Urban Food Policy Pact, promoted by the city of Milan and signed by over 100 municipalities around the world in October 2015, was a great opportunity for knowledge, exchange, and sharing experiences.

	GOALS	TYPES OF INITIATIVES	PROMOTERS
URBAN FOOD STRATEGY	Ensure food security and the availability of healthy food	Formation of Food Policy Boards	Public sector
		Improvement of Logistics	Public and Private sectors
		Promotion of urban farming	Public sector NGOs and social movements
		Development of initiatives to combat urban poverty	Public sector NGOs and social movements
	Strengthen the local economy	Public procurement of local products	Public sector
		Strengthening of alternative food networks	Public and Private sectors NGOs and social movements
	Reduce environmental impacts	Social campaigns	Public sector NGOs and social movements
		Environmental education	Public sector NGOs and social movements
		Food recovery and waste prevention	Public and Private sectors NGOs and social movements
	Improve public health	Social campaigns	Public sector NGOs and social movements
Social campaigns		Public sector NGOs and social movements	

Table 2. Initiatives to promote a sustainable diet.

Source: Prepared by the authors, based on Antonelli et al. 2015





### URBAN FOOD POLICY

Food policies enacted by the city authorities to ensure healthy food, improve public health, strengthen the local economy, and reduce environmental impact and waste.

NEW YORK  
MILAN  
MELBOURNE



### FOOD POLICY COUNCIL

Citizens' committees for food policies. These are created through local initiatives in order to ensure healthy and sustainable food in cities. In some cases, they have been instrumental in the development of urban food policies.

LONDON  
TORONTO  
NEW YORK  
GHENT



### URBAN FARMING

The production of food in the city - including through citizens' vegetable gardens which provide fresh products and reuse waste as fertilizer - helps in creating and maintaining multifunctional urban landscape.

AMSTERDAM  
PARIS  
DAEGU  
QUITO  
ROME

### NEW DISTRIBUTION CHANNELS



Cooperatives, markets, and apps for putting producers and consumers in direct contact; emporiums for the most needy families offering food donated by the big retail chains and food companies.

BARCELONA  
TEL AVIV  
LYON



### FOOD EDUCATION

Courses in schools, cooking demonstrations in marketplaces and supermarkets, and communication campaigns for citizens about healthy eating.

TURIN  
BELO HORIZONTE  
DAEGU  
MEDELLÍN



### FOOD WASTE

There are various initiatives for the reduction of food waste: from awareness campaigns and nutritional education, to initiatives for the recovery and distribution of surpluses to the most vulnerable sectors of the urban population.

PARIS  
LONDON  
TURIN  
CURITIBA



# FEEDING CITIES

*Cities have changed their approach to food and this is changing them*

*Cities have changed their approach to food and this is changing them. The initiatives being promoted range from the production phase to that of the disposal of food waste.*

Source: Forster et al. (2015), Milan Urban Food Policy Pact. Selected Good Practices from Cities. Utopias/29 Globalization, Giangiacomo Feltrinelli Foundation. Available online: [www.fondazionefeltrinelli.it/article/ebook-utopie-milan-urban-food-policy-pact](http://www.fondazionefeltrinelli.it/article/ebook-utopie-milan-urban-food-policy-pact)



# THE COST OF SUSTAINABLE DIETS

Price is one of the major factors influencing food purchases. Therefore, in order to promote healthy and sustainable food for the population, both its cost (real and perceived)<sup>1</sup> and how different choices affect the household budget have to be taken into consideration. In addition to protecting people's health and the environment, a truly sustainable diet must be affordable.

Starting with the menu shown in the previous chapter, the BCFN has studied the Italian situation by processing official statistical data, and based on the available scientific literature, it has done the same for other European countries and the United States.

## THE COST OF DIFFERENT MENUS IN ITALY

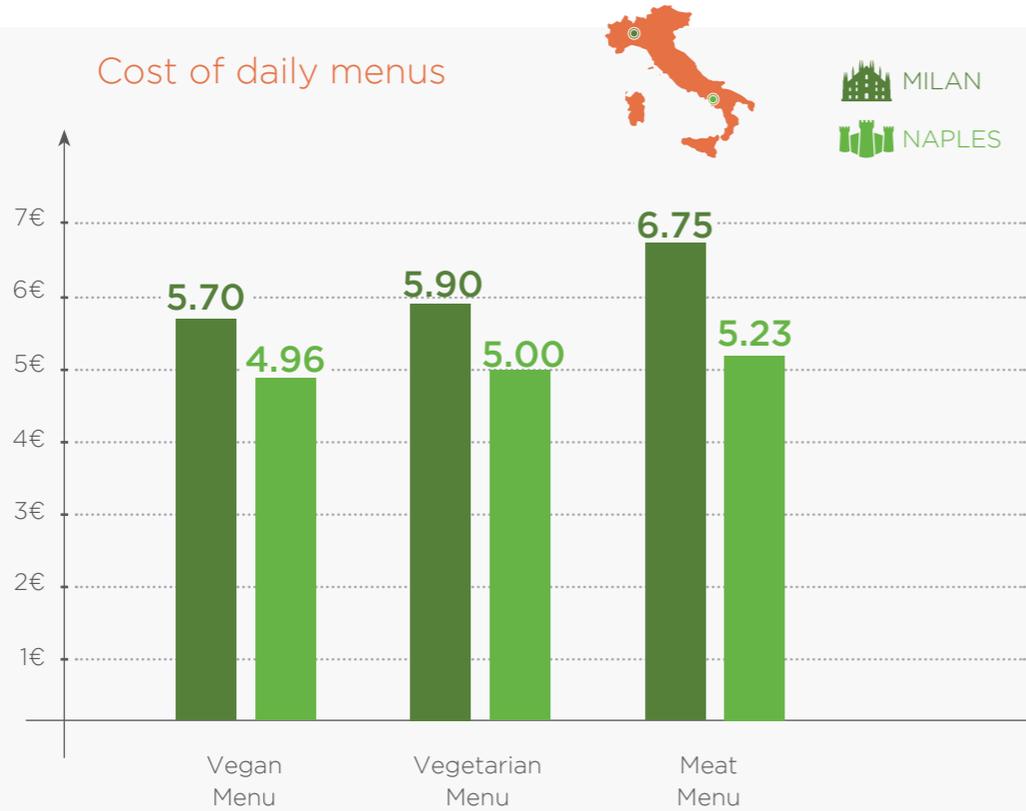
There are many complex variables that influence food prices: prices depend not only on the type of product (e.g. meat or vegetables), but also on factors such as the quality (real or perceived), the choice of store (supermarket or discount store), the

geographical origin, the town where it is purchased, etc. The BCFN has prepared some estimates with Milan and Naples (respectively the two largest cities in the North and South of Italy) as sample cities and used the average prices in the month of April 2016,<sup>2</sup> recorded by the Observatory of Prices.<sup>3</sup> As with the environmental impacts, so as not to be limited to the direct comparison of two different foods, daily and weekly menus were analyzed.

### The daily menu

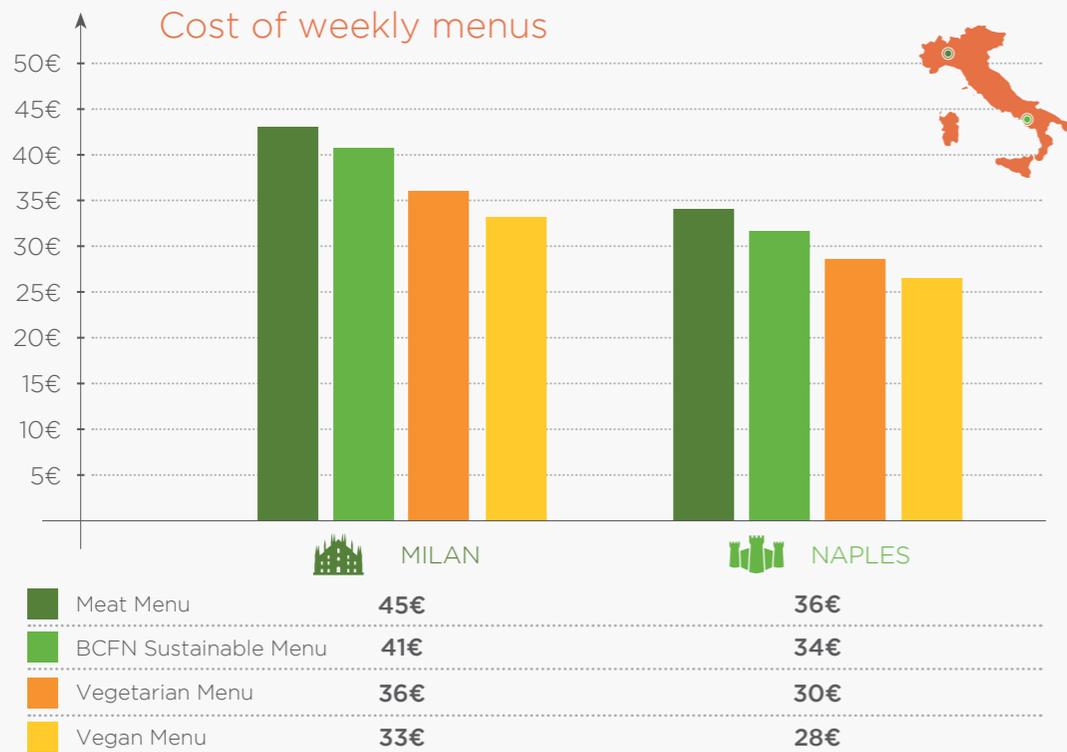
The analysis of the three daily menus described in the previous chapter provides interesting insights into the link between food choices and the family budget. As shown in diagram, the vegan menu<sup>4</sup> and the vegetarian menu have an almost equivalent cost with each other each other in Naples, while in Milan the first costs about €0.20 less than the second menu. However, the menu with meat is more expensive than the vegetarian menu by about €0.85 per day in Milan and almost €0.25 in Naples.

### Cost of daily menus



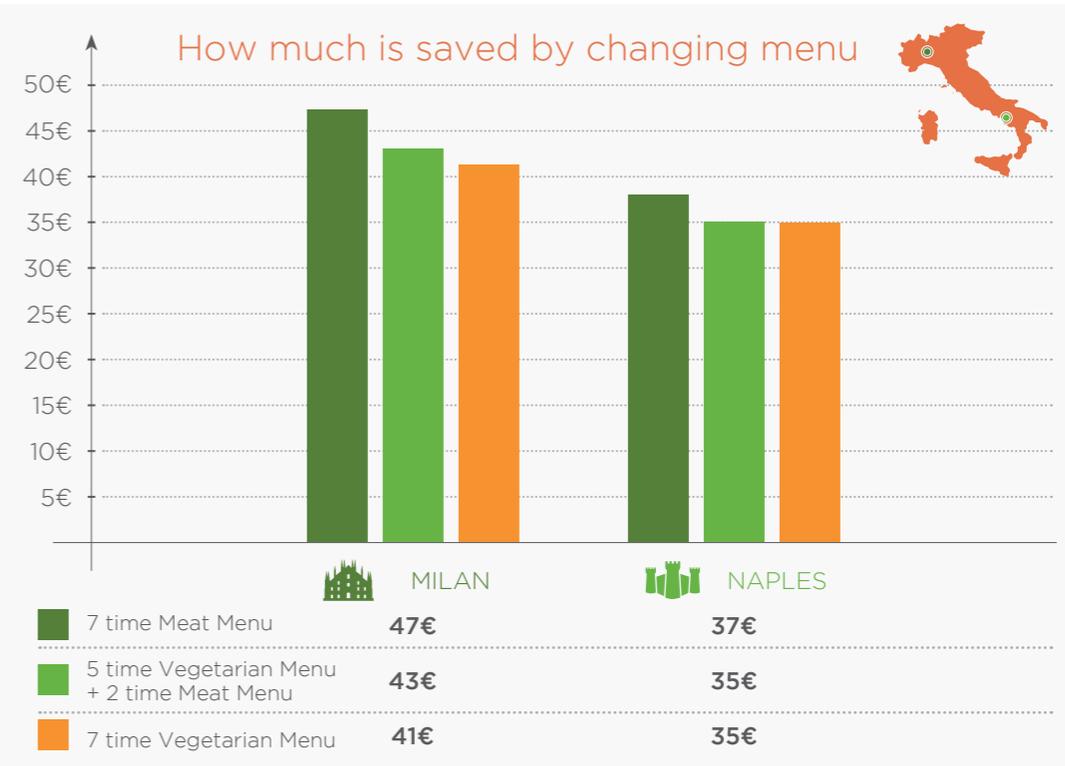
Price of the three menus in the two cities considered: Milan and Naples.

### Cost of weekly menus



Cost of the four different menus analyzed, all nutritionally balanced.

### How much is saved by changing menu



The price of three possible weekly diets: the first is calculated by supposing only the menu with a meat course for the whole week; in the intermediate one the menu with one meat course is followed for two days and the vegetarian menu is followed for five days; the third contemplates only the vegetarian menu.

Three types of weekly diets have also been hypothesized:<sup>5</sup> a menu with meat every day; a vegetarian menu every day, and a combination of the two menus, which calls for five days with a vegetarian menu and two days with meat. The results show that by restricting meat consumption to twice a week, almost €4.20 can be saved, which is more than €220 per year.

#### The weekly menu

There are three menus in this case, too: the least expensive are the two plant-based menus (vegan and vegetarian), followed by the BCFN sustainable menu; the most expensive menu is the one with a high animal protein content.

Based on this data, we can say that in Italy a sustainable diet such as the Mediterranean diet not only

has a lower environmental impact, but it also costs less than diets with a high animal protein content (meat or fish).

<sup>1</sup> WWF, 2012.

<sup>2</sup> Calculations were made by evaluating the prices in five major Italian cities in the months of October 2015 and April 2016, in order to have a geographic and seasonal representation. Milan and Naples were chosen as pilot cities for the final calculations because they are the two cities with the highest and lowest prices, respectively. April 2016 was chosen as the sample month for the final elaborations because, since there were no significant differences due to the seasonality of foods, it was preferable to use the latest, and, therefore, the most updated prices. For details on the calculations, see the Technical Support Document.

<sup>3</sup> The Observatory of Prices and Fees, established by the Italian Ministry of Economic Development. For details about the complete data used in the calculations, see: the BCFN's *Double Pyramid Technical Support Document*.

<sup>4</sup> However, meat substitute foods such as seitan and soy products, the price of which can be quite high in Italy, were not considered when the menu was planned.

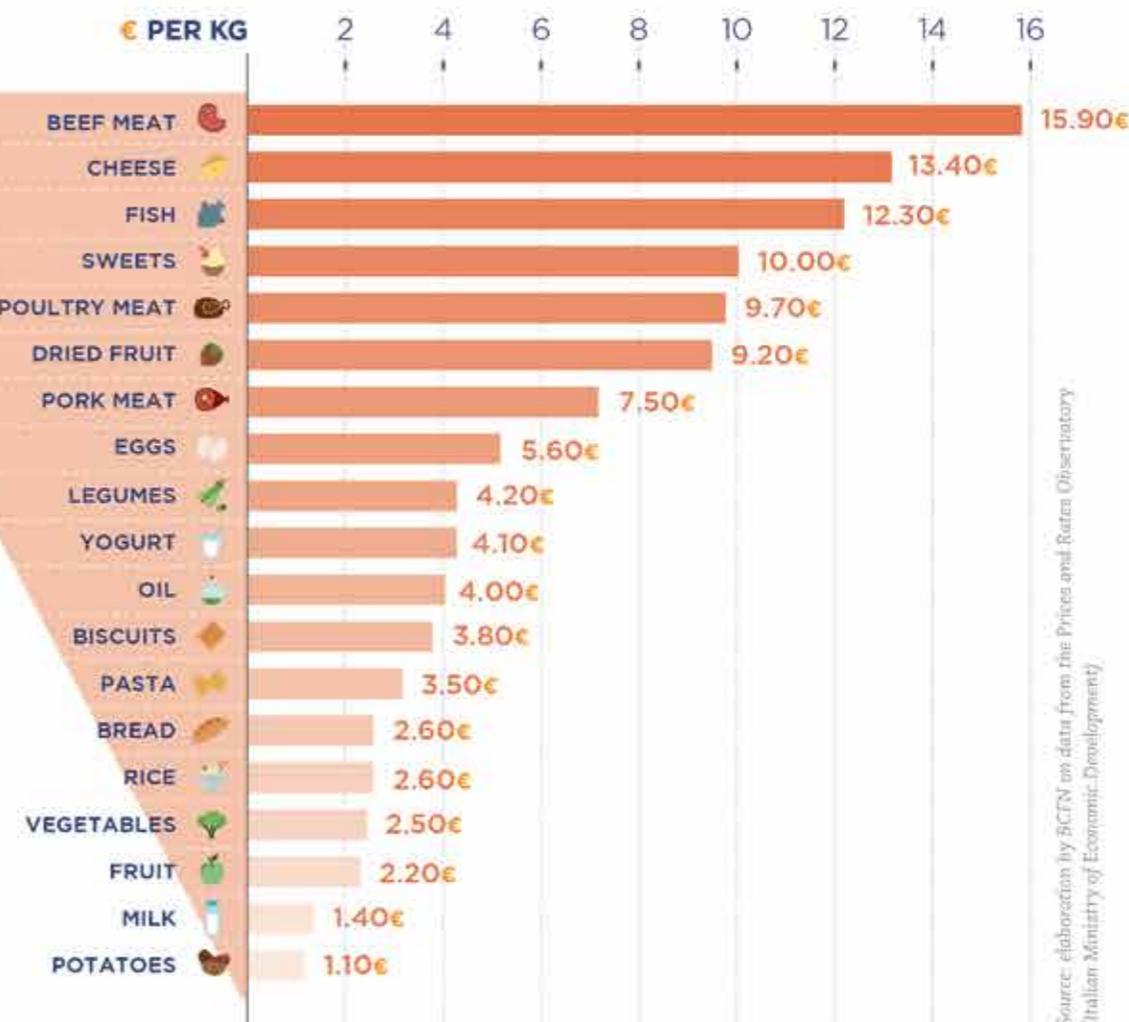
<sup>5</sup> The same exercise was done for the environmental impacts, and the results are given in Chapter 5.

# THE ECONOMIC PYRAMID

BY ORGANIZING FOODS OF THE FOOD PYRAMID ACCORDING TO THEIR PRICE PER KG, YOU GET AN **INVERTED PYRAMID**, THE ECONOMIC ONE: THE **MOST EXPENSIVE** FOODS ARE AT THE **TOP** (THE BASE OF THE PYRAMID), WHILE THE **CHEAPEST** ONES ARE AT THE **BOTTOM** (THE APEX OF THE PYRAMID).



THE PRICES SHOWN IN THE ECONOMIC PYRAMID HAVE BEEN CALCULATED AS THE AVERAGE OF PRICES RECORDED BY THE PRICES AND RATES OBSERVATORY OF THE MINISTRY OF ECONOMIC DEVELOPMENT, IN THE CITIES OF **MILAN** AND **NAPLES** IN APRIL 2016.



Source: elaboration by BCFN on data from the Prices and Rates Observatory (Italian Ministry of Economic Development)

## THE SCIENTIFIC DEBATE ON THE COST OF DIETS

In Italy, the home of fine cuisine and the Mediterranean diet, eating well and in a way that is sustainable is within everyone's reach. However, in other countries, sustainability can have a higher price; this is also shown by the higher incidence of overweight people in the segments of the population with a low income (as well as with less schooling).<sup>6</sup> In the debate on the factors that determine obesity, and diet-related diseases in general, food prices often come under accusation: healthy foods (fruit, vegetables, whole grains, and skimmed products) are too expensive for the average family, while those that are less healthy are often too cheap. It should be said that the issue is complex and in some cases, scientific research has led to conflicting conclusions.

### The importance of the units of measurement

An analysis of the scientific literature immediately shows the fundamental role of the unit of measurement used to compare the price of food. In several studies the data falls into three units of measurement: a) *price per calorie*, which is used the most and is calculated as the ratio between the price per 100 grams of food and the number of calories that it contains; b) *price per edible gram*, which measures the cost of a food as it appears on our plate (most of the unchanged food undergoes some kind of preparation, which goes to change the weight and amount); c) *price per average portion*.

However, all the parameters showed some limits: this was demonstrated by the USDA<sup>7</sup> when calculating the prices of a given food basket per calorie, per 100 edible grams, and per portion, and obtaining different results.

Low-calorie foods, such as fruit and vegetables, are more expensive if the price is calculated in dollars per 100 calories. On the other hand, if the price is calculated based on edible grams and an average portion, they are more cost effective than less healthy foods, the so-called 'moderation foods', or those possessing a quantity of fat, added sugar, or sodium that is higher than the level recommended

by the U.S. Dietary Guidelines, and which should therefore be eaten in moderation.

### The effect of income on consumption

The scientific literature on the relationship between the nutritional quality of a diet and its cost seems to be divided into two factions: a first current of thought, whose main spokesman is the epidemiologist Adam Drewnowski, argues that healthy foods (especially fruit, vegetables, and fish) are more expensive and that this explains the purchasing behavior of consumers, by actually hypothesizing a link between socioeconomic status and quality of diet and, more indirectly, between socioeconomic status and obesity. In other words, there is an inverse relationship between the energy density of a food, its cost per calorie, and its micronutrient content,<sup>8</sup> which leads the people who are less well-off to prefer inexpensive but high-calorie foods with few nutrients.

According to this reasoning, obesity would largely be caused by the high cost of the healthy foods in comparison to those that are less healthful.

A second current argues that price is only one of the components that influence buying behavior. There are two other 'barriers'<sup>9</sup> of a physical nature, namely the lack of outlets nearby for buying fresh and nutritious food, and the behavior caused by deeply held convictions or beliefs (often not supported by scientific reasons) or by the lack of food information.<sup>10</sup>

In order to correct people's eating habits, it is not enough to remove just one barrier, but rather, it is necessary to act on three fronts simultaneously: making healthy and fresh food available everywhere; adopting economic policies to reduce the cost of weekly shopping; and promoting educational actions that have an impact on eating habits.<sup>11</sup>

<sup>6</sup> A. Drewnowski, 2009.

<sup>7</sup> Carlson and Frazão, 2012.

<sup>8</sup> Drewnowski 2004, 2005, 2007. Drewnowski *et al.*, 2009.

<sup>9</sup> Machenbach, 2015.

<sup>10</sup> Frazão *et al.*, 2014; WWF, 2012b.

<sup>11</sup> Mackenbach, 2015.



## THE COST OF DIETS IN THE UNITED STATES

In the United States, the relationship between obesity and socio-economic status has been confirmed by some research: for example, the customers of discount stores are mainly people who, faced with lower levels of income and education, suffer from a higher rate of obesity (27%) compared to those who make their purchases in supermarkets (9%).<sup>12</sup> A study conducted by the Department of Public Health at Harvard University also confirmed that healthy food is slightly more expensive, taking into account both individual foods and the diet as a whole.

The largest differences are found in the menus that include meat: the healthier options cost an average of \$0.29 more per portion and \$0.47 per 200 calories. Greater variability is also found in chicken: with the same calories, choosing thigh meat over breast meat can cost up to \$0.72 more. Then if the entire diet is evaluated, a healthy Mediterranean-type diet based on vegetables, fruit, cereals, and fish can cost up to \$1.54 more per day (\$550 per year) compared to one which is based on processed foods, meat, and refined grains.

A 2015 study on families with diabetic children reached the same conclusions: maintaining a healthy diet with 30% less fat content than their usual dietary habits, led to an increase of about \$56 a week for a family of four.<sup>13</sup>

### Education for sustainable and less expensive diets

Numerous studies have shown that a diet in line with the nutritional recommendations can be maintained without having to spend more. In all these studies, nutrition education has played a vital role, especially for low-income families.

For example, *Food Plans*, promoted by the USDA,<sup>14</sup> allow feeding a family of four with a monthly budget of less than \$600<sup>15</sup> (although with limitations in terms of palatability and with a tendency of having long preparation times).

There is a section of the USDA's website dedicated to dietary guidelines, ChooseMyPlate.com, that has tips on how to eat well and cheaply. There is an example of a bi-weekly menu, some practical advice on how to optimize your grocery shopping budget, a list of foods for every season of the year, an online collection of recipes, and so on.<sup>16</sup> As the USDA study advises, other studies have also shown that the transition from a diet of high energy density to a diet with plenty of fruit, vegetables, and legumes does not necessarily affect the cost;<sup>17</sup> on the contrary, it is possible to save money by choosing vegetables, potatoes, legumes, and dairy products,<sup>18</sup> or by following ethnic diets, such as the Latin American diet, which are healthier and with a lower cost than that of the U.S.<sup>19</sup> A further study<sup>20</sup> showed that the diet consisting of three meals per week based on vegetables, whole

grains, and extra virgin olive oil can halve one's budget, in addition to improving the overall health status. The study involved a series of cooking classes on the preparation of dishes based on vegetables and whole grains, and lectures on the basic principles of nutrition and the benefits of a balanced diet. By the end of the program, 60% of the participants had introduced at least three vegetarian meals a week into their diet, compared with 5% at the beginning of the program, and they had significantly decreased the consumption of meat, snacks, sodas, and sweets. This reduced the cost of their weekly

shopping by 45%, from \$67 to \$37 a week: a saving of about \$124 per month.

<sup>12</sup> Aggarwal *et al.*, 2012; Rao *et al.*, 2013.

<sup>13</sup> Patton, 2015.

<sup>14</sup> USDA Food Plans: Cost of Food report <http://www.cnpp.usda.gov/sites/default/files/CostofFoodJan2015.pdf>.

<sup>15</sup> Data updated in March 2016.

<sup>16</sup> <http://www.choosemyplate.gov/budget/>.

<sup>17</sup> Mitchell *et al.*, 2000; Raynor *et al.*, 2002; Goulet *et al.*, 2008; Drewnowski, 2009.

<sup>18</sup> Darmon *et al.*, 2015; Drewnowski *et al.*, 2009.

<sup>19</sup> Rehm *et al.*, 2011; Maillot *et al.*, 2008; Drewnowski *et al.*, 2010.

<sup>20</sup> Flynn *et al.*, 2013.



## THE COST OF DIET IN EUROPE

European experts do not agree either on the issue of the cost of diets. Recent research at the University of Cambridge,<sup>21</sup> in the UK, looked at the prices of 94 food products in the decade from 2002 to 2012 and found that the healthiest foods (milk, yogurt, fruit and vegetables, lean meat, and fish) were more expensive and their price also tended to increase more than other foods (bacon, beef burgers, sugary drinks, donuts, and ice cream). Suffice it to say that in 2012, the foods with the most calories, and thus less healthy, cost an average of £2.5 per 1,000 kilocalories, while the more healthy foods cost £7.49: about three times more. From 2002 to 2012, the average price of healthy foods increased by £0.17 per year per 1,000 calories, compared with £0.07 of the less healthy foods. Mild promotional actions would be sufficient to lower the price of fruit and vegetables in order to increase their weekly consumption by 20%.<sup>22</sup>

Those who perceive healthy foods as too expensive are especially the more vulnerable sections of the population, which devote a very large proportion of their income to food purchases.<sup>23</sup> In fact, in this context, it is easier to yield to a tendency to replace a food (perceived as too expensive, but usually also more nutritious) with another one that is cheaper, even if of lower quality.

Other studies suggest that a healthy diet is not necessarily more expensive. For example, the food education project LiveWell, developed by the WWF together with the University of Aberdeen,<sup>24</sup> analyzed the cost of a sustainable diet (characterized by a low carbon footprint) compared to the average food spending outlined by the U.K. Department for Environment, Food, and Rural Affairs (DEFRA). The results revealed that the cost of the 2020 LiveWell diet is lower than the average expenditure on food by families in the UK, which means that it is also possible to spend less and make food choices that are healthier and have a low environmental impact.

The same position is supported by the British Health Ministry, which in 2014 launched the project “Eat-4Cheap Challenge” to show that people can eat well for very little money. The project began with a very powerful *call to action*: to evaluate how much money

could be saved in a week by eating in a healthy and tasty way, and share the results with the specially created community. By following a few simple tips and reducing food waste, a family can save up to £2,650 a year: the equivalent of a holiday for four to Disneyland in Paris.<sup>25</sup> The project's website includes a lot of fun and useful information on maintaining a healthy, low cost diet: there is an online cookbook, practical advice, a self-evaluation questionnaire on nutritional knowledge, interactive graphics, and a forum where users can exchange tips and opinions on how to maintain a healthy diet.

Controversial results have also come from France, where several studies<sup>26</sup> seem to show that healthy diets cost more. A study conducted by Professor Drewnowski and his team<sup>27</sup> showed that an additional 100 grams of fruit and vegetables involve a daily increase in food costs that can vary from \$0.23 to \$0.38. It also showed that energy-dense diets (calculated in kilocalories per gram of food) are poor in nutrients but cost less (in terms of dollars per kilocalories). On the other hand, diets with a lower energy density and greater amounts of micronutrients are associated with higher costs. If a person who follows a high energy density diet decides to change their diet, reducing their calorie intake, they will have to bear additional costs. For example, if they went from 18,798 to 16,730 kcal per week, they will have to spend 25% more, paying, compared to a lower energy density, \$764 a year more.<sup>28</sup>

However, there are other studies that have show a less drastic situation. A study conducted in 2013<sup>29</sup> on food prices in France in that year showed that it was possible to maintain a healthy, tasty, and varied diet with just €3.5 per person per day.

<sup>21</sup> Jones, Conklin, *et al.*, 2014.

<sup>22</sup> Ball *et al.*, 2015.

<sup>23</sup> Darmon *et al.*, 2015.

<sup>24</sup> Mac Diarmid *et al.*, 2012.

<sup>25</sup> <http://www.nhs.uk/Livewell/eat4cheap/Pages/save-money-and-eat-a-healthy-diet.aspx>.

<sup>26</sup> Schröder, Marrugat *et al.*, 2006.

<sup>27</sup> Drewnowski, Darmon *et al.*, 2004.

<sup>28</sup> Drewnowski, Monsivais, *et al.*, 2007. 93 WWF, 2012b.

# TEN TIPS FOR SPENDING LITTLE AND EATING WELL



The website [Choosemyplate.com](http://Choosemyplate.com) offers household tips for maintaining a healthy diet without spending too much: here are the top ten.

**1 PLAN ON NOT EXAGGERATING**  
Before you go shopping, decide what you want to eat during the week and make a list of what you need



**2 TAKE ADVANTAGE OF DISCOUNTS**  
Check out the in-store promotional offers



**3 COMPARE PRICES**  
Packaging can be misleading: check the food cost based on the price per kilogram



**4 FAMILY-SIZE PACKS ARE BEST**  
They are cheaper than single servings: prepare and freeze what cannot be eaten right away



**5 SEASONS STILL EXIST!**  
Fruit and vegetables that are in season cost less, and they are fresh and tasty! Try new recipes for the best use of the different vegetables



**6 CONVENIENCE COMES AT A PRICE ...**  
Ready-made products cost more: buy simple foods that are not prepared, and which take time to cook. Both your budget and your taste buds will benefit!



**7 CHOOSE VALUE** €  
Certain products are cheap year-round: legumes are an excellent source of cheap protein. And for fruits and vegetables, the green light goes to carrots, potatoes, leafy green vegetables, apples, and bananas



**8 COOK ONCE ... AND EAT ALL WEEK!**  
Prepare several portions of your favorite dishes: you can freeze them individually and have them available all week



**9 BE CREATIVE**  
There are many solutions to avoid throwing food away! These range from a different flavoring to using leftovers with many different recipes. Remember that wasting food is wasting money



**10 AND WHEN YOU EAT OUT ...**  
Eating at a restaurant can be very expensive. Go hunting for offers and keep an eye on the beverages: these can easily make the final bill higher than expected



Source: translation and graphic adaptation by the BCFN from [Choosemyplate.com](http://Choosemyplate.com).

However, the conditions were to not eat out, not waste food, and drink only tap water. According to the study conducted by the WWF as part of the European Project “LiveWell For LIFE” (LiveWell for low-impact food in Europe),<sup>30</sup> implementing a sustainable diet would not only reduce greenhouse gas emissions compared to the current levels, but it would mean savings for families as well.

Contrary to what was seen for the UK, Sweden does not perceive a clear gap between the prices of healthy and less healthy foods, the performance of which has remained essentially constant over the years.<sup>31</sup>

A Dutch study has shown that it is possible to follow a nutritious, culturally acceptable diet (i.e. based on the typical food of the local cultural tradition), which is varied, cheaper, and with less impact in terms of its carbon footprint.<sup>32</sup>

One can also eat well while spending little in Spain: the LiveWell for LIFE results show that it is possible to adopt a sustainable diet without changing the cost of the weekly shopping.<sup>33</sup> (For more details, see the separate box on the project).

### Affordable Sustainable Diets in Europe

Despite some conflicting data, the case studies analyzed ultimately showed that you can eat in a healthy way regardless of income level: in fact, the healthiest and most sustainable diets do not necessarily have higher costs. However, it is necessary to undermine people’s deeply rooted prejudices and change their eating habits, thus wisely choosing more nutritious, economical, and environmentally-friendly foods: an action in which education plays a key role.

This is the reason why the public authorities must intervene to break down the physical, economic, and educational barriers which undermine the access to healthy food by the most vulnerable segments of the population.

<sup>29</sup> Maillot *et al.*, 2013.

<sup>30</sup> WWF, 2012b.

<sup>31</sup> Hakasson, 2015.

<sup>32</sup> Van Doreen, 2015.

<sup>33</sup> WWF, 2012b.



# LIVEWELL FOR LIFE: SUSTAINABLE DIETS FOR THE UNITED KINGDOM, FRANCE, SPAIN, AND SWEDEN

In 2011, the WWF-UK created the “LiveWell 2020” program. The initiative, developed in collaboration with the Rowett Institute of Nutrition and Health of the University of Aberdeen, which takes into account the nutritional guidelines of the British government, is aimed at changing the eating habits of the British and direct them towards a more sustainable diet that would lead to a 25% reduction in greenhouse gas emissions by 2020, as well as a decrease in the per capita consumption of meat from 79 to 10 kilograms per year.

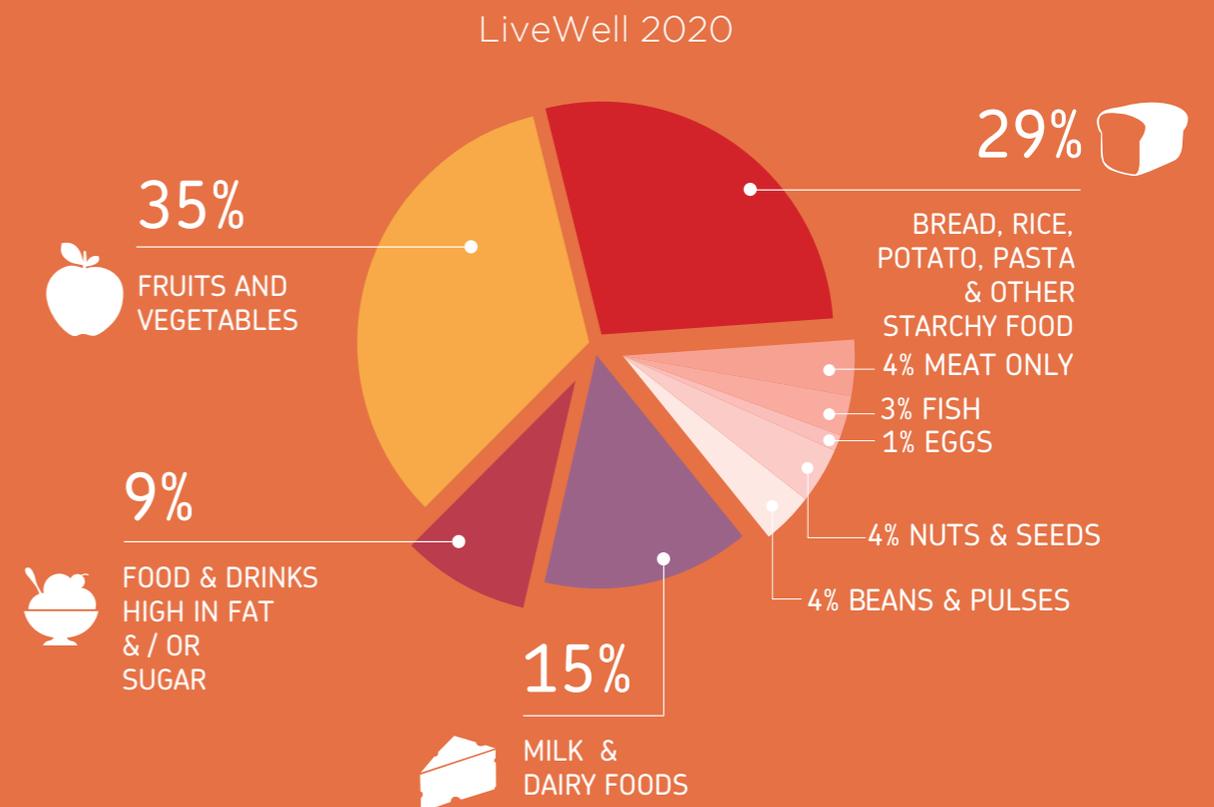
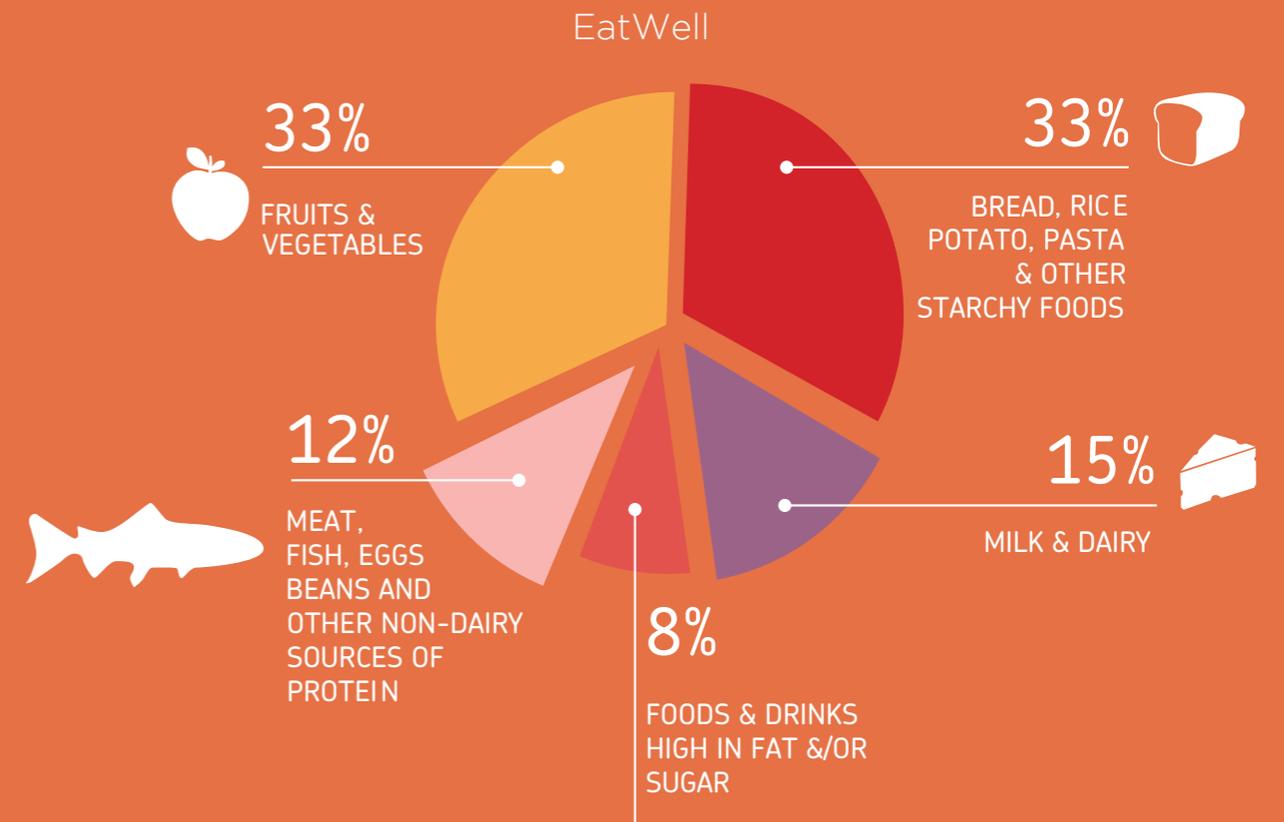
Therefore, starting with the EatWell Plate, a tool to graphically communicate the right proportions for a healthy diet that was developed by the Food Standards Agency in the UK, the LiveWell food plate (LiveWell 2020) proposes a slight revision to make it more sustainable. A substantial reduction in greenhouse gas emissions is even achieved by just limiting the consumption of animal protein and increasing those derived from legumes and nuts. The initiative has been broadened with “LiveWell for LIFE +” (LiveWell Plate for Low Impact Food in Europe), a project funded by the European Union and launched in February 2012 by the WWF UK, WWF European Policy Office, and the Friends of Europe think tank.<sup>34</sup> The program involved three countries: France, Spain, and Sweden. Here, the researchers identified dietary trends and, starting from real

consumption, created a local LiveWell Plate, with a cost equal to or lower than the precedent one. The results have been encouraging.

In France, the LiveWell diet could reduce greenhouse gas emissions by 25% and lower the average daily cost of food expenditure of a person, going from the current €4.90 to €4.36. The French should increase their consumption of legumes and cereals and reduce their consumption of meat and meat products.

In Spain, the LiveWell diet could reduce greenhouse gas emissions by about 27%, at a cost that is almost identical to the present one (on average €3.48 per day per person), by reducing people’s consumption of meat, dairy products, sugar, sweets and fruit-based products, and increasing their consumption of vegetables, cereals, and nuts. In Sweden, the LiveWell diet would reduce emissions by 25% at a slightly lower cost than the current diet (from 44.64 to 44.07 Swedish crowns per day): the proposed diet calls for a reduction in meat consumption and an increased consumption of fruit and vegetables.

<sup>34</sup> WWF, 2012b.





# THE RITUALS OF FOOD: THE SACRED NATURE OF DIETS

Food has been, and still is, an instrument that creates identity and borders. There are many cultural and symbolic-religious aspects of food, and even in multicultural contexts such as those of today, it is still a vehicle to preserve identities and, at the same time, of influence and encounter: when all is said and done, we still are what we eat.

In this chapter we will investigate what food has meant in the past for people and the 'religious' values that it still holds today.

## FOOD AND SOCIAL RITUALS

All the fathers of the social sciences (from Marcel Mauss to George Simmel and Émile Durkheim) stressed that food is first and foremost a social fact: eating is an act that is almost never done individually, not only because it is done mostly in company, but because even when dining alone, the way we act always refers to culturally and socially shared habits and choices. Every meal is the result of behavior that has been layered over time, of sedimented habits passed from generation to generation. Commensality is one of the most typical manifestations of human sociality.

There are different ways, times, and places to dine, but each society has established shared rules and the table has become a social space that governs the relationship between the people seated around it: think of the link between the distribution of the chairs around a table (round or rectangular) and the social role of the occupants, or the order of the dishes or even the diversity of foods consumed by the diners. The table becomes a small representation of the order that regulates society and the ritual of the meal takes on a strong symbolic value. The dining table is the physical and metaphorical place of belonging or foreignness, membership or exclusion, and all sorts of relationships that exist between the members of a community, within them, or among different communities on the outside.

Food sharing does not just have a ritual importance. The food preferences of each individual community actually represent one of the strongest social bonds we have. "Historically, national cuisines have been remarkably stable and resistant to change, and this is the reason why an immigrant's refrigerator is definitely the last place to look to identify signs of integration."<sup>1</sup>

# THE VALUE OF MEDITERRANEITY



One of the geographical areas that has produced sharing at the table is precisely the Mediterranean: not only is its diet a balanced mix of foods but it is also, and above all, the result of cultural and participatory social choices. The Mediterranean is thus presented as a macro-table, a cultural dining table, where the same ingredients appear in similar and different dishes and for plural cultures and religions. The Mediterranean diet promotes social interaction, seeing as the basis of its social customs and holidays is the sharing of a meal; it also gave rise to a considerable body of knowledge, songs, maxims, tales, and legends, and is based on respect for the territory and biodiversity. It guarantees the preservation and development of traditional activities and

crafts linked to fishing and farming in the Mediterranean communities, from Spain to Italy, Morocco, and Greece; Catholics, Sephardic and Ashkenazi Jews, Muslims, the Orthodox, and many others have produced and continue to produce dishes that are considered cultural and religious symbols. From the transmission of skills and knowledge of rituals, traditional gestures and celebrations to safeguarding techniques that nevertheless are simultaneously open to other influences and innovation, the Mediterranean diet is crucial for the development of sustainable and 'culturally compatible' practices.<sup>2</sup>

<sup>1</sup> Pollan, 2006.

<sup>2</sup> UNESCO, 2010.

## IDENTITY AND THE CULTURE OF FOOD

Cuisine is the symbol of civilization and culture; food is configured as a decisive element of human identity and as one of the most effective instruments to communicate it. The reason why there is specific eating behavior in every culture and religion is that this allows us to maintain our status: foods take on symbolic, and social values, and are capable of functioning as containers or carriers of identity.

History teaches us that it is the differences and the meeting of different cultures that generate an identity, precisely because it is not static or already written but changeable and constantly evolving. This is evident in the European Middle Ages when, compared to the past, a substantially innovative food and gastronomy identity was shaped due to the influence of different cultures: that of the Roman and 'barbaric' influence. The taste that one looks for on social occasions is a synthesis of historical and cultural forms that led the populations' food traditions to evolve in parallel with historical events.

The complex symbolic universe that links foods to the effects they have on the body (hot and cold, wet and dry), or to the way in which they are consumed (cooked or raw), and eventually to their being good and 'pure' or bad and 'impure', is related to the fact that food is a link between nature and culture. It is humanly universal because it is necessary, yet it is deeply variable, diverse, and arbitrary. Every kind of cuisine, from simple to more complex, from the north to the south and from east to west, subtracts the foodstuff from its 'natural destiny' to integrate it into a system of cultural combinations. For the anthropologist Claude Lévi-Strauss, the relationship humans have with food is similar to their relationship with language. The human tongue makes sounds because it is naturally predisposed to do so, but the language, grammar rules, syllables, phonemes, words, abstract speeches, poetry, song, and the expression of a particular vision of the world are the result of some of the countless cultural combinations in which the sounds can be articulated. The same thing happens in cooking: nutrition is the natural source of life, but the way in which people eat is entirely cultural.

Food culture is also formed and continues to be

formed on the basis of environmental and climatic influences; it changes according to historical events and people, whose migrations have enriched it with new elements. It is these influences that change the taste of individuals through two-way influences, but which nevertheless do not erase the differences. In Europe there is still a complex geography of food habits that are constantly being intermingled, but which continue to have a strong identity: an example of this is the consumption of beer and wine that, despite various influences, is still distributed in Europe around the center-north (beer) and the center-south (the wine). Although influenced by the standardization of consumption, local specificities therefore remain rooted in habits, perhaps especially at the popular level. It can be said that globalization has infused the discovery, or rather the rediscovery, of food identity with new meanings, and that, in this context, the differences seem bound to increase rather than to disappear. Today we have a new model of consumption based on an identity that is not only changing but also multiple: global and local, ethnic and fusion cuisine can now coexist. Food models and practices are the meeting points of different cultures, the result of the circulation of people, goods, techniques, and tastes from one part of the world to another. The livelier and more frequent the meetings and exchanges are – for example, in border areas – the richer and more interesting the food cultures (as well as cultures in general) are.

## THE SYMBOLIC VALUE OF FOOD IN RELIGIOUS FAITHS

Many rituals, ceremonies, and religious celebrations inevitably include the relationship with food. Precisely because it is a basic and universal element, food "is central to religion – as a symbol, the subject of prayer, as a sign of sharing and not sharing, and as an element of communion".<sup>3</sup> The symbolic value of food in the great religions cannot be underestimated.

<sup>3</sup> Anderson, 2005.

In Judaism a significant number of the 613 *mitzvot* (precepts) that guide the life of an observant Jew regards the food sphere and stems from important passages in the Old Testament. Most of these rules govern the consumption of meat, also because the prevailing interpretation of certain passages in the Bible leads us to believe that humanity was vegetarian at first, and became carnivorous only later, and by divine authority.<sup>4</sup>

Many Jewish and Muslim scholars and experts worked during the seventeenth and eighteenth centuries to prove the existence of scientific foundations as to why pork was forbidden in Islam and Judaism. It was thought that the reason for this taboo was that pork, which could not be suitably preserved in certain climatic zones, was the vehicle of diseases or that the animal's omnivorous diet made its meat difficult to digest. However, none of these reasons can really explain a prohibition that did not stem from 'scientific' reasons, but rather, from historical and cultural ones.

Besides the more famous case of pigs, there is no shortage of examples and they touch on the many various taboos concerning the meat of animals (from horses to cats, from dogs to snakes, and to cows, considered by Hindus as sacred, but not unclean), on fish without fins and without scales, on mollusks and crustaceans for the Jews, and certain foods at certain times of year, such as milk, eggs, and their derivatives for Orthodox Christians when they are preparing for Christmas and Easter. According to Jewish tradition, the act of eating teaches how to make continuous choices and verification, thus defining man's relationship with nature, and complies profoundly with sacredness. In this vision, "diet becomes a ritual, a way of being and acting sacredly, an instrument of perfection; it is not just a way to survive and a biological necessity, but also a system of cultural affirmation."<sup>5</sup>

In religious traditions, the rule is the separation between pure and impure. The idea of purity and impurity is deeply linked to that of contamination, and therefore the rites that each of us enact to avoid it: examples of these are the habit of washing one's hands, maintaining a certain distance from strangers, changing dishes between one course and another, and emptying the garbage, as Italo Calvino wrote

in *La poubelle agréée* (The Agreeable Trash Can) when he lived in Paris, between 1974 and 1976.

## THE SACRALIZATION OF FOOD CONSUMPTION

The sacred nature of consumption is a real aspect in the field of consumer behavior studies, which investigate how goods, services, places, stores, brands, etc., possessing entirely profane and earthly characteristics can become something sacred for consumers, taking on characteristics that are typical of the sphere of the divine and the supernatural.<sup>6</sup> So it is not really surprising that one of the most successful books on gluten-free nutrition that came out recently – *The Gluten Lie and Other Myths about What You Eat* (2015) – was written by a professor of religion at the James Madison University, Alan Levinovitz. In recent years, diets seem to have undergone a progressive process of 'sanctification'. Not only have they lost a merely functional value linked to food and the livelihood of individuals, charged with meaning, value, and symbolic aspects related to culture, ethnicity, individual identity, but they have become actual 'manifestations of the sacred'.

The rituals related to food, from the choice of food (what and why) to how and when to eat them, have become *hierophanies*.<sup>7</sup> Thus, for most people dietary regimes are a totally earthly thing, and, in most cases, more than having to follow requirements, typical of a *regime*, they are limited to observing dietary *habits*.

<sup>4</sup> Di Segni, 1986.

<sup>5</sup> Ivi.

<sup>6</sup> Belk et al., 1989

<sup>7</sup> From the ancient Greek *hierós*, 'sacred', and *phainein*, 'to appear', the term *hierophany* was introduced by the historian of religions Eliade (1959) to precisely indicate the act by which the sacred manifests itself, something which recognizes a completely different order than the earthly one, a reality that does not belong to our world (Deane and Doty, 1965). Implicit in Eliade's thought is the idea that the sacred does not manifest itself at all. A sacred stone continues to look like all other stones except for those willing to see a revelation of the sacred in it (Belk et al., 1989). The fact that the stone retains its physical and earthly characteristics does not mean that it is not a manifestation of the supernatural, but that its sacred nature appears to only a few ... the privileged, favored, and chosen.



For others, however, especially those who have embraced a diet that could be called non-mainstream (low carb, grain free, gluten free, vegan, vegetarian, Paleo, Dukan, Atkins, etc.), the experience of their diet definitely connotes religious elements. People who adopt a certain diet embark on a journey that has many of the characteristics of a real *pilgrimage*.<sup>8</sup> In consumers' stories,<sup>9</sup> the path of their diet is often described as a road they have travelled down with sacrifice and effort, leading to a situation where they feel impure and unworthy of a progressive state of well-being and happiness. The process of going from fat to thin, from sickness to health, or from ugly to beautiful, brings with it many of the values that are related to the processes of transformation, real rites of passage, from a profane and earthly dimension to a higher, transcendental one where physical, as well as spiritual, well-being is reached. And therefore in the liminal processes, sa-

credness does not manifest itself in an exclusively individual dimension, but is expressed in terms of sharing, fellowship, and support among many individuals who are simultaneously traveling along the same path.<sup>10</sup> Diets are a kind of glue: a source of aggregation bringing together those who not only eat in the same way, but who also share the same ideals and the same beliefs which are manifested in a shared lifestyle and philosophy of life.

<sup>8</sup> Turner and Turner, 1978. It is not uncommon to come across postings like this on the Internet: "My Pilgrimage Through a Fad Diet", available on <http://www.fringesport.com/blogs/news/77713348-my-pilgrimage-through-a-fad-diet>.

<sup>9</sup> Nosi and Rugnone, 2015.

<sup>10</sup> Turner, 1974



### Diet Gurus: the creators of charismatic diets

A further element that suggests a process of the sacralization of diets regards the people who popularize them. In 2005, “Forbes” published a ranking of the most important American Diet Gurus<sup>11</sup> which included, among others, Berry Sears (Zone diet), Arthur Agatston (South Beach diet), and Robert Atkins (Atkins Nutritional Approach). The creators of these diets are often considered to be geniuses, magicians, or saviors, and the sentiments expressed towards them are of profound gratitude, devotion, and love. Just as in religion, where there are individuals who are considered sacred – such as the deities, saints, prophets, and church ministers –, in the world of food, the creators of the most popular

diets also achieve this status. They become charismatic leaders able to exert an influence over their followers, those who marry their ‘belief’ in addition to their diet, often turning them into real evangelists. People who are so involved and devoted to a food style from which they draw miraculous benefits can feel compelled to proselytize and convince as many people as possible to abandon their eating habits and to ‘convert’.<sup>12</sup> It is no coincidence that now, in the case of the Paleolithic diet, there are many blogs that offer tips on how to defend oneself from a ‘Paleo evangelist’ or make a quick getaway from a ‘Paleo conversation’.

<sup>11</sup> Lacey, 2005.

<sup>12</sup> Miotto, 2016; Nosi and Rugnone, 2015.

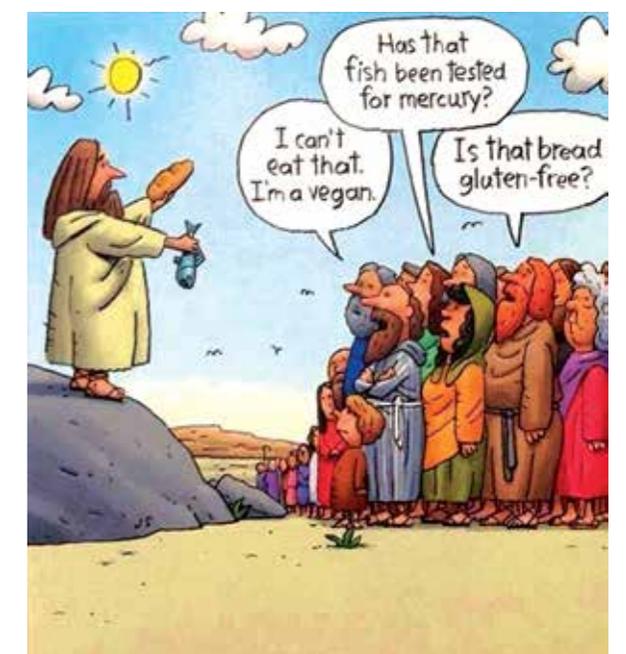


### TODAY'S FOOD TRENDS

We have already mentioned some of the contemporary food trends: the relentless individualization of the meal, which leads to lunches and dinners increasingly being eaten alone, and at the same time, doing other activities (eating in front of the computer screen, sending e-mails, etc.); the dynamics of food integration whereby other people’s sets of rules and habits are acquired, while simultaneously maintaining the system of values of their cultural background (eating a pizza topped with kebab meat). More generally, there is an ongoing process of hybridization, of a pluralism that is conducive to the connection between elements of the original culture and the host culture and the emergence of new and more complex cultural configurations. Another trend is fasting, the lack of food not only for a physical purpose. Among the various circumstances of the absence of food for religious reasons (from prohibition to negation), fasting is found in many traditions; here we are interested in emphasizing that in the third millennium, the most complete form of the absence of substance-food is, paradoxically, a condition of aggregation, which can lead to commensality practices. Thus in different cultures and societies, fasting is experienced together and not alone: people share, help and motivate one another, and together they wait for the time when their renunciation comes to an end.

The latest trend is paradoxically the reversal of the relationship between food and religion: religion not only influences and is embodied in food, but food

itself becomes religion, taking on its sacred character and the set of rules and taboos which, however, is self-based and free from religious reasons. Adherence to dietary rules as if they were religious requirements, the social and cultural sanctions levied on some consumption that is considered improper or unethical, the sense of belonging of those who share a certain food life-style (“all those who” ... feel, above all, they are vegetarians or vegans, “those who” ... do not eat red meat, “those who” ... drink water with lemon every morning) are the consequences of a society where the weakened traditional religious sense is expressed in new forms of practices and beliefs that create other social and cultural ties.



# DIETS AND FOOD TRENDS



**B**alanced and healthy; ‘miraculous’; ethical, ‘trendy’: there are so many kinds of diets. Beyond the motivations for adopting them, not all of them are advisable from a nutritional point of view, and in fact in some cases, the excessive imbalance may even be harmful. Let’s take a look at them together.<sup>13</sup>

## LACTO-OVO VEGETARIAN DIET

The lacto-ovo vegetarian diet is based on grains, vegetables, fruit, legumes, seeds, nuts, dairy products, and eggs. This model can reduce the risk of chronic diseases due to a low consumption of saturated fat and cholesterol and higher intakes of phytochemicals found in foods of plant origin.

## FLEXITARIAN AND CLIMATARIAN DIET

The flexitarian, or reducetarian, diet is a vegetarian diet that occasionally includes meat and/or fish. More than a diet, it is a community, a movement, in which one tends to eat fewer animal derivatives in general. The commonest reasons behind this choice is its health effects, concern for the environment, and the welfare of farm animals. The reasons vegetarians give for their choice include economic and ethical motivations, religious beliefs, and the inequitable distribution of food among the world’s population. The cornerstone of the climatarian diet is environmental protection and differs from the flexitarian diet for its consumption of white meat.<sup>14</sup>

## VEGAN DIET

The vegan model prescribes the exclusion of eggs, dairy products, and sometimes honey, as well as other animal products.

According to the Academy of Nutrition and Dietetics, appropriately planned vegetarian diets, including vegan diets, are healthful, nutritionally adequate, and can contribute to the prevention and treatment of certain diseases only if they are planned appropriately.

## RAW FOOD DIET

This diet consists mainly or exclusively of raw foods and food processed at temperatures below approximately 40°C. In most cases it is a vegan diet based on fruit, vegetables, nuts, and sprouted seeds, grains, and beans. In rare cases, unpasteurized dairy products and raw meat and fish are consumed. The theory at the basis of this diet is that heat degrades most of the vitamins, phytonutrients, and enzymes found in food. Eliminating high-calorie processed foods can result in weight loss; however, there is a risk of nutritional deficiencies and microbial contamination of uncooked foods.

## MACROBIOTIC DIET

The macrobiotic diet is based largely on grains, legumes, and vegetables, whereas fruit, nuts, and seeds are used to a lesser extent. This is not really a purely vegetarian diet since it allows a limited amount of fish. Those who follow this dietary model attempt to balance the elements of yin and yang in food in order to improve the welfare of the person and to treat certain diseases. There is no scientific evidence to support these recommendations.

## GLUTEN-FREE DIET

Gluten is a protein found in grains such as wheat, spelt, barley, rye, hulled wheat, and triticale, and in people with celiac disease and gluten sensitivity, it triggers an autoimmune reaction. For individuals suffering from these diseases, diet is an essential medical treatment. However, a growing number of people follow a gluten-free diet to lose weight or to have health benefits that are often unproven.

Moreover, by choosing processed, packaged, gluten-free food, one tends to consume more sugar, fat, and salt.

## PALEO DIET

Those who follow this diet choose foods that can (or at least could) be hunted, fished, and gathered: meat, fish, shellfish, poultry, eggs, vegetables, roots, fruit, and berries. This diet excludes grains, dairy products, legumes, sugar, and salt. The elimination of high-calorie processed foods may be the explanation of any weight loss. At the same time, the exclusion of specific food groups such as grains and dairy products are not a guarantee for weight loss or improved health, and a balanced diet could lead to the same effect and would be easier to sustain.

## DETOX DIET

Detox diets are varied, but they generally have a common denominator: a period of fasting followed by a strict diet of raw vegetables, fruit and fruit juices, and water. Some detox diets include the use of herbs and other supplements for the intestine. There is little scientific evidence regarding their ability to eliminate toxins from the body, whereas the kidneys and liver consistently and effectively carry out this function.

## DUKAN, ATKINS, SOUTH BEACH DIETS

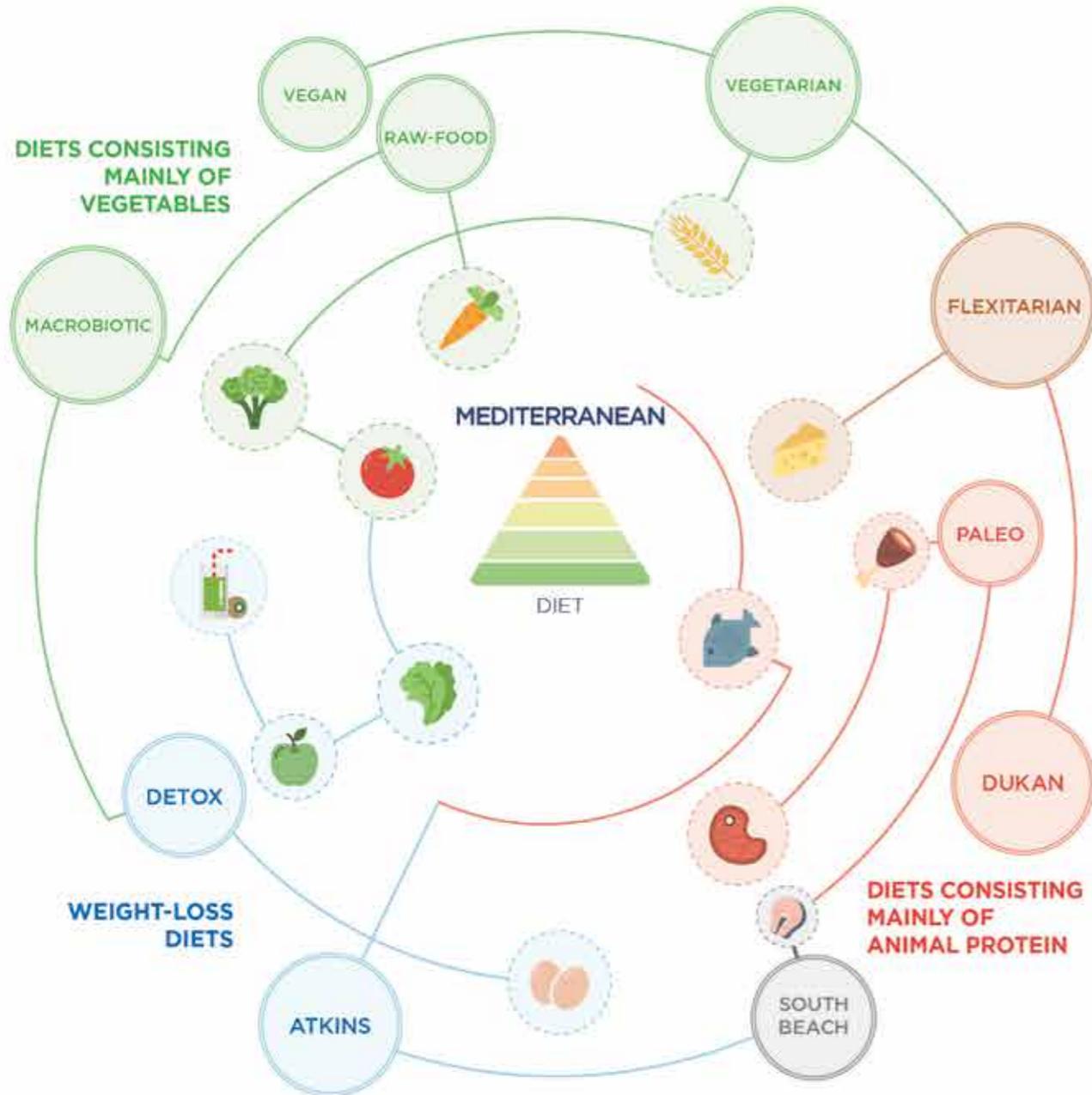
Dukan, Atkins and South Beach are diets that are high in protein and low in carbohydrates. These are strict diets that provide for an initial exclusion of entire food groups, and their gradual reintroduction. These restrictive eating patterns generally work in the short term but do not pay off in the long term, and can cause serious nutritional deficiencies.

<sup>13</sup> American Academy of Nutrition and Dietetics Position Papers <http://www.eatrightpro.org/resources/practice/position-and-practice-papers/position-papers>.

<sup>14</sup> [http://www.huffingtonpost.com/entry/climate-friendly-diet\\_us\\_5682e446e4b0b958f65a9933](http://www.huffingtonpost.com/entry/climate-friendly-diet_us_5682e446e4b0b958f65a9933)

# TRENDY DIETS

The **Mediterranean diet** includes a balanced consumption of all foods, without exceptions



## WHAT SHOULD WE EAT?

The foods allowed in each diet

Index	meat	fish	eggs	dairy product	honey	cereals	bakery	fruit	vegetables	potatoes & tubers	legumes	dried fruit
MEDITERRANEAN												
VEGAN	•	•	•	•	•							
MACROBIOTIC			•	•	•		•					
RAW-FOOD	•	•	•	•	•	•	•			•		
VEGETARIAN	•	•										
FLEXITARIAN												
PALEO				•		•	•			•	•	
DUKAN												
SOUTH BEACH						•	•			•		
ATKINS						•	•			•		
DETOX	•	•	•	•	•	•	•			•	•	•

The transparent foods indicate a consumption that is sporadic and/or reserved for specific variants of the diet

## REASONS FOR ADOPTING A DIET



HEALTH & WELLNESS



ETHICS



RESPECT FOR THE ENVIRONMENT



LOSING WEIGHT

## Food phobias and the 'demonization' of food

Another factor that characterizes sacredness, which is highly visible in the current approach to diets, is the ambivalent reaction one has when dealing with divine power, which combines fascination and devotion with feelings of fear and repulsion, and this is known as kratophany.<sup>15</sup> If one believes in the supreme Good, they implicitly admit that there is also Evil. While the events of Good are benevolent, pious, holy, and pure, those of Evil are bad, diabolical, and impure. Therefore, from the obvious consideration that some foods are 'good' while others are 'evil', this leads to a real demonization of certain foods: for some people – even though they do not have celiac disease – it is gluten, for others, carbohydrates, and for others, only refined carbohydrates, accused not only of being the cause of obesity, but also of causing physical injury and various diseases, including brain diseases. And all this happens in a crescendo of opposition between good and evil based on beliefs that seem to have more to do with faith, superstition, and taboos than with any scientific evidence.<sup>16</sup> The opposition between what is pure and what is impure, between what is virtuous and what is contaminated, through a process of objectification of good and bad in foods, is definitely another element that reinforces the idea of the sacralization of diets. This is why some diets

are attributed with a real *miraculous power*, typical of the legends and mythological tales, such as the ability to heal or rejuvenate. At the same time, while recognizing the sacred in diets, and thus their kratophanic power, one is instilled with fear. They feel *guilty* for straying, for *giving in to the temptation* to eat something that they should not have, and are ready to *sacrifice themselves* to recover that state of rigor and *purity* achieved before they had *erred*.<sup>17</sup> That which is sacred has an influence on human behavior independently, and in fact often contrarily, of objective reasoning.<sup>18</sup> The sacred is something absolute that, in order to be believed, does not need rational and logical arguments: it is based on mystery and dogma. Religion is an act of faith. But if today's approach to a diet is similar to the way one approaches a belief and a philosophy of life, it would be appropriate to reflect on how to undertake communication in this field and what the most effective persuasive arguments are. And it is quite clear that, if this is how things really are, science risks having only a marginal role.

<sup>15</sup> Durkheim, 1975.

<sup>16</sup> Levinovitz, 2015.

<sup>17</sup> Nosi and Rugnone, 2015.

<sup>18</sup> Callois, 1959.



# CARBOPHOBIA



High-protein, low-fat, sugar-free, gluten-free diets: people are looking for the their desired foods, the eating style that will finally allow them to get into perfect shape. Most of the time, those seated at the table who choose a 'reductionist' approach only enter into a vicious cycle of fasting, sacrifices, relapses, and attempting other new diets. The current enemy seems to be carbohydrates. According to a recent survey, 29% of Americans are trying to avoid their intake, and Italians are beginning to follow suit. This negative attitude towards bread and pasta has been spreading for some years, so that in 2005 the physician and author Michael Greger gave it a name: carbophobia. The driving force behind the fear of carbohydrates is a series of trendy books and diet programs, such as *Wheat Belly* or *No Sugar No Grains*, none of which are supported by a scientific background. Moreover, none of the researchers or articles published in the most accredited scientific journals supports the underlying thesis of the carbophobic diets. Where does this strange trend come from? Probably from so-called nutritionism, a term coined by Michael Pollan in his book *The Omnivore's Dilemma*: the mania of judging the value of a diet not according to the food, but only with respect to their nutritional

composition. The author also ponders on our daily difficulties in having to choose from an endless variety of foods in a social context that leads us further and further away from our own culture and tradition. So this is why we need shortcuts to choose what to put on our dinner table: categorizing them as 'good' or 'bad' is the simplest way. From a nutritional standpoint, diets that exclude carbohydrates are unbalanced, and are not sustainable in the long term. If all carbohydrates were really bad for us, then the consumption of foods such as fruit, vegetables, and whole grains would also have to be reduced. And this would deprive the body not only of the energy it requires, but also of essential nutrients like vitamins and minerals. In conclusion: no diet that is based on the elimination of a specific nutrient works, and to obsessively select only certain types of 'good' foods only makes sense if you want to lose weight quickly, with the near certainty of regaining it quickly, even with 'interest'. Eating healthily and maintaining a balanced relationship with food is a long, difficult path full of compromises, where there are no easy solutions, but the rewards in terms of health, longevity, and taste will no doubt be the best achievement.

# ORTHOREXIA: WHEN EATING HEALTHILY BECOMES A DANGEROUS OBSESSION

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Orthorexia has been described by Steve Bratman as an obsession for a healthy diet. What could be wrong with wanting a healthy diet, considering that there are many professionals working to promote proper eating habits? But when the natural desire to improve one's diet leads to a form of obsession, the consequences can be dangerous. Although it is not yet a clinically recognized disorder, orthorexia is spreading and gaining media attention. Unlike anorexia or bulimia, orthorexia is not characterized by the desire to be thin. The driving force is the desire for perfect health and a state of 'purity', which often finds a positive reinforcement within society.

The people who are affected by it start by choosing organic and whole foods, with specific nutritional characteristics. Then they go on to the complete exclusion of 'impure' foods in an obsessive search for 'cleaner and cleaner' foods until their restrictive behavior leads them to exclude almost all foods, which interferes with their quality of life. Orthorexic people end up avoiding social situations for fear of not finding the foods allowed in their diet.

With the spread of nutritionism and food trends in fashion in affluent societies, the relationship with food is becoming less serene, leading to a loss of the classic reference points and pleasure that have traditionally been associated with the dinner table.



# WHAT INSTITUTIONS CAN DO



The BCFN Foundation is profoundly convinced that the adoption of sustainable diets and an improvement in the functioning of the food system will significantly contribute to achieving the sustainable development goals, especially in light of what emerged from the COP21, and it hopes that institutions and policy-makers at the national and international level consider nutrition as the key to a more sustainable economy. In particular they should:

## INFORM, EDUCATE, ADDRESS



Make sure everyone has fully understood the vital role the agricultural sector plays in sustainable development, by increasing their awareness of the great environmental impact of food, especially among young people. This requires developing ambitious and long term political programs that would lead families and schools to consider education on the proper use of food, without excess or waste, as one of the primary tools for ensuring the welfare of the younger generations.

## LEARN FROM EXPERIENCE



Avoid repeating past mistakes, and learn from the experience acquired through the programs and projects for the promotion of sustainable diets that have already been carried out in different countries. It is therefore necessary to set up an open database of the research and best practices to support governments and institutions responsible for making decisions and the actors who will have to implement them.

## CREATE NETWORKS



Involve the operators of the entire food chain and the sectors that have a direct or indirect impact on eating habits in food programs, periodically monitoring and measuring the progress achieved: public institutions, manufacturers, farmers, households, distributors, restaurants and caterers, schools, and NGOs.

## CONSIDER THE DIFFERENCES



Include specific objectives, relying on adequate financial resources, that take into account the dietary habits and traditions of each country. Establish a combination of objectives and regulatory measures aimed at all those involved and which makes the implementation of social programs to promote a sustainable diet possible.

## START WITH THE CITIES



Consider the commitment towards cities as a priority. That is where there is the greatest concentration of unhealthy eating practices that cause waste, pollution, and malnutrition, and produce harmful effects that primarily affect the most vulnerable sections of the population. In an era when more than half the world's population has left the countryside and the urbanization rate is the highest in history, this is the only way to facilitate the transition to a more sustainable food system.

# WHAT YOU CAN DO



Given the importance of food for the welfare of people and the environment, the BCFN Foundation offers the following reasons to induce people to adopt sustainable eating habits.

## HEALTHY EATING FOR LIVING BETTER AND LONGER



Prevention through nutrition is a priority for everyone. The moment a person decides what to eat, they become responsible for their own health. Obesity and other non-communicable diseases can be the result of improper lifestyles, due to the combination of an unbalanced diet and insufficient physical activity. Eating properly can lengthen and improve one's life.

## IT IS BETTER TO USE YOUR HEAD AT THE DINNER TABLE



Food choices should always be the result of conscious decisions, based on scientific evidence and accredited expertise. Barring specific pathologies, there are no foods that are prohibited or miraculous: it is best to stay away from fads, even when they are promoted by the social media and showbiz personalities.

## IF IT'S GOOD FOR YOU, IT IS ALSO GOOD FOR THE ENVIRONMENT



A correct diet is more sustainable from an environmental point of view. Adopting balanced eating habits is not only a responsible choice for oneself, but it is also a form of respect towards others. There is all the necessary scientific evidence showing that a nutritionally correct diet can significantly reduce our impact on the planet.

## YOU CAN EAT HEALTHILY WITHOUT SPENDING MORE



A proper, balanced diet does not necessarily cost more, but it requires a greater awareness of the correct combination, quantity, and frequency of consumption of foods in the food pyramid. Therefore, the prerequisite of the sustainability – including economic – of a diet is that it spreads correct nutritional information and points to reviving the traditional local culinary culture.

## NOW THAT YOU KNOW, PASS THE WORD ON!



Awareness is not enough. In order to get people to change their behavior, and counteract the current trends, it is necessary to involve all the actors in the food system. For this purpose, it is necessary to foster collaboration by asking schools, companies, distributors, and the media to implement actions, services, and products inspired by the guidelines of a sustainable diet. Spreading this material is also a contribution to raising awareness on these issues.

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Access to food and malnutrition: the BCFN reflects on how to promote a better food system on a global scale and how to enable a more equitable distribution of food resources, encourage social welfare, and reduce the impact on the environment.

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The relationship and the delicate balance between diet and health: the BCFN has collected the recommendations of scientific institutions around the world and of the most qualified experts, and explains its proposals to facilitate the adoption of a proper lifestyle and a healthy diet.

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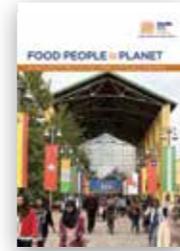
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