



Obesity: the impacts on public health and society


**Fondazione
Barilla**
il tuo cibo, la tua terra
people, environment, science, economy

THE BCFN CONTRIBUTION TO THE MAJOR ISSUES IN FOOD AND NUTRITION

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



► FOOD FOR ALL

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



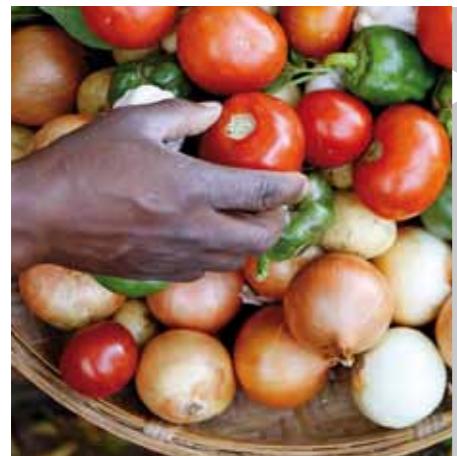
► FOOD FOR SUSTAINABLE GROWTH

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



► FOOD FOR HEALTH

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



► FOOD FOR CULTURE

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



THE VISION OF BARILLA CENTER FOR FOOD & NUTRITION

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

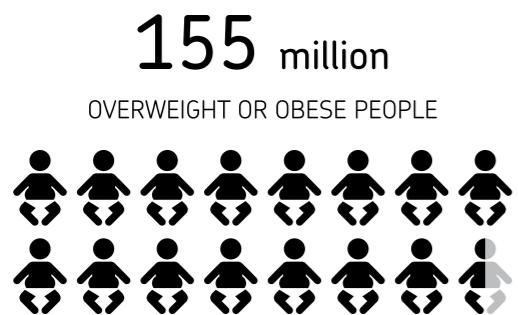
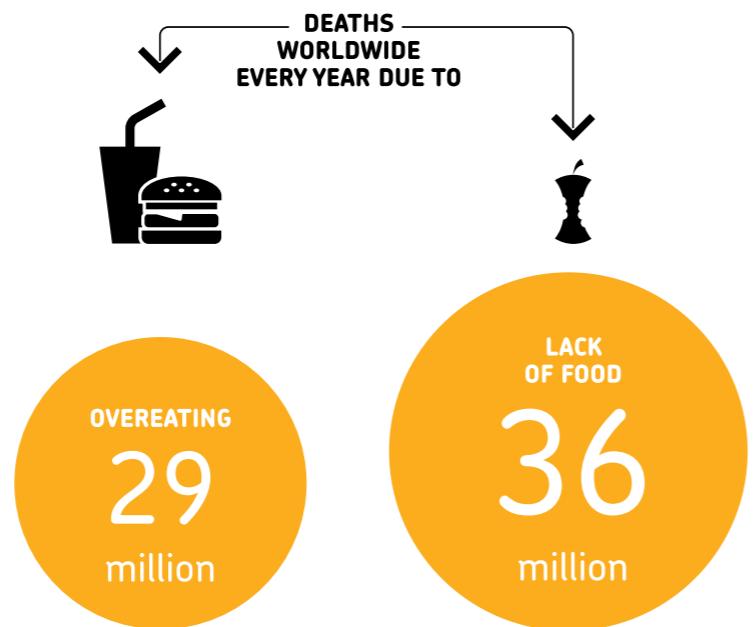
These topics under study are broken down into four areas: Food for Sustainable Growth, Food for Health, Food for All and Food for Culture. The areas of analysis involve science, the environment, culture and the economy; within these areas, BCFN explores topics of interest, suggesting proposals to meet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

THE CURRENT PARADOXES ON FOOD AND NUTRITION

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

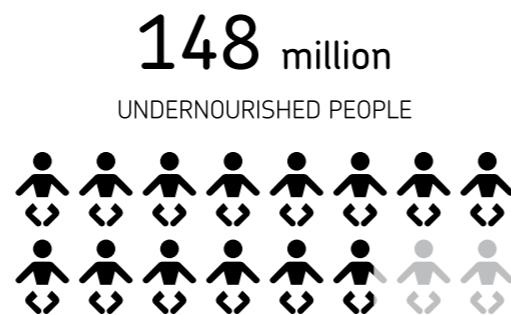
EXCESS OF FOOD OR ACCESS TO FOOD?

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



CHILDREN

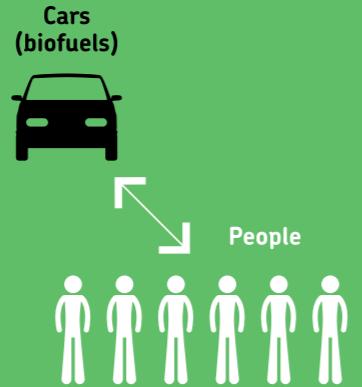
For the first time in fifty years, the new generations will have a shorter life expectancy



FEED PEOPLE OR CARS?

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

THE COMPETITION BETWEEN:



IS COMPETITION BETWEEN:

Car-owners
1 billion

People with difficulty in having access to food
2 billion

DID YOU KNOW?

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

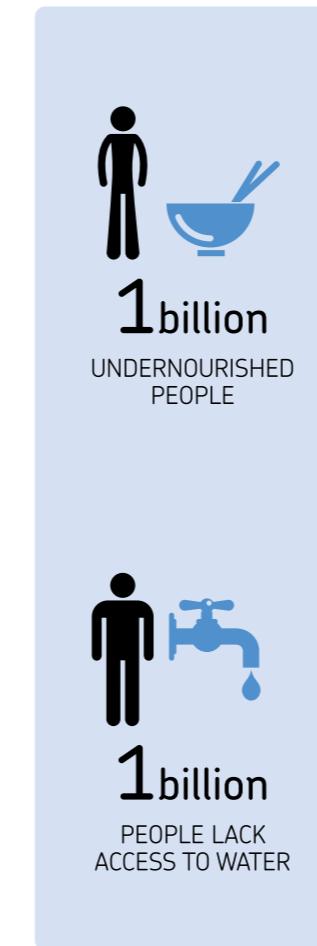


55%
is used for food

45%
is used for the production of ethanol for fuel

NOURISH PEOPLE OR ANIMALS?

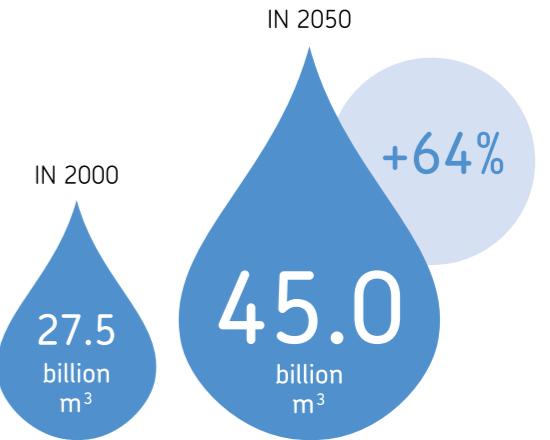
There are about three billion farm animals on the planet. A third of the global food production is destined for their nutrition and these animals contribute significantly to climate change factors. In fact, it is estimated that they are responsible for at least **50% of the agricultural emissions**



GLOBAL FOOD PRODUCTION USED THEIR NUTRITION



ANNUAL GLOBAL WATER DEMAND FOR LIVESTOCK





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Dear Reader,
Obesity is on the rise worldwide and it raises concerns because of its negative effects on people's health and on the sustainability of current and future healthcare systems. Not only are Western countries hit by this phenomenon, but many emerging countries are also being affected.

A few figures will suffice to understand the gravity of the situation: according to World Health Organization projections, in 2015 approximately 2.5 billion adults will be overweight, 700 million of whom will be obese. The spread of obesity in children is even more startling: worldwide, one school-age child in ten is obese or overweight, which is equal to 155 million children, 30-45 million of whom are classified as obese.

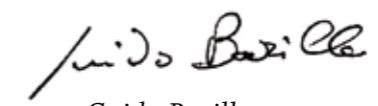
These people are living in an uncomfortable condition from the viewpoint of quality of life and the risk of chronic diseases, with a high probability of a reduction in life expectancy.

The importance and urgency of this topic has driven us to do an in-depth investigation of the phenomenon, in relation to the diet and lifestyles adopted, as well as the various factors that combined to create this current state of overweight and obesity in the world and its resulting consequences. We considered the importance of the environment we live in, the characteristics of the family and workplace, the responsibility of the schools, the policies of governments, and the role of the food industry and retail distribution.

This work contributes to the understanding of this complex phenomenon and indicates specific proposals for intervention. However, here I would like to emphasize a point that is general in nature: there are no easy and unequivocal solutions when dealing with topics of this scope and magnitude. To slow down and reverse the epidemic in progress, it is necessary to drastically increase every individual's awareness of the impacts of obesity on individuals and groups, and enact multi-stakeholder, medium-long term plans involving institutions, food production chain entities, and individuals in joint actions aimed at significantly and permanently changing people's choices and behavior.

The road will be long and challenging, but if everyone does their part, the outlook for a better, healthier life will be possible for all.

Enjoy the read!


Guido Barilla
Presidente BCFN

EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

THERE ARE 1.5 BILLION OVERWEIGHT PEOPLE IN THE WORLD, HALF A BILLION OF WHOM ARE OBESE

OBESITY COSTS BETWEEN 2%-8% OF HEALTHCARE SPENDING

The World Health Organization (WHO) has recognized that obesity is a global epidemic. It has been demonstrated that overweight and obesity represent crucial risk factors for the onset of different chronic diseases which are responsible for 60% of deaths worldwide. This has led the European Association for the Study of Diabetes (EASD) to recognize the prevention and treatment of obesity as “the most important public health issue worldwide.”

Globally, about 1.5 billion adults are overweight and among them, 200 million men and about 300 million women are obese (WHO). These values have doubled compared to values in 1980 and projections estimate that by 2015, about 2.5 billion adults will be overweight and 700 million will be obese.

This phenomenon has some significant impacts on society from the point of view of costs linked to treatment of disease and its complications (personal medical care, hospital care, healthcare, and drug services). Direct costs linked to obesity represent a 2%-8% share of total healthcare costs worldwide (WHO); healthcare spending incurred by an obese person is on average 25% higher than that of a person of normal weight (Withthow and Alter, 2010). Another significant share of costs, defined as *indirect* costs, is linked to the loss of productivity. The reasons which have led to the explosion of the obesity phenomenon and the differences in the prevalence of this condition found among different social groups are cultural and economic in nature, besides being purely biological and epidemiological.

Factors such as education levels, income, and social status seem to be determinant factors relative to the likelihood of an individual becoming obese.

Childhood obesity, particularly in Western countries, represents a growing problem with remarkable healthcare and social significance. Scientific literature has, in fact, pointed out the existence of a consolidated relationship between cases of overweight/obesity in childhood and in adulthood (Sandhu *et al.*, 2006; Dietz *et al.*, 1998). For this reason, childhood obesity is critical for the phenomenon to last throughout an individual’s entire lifetime, with significant consequences due to the increased likelihood of contracting chronic diseases such as diabetes, hypertension, cardiovascular diseases, and cancers in adulthood.

Overweight and obesity also have important implications in the work environment, generating a negative impact on workers as well as employers. In fact, different studies show that, on average, overweight or obese people earn lower salaries, are excluded from certain types of occupations (such as sales or customer relations), and are victims of discrimination in the workplace. Furthermore, companies incur costs linked to absenteeism (Finkelstein, Fiebelkorn and Wang, 2005; Ricci and Chee, 2005), lower productivity at work due to health problems or “presenteeism” (Ricci and Chee, 2005), and disability (Sturm, Ringel and Andreyeva, 2004). According to a recent study (Finkelstein *et al.*, 2010), the annual cost attributable to obesity

among full-time employees in the United States would amount to circa 73.1 billion dollars. From the point of view of environmental impact, food consumption that is constantly above the recommended calorie requirements by a growing number of people, especially in Western countries, not only represents a risk to health, but also puts more pressure on natural resources and the environment. In this regard, scientific literature includes overeating among food waste (Smil, 2004).

Governments (national and supranational) have the duty to intervene first to reduce the problem of obesity. The potential tools at their disposal are:

- the use of different forms of information, education, and persuasion to make individuals more aware of their own behavior (dietary and not), and its correctness;
- favor the availability of healthier eating options (or facilitate access to healthier options which already exist) and create the presuppositions to combat sedentary lifestyles;
- impose rules or use tax measures to discourage consumption of certain products.

Different countries have recently initiated (or are still in the phase of studying) interventions concerning the taxation of certain categories of products. However, the use of taxes as a tool in this context remains a much-debated topic. This is a direct intervention and from the point of view of costs, it is one of the most advantageous measures. However, issues of equality, difficulty in the choice of foods to be considered, and uncertain effects on long-term eating habits may arise. In any case, without the simultaneous implementation of interventions favoring the selection of healthier alternatives and the consumer’s actual accessibility to them, it does not seem to be a measure that can have a significant impact on behavior.

The proper execution of governmental programs also requires involvement by the food and retail industries, in consideration of their significant role in defining product offerings, and the communications skills of these players, which are able to influence end user demand and the composition of food consumption. In recent years, consistent with the progress of nutritional science and their role in society, companies have begun to execute positioning policies, developing the range, marketing, and promotion of dietary education, and sponsoring sports and physical activities aimed at supporting governments’ commitment to combating overweight and obesity.

Some winning factors can be identified from an analysis adopted by some OECD countries to prevent obesity and its consequences (Sassi, 2010):

- combination of many interventions put into action by the relevant players, which produce their effects over different time horizons;
- high participation in the individual interventions by the relative population;
- sustainability of the effects of the interventions on people’s behavior in the long term.

Furthermore, it is fundamental that the various interventions be combined into a medium-to long-term prevention strategy (to avoid the risk of suspensions or slowdowns due to the emergence of more contingent needs or political changes), which covers different age groups and groups at risk while it represents an effective solution at a sustainable cost, guaranteeing health gains that are greater than individual interventions (to be evaluated with suitable systems of measurement).

Having taken all these elements into account, the BCFN has identified seven priority recommendations to deal with the obesity epidemic.

- ① *Inform and mobilize public opinion.* Make public opinion more aware and reactive to obesity’s consequences on health, its impact on society, and its economic and environmental costs.
- ② *Plan a joint government-private sector commitment.* Activate integrated and coordinated medium- and long-term plans to combat obesity which involve all the major players concerned.

IN THE FIRST PLACE, IT IS THE GOVERNMENTS WHICH MUST INTERVENE

THE INVOLVEMENT OF THE FOOD INDUSTRY AND DISTRIBUTION IS NECESSARY

THE 7 RECOMMENDATIONS OF BCFN

- ③ *Spread the culture of prevention.* Educate people on the concept of a *limit* and transmit the culture of prevention so that healthy behavior increasingly becomes a conscious choice.
- ④ *Teach healthy habits in childhood.* Reinforce establishments which educate and inform young people.
- ⑤ *Use the tool of price in a balanced manner.* Carefully evaluate the pros and cons of introducing tax disincentives such as taxes on junk food.
- ⑥ *Encourage commitment from industry and retail.* Get the food industry and retail involved in public health initiatives promoted and led by governments.
- ⑦ *Combat the obesogenic environment.* Combat the factors that lead to taking on improper lifestyles and food choices which make it difficult to make healthy choices.



OBESITY: IMPACTS ON PUBLIC

HEALTH AND ON SOCIETY

CAUSES



Ample supply of low-priced foods that have a high caloric intake and a low nutritional value



Progressive drop in food and beverage prices and a worldwide increase in per capita income and more extensive purchasing power



Labor conditions: increased outsourcing that causes long workdays and very sedentary lifestyles

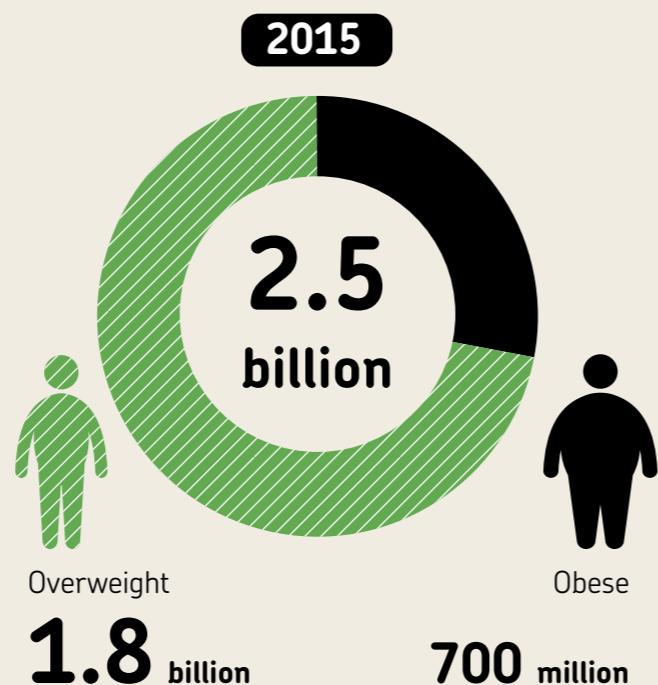
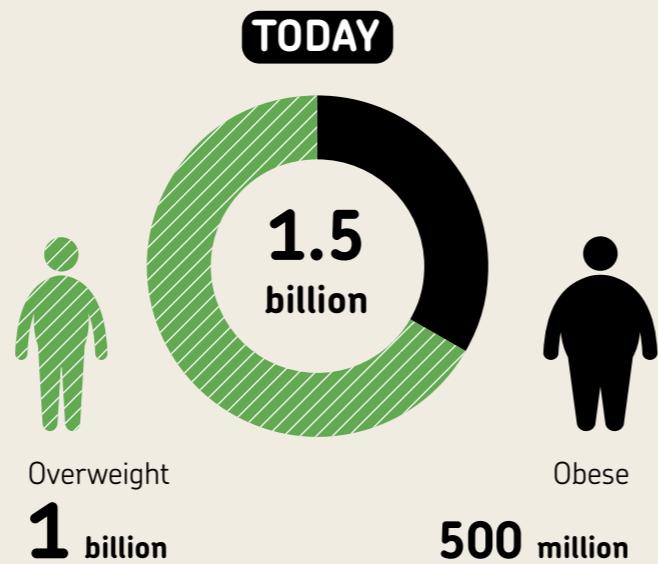


High urbanization and long, frequent car trips



Lifestyles: less time dedicated to the preparation and consumption of meals, little activity, and low level of dietary education

THE MAGNITUDE OF THE PHENOMENON

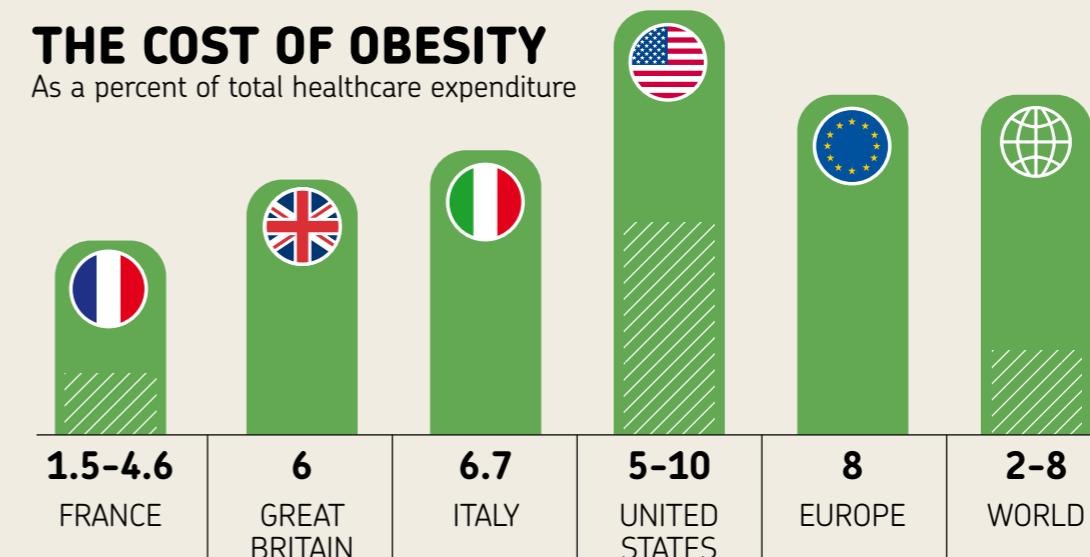


Obesity is associated with:

- Higher mortality due to the onset of chronic diseases
- Greater environmental impacts and greenhouse gas emissions
- Negative impacts in terms of school performance and labor productivity

THE COST OF OBESITY

As a percent of total healthcare expenditure



On average, healthcare spending incurred by an obese person is **25%** higher than that of a person of normal weight

RECOMMENDATIONS



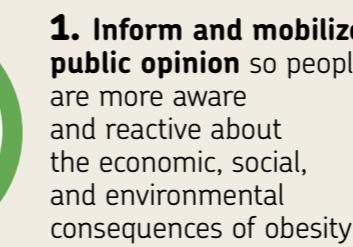
4. Teach healthy habits starting in childhood, facilitating access to suitable organizations and spaces



5. Use the price lever in a balanced manner, carefully evaluating the “pros” and “cons” on the introduction of tax disincentives such as taxes on “junk food”



6. Encourage the food and distribution industries' commitment to public health initiatives promoted and guided by governments



1. Inform and mobilize public opinion so people are more aware and reactive about the economic, social, and environmental consequences of obesity



2. Plan a joint effort by governments and the private sector, activate integrated plans over the medium-to long-term



3. Spread the culture of prevention so that healthy behavior increasingly becomes a conscious choice starting during pregnancy

1. THE OBESITY EPIDEMIC: SCENARIO AND SOCIO-ECONOMIC IMPACTS



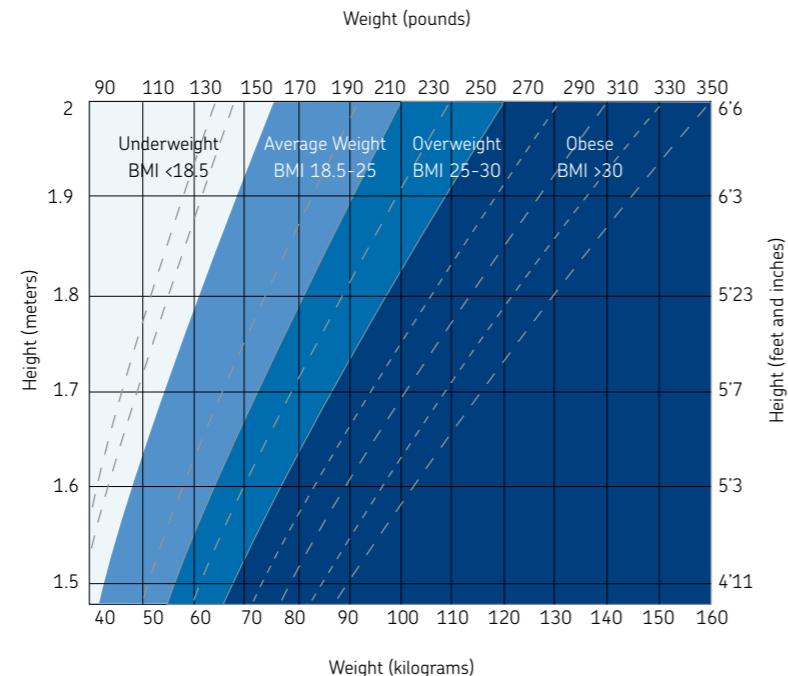
1.1 THE GLOBAL SCENARIO AND ITS DIMENSIONS

OBESITY IS RECOGNIZED AS A GLOBAL EPIDEMIC

In 1997, the World Health Organization (WHO) recognized obesity as a global epidemic and launched this alert again in 2002, with specific reference to Europe.¹ Indeed, in recent years, obesity rates have increased worldwide, both in developed and developing countries, although with some marked differences in the various countries, with the sole exception of Sub-Saharan Africa.

Before analyzing the data relative to the phenomenon in the various geographic areas, it is useful to define what is meant by obesity and being overweight. WHO deems these conditions as a state of excessive accumulation of fats – adiposity – with potentially harmful repercussions on health. An individual's degree of adiposity cannot be immediately measured; however, there are some proxies based on anthropometric features that can be easily measured and are recognized internationally. In particular, the Body Mass Index (BMI), measured as the ratio between weight (in kilograms) and height (stated in m^2), is the indicator most used.

Figure 1.1. Weight, height, and body mass index



Source: National Institute of Health (NIH).

The National Institute of Health² (NIH) began to define the condition of obesity in terms of BMI in the 1980s, and in 1998 it was established that a BMI value higher than 25 kg/m^2 equals the threshold of being overweight and that a value greater or equal to 30 kg/m^2 means a person is considered obese.

Obesity is a complex disease with multiple factors, but at the individual level, the main culprit in the majority of cases of obesity is a combination of excessive contributions of calories and reduced physical activity: in other words, the intake of calories is greater than those consumed by exercise or normal daily activities. A limited number of cases is instead due to genetics, health reasons, or psychiatric illnesses.

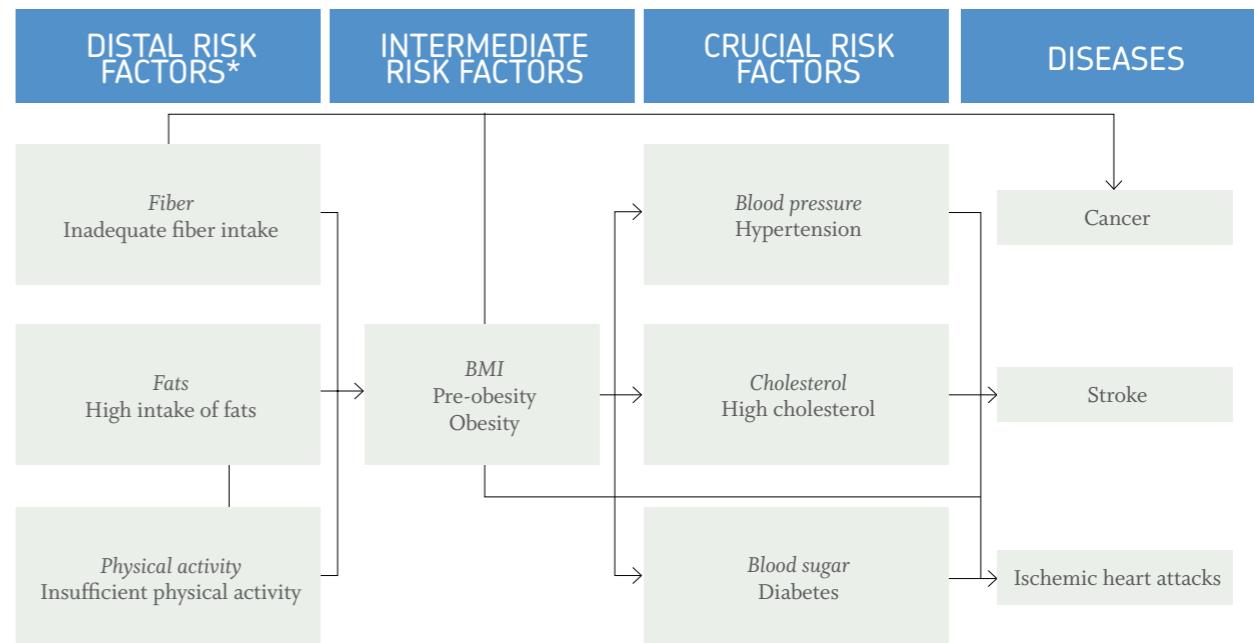
In regard to the causes of obesity at the group level, however, reference is especially made to the characteristics of the socio-economic environment. In particular, the term "obesogenic environment" was coined in the 1990s, when studies were begun on which environmental risk factors influenced the nascent epidemic of obesity and it was defined as: "the sum of influences, opportunities or life conditions that have promoted the onset of obesity."³ The term includes the entire range of social, cultural, economic, and infrastructural conditions which affect the potential for an individual to lead a healthy life. For example, think of people's reduced physical involvement in daily activities, due to technological progress,⁴ or some features of the urban landscape that can condition accessibility, availability, and consumption of some foods, or the performance of physical activity, which limits people's possibilities of choice.

The concern for the exponential growth in rates of obesity and being overweight is that these conditions represent crucial risk factors for the onset of many chronic diseases, which are responsible for 60% of deaths worldwide (and 86% in Europe).⁵ This has led the European Association for the Study of Diabetes (EASD) to recognize the prevention and treatment of obesity as "the most important public health issue worldwide."

Figure 1.2 shows the results of some studies⁶ aimed at establishing the causal nexus be-

OBESITY IS A VERY COMPLEX, MULTIFACTORIAL DISEASE

Figure 1.2. The chronic disease prevention (CDP) model



* "Distal risk factors" are understood as factors that cannot be directly traced to the onset of the disease.

Source: reproduced by BCFN, based on OECD and WHO data, 2010.

SINCE 1980,
THE NUMBER OF OBESE
AND OVERWEIGHT
PEOPLE WORLDWIDE HAS
DOUBLED

tween risk factors and the onset of chronic diseases. The model takes into consideration three categories of diseases: cancer, stroke, and ischemic heart attacks. The crucial risk factors are those which have a direct effect on the likelihood of contracting the three diseases under consideration, while the distal risk factors (low intake of fruits and vegetables, high intake of fats, and insufficient physical activity) act indirectly. The indirect effect is partially mediated by the BMI, which acts directly on crucial risk factors and on the onset of diseases and, in turn, is influenced by distal risk factors.

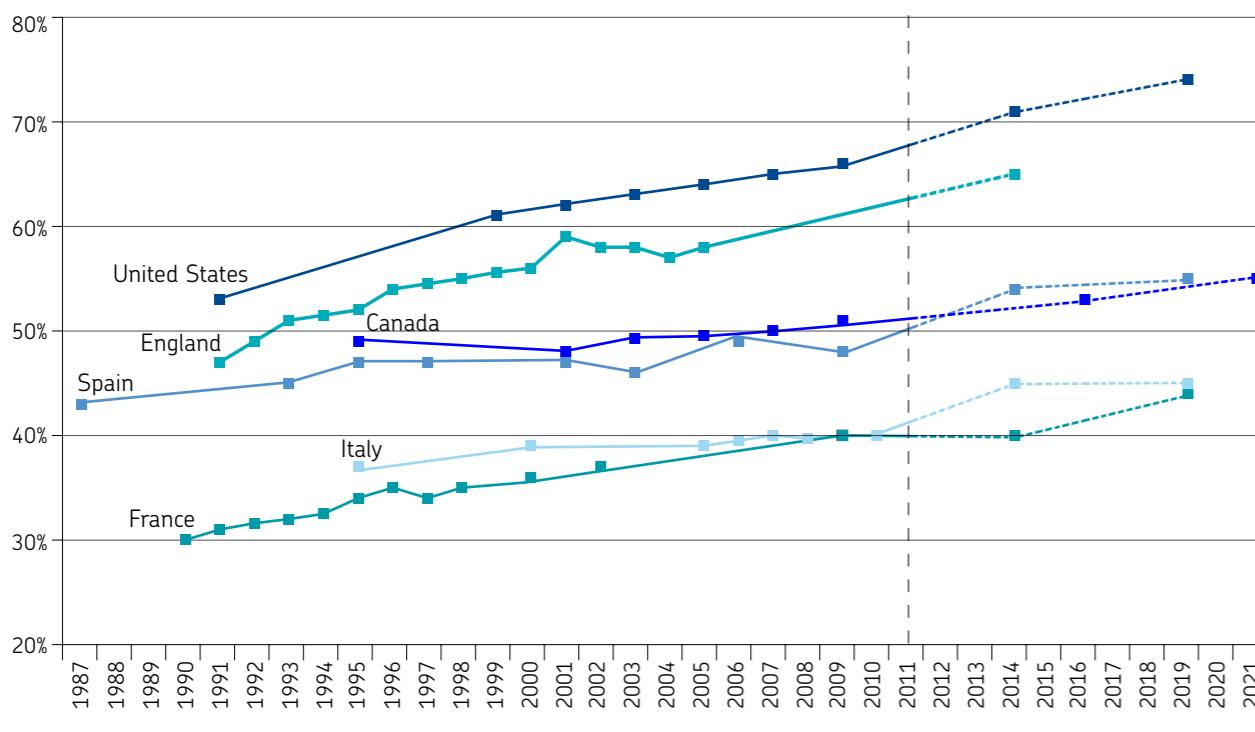
Thus, the model underlines how both the BMI and the interaction among the various indirect and direct risk factors (connected to lifestyle and the effects of an unbalanced diet) are fundamental in preventing the major chronic diseases.

Now that the various definitions supplied are clarified and the extent of the problem has been shown, we will move on to analyze the major trends observed in the different geographic areas on the planet.

WHO estimates that globally about 1.5 billion adults are overweight and among them, 200 million men and about 300 million women are obese. These values are doubled compared to values in 1980, and projections estimate that by 2015 about 2.5 billion adults will be overweight and 700 million will be obese. Today, 65% of the world's population lives in countries where obesity and being overweight are responsible for a higher number of deaths than those due to malnutrition or hunger.

Starting in the 1960s, a generalized increase in the BMI has been observed in all the OECD countries: in fact, prior to 1980, the obesity rate in these countries had always remained under the 10% threshold, and then grew, until it doubled and in some cases tripled over a thirty-year period.

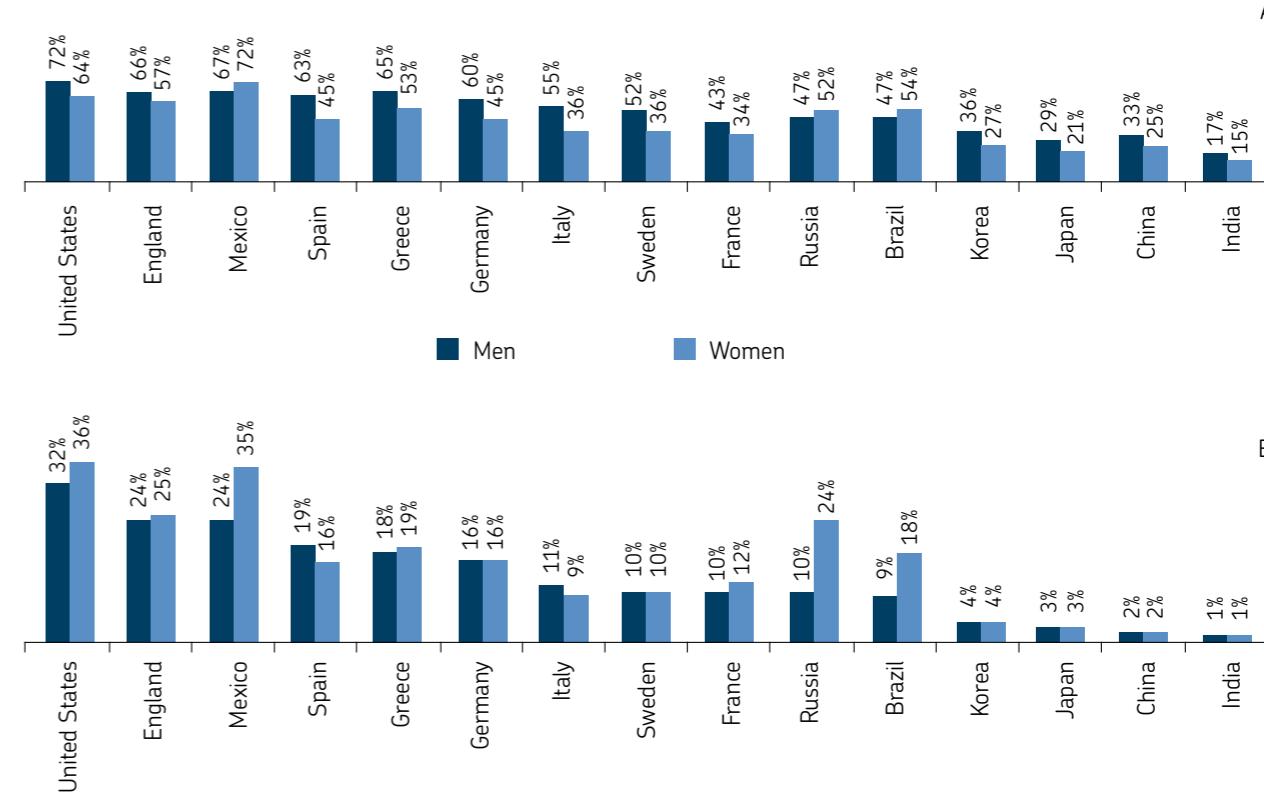
Figure 1.3. Evolution and estimate of the percentage of obese and overweight people in the population in some OECD countries



Source: reproduced by BCFN, based on OECD data, 2010.

Although obesity and being overweight are present internationally, some significant differences have been found among the different geographic areas regarding the manner in which they develop and in the gravity of their distribution.

Figure 1.4. Overweight individuals (A) and obese individuals (B) in some countries (% of the adult population, 2008)*



* The data on overweight individuals includes those with a BMI >25 kg/m², while the data on obesity includes only those individuals with a BMI >30 kg/m².

Source: reproduced by BCFN, based on OECD data, 2010.

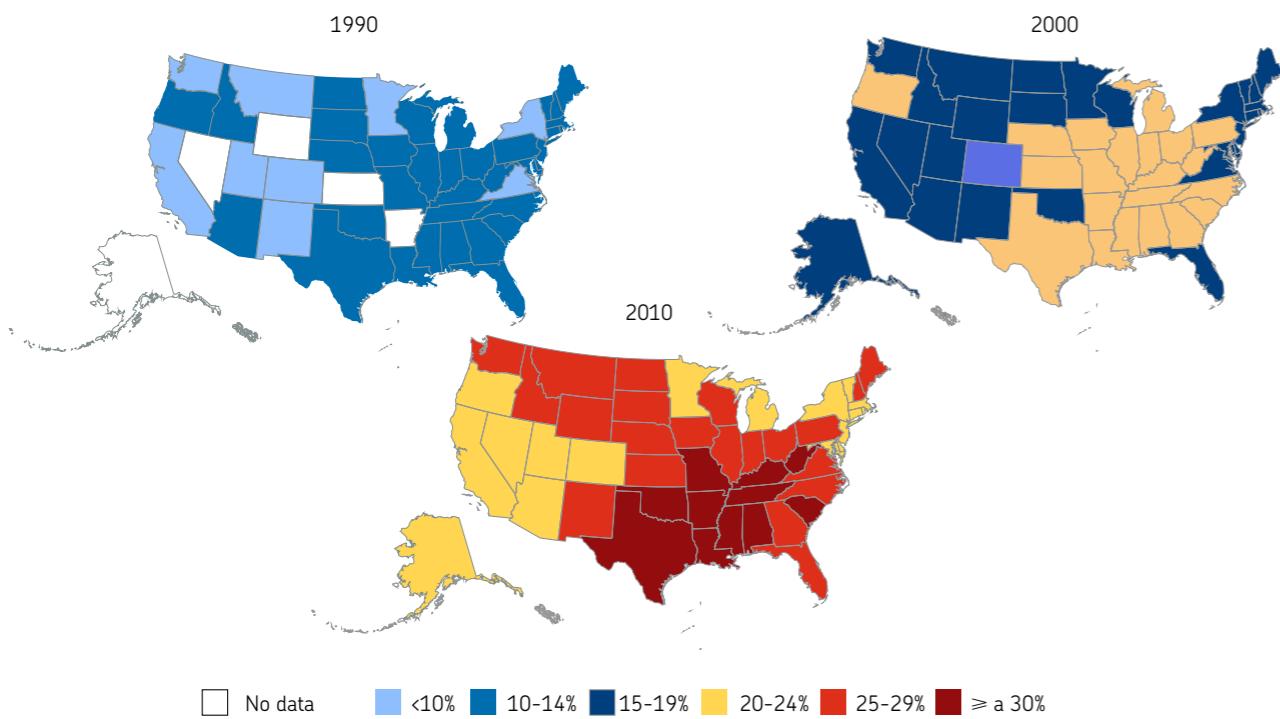
1.1.1 United States

The United States presents a clear case due to the percentage of its population that is obese and overweight. About 68% of Americans are overweight, and 34% of the adult population (over 61 million people) appears to fall within the identification criteria for the definition of conditions of obesity. Furthermore, the NIH deems that it is possible to identify a percentage equal to 4.7% of the American adult population that could be included in the so-called "extreme obesity" category (BMI>40).

Figure 1.5 shows the growth trend in the prevalence of obesity from 1990 to 2010 in the American adult population. In 1990, ten states had an obesity rate that was below 10% of the adult population of both sexes and no state exceeded 15%. In 2000, no American state had a prevalence of obesity below 10%, while 23 states were actually at values which were around 24%, without exceeding the 25% threshold. The situation worsened dramatically in 2010: 36 states have surpassed the 25% threshold, and 12 of them (Alabama, Arkansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Oklahoma, South Carolina, Tennessee, Texas, and West Virginia) have gone over 30%.

68% OF AMERICANS ARE
OVERWEIGHT,
34% ARE OBESE

Figure 1.5. Obesity growth trends ($BMI >30 \text{ kg/m}^2$) among the adult population in the United States (1990–2010)



Source: Behavioral Risk Factor Surveillance System, Center for Disease Control and Prevention (CDC), 2010.

1.1.2 Europe

13.4% OF EUROPEANS ARE OBESE, BUT THERE ARE MAJOR DIFFERENCES AMONG COUNTRIES

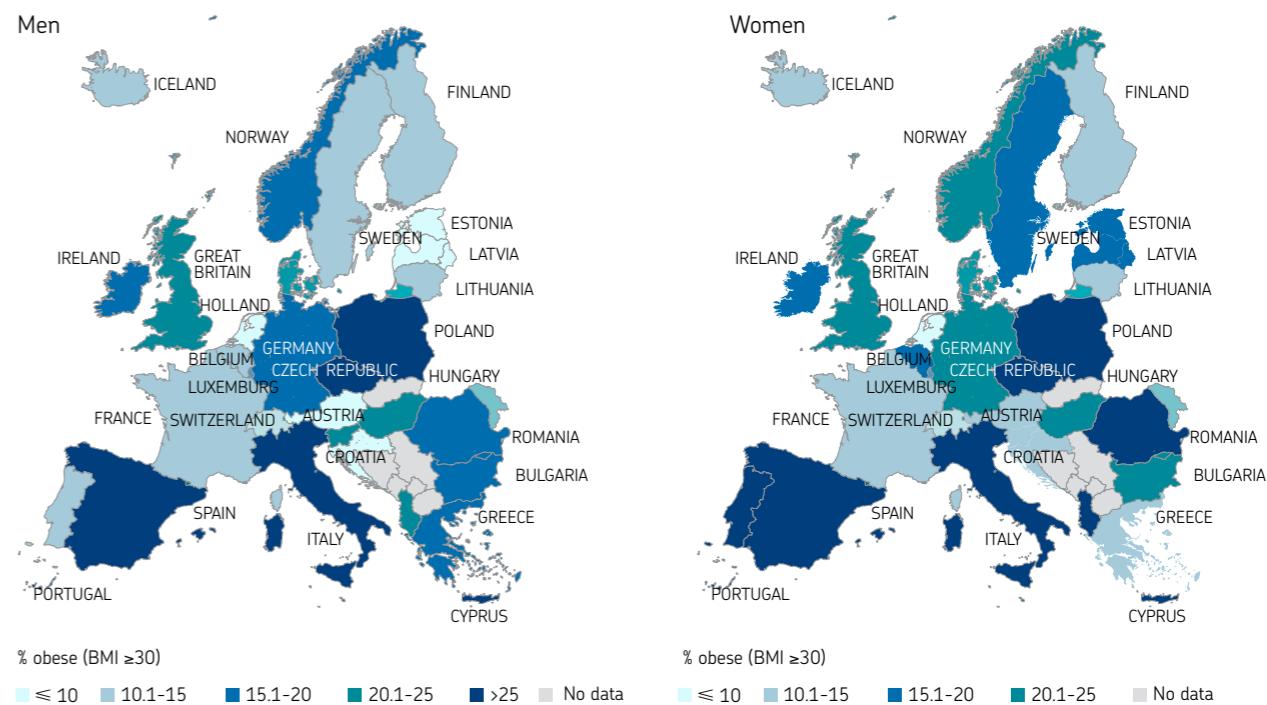
The obesity phenomenon is also growing strongly in Europe. Looking at the statistics produced by the OECD, the obese adult population went from a share of 6.6% in 1978 to a 13.4% share (about 66 million people) in 2010. Average European BMI is about 26.5 kg/m², among the highest in the world, but considerable differences are found between countries. In fact, the prevalence of obesity over the past decade has increased to between 10% to 40%, with higher rates in Eastern Europe compared to Western Europe. The European countries that are now most affected are: England (24.5%), Hungary (19.5%), Greece (18.1%), Spain (17.5%), Germany (14.7%), and France (11.2%). Over the past twenty-five years, the highest growth rates (over 25%) were found in Spain, Italy, Poland, and the Czech Republic. Analyzing the Italian situation in particular, it is noted that 58.3% of the adult population is of a normal weight, 29.6% is overweight, 10.5% is obese, while 2.6% is underweight. However, the distribution of these four categories of individuals throughout Italy shows a remarkable difference between the North and the South: in fact, all the regions of southern Italy and its islands, with the exception of Molise, show a percentage of obesity and being overweight that is higher than the national average.⁷

Looking toward the future, the OECD data shows a growing trend for the next ten years: by 2020, the overweight and obese adult population (ages 15–74) will be 45% of the total.

Despite one of the lowest rates of prevalence in Europe, the obesity phenomenon is also increasing in France. About one person out of ten is obese and when overweight people are included, it reaches 40% of the population. The projections produced by the OECD show that this figure will grow until it reaches 45%.

With regard to Great Britain, after the United States, it is the country that is hardest hit by

Figure 1.6. Percentage of change in the prevalence of obesity in the past twenty-five years in Europe

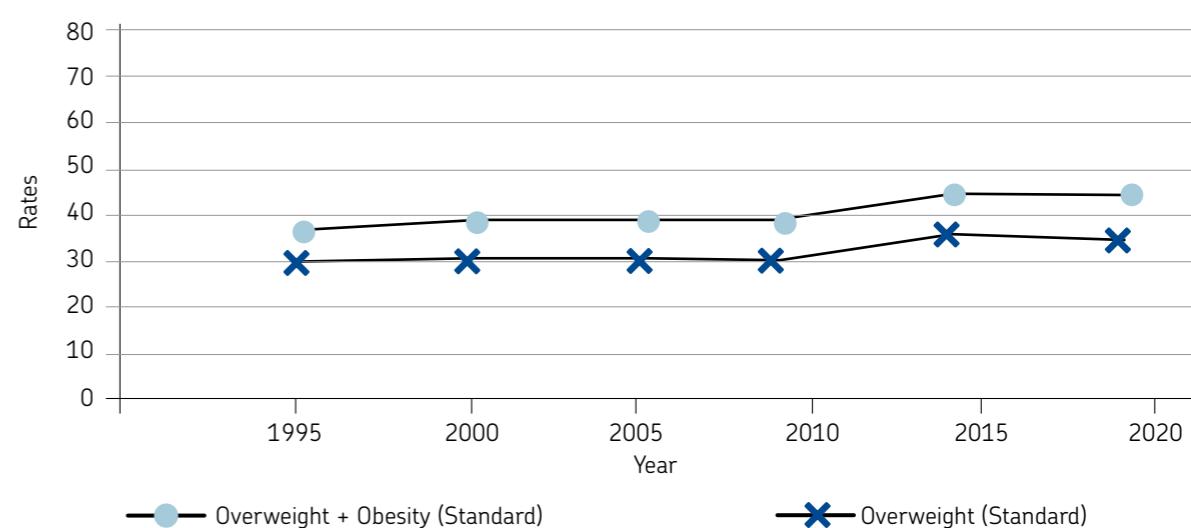


Source: Berghöfer A. et al., *Obesity prevalence from a European perspective: a systematic review*, in "BMC Public Health", 2008.

overweight individuals and obesity (Figure 2.4). A Health Survey study⁸ has published some estimates on its future distribution, in terms of BMI, in the male and female populations in England.

According to the study's forecasts, in 2050, 60% of the male population and 50% of the female population may be obese. On the other hand, the share of the English male population with a BMI ranging from 18.5 and 25 kg/m² (normal weight) in 2050 will drop from the current 30% to below 10%.

Figure 1.7. Evolution and projection to 2020 of the prevalence of being overweight and obesity in the adult population (ages 15–74) in Italy



Source: reproduced by BCFN, based on OECD data, 2010.

1.1.3 Other countries

CHINA AND BRAZIL ARE ALSO EXPERIENCING RAPID GROWTH IN OBESITY

Although the phenomenon is expanding, in Asian countries prevalence rates are more markedly contained compared to the United States and Europe (3% of the adult population is obese in Japan and 4% in South Korea).

However, the speed with which the phenomenon is growing in China is worrisome: in 2004, there were 60 million obese Chinese, and 200 million were overweight, but in 2009 this increased to 100 million obese people and 310 million people who were overweight. Another emerging country, Brazil, is already dealing with the problem of having a high share of population that is overweight and obese, with rates similar to those in Europe, and the prevalence of obesity is concentrated especially in the female population.

1.1.4 Excess weight and obesity among children in different geographic areas

In the global context outlined above, it can be noted that all Western countries are experiencing exponential growth in the phenomenon of childhood obesity, as well as overweight children. As it is easy to imagine, the impact generated by overweight and obese children and adolescents is extremely significant, for countries' budgets in terms of negative costs for healthcare, as well as its repercussions on the proper physical and cognitive development of children and adolescents.

ONE CHILD OUT OF TEN WORLDWIDE IS OBESE

According to data collected by the International Obesity Task Force (IOTF), obese and overweight school-age children number 155 million, or, one child out of every ten children. Among them, 30-45 million are classified among the obese, which means 2-3% of the population ranging in age from 5 to 17 years.

The gravity of the expansion of the phenomenon of obesity and being overweight to the youngest population groups is shown - once again citing a shocking American figure - in the tripling of cases of overweight youth from 1970 to the present time. According to a recent study by the Trust for America's Health and the Robert Wood Johnson Foundation,⁹ almost one-third of American children and adolescents are overweight or obese. In particular, according to the NIH, 16% of children between the ages of 6 and 19 are currently obese, while another 15% is at a strong risk of becoming obese.

The problem of childhood obesity is also increasingly widespread in Europe: in the member states of the European Union, about 400,000 children are considered overweight and over 85,000 are considered obese.¹⁰ In regard to youth obesity only, its prevalence in Europe is now ten times higher compared to the 1970s.¹¹

In Italy, an investigation promoted by the Health Ministry in cooperation with HSBC¹² (Health Behaviour in School-aged Children), involving over 42,000 third-grade students and 44,000 parents, revealed worrisome levels of bad eating habits, sedentary lifestyles, and being overweight: 22.9% of the children studied were overweight, and 11.1% were in an obese condition. Regional variations were evident, with percentages that were generally lower in northern Italy and higher percentages in southern Italy. The study also revealed that parents do not always have a correct idea of their child's weight status: among mothers of overweight or obese children, 36% did not deem their child to be overweight and only 29% thought that the amount of food the child consumed was excessive.

Instead, the figure on childhood obesity is low and has been relatively stable for the past twenty years in France. However, OECD projections estimate strong growth in the risk of childhood obesity.

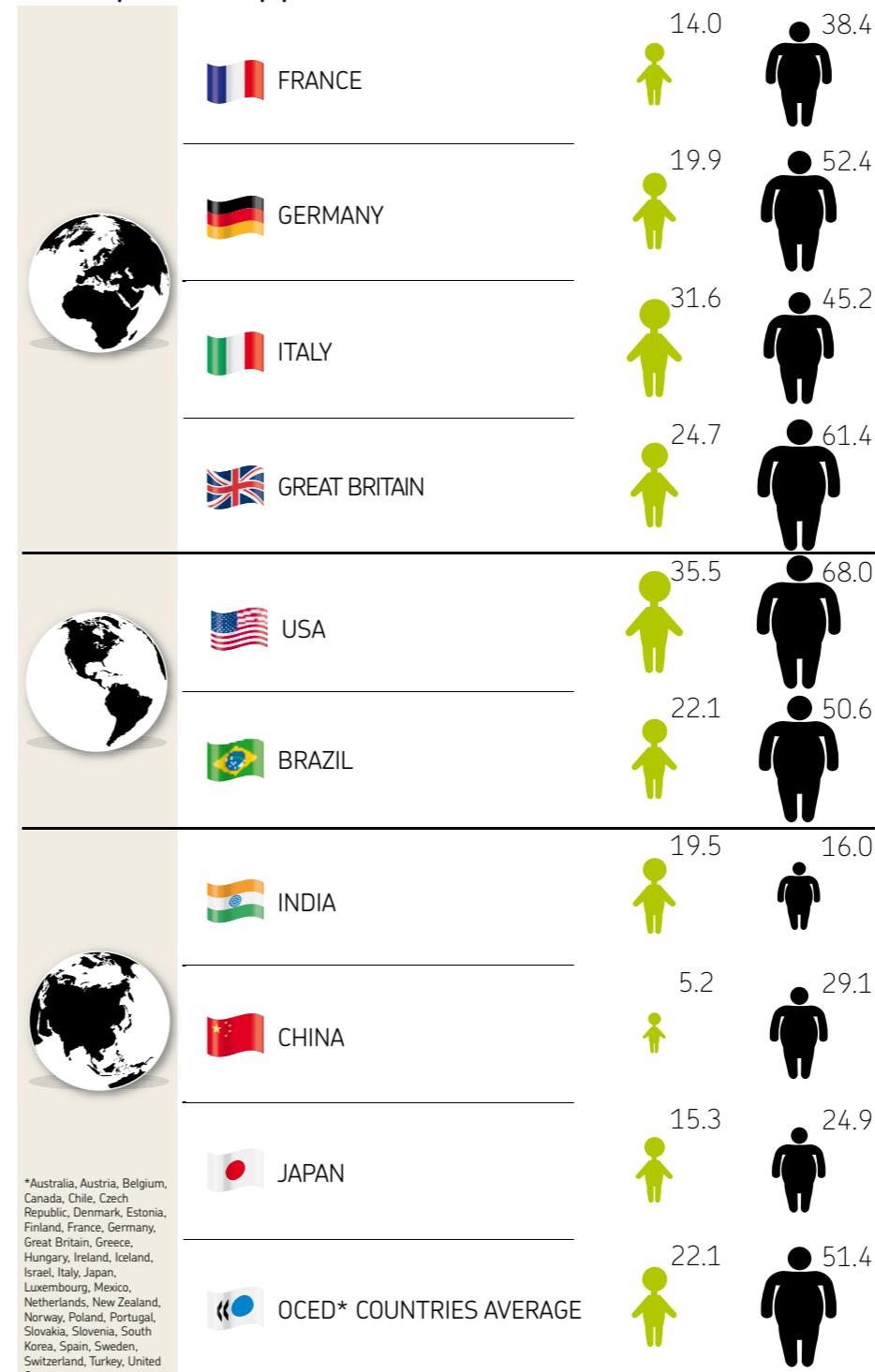
CHILDHOOD OBESITY

Childhood obesity, particularly in Western countries, represents a growing problem with remarkable healthcare and social significance. The phenomenon lasts for the individual's entire lifetime and influences the increased likelihood of contracting chronic diseases in adulthood including diabetes, hypertension, cardiovascular diseases, and cancer.

Worldwide, one school-age child in ten is obese or overweight.

CHILDREN ● ADULTS ●

Data as a percent of total population



Source: OCSE, *Health at a Glance 2011*



Lynn Johnson/National Geographic Stock

1.2 THE IMPACTS OF OBESITY AND BEING OVERWEIGHT ON HEALTH AND LONGEVITY

1.2.1 Obesity and life expectancy

One of the most important studies, conducted to highlight the relationship between obesity and mortality,¹³ carried out on a sample of one million adults representing Europe and North America, concluded that the mortality rate increases very quickly when individuals surpass the threshold of 25 kg/m^2 . An obese person with a BMI between 30 and 35 kg/m^2 has a life expectancy that is four or five times lower than the life expectancy of a normal weight person; this gap increases to reach ten years when the BMI is between 40 and 45 kg/m^2 (third-degree obesity). This relationship seems to be weaker only after age 70, a phenomenon known as the *obesity paradox*, where the mortality rate seems to be lower among overweight people compared to normal weight people (this effect is mostly due to the decrease in body mass due to chronic diseases). Figure 1.8 reports the results of a study published in the *Annals of Internal Medicine*¹⁴ and conducted on a sample of 3,457 people, examined over a time period of about forty years. The study's objective was to highlight the correlation between potential years of life lost and BMI, divided into categories. Potential years of life lost were estimated through the number of deaths recorded in the population sample during the course of the entire period studied.

The categories studied were the following:

- First group: BMI between 18.5 and 24.9 kg/m^2 ;
- Second group: BMI between 25 and 29.9 kg/m^2 (overweight);
- Third group: BMI equal to or higher than 30 kg/m^2 (condition of obesity or hyper-obesity).

The average age of the people in the sample was 40 and the population was divided by sex and distinguished between "smokers" or "non-smokers."

If the category of non-smokers is examined, the data appear to be very clear. In the women belonging to the second group ($\text{BMI } 25\text{--}29.9 \text{ kg/m}^2$), a decrease in life expectancy at age 40 was found to be about three years compared to that of the first group, while for women in the third group ($\text{BMI } \geq 30 \text{ kg/m}^2$) this decrease was about seven years. In men, the ratio is similar, despite an average lower life expectancy.

Despite the wealth of studies conducted on the subject, it is hard to isolate and understand what the general impact of the obesity epidemic is on average life expectancy, as it is difficult to forecast its future impacts.

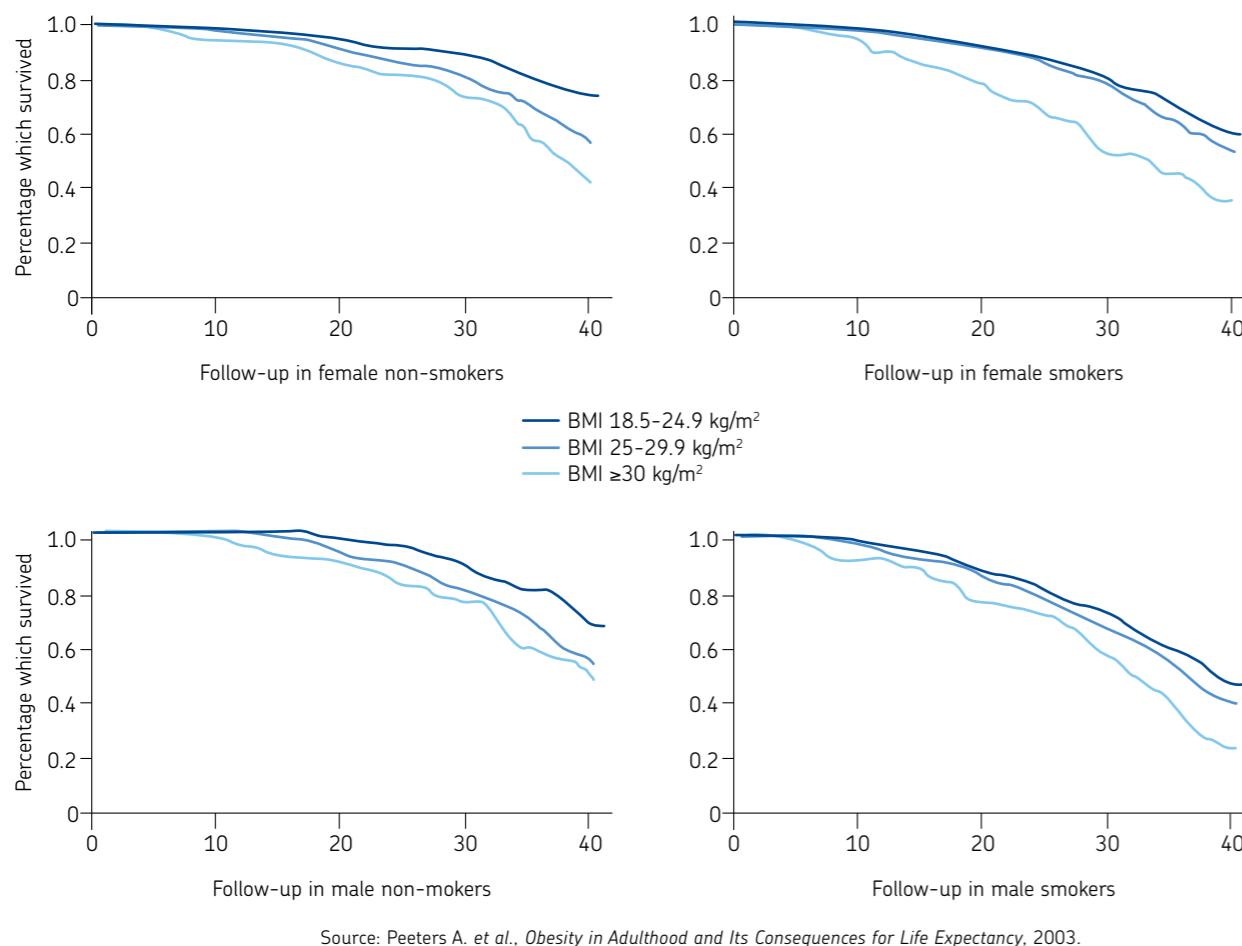
Leading institutions such as the English Department of Health confirm that if the rate of prevalence of obesity continues to grow at the present pace, by 2050 average life expectancy will have to be adjusted downward by at least five years.

THE MORTALITY RATE INCREASES RAPIDLY ONCE THE THRESHOLD OF BEING OVERWEIGHT HAS BEEN EXCEEDED

AT OBESITY'S CURRENT GROWTH RATES, THERE IS A RISK OF A FIVE-YEAR DROP IN LIFE EXPECTANCY BY 2050

Nevertheless, there are other studies which present less pessimistic estimates, such as a study by Foresight¹⁵ which estimates - in the event that current growth rates are confirmed regarding the prevalence of obesity - a decrease in average life expectancy of only about six months.

Figure 1.8. Population survival rates based on BMI



Source: Peeters A. et al., *Obesity in Adulthood and Its Consequences for Life Expectancy*. 2003.

1.2.2 Obesity and disability

THE LINK BETWEEN OBESITY AND DISABILITY IS VERY HIGH

The causal nexus between obesity and disability is instead stronger. In Europe, the disability rate recorded among the obese population, measured by the ADL indicator (*Limitation in Activities of Daily Living*), is about double that of the rate of the normal weight population. In the United States, an obese 70-year-old person can expect to spend 40% of his remaining lifetime with diabetes, 80% with hypertension, and 85% with types of osteo-arthritis, while a normal weight person will show values that are about 17%, 60%, and 68%, respectively.¹⁶ The American Medical Association¹⁷ has conducted a test on a total of 5,724 participants belonging to the three weight categories described previously, who were asked to perform six different physical tests in order to evaluate the degree of disability in relation to their BMI. Socalled "functional impairment" (percentage of interviewees who showed that it was difficult or even impossible for them to carry out certain physical exercises¹⁸) doubled in obese people compared to people whose BMI was within the normal range.

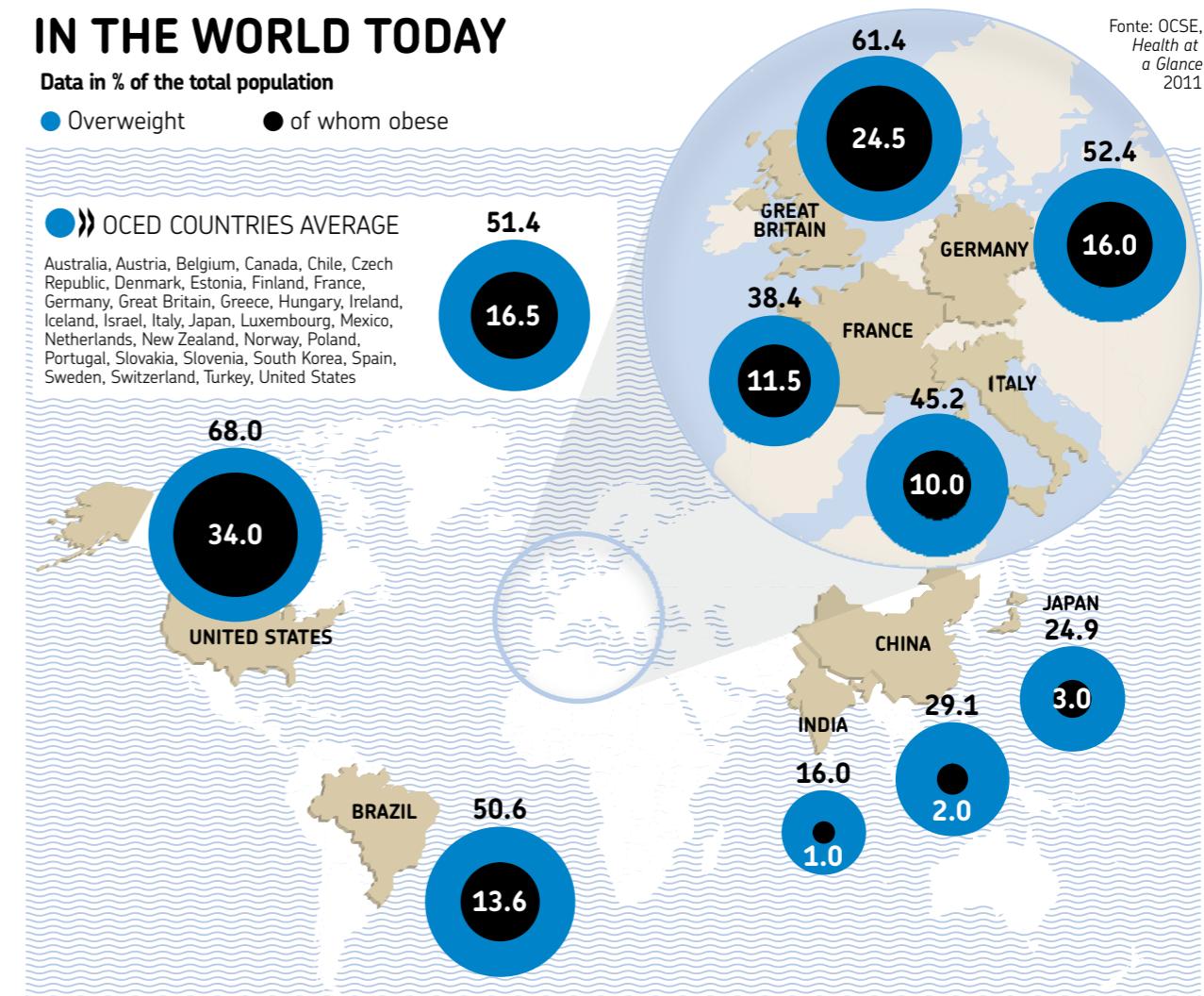
IN THE WORLD TODAY

Data in % of the total population

● Overweight ● of whom obese

OCED COUNTRIES AVERAGE

Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Iceland, Israel, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United States



1.3 THE SOCIO-ECONOMIC COSTS OF OBESITY

OBESITY GENERATES
SIGNIFICANT HEALTHCARE
COSTS DUE TO
ASSOCIATED DISEASES

32

JUST AS SIGNIFICANT,
ARE THE INDIRECT COSTS
LINKED TO THE LOSS OF
PRODUCTIVITY

1.3.1 The different types of costs linked to obesity

Obesity is a phenomenon that not only has negative repercussions on an individual's health, but it also involves significant economic costs which burden the entire community, and obviously, the individual and his family members. In addition to being recognized as a disease by WHO (2000), obesity is a basic risk factor for many non-transmittable chronic diseases, with repercussions on medical (direct) costs as well as the (indirect) costs linked to the loss of productivity due to the onset of the diseases.

Direct costs refer to medical expenditures for the treatment of the disease and its complications (personal healthcare, hospital care, medical, and drug services). In fact, it is known that obesity is responsible for some diseases such as hypertension, Type 2 diabetes, high cholesterol, heart diseases, stroke, asthma, and arthritis.

According to different scientific studies, with the increase in obesity levels, medical expenditures for the diagnosis and treatment of these diseases are destined to grow in the coming years. Different studies provide retrospective and future estimates on the degree of impact that obesity will have on the diseases mentioned above and the extent of the healthcare costs directly associated with the phenomenon. There are different methods to calculate the impact of these costs: case studies, dynamic models, surveys that are representative at the national level, regressive analyses, and forecasted simulations.

Aside from the direct costs, there is another category of costs defined as indirect costs, which represent an equally significant part of the socio-economic impact of obesity, and among them, the costs which play the most important role are costs that have an effect on productivity.

Some sub-categories can be found within indirect costs¹⁹ linked to the topic of labor productivity:

- *absenteeism*: days lost by workers absent from the workplace for health reasons linked to obesity;
- *presenteeism*: decrease in productivity of obese or overweight workers in the workplace;
- *premature mortality or years of healthy life lost (QALY)*²⁰ due to diseases linked to obesity;
- *increase in insurance premiums* in cases of disability linked to obesity.

In addition to costs connected to productivity, there are other indirect costs linked to the development of human capital. In fact, the effects of obesity and being overweight may also have negative consequences on educational performance (similar to the topic of workplace productivity).

This is a significant issue that has significant economic potential, especially in light of the increasing levels of childhood and adolescent obesity.

Finally, there are other indirect costs that can be traced back to the psycho-social sphere (depression, etc.) in overweight and/or obese individuals, but this is a cost category that has not been much explored until now, especially from the point of view of its economic impacts on society.

1.3.2 The sum of indirect and direct costs in the United States, Europe, and in developing countries

According to a recent study,²¹ it is estimated that direct costs linked to obesity are about 2-8% of total healthcare costs at the global level and that healthcare expenditures incurred by an obese person are, on average, 25% higher than that of a person of normal weight. These estimates may be deemed conservative, and therefore, the actual figure may be very much higher. Up to now, it has unfortunately been impossible to find publications in literature which more accurately quantify the costs linked to obesity and being overweight at the global level. However, there is much data available for the most developed countries.

Starting with the situation in the United States, the country with the world's highest share of an obese population, and for which various studies are available in this regard, in recent years there has been an exponential increase in costs relative to medical care linked to obesity and diseases which are connected with it (direct costs). It is estimated that in the United States, these costs amount to about 5-10% of total healthcare spending²² and to about 1% of its GDP.²³ According to some studies, in 2008 these costs amounted to \$147 billion for adults only²⁴ and to \$14.3 billion for children.²⁵ Meanwhile, only ten years prior, these costs were \$78.5 billion, half of which were financed by Medicare and Medicaid programs.²⁶

In 2006, the differential between costs for healthcare spending incurred by an obese person and a normal weight person was about \$1,429, compared to \$930 in 1998, and which, in terms of percentage, is about 42% more. Again in the same year, the increase in the per capita percentage relative to annual costs attributable to obesity was estimated at 36% for the Medicare program, at 47% for the Medicaid program²⁷ and at 58% for private payers. According to another study,²⁸ the differential between per capita healthcare expenditures incurred by an obese person compared to that of a normal weight person was about 8% in 1987, while this percentage rose to 38% in 2007.

Instead, with regard to the category of indirect costs,²⁹ it is estimated that the impact of these costs would amount to about \$66 billion.³⁰

Thus, by adding up the direct and indirect costs, economic costs linked to obesity in the United States would total about \$227 billion.

Other studies are attempting to forecast the impact that direct costs may have in coming years if the phenomenon's growth trend should continue at the levels recorded between 1970 and 2004.³¹ In 2030, these costs should be between \$860.7 and \$956.9 billion, which represent 16%-18% of total healthcare costs incurred in the United States.

According to another study, it is estimated that in 2030 there will be 11 million more obese people in the United States than there are today, and consequently, it is estimated that costs for healthcare spending linked to diseases connected to obesity will increase to about \$48-66 billion each year by 2030.³²

Regarding per capita healthcare spending, a study (CBO, September 2010) forecasts three scenarios which may occur by 2020:

- ① if the percentage of obese people should remain unchanged compared to 2007 (28%), per capita healthcare spending would increase by 65% (going from \$4,550 in 2007 to \$7,500 in 2020);
- ② if the percentage of obese people should rise at the same pace recorded between 2001

AN OBESE PERSON'S
HEALTHCARE SPENDING
IS ABOUT 25% HIGHER
THAN AVERAGE

and 2007, in 2020 this percentage would be 37% and per capita healthcare spending would be 3 percentage points higher compared to the spending in the first scenario (\$7,760);

- ③ if the percentage of obese people should return to 1987 levels, this percentage would be around 20% and per capita healthcare spending would be \$7,230, about 4% lower than the spending forecast in the first scenario.

As can be easily understood, literature on the situation in the United States is vast and therefore, the data available, especially with reference to forecasts, may vary.

The chart in Figure 1.9 summarizes the cost categories linked to obesity and their relative costs.³³

Figure 1.9. Major cost categories linked to obesity and being overweight and their economic impact in the United States

COST CATEGORY	SUBCATEGORY	MAIN EFFECTS	RELATIVE COSTS	TOTAL COSTS	TOTAL AMOUNT (NOT IN DOLLARS)
DIRECT MEDICAL COSTS		Medical costs linked to being overweight (compared to a normal weight person) Medical costs linked to obesity (compared to a normal weight person) Annual direct costs linked to obesity Total healthcare costs attributable to obesity and being overweight	10-20% higher 36-100% higher	\$14.3 billion \$86-147 billion	
PRODUCTIVITY-RELATED COSTS	Absenteeism	Workdays lost due to obesity compared to a normal weight person (in one year) Risk of a higher percentage of absenteeism Annual costs at the national level due to absenteeism and attributable to obesity	1-24-1.53 times higher	\$3.38-6.38 billion or 79-132 \$ per obese person	1,024.72 days
	Presenteeism	Drop in productivity due to obesity	1.5% higher		
	Disability	Probability of receiving income support for disability	5.64-6.92 percentage points more		
	Premature death	Years of life lost due to obesity (compared to life expectancy) QALYs lost due to obesity			1-13 years per obese person 9,93 million total QALYs in the United States in 2004
TRANSPORTATION COSTS	Fuel costs	Excess fuel used by airplanes due to obesity Excess fuel used each year by non-commercial motor vehicles on highways due to obesity		742 million (2010 USD) 2.53-2.7 billion (2010 USD)	350 million gallons 938 million - 1 billion gallons
	Environmental costs	CO ₂ emissions deriving from transportation and more for each person (at the OECD level)			10 million tons
COSTS LINKED TO THE DEVELOPMENT OF HUMAN CAPITAL		Levels attained (in terms of class) School days absent (each year)	0.1-0.3 levels less 1.2-2.1 more school days absent		

Source: Hammond and Levine. *The Economic Impact of obesity in the United States*, 2010.

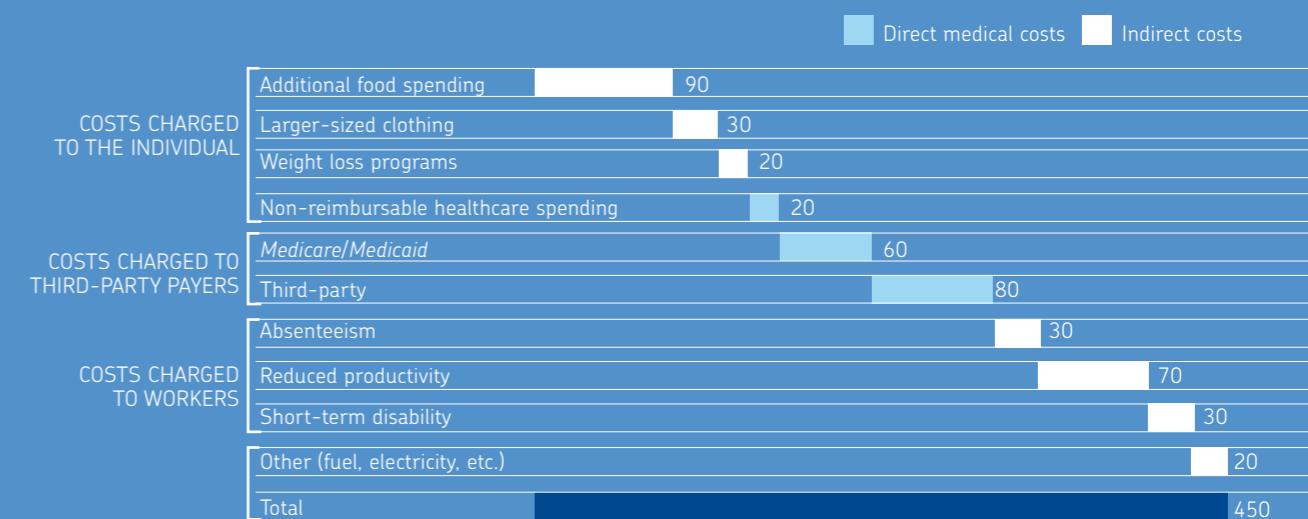
Moving on to the situation in Europe, according to the European Charter on Countering Obesity (Ministerial Conference of the European Region of WHO, Istanbul, November 2006), obese and overweight adults would be responsible for up to 8% of healthcare spending.

According to the latest estimate made by the European Commission, total direct costs linked to obesity incurred by the Member States of the European Union in 2006

The economic impact of obesity in the United States: an overall appraisal of costs

It is calculated in the United States that for every BMI point higher than 30, total annual medical expenditure (public and private) per capita increases by 8% (or about \$300 more for each BMI point). Compared to annual medical expenditure per capita of \$3,950 (for a normal weight person with a BMI lower than 25), a person with an index ranging between 30 and 34 incurs annual medical expenditure of \$4,675 (+18% compared to that of a normal weight person). The divergence increases more than proportionally with the increase in the BMI coefficient: the graph shown below illustrates the distribution of costs per category.

Figure 1.10. Subdivision of costs linked to obesity in the United States (billion dollars)



Source: reproduced by BCFN, based on data from the Centers for Disease Control and Prevention, 2006 National Health Expenditure Accounts; Euromonitor.

IT IS ESTIMATED THAT AN OBESE 18-YEAR-OLD WILL COST THE ITALIAN HEALTHCARE SYSTEM €100,000 MORE THAN A NORMAL WEIGHT PEER DURING HIS/HER LIFETIME

amounted to about €59 billion a year, but the same study forecasted a much greater overall economic impact (a figure which could vary from €118 to €236 billion a year). According to other studies, in 2002 the total amount of indirect and direct costs totaled about €33 billion a year.³⁴

Analyzing the latest WHO data (2006), it can be noted how, for example, in Sweden direct costs are estimated at \$45 per capita annually and indirect costs are estimated at \$157 per capita annually; in Germany, direct costs per capita are estimated at \$35 annually, while in the Netherlands the value differs slightly (\$32). In recent years, in other countries such as Great Britain, these costs are rising at surprising levels: they went from \$13 per capita annually in 1998 to \$25-31 per capita annually in 2002. In Great Britain, it is also estimated that these costs could be 70% higher in 2015, compared to the costs recorded in 2007.³⁵

Analyzing the situations of some European countries, it was noted how, for example, in France³⁶ in 2002, direct costs varied from €2.1 to €6.2 billion and represented from 1.5% to 4.6% of total healthcare spending.

In Italy, it was calculated that in 2005, annual direct and indirect costs for overweight/obesity conditions amounted to €22.8 billion annually, of which 64% was for hospitalizations (EXPENDITURE Study, University of Milan).³⁷ All this indicates how obesity is actually responsible for a series of serious cardiovascular, metabolic, bone and joint, cancerous, and respiratory diseases which involve a decrease in life expectancy and a considerable burden for the Italian National Health Service.

In 2009, the Scuola Superiore Sant'Anna estimated that the impact of the social cost of obesity in Italy was €8.3 billion, equal to about 6.7% of public healthcare spending. Forecasting an average life expectancy of 75 years for an obese person, the same study estimated that the additional total social cost for an obese eighteen year old would be about €100,000 during the course of his or her life, compared to a peer of normal weight. As anticipated, for some years now the obesity phenomenon has also begun spreading to developing countries, and there is now some scientific evidence which quantifies its economic impacts on society.

A significant number that can help in understanding the extent the phenomenon is taking on even in these countries is the percentage of costs linked to obesity on GDP: in 2001, the percentage recorded in China was 2.1%, while in India it was 1.1%.³⁸

According to another study, in China, healthcare spending just for obesity was equal to almost \$50 billion in 2000 and it is forecasted that this figure will rise to about \$112 billion by 2025.³⁹ In Brazil, another one of the economies considered to be emerging, total costs linked to obesity and being overweight represented about 3% of total hospitalization costs for men and 5.8% for women, which correspond to 6.8% and 9.3% of all hospital stays.⁴⁰

Although the healthcare costs of these countries cannot be directly compared with those of Western countries, it can be presumed that diseases associated with obesity and being overweight are having a significant impact on hospitalizations, and more in general, on the healthcare costs of developing countries, with percentages that approach those of developed countries.

The economic impact of obesity in Italy: Impact on healthcare spending forecast for 2050

In the coming years, the dynamics of public healthcare spending is a result of the evolution and reciprocal interaction of certain components:

- **demographic**: number and structure by sex and age of the population;
- **economic**: propensity found in all advanced economies toward a growth in overall healthcare spending that is proportionally higher than the growth in GDP;
- **epidemiological**: prevalence of major diseases, in particular, chronic diseases;
- **exogenous**: scientific discoveries, technological changes, their impact on the effectiveness and costs for the provision of healthcare, policies to contain healthcare spending, etc.

To highlight the contributions of the individual factors, the proposed forecasting model is based on a modular type of approach founded on the interaction between the following variables:

- the growth of healthcare spending in line with GDP;
- the variation in population numbers;
- the variation in the demographic mix;
- consideration of the flexibility in per capita healthcare spending compared to a variable in available income.

This model is based on the review of 2010 estimates for public healthcare spending for the resident Italian population and GDP.

Instead, forecasts for the 2011-2050 period, used:

- for growth estimates of demographic variables, the main hypothesis for the projections prepared by ISTAT [National Statistics Institute] in "National Population Forecasts by Age and Sex - 2007-2051;"
- for the evolution of available income,

the projections of growth rates on a ten-year basis of actual GDP, supplied by the Italian General Accounting Office.

The starting point is 2010 public healthcare spending, which totaled €113.5 billion, equal to 7.3% of Italy's GDP. The projection for public healthcare spending up to 2050 concentrated on estimating the impact of the demographic and economic factors. Demographic changes and growth in available income have an impact of over €168 billion on healthcare spending compared to 2010.

At the end of the period, public healthcare spending will reach a sum close to €281.5 billion, equal to 9.7% of GDP in 2050. The growth in the ratio is not standard over the years: most of the growth will be concentrated in the first decades of the period under consideration, while the ratio tends to stabilize in the last decade.

The evolution of the ratio between public healthcare spending and GDP is contained in Figure 1.11.

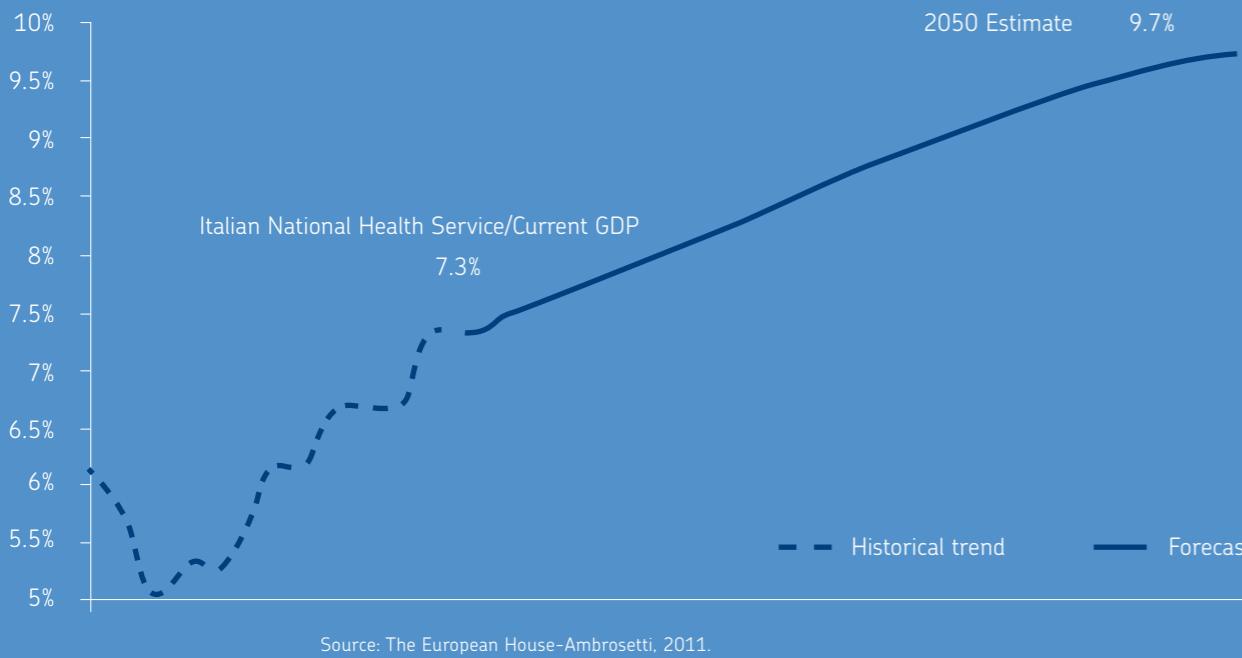
This model is based on the hypothesis that the current epidemiological framework will remain unchanged.

However, it is possible to hypothesize introducing a variation of the epidemiological framework into the forecasting model that can be associated with the increase of a risk factor for many diseases (cardiovascular diseases, diabetes, some tumors, etc.), such as obesity.

The basic hypotheses are the following:

- in Italy, obese children are 11% of the population;
- it is estimated that the number of obese adults will increase by an annual average of 2.4% until 2050 and an annual average of 2.8% from 2025 to 2050, taking into account that 70% of children

Figure 1.11. Evolution of the ratio between public healthcare spending and GDP between 1992-2010 period and projection by 2050



who are now obese will remain obese as adults and that, on average, one-third of obese adults were obese as children;

- it is assumed that the healthcare cost for an obese adult averages €1,400 more than the average per capita healthcare cost and this occurs due to the diseases he is more often subject to, compared to a normal weight person.

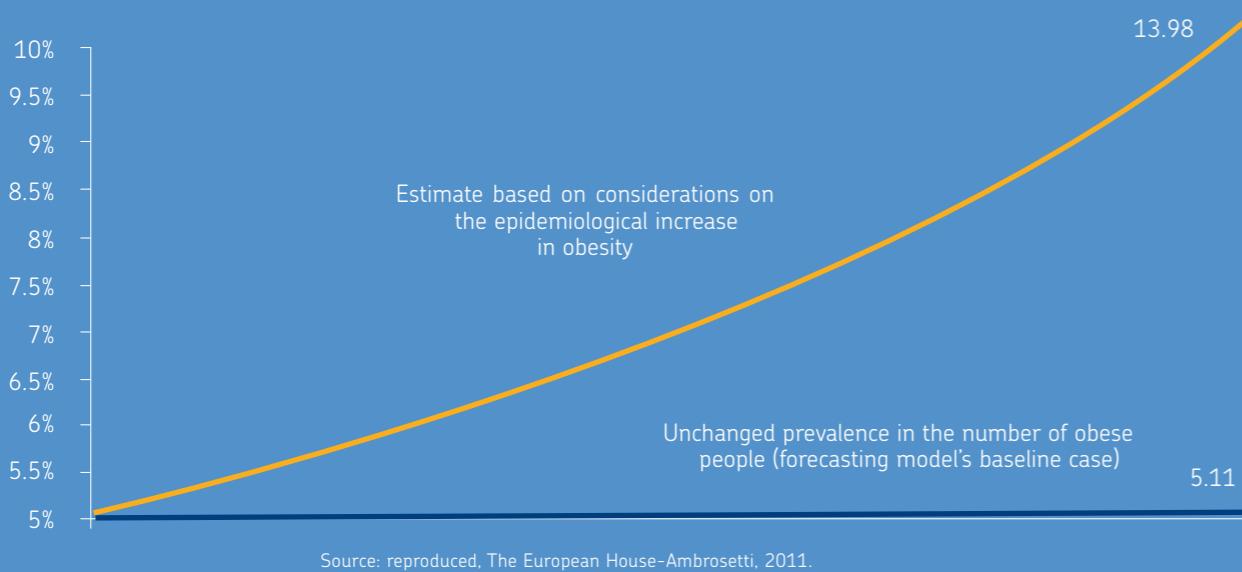
The change in the epidemiological assumptions on obesity combined with the assumptions on the demographic mix brings the number of obese people to almost 14 million in 2050 (compared to about 5 million people who would be recorded in the event that the assumptions are not changed).

By crossing the data relative to per capita healthcare costs associated with eve-



Obesity: the impacts on public health and society

Figure 1.12. Trend in the number of obese persons in Italy (millions)

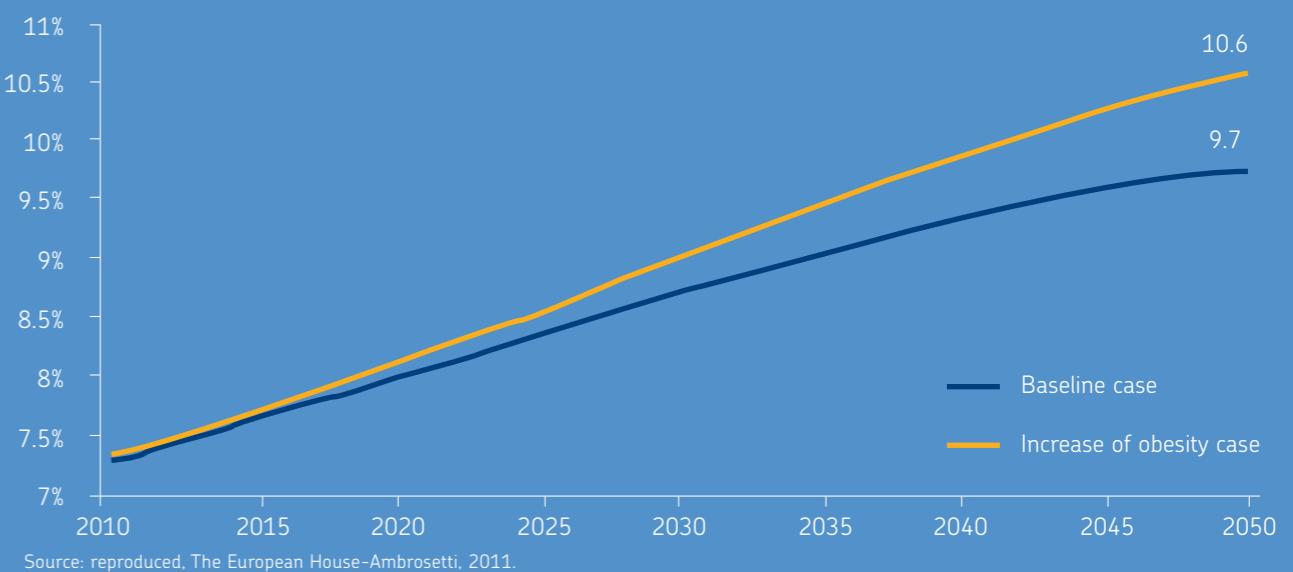


ry obese person and the growth in the number of obese people, it is possible to estimate a greater impact on healthcare spending.

With a forecast up to 2050, this simulation leads to greater spending, compared to the baseline case model, of about €24.3 billion, with a consequent impact of healthcare spending on GDP equal to about 10.6% (compared to 9.7% in the forecasting model's baseline case).

The total cost caused by the epidemiological framework simulations for the 2010-2050 period is €347.5 billion.

Figure 1.13. Trends in healthcare spending/GDP ratio in the baseline case and in the event of changes in the epidemiological framework on obesity



A photograph of two young girls in blue and white soccer uniforms standing outdoors on a grassy field. Both girls are holding and eating slices of orange. The girl on the left is wearing glasses and has her hair pulled back in a ponytail. The girl on the right has her hair in a bun and is also wearing glasses. They are both looking down at their oranges.

2. THE SOCIAL, ENVIRONMENTAL, AND CULTURAL DIMENSIONS OF OBESITY

2.1 OBESITY IN DIFFERENT SOCIO-ECONOMIC GROUPS

The explosion of the obesity phenomenon and the differences in the prevalence of this condition found among different social groups are cultural and economic in nature, in addition to being purely biological and epidemiological. Factors such as education levels, income, and social status seem to be determinant factors relative to the probability of an individual becoming obese. Some evidence of the existing relationships between obesity rates and some variables which determine individuals' socio-economic status will be provided below. However, first it is necessary to understand how the phenomenon breaks down differently, just at the levels of sex and age.

2.1.1 Obesity between men and women

IN GENERAL,
OBESITY IS MORE
WIDESPREAD AMONG
WOMEN THAN MEN

The worldwide obesity rate is trending higher in the female population than the male population¹ (Figure 1.4).

Different attempts have been made to explain this phenomenon. An American study,² for example, demonstrates how, starting in 1970, women experienced a progressive drop in actual income compared to the number of hours dedicated to work and how this was closely connected to an increase in obesity rates.

Furthermore, it also emerged that women who had experienced nutritional imbalances (phenomena that are more widespread among females than males) in adolescence are more likely to develop obesity in adulthood.

As will be seen below, the gender difference in the prevalence of obesity appears to be significantly correlated with other individual characteristics, such as socio-economic status, ethnic group, some psychological, metabolic, and endocrinological factors (hormone levels), and the level of physical activity.

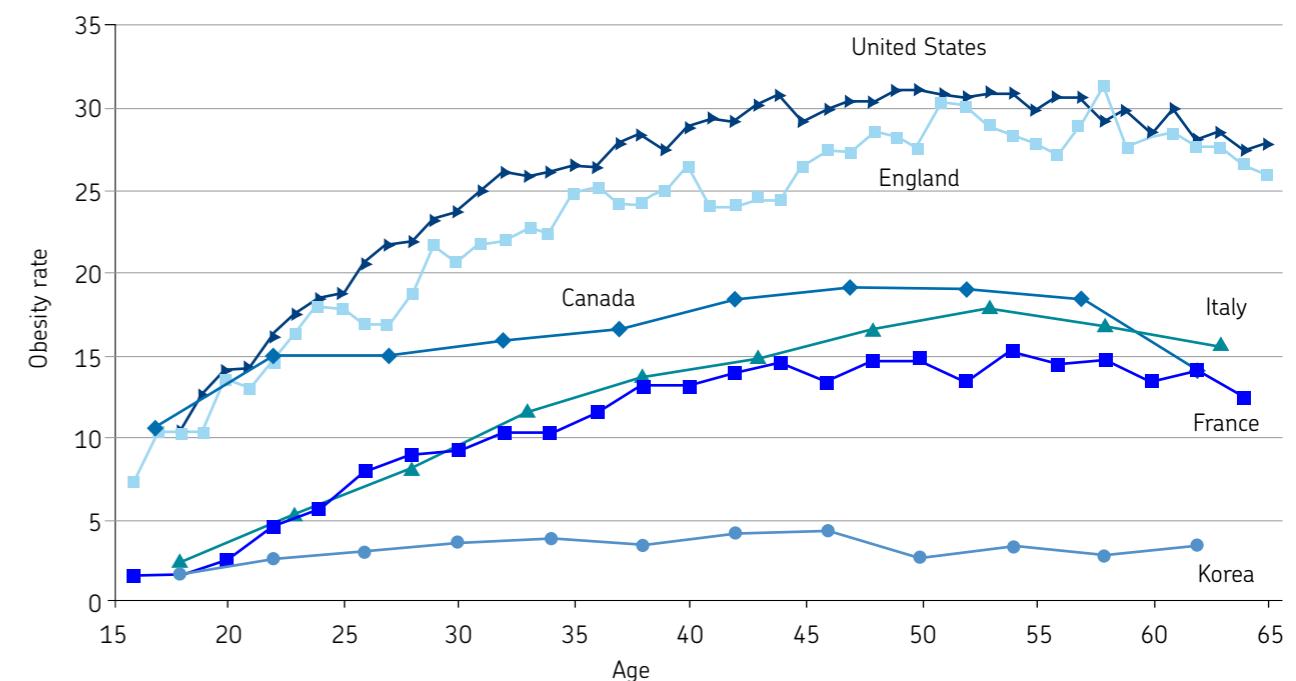
2.1.2 Obesity in different age categories

RATES OF OBESITY AND
EXCESS WEIGHT GROW
AS AGE INCREASES UNTIL
ABOUT AGE 50, AND THEN
DECLINE

Statistical evidence collected in some countries shows how the relationship between body weight and age categories follows an upside-down "U" curve. Weight tends to slowly increase with advancing age, until it reaches a peak around age 50, and drops as individuals age, through the spread of chronic diseases, most of which cause a loss in body weight.

This phenomenon can be traced back to the different lifestyles adopted over the entire lifetime of individuals. During the early years of life and adolescence, physical activity

Figure 2.1. Prevalence of obesity in different age categories (2010)



Source: reproduced by BCFN, based on OECD data, 2010.

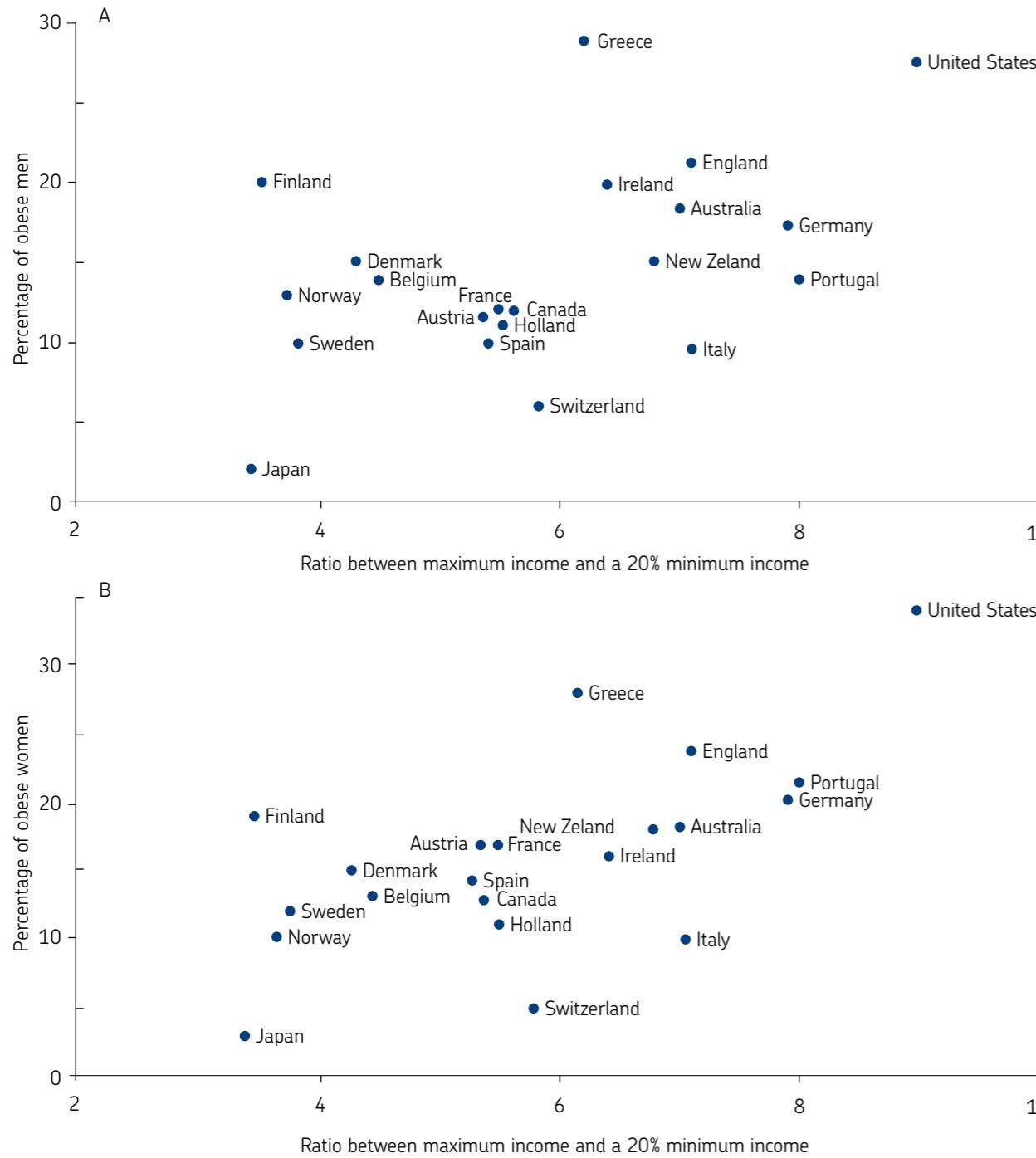
which tends to be more intense and regular and a more controlled diet allows a good BMI level to be maintained (even with the due differences and exceptions among the different countries), while with the passage of years and the start of work activity, a generalized growth is noted in the prevalence of obesity in the countries observed. This is due, for example, to the high degree of outsourcing in the job market in high-income countries, which, for the most part, provides jobs that are sedentary. However, upon reaching age 50, there is a slow inversion of the trend, due to the appearance of the first symptoms of chronic diseases and the consequent prevention and control measures adopted, such as low cholesterol or low sugar diets.

2.1.3 Obesity and socio-economic conditions

A study published in the *Journal of Epidemiology Community Health*³ analyzed the prevalence of obesity in relation to the degree of the distribution of well-being (measured as the distance between the income of the richest and that of the poorest). Although this factor is not sufficient on its own to explain the differences in the obesity rates among the different countries observed, the results show how a high degree of inequality in income distribution generally corresponds to a greater prevalence of obesity in the population. The graph in Figure 2.2 shows a cluster of countries with similar obesity rates which tend to be limited, compared to limited social inequality (countries occupying the center of the table): as the values on the axes increase, a rather sustained increase is shown in the prevalence of obesity, as in the case of the United States and Greece.

GREATER SOCIAL
INEQUALITY IS ASSOCIATED
WITH A TREND TOWARD
HIGHER OBESITY RATES

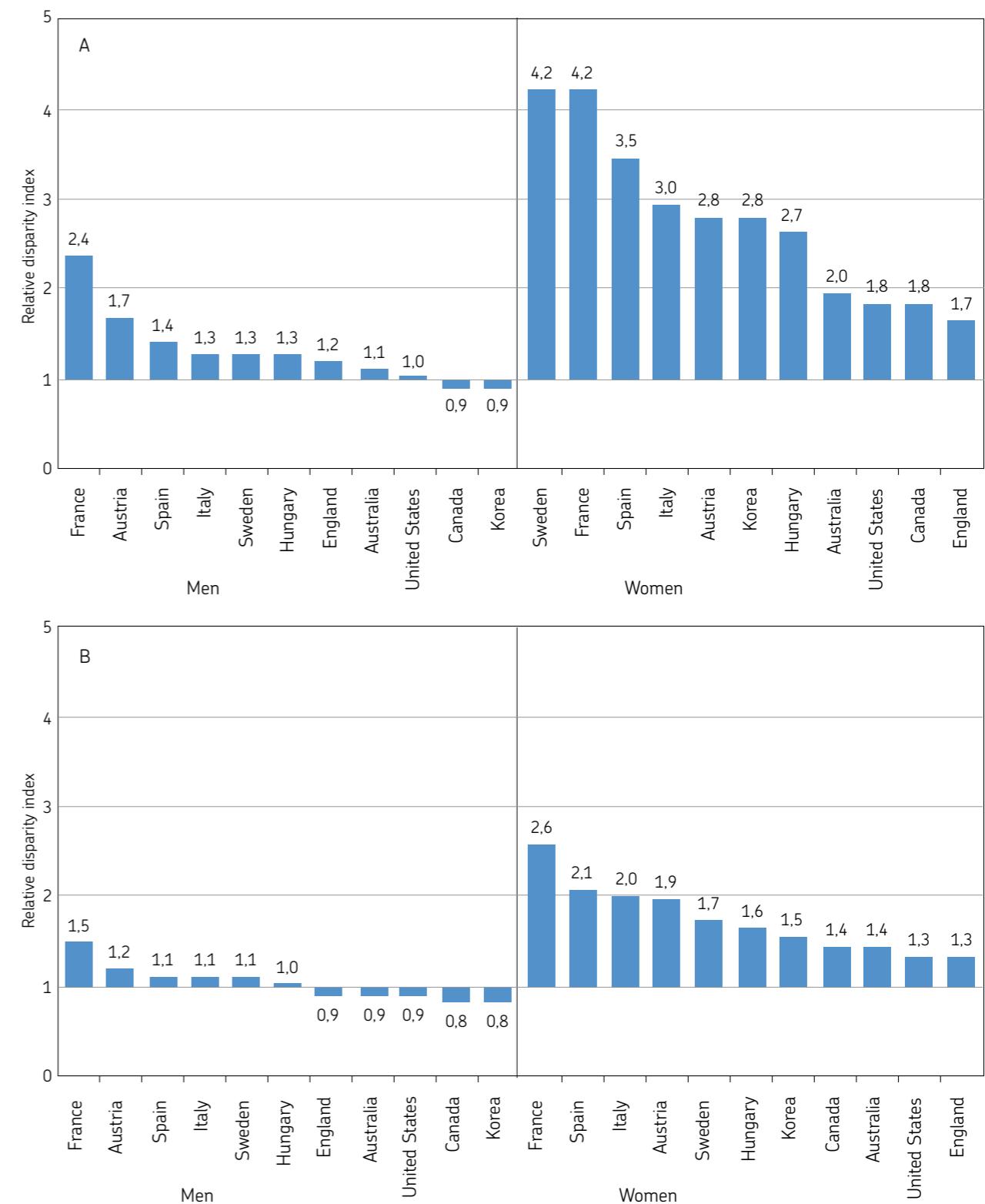
Figure 2.2. Ratio between the rates of male (A) and female (B) obesity and income inequality (measured as the ratio between the two ends of the income scale) in 1 wealthy countries (2005)



Source: reproduced by BCFN, from Pickett K. E. et al., 2005.

OECD provides another measurement of social disparity in relation to obesity, equivalent to the likelihood of being obese in the poorest classes compared to the wealthiest classes (Figure 2.3). This analysis also confirms that the level of social disparity generates a greater likelihood that women will be more overweight or obese than men. Indeed, women who belong to the wealthiest classes have significantly lower obesity rates than women belonging to poorer social classes, while this data is less evident in the case of men.

Figure 2.3. Disparity between obesity (A) and excess weight (B) based on belonging to a social/income class for men and women (2010)



Note: the values in the column in the charts refer to the likelihood of an individual belonging to the lowest social/income class being obese (A) or overweight (B) compared to an individual belonging to the highest social/income class. For example, in France, men belonging to the lowest social/income class are 2.4 times more obese than men belonging to the highest social/income class.

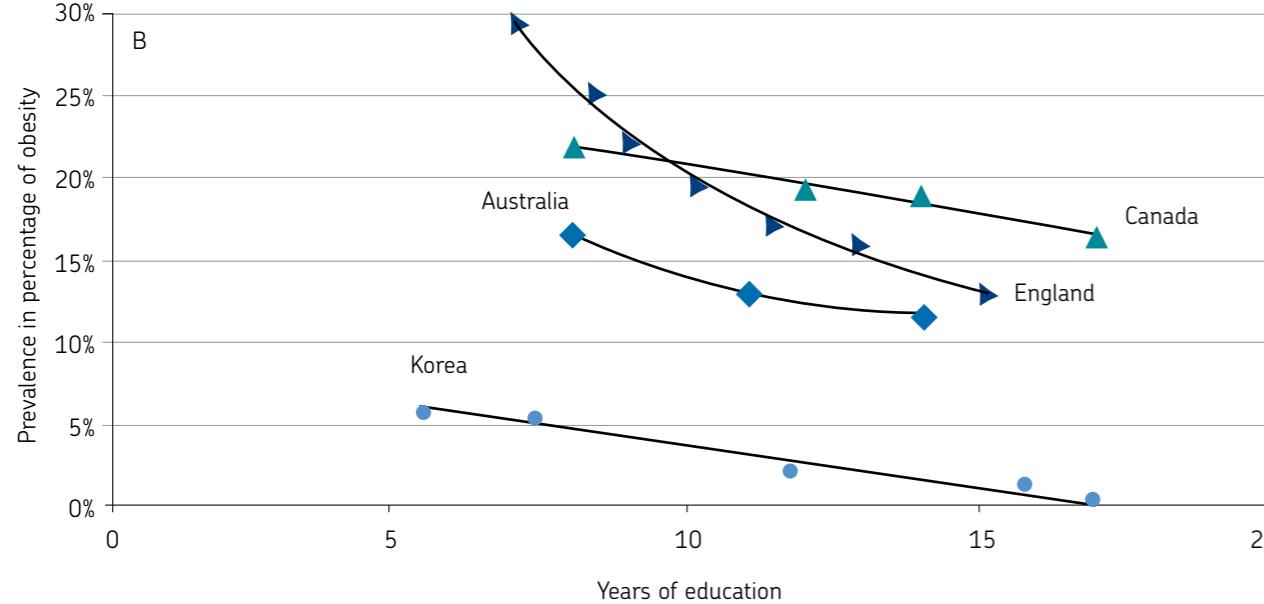
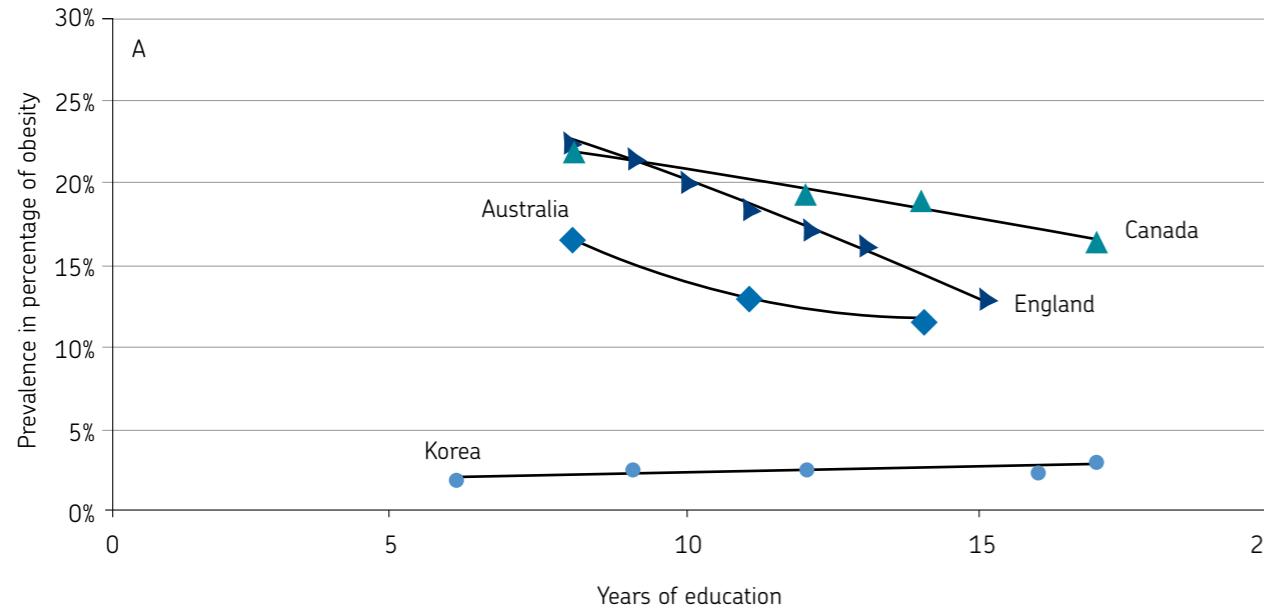
Source: reproduced by BCFN, based on OECD data, 2010.

2.1.4 Obesity and Education

IN GENERAL, AN INVERSE RATIO HAS BEEN OBSERVED BETWEEN EDUCATION LEVELS AND OBESITY

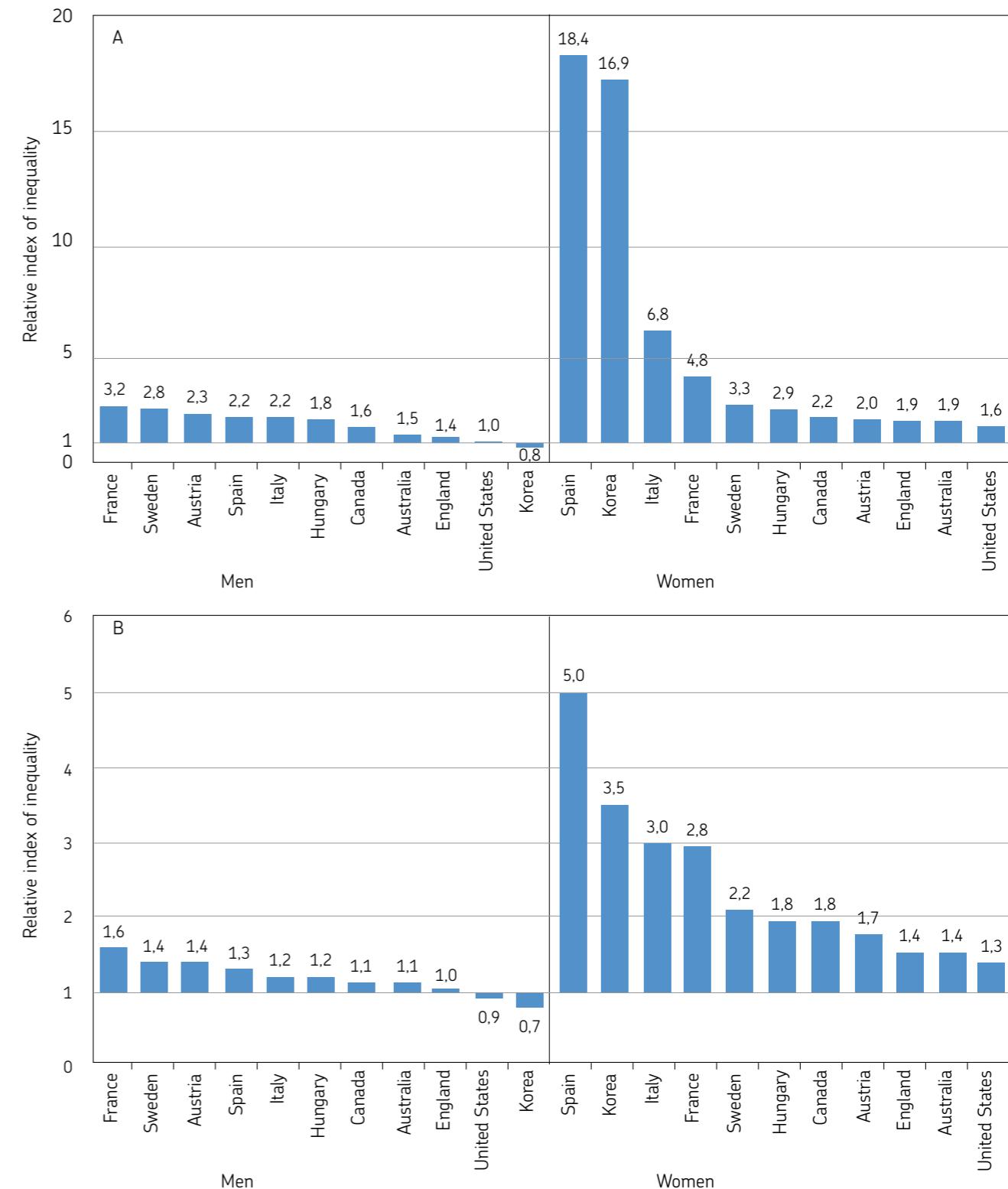
There are many studies which highlight the existing relationship between the number of years dedicated to education and lifestyle and obesity.⁴ People who have dedicated more time to their education generally consume less tobacco or alcohol, do not take drugs, and have a lower than average prevalence of obesity and being overweight.⁵

Figure 2.4. Obesity and education levels in men (A) and women (B) in some OECD countries



Source: reproduced by BCFN, based on OECD data, 2010.

Figure 2.5. Disparity between obesity (A) and excess weight (B) based on education levels for men and women (2010)



*Note: the values in the bar graphs refer to the likelihood of an individual with little education being obese (A) or overweight (B) compared to an educated individual.

Source: reproduced by BCFN, based on OECD data, 2010.

IN ITALY, A SAMPLE OF INDIVIDUALS BETWEEN 25 AND 44 YEARS OF AGE SHOWS HOW THE PREVALENCE OF OBESITY FALLS AS THE LEVEL OF EDUCATION RISES

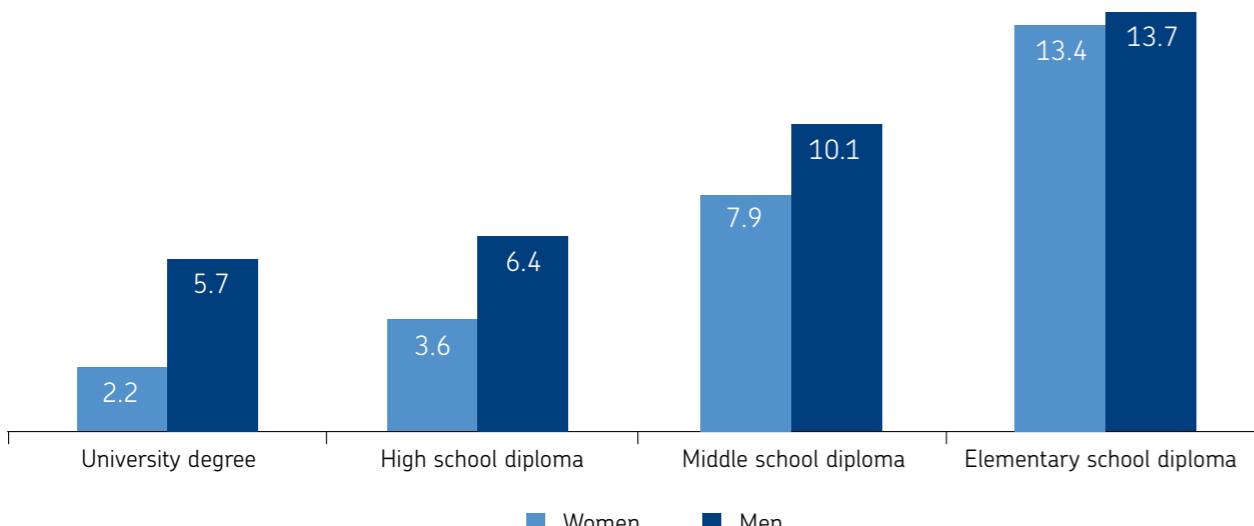


Figure 2.6. Persons aged between 25 and 44 (out of 100 people) with a BMI >30 by sex and educational diplomas (2010)

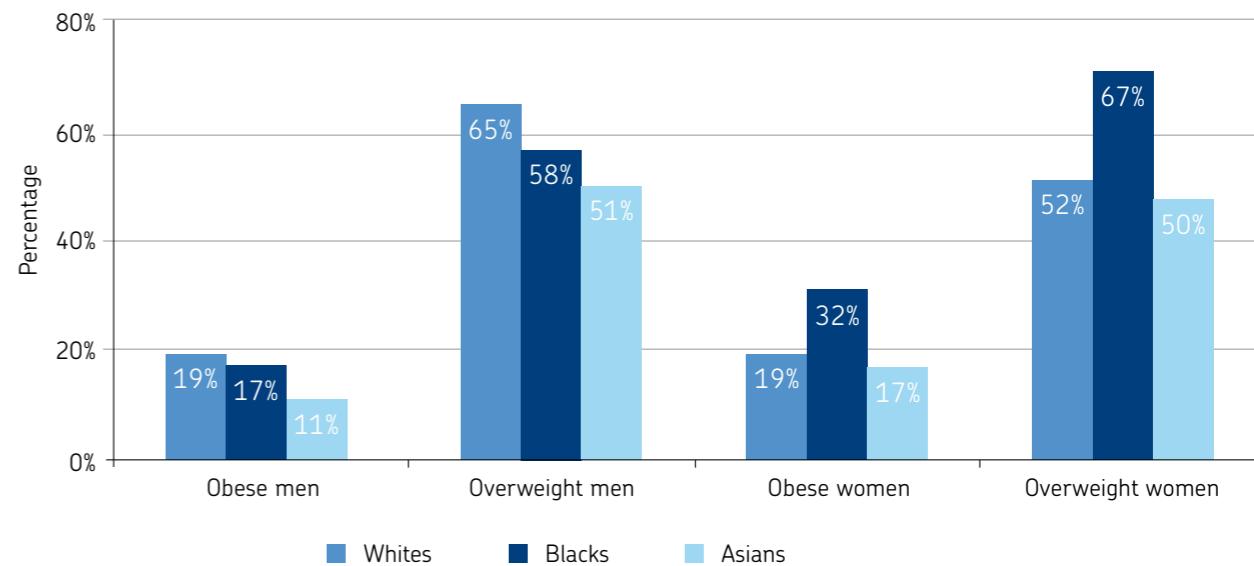
Figure 2.4 shows the results of a study conducted in four OECD countries,⁶ highlighting that the prevalence of obesity decreases with an increase in years of education, also showing how the inverse ratio between obesity rate and education level is more marked in the female population than in the male population. Indeed, there does not seem to be any relationship between education level and obesity in men, with the exception of Korea, where it is, in any case, mitigated by a very low rate of obesity.

The disparity index can also be applied to education levels, thus allowing an evaluation of the difference between the obesity rate among less educated individuals compared to those with more education (education levels are measured on the basis of the number of years they dedicated to schooling).

In Figure 2.5, it is noted that the level of disparity is also higher for the obese population in comparison with the overweight population. Moreover, the effect of education on obesity and being overweight is markedly higher in women compared to men. Indeed, the graph shows as an example that a Spanish woman with little education is about 18 times more likely to be obese than an educated woman. For men, the probability instead increases 2.2 times. In Italy, an analysis performed on a sampling of adult individuals whose ages ranged from 25 to 44 clearly shows how the prevalence of obesity is gradually reduced as education levels (defined by the diplomas in their possession) increase, for both women and men (Figure 2.6).

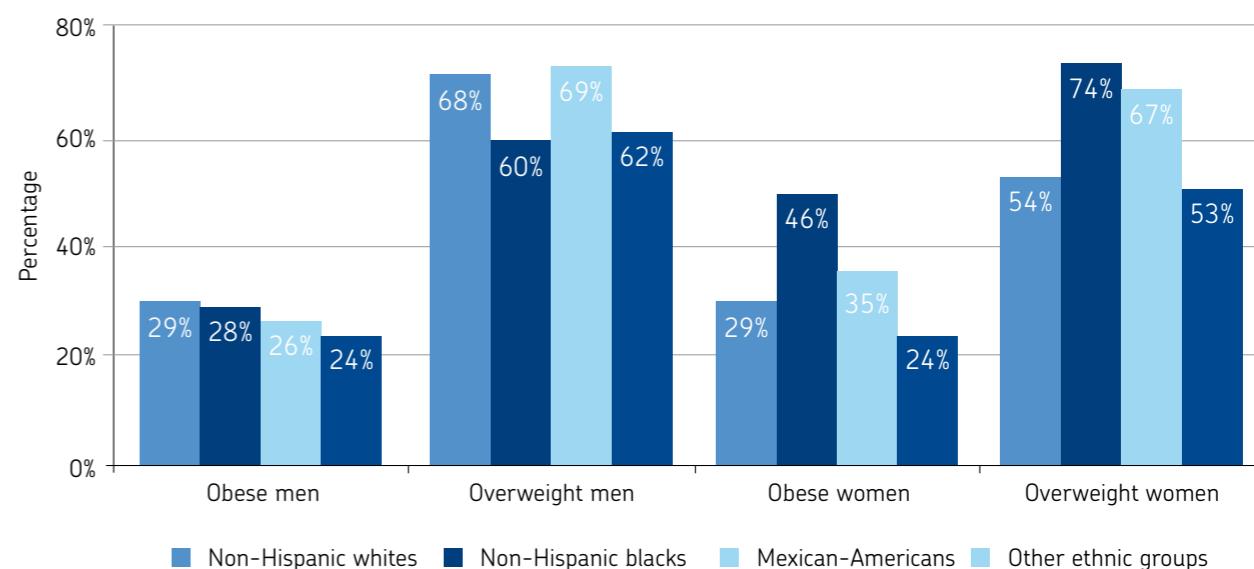
Figure 2.8 shows how the female African-American population of the United States also has overweight and obesity rates that are sharply above the average.

Figure 2.7. Prevalence of obesity in different ethnic groups in England (2007)



Source: reproduced by BCFN, based on OECD data, 2010.

Figure 2.8. Prevalence of obesity in different ethnic groups in the United States



Source: reproduced by BCFN, based on OECD data, 2010.

2.1.5 Obesity in different ethnic groups

Ethnic groups and the dynamics of migration are dimensions which generate different lifestyles and eating behaviors. Ethnic minorities often belong to the lowest social classes and tend to be marginalized; this can lead to obesity and overweight (in poorer social classes, with lower educational levels and income, the overweight and obesity rate tends to be higher).

For example, in England, the female population shows different trends depending on diverse ethnic groups, with a peak in the prevalence of obesity recorded among women of color, while for men the data appears to be more linear, as shown in Figure 2.7.

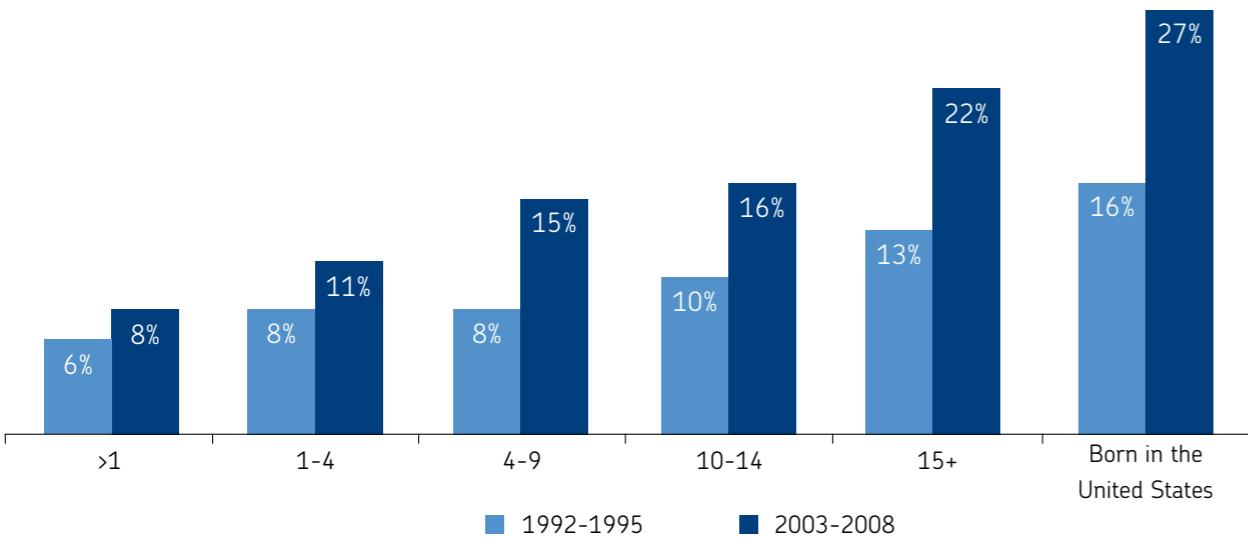
The role that an obesogenic environment plays is also remarkably important - as in the case of the United States - because it causes an increase in the prevalence of obesity among immigrants, who are often accustomed to lifestyles and eating habits that are radically different from those in the United States.

During the period from 1991 to 2008, the average obesity rate for the U.S.-born population went from 13.9% to 28.7%, while the rate for immigrants went from 9.5% to 20.7%. A study

THE EFFECTS OF AN OBESOGENIC ENVIRONMENT ON THE OBESITY RATES OF IMMIGRANTS TO THE UNITED STATES

published in the *Journal of Community Health*⁷ notes how, starting from a lower average rate of obesity and being overweight among immigrants compared to native-born U.S. citizens, the risk of obesity and being overweight among immigrants increases along with their stay in the United States (Figure 2.9).

Figure 2.9. Average obesity rate of a sample of approximately 450,000 people who emigrated from 30 countries in relation to the length of their stay in the United States compared to the population born in the United States (2008)



Source: reproduced by BCFN, based on *Journal of Community Health*, 2011.



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2.2 CHILDHOOD OBESITY

Childhood obesity, particularly in Western countries, represents a growing problem with considerable healthcare and social significance.

International scientific literature has supplied proof of a solid relationship between being overweight/obese in childhood and being overweight/obese in adulthood:⁸ indeed, childhood obesity is critical for the phenomenon to persist throughout the entire life of the individual, with significant consequences on increasing the likelihood of contracting chronic diseases in adulthood, such as diabetes, hypertension, cardiovascular problems, and tumors. For overweight and obese children, this can involve a series of psychological and physical consequences (conditions of malaise linked to being overweight, such as motor difficulties, anxiety, asthma, the onset of psychological problems, which involve low self-esteem and social isolation) which can manifest themselves during childhood (early consequences), in addition to often more serious problems which they may more easily encounter in adulthood (later consequences). In general, childhood obesity is more evident if there is a family connection (a child of obese parents has over a 70%-80% probability of being overweight than a child whose parents are of normal weight), if there are improper eating habits, and if the child does not perform enough physical activity.

2.2.1 Causes of obesity in children and adolescents

The origin and causes of obesity are many and complex: there are (few) cases in which the causes and origins are of a genetic nature, but in the majority of cases the child's and the family's lifestyle determine the onset and persistence of the disease.

Nutrition

As stated previously, one of the causes of obesity in children and adolescents is linked to the chronic and prolonged excess intake of calories. Parents' concern for their child is often seen when the child or the adolescent does not eat much, but rarely when they overeat. On the one hand, parents' concerns may have a basis, since an insufficient diet leads to deficiencies of various types, which can impair growth; on the other hand, an excessive caloric intake causes the child to be overweight, and then causes him/her to actually become obese.⁹ Aside from the total number of calories, the composition of the diet may also contribute to the development and maintenance of cases of people who are overweight and obese: in fact, a diet rich in fats fosters the accumulation of lipids through:¹⁰

- *Caloric density:* fats give food greater caloric density; therefore, the amount of energy

EXCESS WEIGHT AND
OBESITY IN CHILDHOOD
REPRESENT SERIOUS
RISK FACTORS FOR
ADULT HEALTH

EXCESSIVE CALORIC
INTAKE

UNBALANCED DIET
INCLINED TOWARD INTAKE
OF FATS

THE IMPORTANCE OF IMPROVING INCORRECT DIETARY HABITS DURING THE DEVELOPMENTAL YEARS

taken in is greater when the same volume is ingested. Since the feeling of satiety is influenced by the food's volume and its composition (ratios between proteins, fats, and carbohydrates) and since low caloric density foods are more voluminous than high caloric density foods, the latter tend to induce less satiety than the former;

- **Palatability:** fats give food greater appeal (consistency, freshness, etc.) and therefore encourages their consumption, increasing the total energy contribution;
- **Heat-generating characteristics:** the lipid's own metabolic characteristics cause the intake of fats to be followed by their efficient deposit as triglycerides. In fact, energy cost for the digestion, absorption, metabolism, and storage of lipids ranges between 2% and 4% of the energy content of the lipids taken in; thus, they are much less than the energy costs for carbohydrates (5%-24%) and proteins (25%-30%). A significant association between the level of adiposity expressed as a percentage of total body weight, and a diet's lipid content, expressed as a percentage of total caloric contributions, has been clearly demonstrated in obese children.¹¹

Even the fiber contained in foods is important: a limited amount of fiber contributes to reducing the meal's volume and speeding up the absorption of nutrients. Therefore, overeating can cause an increase in the volume of fat cells (hypertrophy) and also cause an increase in their number (hyperplasia).

This phenomenon occurs mostly in the first two years of life and during puberty and is associated with a specific predisposition to obesity in adulthood, in addition to difficulty in losing weight and keeping it within limits, due to the impossibility of eliminating the mature adipocytes once their process of differentiation has been completed.

Intervention during the growth stage is of fundamental importance because it can lead to better and more lasting results than results which can be obtained in adulthood. Parents should be the first to notice the child's excessive weight gain and report it to the pediatrician, who is surely the best person to help them. However, often a strong appetite is interpreted as a sign of well-being and so the tendency is to encourage it rather than limit it, in the hope that the obvious excess pounds may disappear during puberty.

In addition to high caloric intake (compared to the energy expended), a child's diet is frequently irregular over the course of the day, with prolonged exposure to a supply of easily accessible foods which are not controlled by adults. This promotes constant eating, and especially, eating that is not always correct in terms of meeting the daily requirements for macronutrients, vitamins, and minerals: indeed, in addition to "overeating," the child often feeds himself in an undisciplined manner, too often and badly.

Food supply characteristics

There is a general consensus in medical and scientific literature when discussing the correlation between obesity and being overweight in adolescents and the types of supply/accessibility of foods present on the market.

Analyzing changes in food supply¹² in the United States¹³ are shown as:

- these studies demonstrate that the consumption of soft drinks starts in the second half of the 1980s, while maintaining a less marked, but constant increase over time in the second half of the 1990s. This consumption is closely correlated with obesity in adolescents, since carbonated and sugared drinks (soft drinks) are significantly linked to levels of obesity in adolescents;
- this explosion benefited from the beverages' massive presence within the distribution system, and in particular, from soft drink-related advertising campaigns, which doubled in the United States from \$541 million in 1995 to almost \$800 million in 1999¹⁴ (during the same period of time, advertising expenditures on foods and foodstuffs dropped 20%,

going from \$11.6 to \$9.8 billion);

- the increase in the consumption of soft drinks was accompanied by an increase in food eaten outside of the home (in restaurants, pubs, fast food restaurants, etc.), often served in portions having percentages of nutrients that are higher¹⁵ than those of a normal meal.¹⁶ The habit of eating snacks between meals has continued to spread; the greatest contribution to the increase of energy intake recorded in the United States over the past twenty years seems to be due more to snacks than to the calories taken in during main meals.¹⁷ Again in the United States, an additional factor that has caused the increase in obesity and being overweight in children and adolescents, and more in general, in the population, is the decline (in real terms) of the average prices of food. This has generated an increase in foods that are purchased and eaten and an increase in preferences for high caloric density foods (snacks, chocolate, potato chips) which, within the average reduction of prices noted, have recorded the greatest contractions and tend to cost less than those foods which are low in caloric density (fruits, vegetables, grains).¹⁸

The way the current food supply has been developed and shaped in many of the world's countries has been a factor in the increase of obesity and being overweight in children and adolescents, along with factors linked to lifestyle.

Urban changes

Lifestyles which provide suitable activity is one of the factors that most reduce the likelihood of obesity and being overweight.

Historically, physical exercise was an activity that did not necessarily have to be planned during the day or the week, since it was an integral part of daily and working life. The increase in the distances traveled¹⁹ to reach the place of work/study has reduced people's physical mobility, as people move mostly in private cars or public transportation, while technological improvements have made work more sedentary.

In such a situation, changes in urban places and spaces where children and adolescents grow up produce effects on their level of motor activity. More specifically, the creation of "urban sprawl" and the increase in miles traveled by car have had a significant impact on children's and adolescents' physical activity levels, as they rarely walk or use bicycles to get to school or places of amusement.²⁰

Consider that in 1977, 15.8% of trips made by children and adolescents ranging in age from 5 to 15 were carried out by walking or using a bicycle; in 1990 this percentage dropped to 14.1%, in 1995 to 9.9%, and now it is below 4%.

Such a reduction is due to parents' increasing willingness to accompany their children to school or to places of amusement, due to the distance between the place of residence and the school being too great to be covered by their children on foot or on bicycles, and due to the unavailability of special lanes or paths free from automobiles and dangers.

Nevertheless, since this situation seems to represent an outside variable, it would be opportune to encourage policies to promote and facilitate some sports activities also. The loss of opportunities to practice motor activities of this kind (walking to school or playing with friends) has an additional impact on the lower propensity for physical exercise in other situations (group sports activities, etc.)²¹ and this is an additional factor in the lower propensity to adopt an active lifestyle as an adult.

INCREASE IN THE CONSUMPTION AND SUPPLY OF SOFT DRINKS AND SNACKS

THE EVOLUTION OF URBAN PLACES AND SPACES HAS DECREASED THE PROPENSITY FOR PHYSICAL ACTIVITY



Karen Kaszauskis/National Geographic Stock

The spread of sedentary lifestyles

A sedentary lifestyle is another risk factor²² for obesity and being overweight. The spread of sedentary lifestyles in childhood often benefits from a change in family and social demands which leave few, if any, possibilities to perform basic motor activities.

For example, children spend many hours in front of the television or at the computer²³ because their parents tend to be busy at work until the evening hours. The constant increase in the time young people spend in front of the computer, television, or electronic devices is confirmed by an American study²⁴ which calculated that the average time youth, ranging in age from 8 to 18,²⁵ spent in front of electronic devices in 2009 was 7 hours and 38 minutes a day. Compared to five years previously (2004), an increase of 1 hour and 17 minutes was recorded.

Furthermore, current trends indicate that children and adolescents leave home less and less, since parents are very apprehensive about their safety²⁶ and they participate less frequently in physical education activities (in particular, adolescent girls²⁷). And there are numerous international studies which have associated this behavior with an increase in the prevalence of childhood obesity.²⁸

Physical exercise, besides preventing an excessive increase in body weight, is of fundamental importance for a child's growth, since it promotes and helps to modify the ratio between lean mass (muscle tissue) and fat mass (adipose tissue). Therefore, it would suffice to practice mediumintensity aerobics, such as a walk that subjects muscles to a slightly intense but constant effort, allowing energy to be drawn from reserves of fats.

Changes at school

Not only has the way children and adolescents arrive at school changed, but the school environment has also changed. In recent years, for example, there has been a radical change noted in the food served at school and the food available through vending machines.

As analyzed previously, the consumption of soft drinks increased exponentially between the late 1970s and the late 1990s and this is partly due to the availability of soft drinks sold through vending machines in schools.²⁹

In the United States, the spread of vending machines also benefited from the policies adopted by vending machine operators who paid more and more royalties to schools, thus providing increased income for school budgets. Furthermore, in the United States many schools have allowed vending machine companies to advertise products for sale.

In these schools, the possibility of easily having constant access to certain products (potato chips, snacks, soft drinks, etc.) in vending machines is correlated to obesity and being overweight. It has been estimated that an increase of ten percentage points in the availability of these products at school produces an increase of one BMI point in children and adolescents.³⁰

Family and genetic factors

As mentioned previously, parents' treatment of their children, often dictated by apprehension for their health and safety, combined with the demands of their work, fosters the acquisition of behaviors and habits based on a sedentary lifestyle in children and adolescents. An Italian multipurpose investigation carried out by ISTAT in 2000 demonstrated how 25% of overweight children and adolescents had an obese or overweight parent, while the percentage rose to about 34% when both parents were obese or overweight. This underlines how crucial family factors are in the development of obesity: the family's example is fun-

TELEVISION AND COMPUTERS HAVE REDUCED THE TIME DEDICATED TO PHYSICAL ACTIVITY

SNACKS AND SOFT DRINKS AVAILABLE IN SCHOOLS THROUGH VENDING MACHINES

THE IMPORTANCE OF PARENTS' ATTITUDES AND BEHAVIOR

damental and it cannot be expected that a child will adopt correct nutritional habits if the parents do not follow a balanced diet.

However, the influence that parents can have in the development of their overweight and obese children also relates to a genetic aspect. Although a genetic predisposition, in itself, is not a reason that can explain obesity and being overweight, it can represent an element of greater sensitivity and predisposition to cases of energy imbalance.

Therefore, it can be concluded that "social" reasons such as urban changes, changes at school, and the structure of the food supply modify the daily caloric intake pattern in children and adolescents, influencing obesity and being overweight, especially in persons who are more sensitive from a genetic point of view.

In a recent study published in *Nature*,³¹ a team of researchers from Cambridge University analyzed the genomes of 300 seriously obese children and found a correlation between the loss of a portion of DNA and cases of serious obesity. The gene which disappears in obese children would belong on chromosome 16, which regulates hunger and levels of sugar in the blood.

Obviously, the study concerned a condition that was rather rare at the population level and it is premature to forecast the impact of this and other genetically transmitted abnormalities on the obesity epidemic we are facing.

The results of this study, which is of a pioneering nature within the scope of scientific research on the relationship between genetic characteristics and obesity, require further information and comparisons, but they indicate that there is a genetic component that makes some individuals more sensitive toward obesity or being overweight.

In conclusion, a child can inherit a predisposition to obesity from his parents' genes, but it is from them, starting at birth, that he learns motor and nutritional habits which, if correct, will best balance the contribution and consumption of calories during his entire lifetime.

2.2.2 The effects of obesity in children and adolescents

CHILDHOOD OBESITY IS A SIGNIFICANT RISK FACTOR FOR ADULT HEALTH

Childhood obesity is recognized as one of the major public health problems, due to the damage it does to children's health, as well as the damage it causes to adults (due to the high degree of cases of obesity and being overweight lasting even into adulthood³²).

Its major effects on health can be summarized as being problems of a metabolic nature (insulin resistance, glucose intolerance, hypertension) and non-metabolic in nature, such as bone and joint diseases (valgus of the lower limbs, joint pain, reduced mobility, flat feet), skin diseases (strié rubrae, acanthosis nigricans), liver diseases (fatty liver), and respiratory diseases (desaturations and nocturnal apnea).

In addition, people who were overweight or obese in their youth have greater exposure to cardiocirculatory diseases (hypertension, coronary diseases), musculoskeletal diseases (early onset of arthritis due to the increase in static-dynamic demands on the spine and lower limbs, subjected more to the weightload), metabolic diseases (diabetes mellitus, high cholesterol, high triglycerides, etc.), up to the development of tumors in the gastrointestinal tract.³³ Increases in body weight and other obesity indices in youth (but not only) can translate into later increases in blood pressure.

A study which recently appeared in the *New England Journal of Medicine*³⁴ monitored almost 5,000 American children born between 1945 and 1984, arriving at the conclusion that childhood obesity involves a more than double likelihood of death by age 55, due to the increased risk of developing diseases linked to metabolism, coronary diseases, and hypertension.

IN ADDITION TO HEALTH PROBLEMS, EMOTIONAL, SOCIAL, AND PSYCHOLOGICAL CONSEQUENCES OCCUR

In addition to the health consequences, obese and overweight children have emotional, social, and psychological consequences.³⁵ A significant negative repercussion on children affected by obesity and being overweight is the low self-esteem they have,³⁶ which often makes them feel inadequate with regard to their social frame of reference, compared to their peer group, and which may have more marked manifestations of depression, loneliness, anxiety, isolation, and marginalization by their playmates and at school.

To a great extent, children become aware of themselves and their identities by also perceiving how others behave with them: in fact, the self-esteem that a child or an adolescent has increases or decreases according to the responses that he gets from his frame of reference. In the majority of cases, obesity and being overweight are the subject of scorn and, therefore, obese or overweight children suffer from low self-esteem.

Depression is another possible consequence of obesity which affects overweight and obese children.

In certain cases, these children tend to feel insecure and inferior to other children and react by isolating themselves and falling into a depression, while in other cases they try to be very friendly to be accepted and can actually become "the heart and soul" of a group. As occurs with obesity and being overweight, depression in children and adolescents persists at a high level in adulthood, with consequences on life expectancy, socio-economic status, and the lower likelihood of marrying and forming a family.

Children themselves perceive obesity and being overweight as undesirable situations; therefore, actual cases of discrimination can arise among children linked to these conditions. In some studies, it has been shown that children placed in front of photographs of obese children have defined them as lazy, idle, and undesirable as friends, but the truly interesting result is that overweight children also indicated that other overweight children were lazy, idle, and undesirable as friends.

This situation worsens during the transition to adolescence: obese adolescents, in fact, are teased, mocked, and isolated. Furthermore, cases of severe and chronic obesity tend to increase aggressive and provocative behavior since the adolescent has to "fight" harder to be accepted. Finally, due to the lower level of self-esteem and greater exposure to depression, anxiety, and isolation, obese adolescents are more inclined to behave in ways that are negative for their own health, such as, for example, alcohol consumption and smoking cigarettes.³⁷

2.3 THE COSTS OF OBESITY IN THE WORKING WORLD

OBESITY IS ASSOCIATED WITH LOWER THAN AVERAGE SALARY LEVELS, ESPECIALLY FOR WOMEN

The growing rates of obesity and being overweight have important implications on job market dynamics and on workers in the public and private sector.

Different studies show how overweight or obese people on average earn lower salaries, are excluded from certain types of occupations (such as, for example, customer relations or sales), and are victims of discrimination in the workplace.

In particular, through a study conducted to understand what the impact of obesity is on salaries,³⁸ it was shown that women are at the greatest disadvantage, without distinguishing among ethnic groups: in fact, both body mass index and weight seem to have negative effects on salaries. The worst data is recorded among white women, for whom it is estimated that being 64 pounds (about 29 kg) overweight causes a 9% reduction in salary, the equivalent of one year and a half of education or three years of work experience.

Furthermore, discriminatory behavior against overweight or obese people also occurs during the phase of access to the market or in the workplace.³⁹ For example, in Great Britain obese people of working age are 15-20% less likely to be hired.⁴⁰ Similar discriminatory behavior has been found in Finland, especially against obese women.⁴¹ In Australia, obese people of working age are the category most excluded from the job market: 8% more compared to their peers, and if they are older, the likelihood of exclusion rises to 20%.⁴²

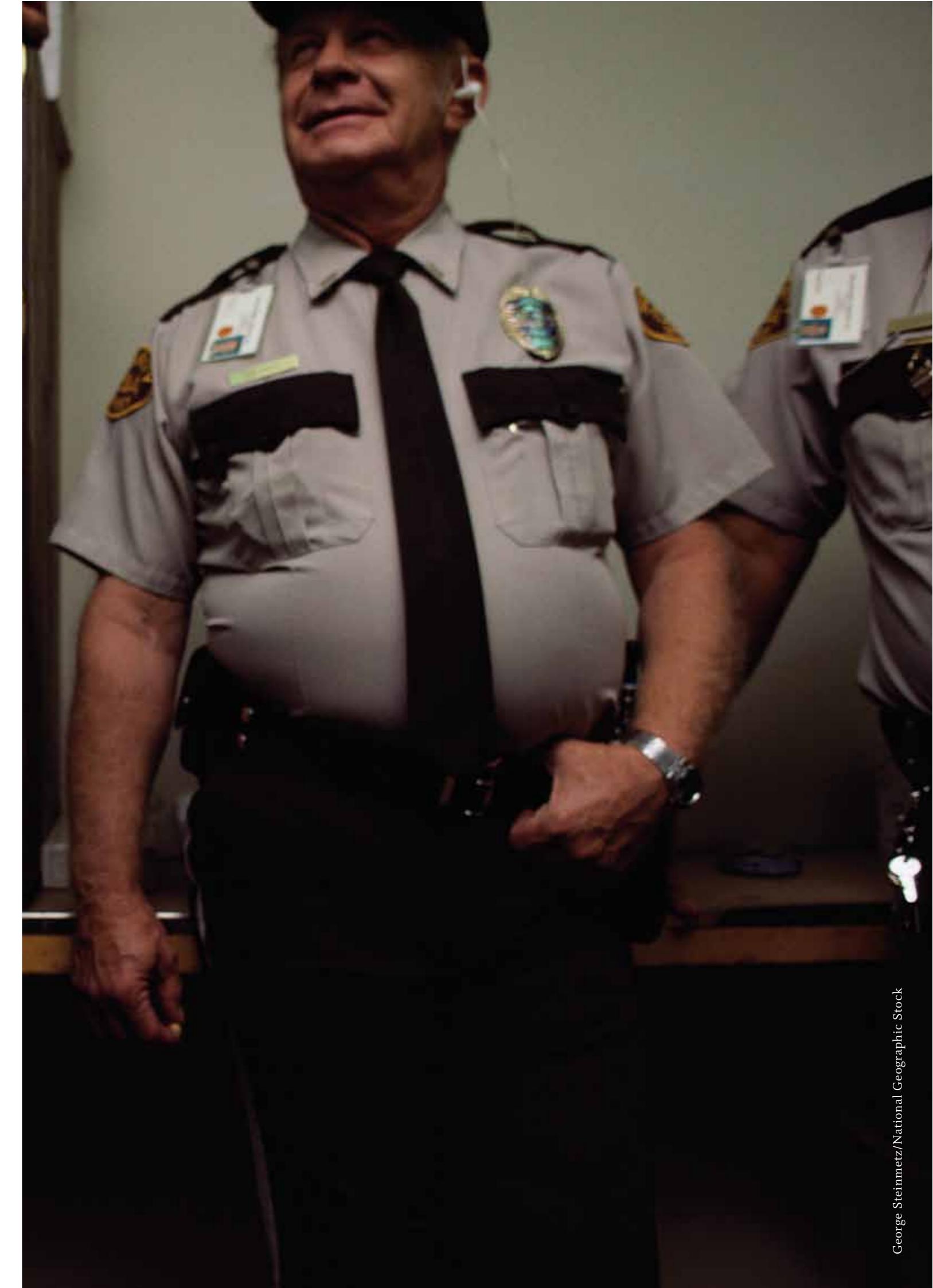
As previously mentioned in Chapter 1, the costs to companies for obesity and being overweight are linked to absenteeism (Finkelstein, Fiebelkorn and Wang, 2005; Ricci and Chee, 2005), lower productivity at work due to health problems or “presenteeism”⁴³ (Ricci and Chee, 2005), and disability (Sturm, Ringel and Andreyeva, 2004).

The majority of estimates relative to these costs present in the literature refer to the United States, the country which records the highest percentage of obese adults.

From the point of view of direct costs, a study⁴⁴ estimates that in the United States, companies spend about \$45 billion each year for their obese and overweight employees' medical care. Indirect costs arising from days absent from the workplace caused by obesity are instead equal to \$730 for every male employee and \$1,063 for women.⁴⁵ This study reports that, on average, obese workers miss two days more of work compared to their normal weight colleagues. A more recent study⁴⁶ contains data that is even higher: 5.9 working days more are lost each year.

According to another recent study,⁴⁷ the annual cost that can be attributed to obesity among fulltime employees in the United States would amount to about \$73.1 billion, out of which 82% is connected to medical expenses and presenteeism, while the remaining 18% is connected to absenteeism. In the United States, the per capita costs of obesity which are incurred by companies would total \$16,900 for obese women with a BMI higher than 40 and \$15,500 for men in the same BMI category.

TO COMPANIES, THE COSTS OF OVERWEIGHT AND OBESITY ARE LINKED TO ABSENTEEISM, LOWER PRODUCTIVITY ON THE JOB DUE TO HEALTH PROBLEMS, AND DISABILITIES



A study conducted by the Australian government estimates that obese workers are absent 17% more than their normal weight colleagues, and for a longer time, or on average, 3.8 days a year compared to people with a normal body type, at 3 days a year.⁴⁸

Other studies underlined a third effect arising from obesity, which is greater exposure to accidents in the workplace:⁴⁹ in fact, overweight workers would be exposed to a risk of disability that is 26% higher than their colleagues' risk. This risk would rise to 76% for obese workers.⁵⁰ It was indicated that the direct and indirect costs to the employer increase proportionally along with the growth in workers' BMI.⁵¹ In the case of third-degree obesity, healthcare spending is 81% greater than the expenditure incurred for people of normal weight,⁵² with an annual cost in terms of lost workdays that amounts to a sum ranging from \$460 to \$2,485 per capita.⁵³ Taking into account the prevalence of obesity in the workforce, the estimated loss to an American company with 1,000 employees is about \$285,000 a year.⁵⁴ According to a Gallup research study conducted in the United States in 2011, on an aggregate level overweight or obese workers are absent from work 450 million days more a year⁵⁵ than their normal weight colleagues, which translates into a loss of productivity equal to \$153 billion a year. In addition to losses in terms of productivity, companies incur medical expenses that are 42% higher for obese or overweight employees compared to other employees.

Lastly, but certainly no less important, it was found that obesity represents one of the major risk factors for early withdrawal from work.⁵⁶

Figure 2.10. Annual estimates of costs tied to lost productivity and absenteeism, subdivided by weight categories among full-time workers in the United States

GROUP	PERCENTAGE OF AMERICAN WORKERS EMPLOYED FULL-TIME	AVERAGE NUMBER OF "UNWELL" DAYS A MONTH	ESTIMATE OF WORK DAYS LOST BY FULL-TIME WORKERS (*)	ANNUAL ESTIMATE OF COSTS DUE TO LOSS OF PRODUCTIVITY ARISING FROM ABSENTEEISM (**)
Persons of normal weight and without chronic diseases	13.9%	0.34	base	base
Overweight or obese persons without chronic diseases	17.9%	0.36	1,505,995	\$513,544,375
Overweight or obese persons with one or two chronic diseases	30.2%	1.08	94,301,528	\$32,156,821,142
Overweight or obese persons with three or more chronic diseases	17.8%	3.51	238,457,008	\$81,313,839,758
Persons of normal weight with one or two chronic diseases	14.8%	1.07	45,639,781	\$15,563,165,458
Persons of normal weight with three or more chronic diseases	15.3%	3.48	69,943,339	\$23,850,678,489
Total			449,847,652	\$153,398,049,221

Note: Observation Period: January 2 - October 2, 2011. Sample Observed: 109,874 full-time employees (United States).

* Assumption of 112,590,754 full-time employees; conversion of "unwell" days and days lost in the workplace is 0.312.

** 341 dollars for each workday lost; this estimate (in real prices) is based on a research study by Goetzel et al. 2003.

Source: reproduced by BCFN from Gallup, *Healthways Being Index*, 2011.

2.4 THE IMPACT OF OBESITY ON ENVIRONMENTAL SUSTAINABILITY

Economic growth, social changes, and the constant search for a higher standard of living have given rise to the tendency to eat foods once considered rare and prestigious more often and in larger quantities. If the possibility of eating a greater variety and wealth of foods has undoubtedly brought some benefits, such as the disappearance or mitigation of nutritional deficiencies in developed countries, the trend toward eating more than necessary and the reduction in physical activity arising from new and diverse types of work, often with imbalances among the various nutrients in the diet, has exposed people to other serious risks such as obesity, hypertension, diabetes, etc.

Consumption of food that is constantly above the recommended calorie requirements by a growing number of people, especially in Western countries, does not only represent a risk to health, but also puts more pressure on natural resources and the environment.

In this regard, scientific literature includes overeating among food waste (Smil, 2004).⁵⁷

In reference to food waste generated in the last stage of the food production chain (household and restaurant waste, which in Western countries represents the greatest share of waste occurring throughout the entire production chain), a significant portion is due to the oversized portions served and the quantity of food served, and more in general, to the tendency to eat more than is necessary.

Obviously, all this translates into a greater impact on the environment and overconsumption of natural resources for the production of foods which are not strictly necessary for proper body sustenance. For an estimate of food waste's environmental impacts in terms of consumption of resources (ecological footprint), water (water footprint), and greenhouse gas emissions (carbon footprint), see the paper the BCFN recently published on this topic.⁵⁸

More generally, different studies have demonstrated that overconsumption of food has an indirect impact on global warming. A study by the London School of Hygiene and Tropical Medicine⁵⁹ demonstrated that the high obesity rates in the most developed countries caused 1 billion tons of greenhouse gas emissions every year (out of a total of 31.6 billion tons of greenhouse gas emissions every year⁶⁰).

In conclusion, when comparing a population of obese persons to a normal weight population, on average, the results show that the obese population consumes about 20% more food.⁶¹

A DIET THAT IS HIGHER THAN CALORIC REQUIREMENTS IS CONSIDERED TO FOOD WASTE AND HARMFUL TO THE ENVIRONMENT

reasons or reasons linked to social acceptance; the body's own functioning was threatened, since the body was now so overworked that it could no longer support the individual in his activities. At this point, obesity is evident as an illness, with all its potential for causing disabilities. It is a sneaky, unidentified illness, that leads the obese person into a spiral of guilty feelings arising from a weakness, and thus it is experienced as a "just punishment."

I would ask myself why I never had the necessary will power to control the impulse to eat "junk" and I thought there was something wrong with my brain.

I felt ill. I had become disabled by now.

Handicapped [...] is the appropriate term. She would laboriously drag herself to work every morning, trying to resist the fatigue that hung over her every morning from the first moment she awoke.

Depressed and frustrated by the umpteenth failure.

Relationship with mobility in the environment

An obvious malaise is noted in obese people in their relationship with the outdoors: the color of their clothing is black, or a dark color, and they never use public transportation.

These are people who live trying to hide from the world, to not be seen, and not be judged and mocked by others. Normal weight people tend to have no clue about how obese people suffer and make fun of them because of their appearance without imagining their suffering. They avoid crowds and try to isolate themselves and hide from others' eyes as much as possible.

Rebellious obese people who turn their condition into a challenge are rare, because the tendency is to instead suffer discrimination in silence, like defenseless children: interaction with others is almost always described in negative terms and

obese people tend to be defensive about their weight.

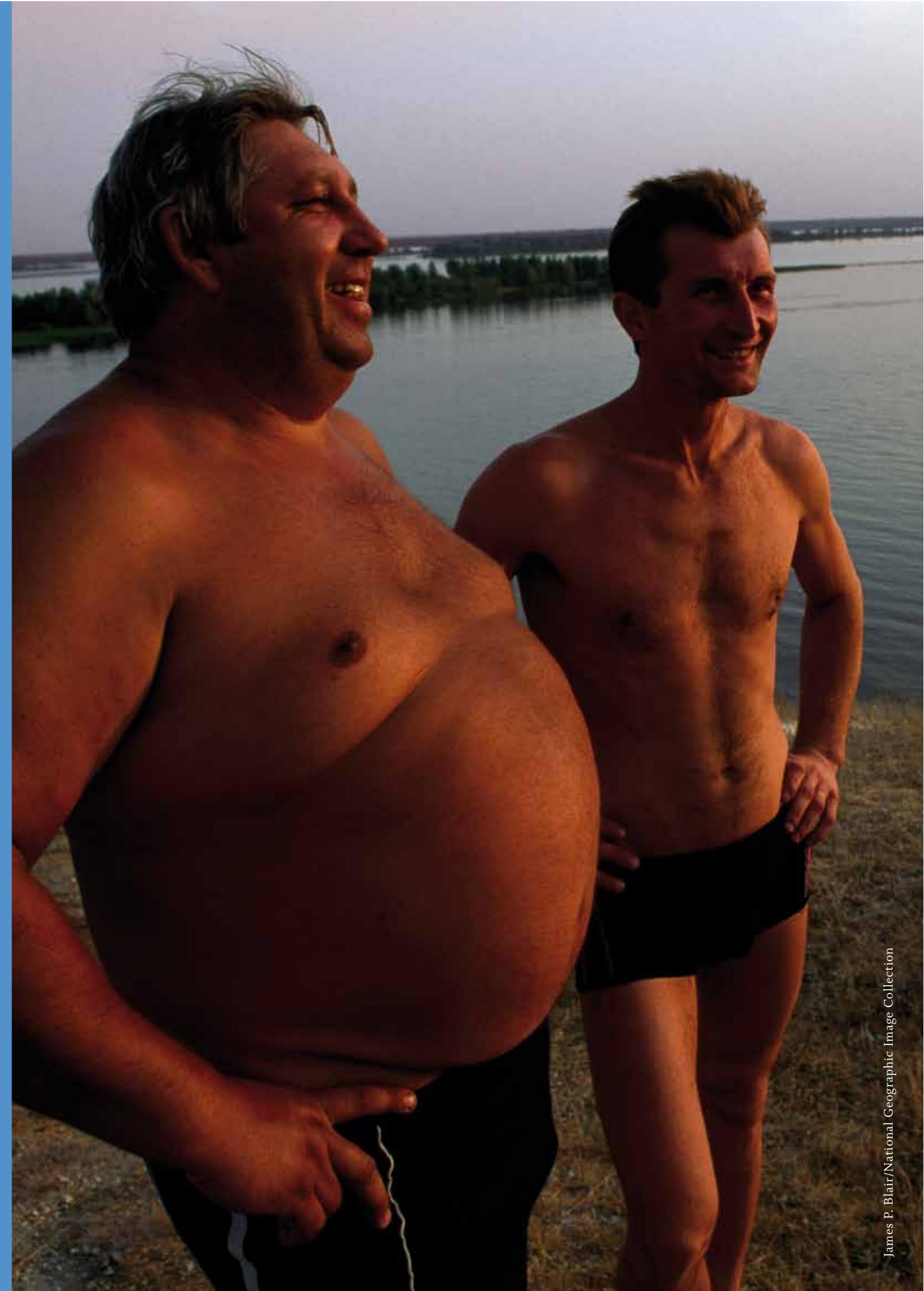
When she would leave the house, she mostly wore black; to go elsewhere, she would take the car. The crowd would look at her and she felt she was being mocked by anyone she would see laughing or whose gaze lingered a little longer on her person, but this happened at work too. It would happen to her if she saw her co-workers talking, she would think that they were talking about her in a negative fashion [...] When she was among them, she would smile and be courteous, that was her specialty.

The crowd would look at him and he would feel like a piece of garbage. When among them, he isolates himself and his wife has pointed it out to him more than once.

She was always smiling. Over time, her friendliness became a shield, her emotions were different when she was among people. Sometimes she smiled too much, almost taking pleasure in making herself disappear. Sometimes she didn't even feel like setting foot outside the door so she wouldn't be seen: you pretend nothing is wrong and you're dying inside [...] in silence, and with a polite smile on your face.

Their relationships with work

Obese adults do not seem to have difficulty in finding a job and therefore they are persons who tend to be professionally fulfilled, but who are not satisfied because, again, the positive result is canceled out by the weight of their bodies. In fact, the latter may have created some limitations on three levels in their job search: on the functional level, because an obese person may appear unfit for certain duties that require speed; on an esthetic level, because the fact of being fat again brings up their problems of relationships with others, since they are exposed to colleagues' prejudices; and on the internal level, because all these aspects are transformed into a feeling of worthless-



James P. Blair/National Geographic Image Collection

3. THE FIGHT AGAINST OBESITY: THE ROLE OF GOVERNMENTS AND THE PRIVATE SECTOR AND THE RESULTS OF PREVENTION POLICIES



3.1 PUBLIC POLICIES FOR DEALING WITH THE PROBLEM

3.1.1 The WHO guidelines

Today, non-communicable diseases such as cancer, chronic pathologies of the respiratory system, cardiovascular diseases, and diabetes represent a primary threat to human health. These four pathologies cause 35 million deaths per year, about 60% of the total deaths in the world, and 80% of those registered in medium-low income countries.¹

More than 80% of cardiac diseases, type 2 diabetes, and a third of the tumoral forms can be prevented by eliminating the risk factor which generates them, such as consuming tobacco-based products, unbalanced diets, physical inactivity, and excessive consumption of alcohol. Nonetheless, without a consistent and joint commitment by the governments, industry, and the main stakeholders at global level, the death rate due to these pathologies shall continue to grow. It is estimated that over the next 10 years, deaths from non-communicable diseases will increase by 17% at global level and, even more worryingly, the increase will be most acute in Sub-Saharan Africa (+27%) and the Middle East (+25%).²

The fight against non-communicable diseases and their risk factors must, therefore, be among the primary options of global policymakers' agendas and it is necessary to form a basis of consent on the matters of public health which necessarily require medium-long term policies.

In the resolution at the end of the *High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases*, held in September 2011, WHO provides some important guidelines for adopting policies aimed at fighting the morbidity and mortality of noncommunicable diseases, asserting: "It is necessary to acknowledge how an increase in prevalence, morbidity, and mortality in non-communicable diseases is widely combatable through the adoption of shared and multi-sectorial actions by member States and other stakeholders involved at the national, regional, and global levels. A reduction in the level of exposure of single individuals and the collectivity of identified risk factors, together with the reinforcement of actions aimed at creating a higher awareness in choices in daily life, are defining factors for the success of these strategies."

WHO has dedicated a whole section to the policies needed for reducing the incidence of the risk factors in the *Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases 2008-2013*. The main objective is to convince individuals to consciously make more healthy choices during their daily lives. It is necessary to involve both the public sector and the private sector in various environments, such as agriculture, finance, business, urban, education, and sport, and in different contexts, such as schools, work, family, and associations.

Among the risk factors upon which WHO has focused its efforts, are obviously overweight and obesity, which are increasingly assuming the form of a global epidemic. In 2004, WHO published a document which identifies and explains certain strategies which can be pursued in order to limit the expansion of the phenomenon, including:³

- ⌚ Promote and support breastfeeding during the first 6 years of life and develop specific feeding programs for infants;
- ⌚ Develop a national program on nutrition focused on the prevention of non-communicable diseases;
- ⌚ Establish and implement guidelines for healthy eating and favor a more healthy composition of food by means of:
 - decreasing quantities of salt;
 - eliminating trans-fatty acids;
 - decreasing saturated fats;
 - limiting sugars;
- ⌚ Provide precise information to consumers in order to incentivize more conscious choices;
- ⌚ Implement a program leading the main producers of food and non-alcoholic drinks to realize more responsible marketing campaigns, especially for children.

3.1.2 The role of the government in consumer choice

The fight against obesity, in the same way as the fights against the consumption of tobacco or alcohol abuse, is connected to the action of the governments. Through the regulation and imposition of taxes, the implementation of campaigns for information and awareness, or a mixture of all these measures, governments can play a fundamental role in addressing the process of consumer choice.

The measure and the approach – which can be more or less paternalistic – with which the State decides to intervene on consumer choices can define some of the criticalities linked to the possible distortions of consumption. Defining the level of "interference" to be exercised by the policymakers on individual choices in relation to the set objectives and expected results thus becomes decisive.

Government programs may, therefore, be subdivided into four typologies:⁴

- ⌚ Actions aimed at extending the possibilities of choice by consumers;
- ⌚ Actions aimed at changing consumer's preferences without influencing the final price;
- ⌚ Actions aimed at increasing the final price of certain products or services;
- ⌚ Prohibition to consume certain products.

Expansion of the possibility of consumer choices

The expansion of the possibilities in choice is the least intrusive adoptable measure because it does not limit consumer freedom. For example, the offer of new urban transport procedures, aimed at limiting the use of personal vehicles and thus avoiding the formation of excessive traffic and pollution, is a measure for expanding the public transport offered to consumers. The limit of these least intrusive measures is cost and the uncertainty of their success: in fact, consumers are supplied with a wider range of possibilities without, however, a clear indication of choice.

In the case of the fight against obesity, incentives could be supplied to food manufacturers for healthier foods for the purpose of being able to market them at lower prices, increasing the products available to consumers at a set price.

CAMPAIGN OF INFORMATION AND EDUCATION FOR CHILDREN**AWARENESS TOOLS FOR ADULTS*****Changing consumers' preferences***

This type of action is highly varied due to the different level of "intrusion" in the process of consumer choice. There are at least two types of interventions which fall into this category. The first is finalized at forming the tastes and preferences of consumers from an early age through awareness campaigns and information in schools and in the main points of infantile aggregation.

This type of strategy has the advantage of establishing correct eating habits which endure throughout the individual's life.

The second approach includes actions aimed at changing the lifestyle and preferences already consolidated in adulthood through spreading specific information on the risks connected to certain consumption choices.

The diffusion of information is one of the most effective and common methods to use when a consistent informative asymmetry is registered between manufacturers and consumers and, when properly addressed, is capable of significantly changing choices in consumption. In order to transmit comprehensible information, there must be coordination between the policies of public information (campaigns and development programs) and private information (industrial and marketing policies). Governments may, therefore, decide to regulate the diffusion of certain messages by food companies.

The cost of these measures would be lower than the hypothesized cost regarding the above-described mechanisms to expand the range of choices. Nonetheless, the cost of efficient communication is directly proportionate to the complexity of the subject treated and also depends on how often the message must be repeated in order to reach a sufficient target of consumers.

Increase of the final price**TAXATION OF PRODUCTS CONSIDERED UNHEALTHY**

Governments can influence consumers' choices by working on the final price for the products. A classic example of this type of intervention is indirect taxation on products considered unhealthy.

The increase in price influences the willingness to pay (WTP) of consumers, who are expected to consume less of certain products that are subjected to price increase due to taxation. The increase in the end price of certain goods in order to disincentivize their consumption depends, however, on how elastic demand is with respect to the price. In the case of elastic demand, the level of demand will drop more than proportionately to an increase in price; in the case of non-elastic demand, even before a significant increase in price, the quantity of the goods on demand will continue to be stable or drop in a less than proportionate manner. As can be seen in the next paragraph, this type of intervention is not without uncertainties concerning achievable results.

Prohibition to consume certain products

The actions involving the highest level of State "intrusion" in consumers' freedom of choice are those which prohibit making certain choices.

Such impositions must be justified by the presence of a high risk to the health of individuals or strong negative externalities connected to contrary behavior: a typical example of these is provided by exposure to passive smoking.

Prohibitions are the least costly measures of regulation to be adopted as they imply low costs of implementation and control. The risk associated with these actions is that when there is a strong demand for certain goods which are prohibited, illegal channels of distri-

bution managed by organized crime can develop, as in the case of drugs. In these cases, the indirect costs assume enormous proportions.

3.1.3 Conclusive considerations

In short, governments may encourage changes in the lifestyle of citizens, favoring the availability of new alternatives for healthier consumption or facilitating access to those already existent; or again, they may use various forms of persuasion, education, or information in order to make healthy options more attractive and the subject of conscious choice. This "discreet" approach can be costly and hard to realize. In fact, a more direct approach, based on the imposition of rules or the use of tax measures directly concerning the products, may prove to be more immediately applicable and less costly to realize from an economic point of view, but it affects all consumers indistinctly with high political and social costs and potentially regressive effects.

An investigation on the policies adopted at the national level indicates how OECD and EU⁵ countries are intensifying efforts to encourage a healthy diet and an active lifestyle.

Most of the countries promote initiatives aimed at school-age children, such as introducing healthy foods in school menus and vending machines, health education programs, or improving opportunities for physical activity. Many governments distribute nutritional guidelines and messages promoting health, encouraging the use of bicycles or traveling by foot. On the other hand, governments can be resistant to the use of normative or fiscal instruments due to the complexity of such instruments, but also because they fear conflict with the food industry, which does not help achieve public health objectives. Nonetheless, in recent years there has been an increase in the initiatives concerning the taxation of certain categories of products.

Combining different interventions in a prevention strategy covering various age ranges and groups at risk can provide an effective solution at a sustainable cost, guaranteeing a much greater gain in health than that achieved through the single interventions.

It is calculated that such a strategy would cost no more than €9 per inhabitant in Mexico, €15 in Japan and England, €17 in Italy, and €24 in Canada: an infinitesimal percentage of the overall health expenditures in these countries, and which would only constitute a small part of that 3% of health expenditures which OECD countries spend on average for prevention policies.⁶ If implemented, this strategy would prevent 155,000 deaths by chronic illnesses every year in Japan; 75,000 in Italy; 55,000 in Mexico; and 40,000 in Canada, given that the incidence of chronic diseases would decrease, reducing disability and improving the quality of life.

It is clear that the outcome on people's health can only be achieved in the medium-long term, a time span that goes well beyond the usual alternations in national governments. The projects to be actuated often involve long realization times and repeated investments over time.

In order to concretely achieve the expected results, it is necessary that the initiatives be inserted into medium-long term plans, in order to avoid the risk of suspensions or delays dictated by the emergence of other requirements, above all in conditions of limited available public resources – such as those which we are currently experiencing.

Another element of great importance, aimed at guaranteeing the achievement of the objectives pursuant to these plans, is the perfection of reliable systems for measuring results, in order to evaluate the true effectiveness of the actions taken, both in the short and long term. Only in this way is it possible to verify, using certain data, the correctness of the actions taken and their validity, not only from a social-cultural viewpoint, but also regarding economics and people's health.

THE IMPORTANCE OF ADOPTING MEDIUM- TO LONG-TERM PLANS AND MEASURING THE RESULTS ATTAINED



Karen Kasmauski/National Geographic Stock

3.2 THE USE OF TAX LEVERAGE FOR DISINCENTIVIZING THE CONSUMPTION OF CERTAIN FOODS

3.2.1 Introduction

The previous section analyzes the range of possible actions to be implemented and the policies to be adopted in order to reduce the obesity epidemic.

In recent years, the OECD has made an important contribution to the development of the topic, publishing studies, formulating proposals, and analyzing various and feasible plans of action for governments, bodies, and international institutions.

Such analyses clearly show how the impact on economy and health of the programs aimed at increasing physical activity and favoring the adoption of a balanced and healthy diet in the population is more effective when representing an ample and coordinated action of prevention than single specific interventions, which may be useful, but may prove less incisive and of doubtful effectiveness in the long term. In other words, coordinated prevention interventions would be more effective, less costly, and longer lasting over time, compared to single interventions.

The governments have various possibilities for encouraging citizens to adopt healthier and more balanced lifestyles and dietary models: in order to make people more aware of their eating habits, they can use education and information, such as recommending or not recommending certain foods, tax instruments, or introduce restrictive regulations.

The use of tax leverage for a more restrictive regulation is a “transparent” approach because it clearly indicates what is to be achieved and the message is explicit; but, at the same time, this causes problems concerning equity, in that it affects all consumers in an indiscriminate manner, including those who are not obese or those leading a healthy lifestyle, and has a different impact on the various population groups in economic terms. In this way, complex regressive effects can be generated on certain types of consumption and consumers.

In relation to the potentially negative side effects of tax instruments, until recent years, OECD countries aimed their efforts in the battle against obesity by using instruments of education and information, mainly focusing on school-age children, regulating meals served in school canteens and foods sold in vending machines within the schools and areas used for physical activity, and introducing, albeit infrequently, information courses on health by means of distributing guidelines on diet and physical activity.

In the last three years, however, there has been a strong acceleration related to the use of taxation on consumer food products aimed at fighting the obesity epidemic. At the same time, in many European countries (for example, France,⁷ Spain, and Italy), activities promoting lifestyle and healthy eating models, especially using local initiatives, such as those launched in the United States (Let’s Move⁸), in Great Britain (Change4life⁹), and in Switzerland (Action-santé¹⁰), are extensive and coordinated. The novelty of these programs is that a relevant role

IN RECENT YEARS,
THE USE OF TAXATION
HAS INCREASED

THE EXPECTED EFFECTS OF USING THE TAX LEVER

the food and distribution industries can play in the fight against obesity has been acknowledged. Therefore, in partnership with the food industry, actions were implemented to reformulate the offer in an attempt to reduce the content of certain ingredients deemed potentially damaging to the health (first of all, by reformulating the recipes regarding total fats, saturated fats, and salt), to reduce the average size of portions sold, to make healthier alternatives available with respect to present products with high caloric content, and to limit the advertising of these latter products, in particular advertising aimed at children, who are more vulnerable. The most important innovation in this framework, one which has produced opposing reactions among the different stakeholders, is linked to the imposition of specific taxes in order to limit the consumption of foods whose content and caloric count are considered unhealthy.

3.2.2 Taxes on “junk food”

Between the end of 2010 and the start of 2011, many countries in the OECD have introduced taxes on foods and beverages deemed and/or defined as unhealthy and having an unbalanced caloric composition, which are also commonly known as *junk food*. The idea behind the use of tax leverage, together with other measures for fighting obesity, lies in the most consolidated economic relationship existing between the price and quantity of goods: that is, an increase in the price of goods corresponds to a decrease in the quantity sold/consumed.

Therefore, the use of the tax instrument has two effects: the first potential effect is to change eating habits and reduce the assumption of unhealthy foods; the second, certain, effect is to increase tax revenue for the State's coffers.

In particular, OECD countries recently using the tax instrument include:

- **Denmark.** In 2010, duties on some pastry and cake products, chocolate, ice cream, and sugared beverages increased by 25%. In October of 2011, a surcharge of 16 Danish Kroner (€2.15) per kilogram of nutrient was introduced on foods having a concentration of saturated fats exceeding 2.3%. The declared objective was to safeguard public health and the reduction of connected health costs, but also an increase in tax revenue for the State. Economic estimates, in fact, speak of an increase in revenue equal to at least €200 million per year. More specifically, foods subject to taxation include butter, oils, and dairy products in general. The estimates carried out by the Danish government indicate an expected reduction of 4% in the annual consumption of saturated fats. The impact on prices registered for the months following the introduction of the surcharge include a 30% increase in the price of a package of butter, 8% for a pack of crisps, and 7% for one liter of olive oil.
- **Hungary.** In 2011, a “chips tax” was introduced with the objective of slowing the problems of weight and obesity and, at the same time, dedicating additional resources to the national health system. The tax is applied on certain foods having a high content of sugars, salt, caffeine, and excess carbohydrates. The rates on such foods have increased by 5-20%. The tax is equivalent to €1.60 for every 100 liters of sugared beverage having a fruit content lower than 25%, €3.35 for every 10 kg of prepackaged confectionery, and €6.67 for every 10 kg of food aromas and salted snacks. The incremental revenue for the State is estimated at €70 million per year. Not available, however, are estimates on the expected reduction in consumption of the affected foods.
- **Finland.** In 2011, a tax of €0.75 was introduced for each kilogram of confectionery products and it was decided that the excise tax would be increased by €0.03 per liter for sugared beverages (from 4.5 to 7.5 euro cents per liter).

- **France.** In January 2012, France introduced a tax both on sugared beverages and beverages containing sweeteners. The tax is €7.16 for every 100 liters of sugared beverages or beverages with added artificial sugars, equivalent to about 7.2 euro cents per liter, equal to about 2.4 euro cents per can.

Figure 3.1. Countries which have introduced taxes on “junk food”

COUNTRY	YEAR	TYPOLOGY OF TAX	FORESEEN REVENUE
	2010	Increase in duty of 25% on chocolate, ice cream, sugared beverages and foods rich in sugar	N.D.
	2011	2.15€ for each kg of saturated fat, on foods having a content of saturated fats > 2.3% Expected effects of reduction 4% consumption per annum of saturated fats Effects recorded in average price increase of 30% for a package of butter, 8% for a pack of crisps, 7% for a liter of olive oil	200 million €/l
	2011	Rates increased between 5 and 20% on foods and beverages containing sugar, caffeine, and carbohydrates in high content 1.6 € for every 100 liters of sugared beverages having a fruit content lower than 25% 3.5 € for every 10 kg of prepackaged confectionery, 6.67 € for every 10 kg of food aromas and salted snacks	70 million €/l
	2011	0.75 € per kg of confectionery product Increase in duty of 3 euro cents per liter (from 4.5 cents/l to 7.5 cents/l)	N.D.
	2012 (january)	7.16 € every 100 liters of sugared beverages or those having added sugars (2.4 euro cents per can)	280 million €/l

Source: BCFN document on communications by the Ministries of Denmark, Hungary, Finland, and France.

Other countries are discussing the opportunity to introduce taxes on “junk foods” as instruments for reaching the objectives of reducing obesity, and among these are Italy, Belgium, Ireland, Romania, and Great Britain.

3.2.3 Pros and cons of taxation on junk food

The idea of taxing certain foods rather than others for the purpose of encouraging consumers to reduce their consumption is a very controversial issue.

The varying positions (pros and cons) are related to two distinct themes: the first is linked to the methods for identifying food to be taxed; the second is correlated to the opportunity and typology of duty/tax to be applied in order to reduce consumption of these foods. Regarding the first theme, and as can be gathered from an analysis of the cases reported above, there is no universally acknowledged methodology to be followed in order to unequivocally identify which foods are to be taken into consideration and in what way. Rather than the type of consumed food per se, it is the quantity and frequency with which it is consumed that can cause problems due to its poor nutritional and caloric balance, as well as a sedentary lifestyle. Sugar, fats, and salt are essential to living, but they can produce damaging effects to human health when ingested in high doses or exceeding the required amount and/or for prolonged periods of time.

DIFFICULTY IN DEFINING FOODS TO BE TAXED

International guidelines set precise indications on the recommended levels to be taken for each nutrient deriving from a daily diet as a whole: continuously exceeding such reference values increases the probability of having effects on health. Given that, to date, there is no subjective and recognized methodology which indicates the threshold values for the various nutrients beyond which individual foods are considered unhealthy, different taxation schemes have been applied which only affect certain categories of foods and/or nutrients, and these differ country to country.

UNCERTAINTY ON THE ACTUAL CHANGE IN TAXED FOOD EATING HABITS

With reference to the second theme, on the one hand there are those who sustain that taxation of foods having an unbalanced content and caloric count is necessary in order to protect public health and the sustainability of healthcare systems; on the other hand, there are those who sustain that imposing a tax on one of these types of food does not lead to any significant change in eating habits, but could instead generate unforeseen side effects.

If one observes the estimates elaborated by the various countries of the impact caused by a reduction in the consumption of "junk food" following the introduction of specific taxes, it becomes clear that the variable used is relative to the elasticity of consumption with regard to price.

Nevertheless, it is hard to estimate what the overall reaction of the consumers will be in relation to increases in price due to taxation, when only the elasticity of consumption to price is considered.

Individuals choose foods according to their cultural and social backgrounds, and according to preferences linked to individual taste and – an increasingly relevant phenomenon – to the availability and concrete accessibility of such food (consider, for example, that it is not always possible to eat fruit or fresh vegetables during the work day), and considering price as the only factor for inducing changes in eating habits proves reductive.

In this context, taxation on "junk food" could also cause side effects which, in fact, can annul or limit the action implemented by the fiscal instrument to a large extent. It could happen, for example, that some consumers reduce their consumption of healthy food in order to compensate for the higher cost of foods having an unbalanced content and caloric count. Other consumers could address their preferences to replacement foods which may potentially also be considered "junk food" simply because different criteria of classification are used. Still others might absorb the increase in price and keep their consumption habits unaltered.

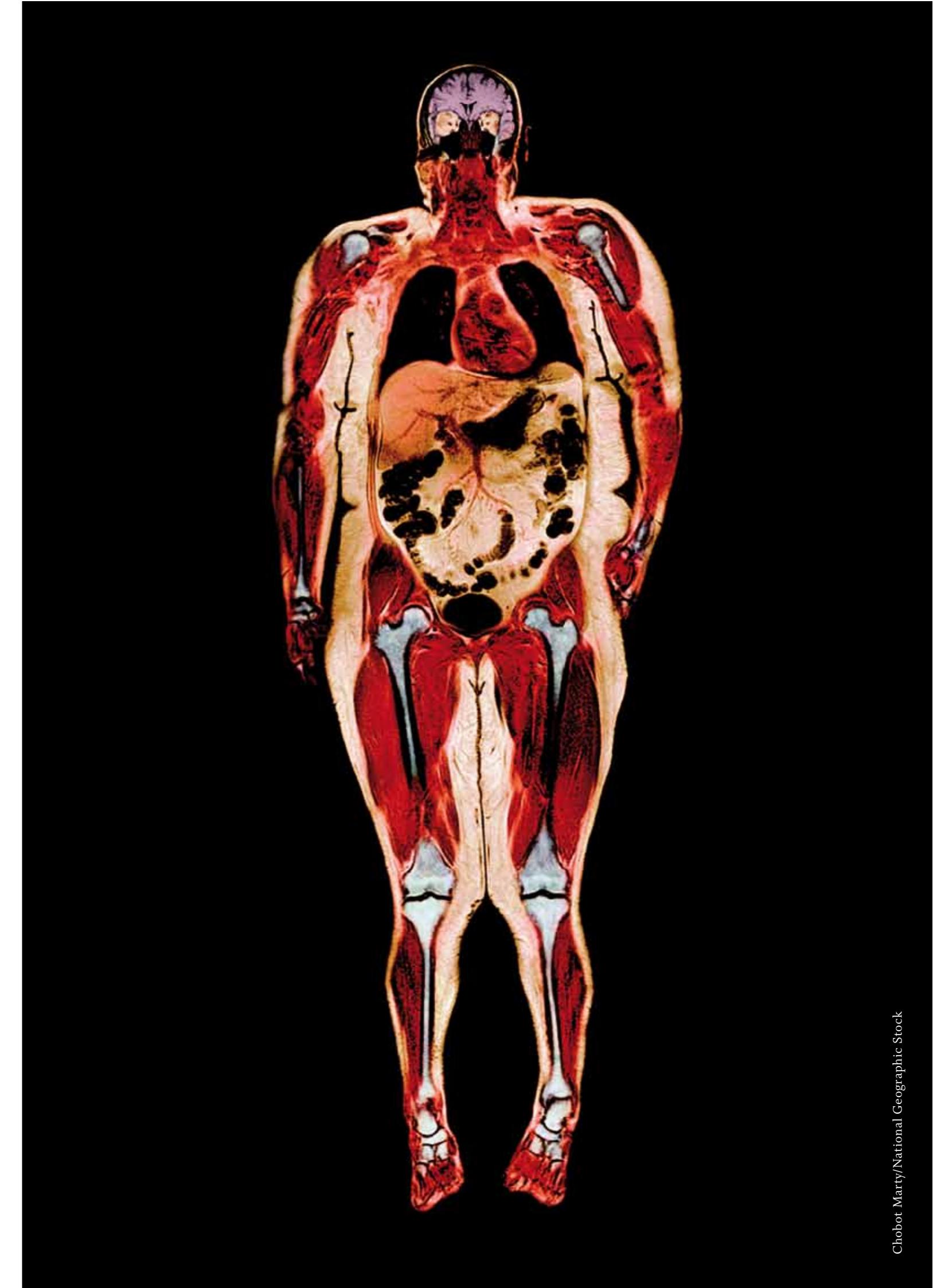
POSSIBLE UNEXPECTED EFFECTS OF TAXATION OF SOME FOODS

This raises problems in relation to the regressive and partially discriminatory effects produced by taxing foods with an unbalanced content and caloric count. Given that citizens having lower incomes spend a higher quota of their income on food compared to higher income citizens, such tax is more of a burden on those with lower incomes.

On the other hand, citizens with the lowest incomes are the ones at greatest risk of becoming obese.

In conclusion, when wishing to use fiscal instruments, the intervention should be of a notable entity (contained increases are not very visible and do not cause changes in consumer's habits) and extended to replacement products, unhealthy alternative products, etc.

With reference to the analyzed cases, it must be stressed that there is no common and ample application which includes, for example, the substitute products. Taxing sugared beverages, which medical-scientific studies deem responsible for the increase in obesity, may not lead to the desired effects of reduced consumption, when implemented only for that category of products, only using tax instruments, and without the aid of information and education campaigns on the issue.



3.3 THE ROLE OF INDUSTRY AND MARKET PERSPECTIVES

THE IMPORTANCE OF INVOLVING ALL THE PLAYERS IN THE PRODUCTION CHAIN IN GOVERNMENT PROGRAMS

It is evident, from the previous sections and the previous documents published by the BCFN,¹¹ that there are many players who can and must have an active and proactive role in order to significantly reduce the extent of the problem of obesity.

Due to a global increase in prevalence of this pathology and the problems of public health connected to it, governments, as the main responsible bodies for the sector, have started to put programs into practice for preventing and fighting the phenomenon (sections 3.1 and 3.2).

In order to make government programs more effective, the involvement and close collaboration of manufacturing and distribution companies operating throughout the food chain are necessary, considering the important role they play in the creation of the product offer and their communication skills which can influence food consumption.

During recent years, the food industry has undertaken a decisive and progressive process of variation and enlargement of what it offers to consumers. They are doing this by reformulating products already on the market to obtain nutritional profiles which are more aligned with the main international guidelines and the launch of new product lines designed for obtaining predefined nutritional characteristics (see, for example, products with *nutritional* and healthy claims).

Together with these actions, communications to the public have been enriched with specific information on the role that individual products can play within a correct diet (GDA system¹²) and with suggestions for correct consumption; self-regulation codes for communications toward sensitive targets have also been introduced.

Shown below are two in-depth examinations: one, on the French program Epoche and, the second, on the Swiss program Actionsanté. They represent examples of programs in the fight against obesity which actively involve the main stakeholders of the food chain.

The EPODE program

In 2003, eight French cities¹³ initiated, with the representation of the Ministries for Families, Youth, Teaching, Agriculture, and Diet, the EPODE project (*Ensemble prévenons l'obésité des enfants*), which has several initiatives for fighting and preventing childhood obesity.¹⁴

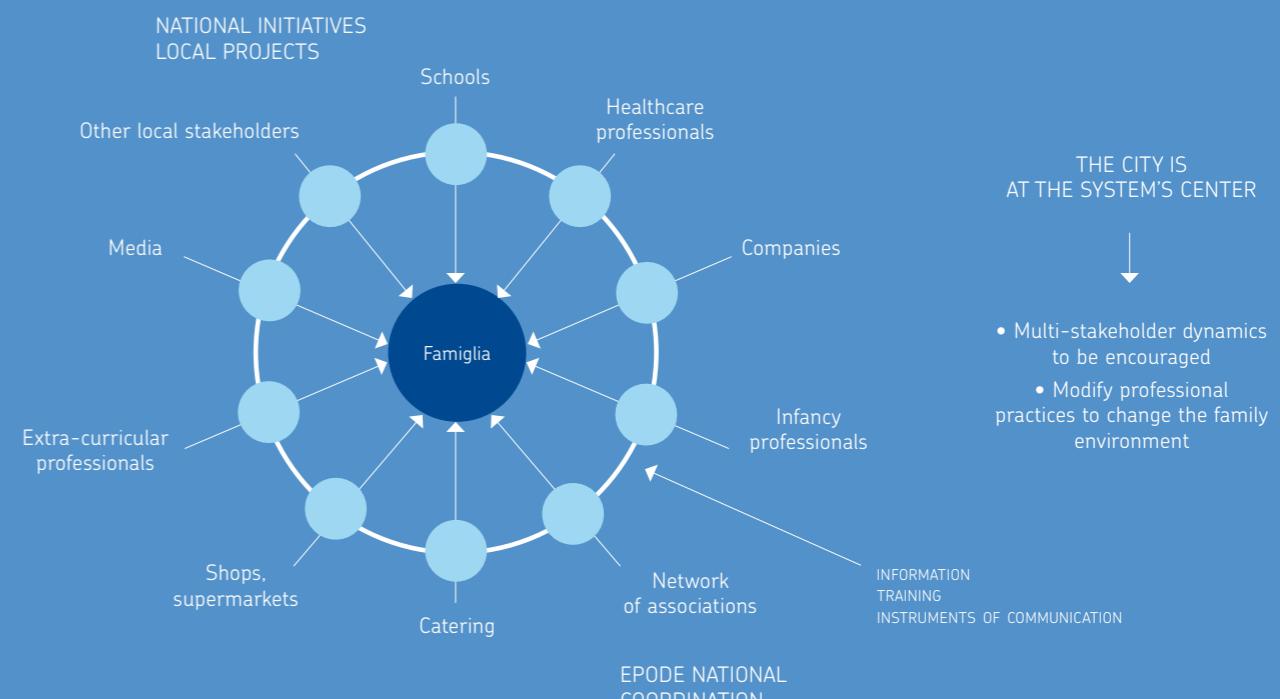
In particular, the EPODE project aims to:

- *integrate school courses* with teaching campaigns on the theme of dietary education;
- *promote a dynamic and non-sedentary lifestyle*;
- *adapt the food offered at school canteens* for the purpose of getting children used to a healthy and diversified diet;
- *involve parents* in the healthy development of their children.

The project intends to carry forward two programs realized on two levels—one national and one local. At the national level, guidelines are established through the interaction between three different bodies (a group of independent nutrition experts, the involved ministries, and a number of multinationals active in the food sector); at the local level, the implementation and coordination of the identified policies are entrusted to a project manager who can count on the collaboration of the local authorities and main stakeholders.

The project consists of the involvement of all the local stakeholders (schools, media, associations, retailers, supermarkets, etc.) in the implementation of a long-term strategy aimed at modifying the urban environment so that it favors correct lifestyles and eating habits for families and children in particular.

Figure 3.2. The local stakeholders involved in the EPODE project



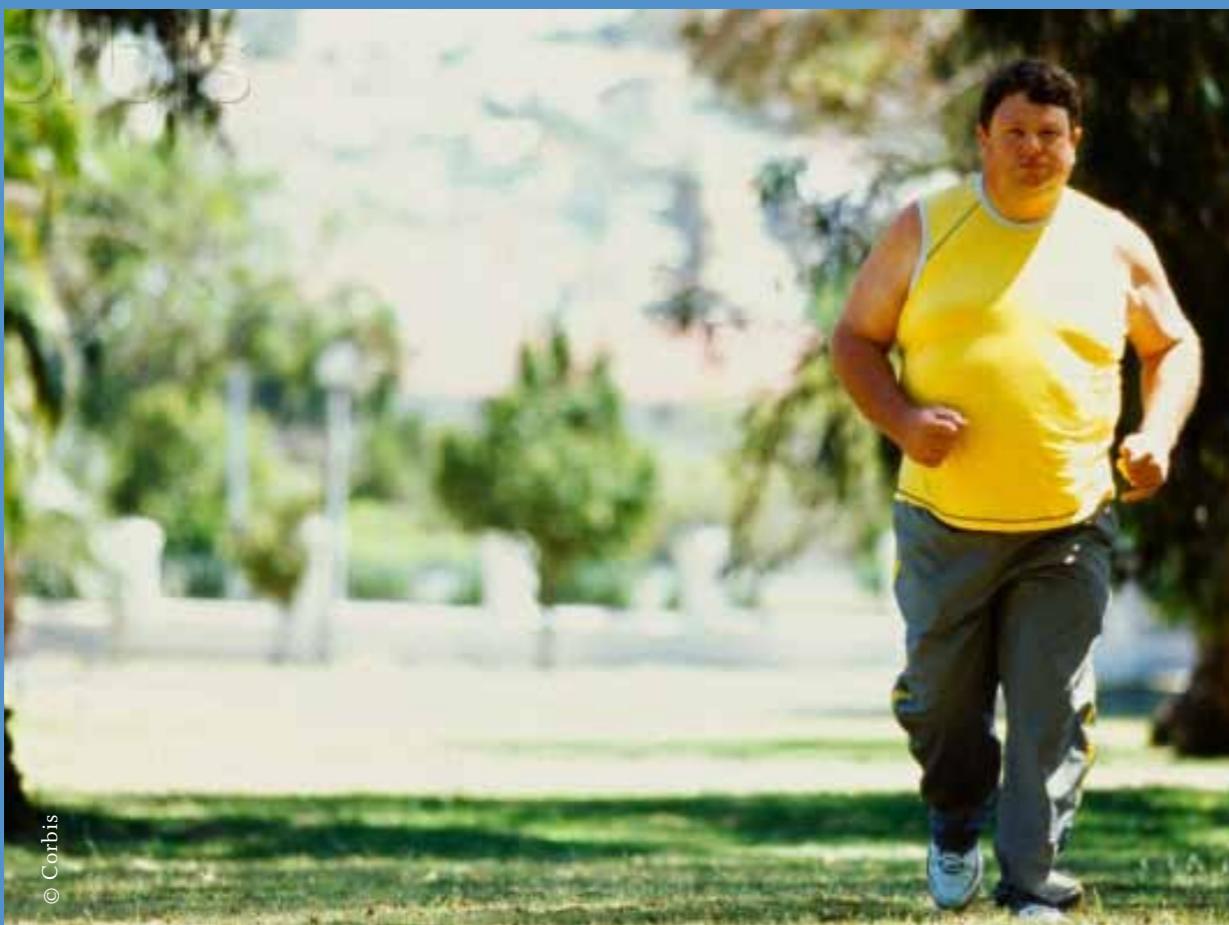
Among the different initiatives, of particular relevance is the use of advertising channels as a vehicle for making children and their families aware of the importance of a healthy diet, through messages of social communication emphasizing the importance of eating fruits and vegetables, a varied diet, and practicing sport. The program involves several partners among multinational companies¹⁵ and some local groups. With a view to public-private partnerships, the companies make a yearly contribution (for a minimum duration of 5 years) equal to €1 for each inhabitant of the cities which adhere to the initiative. Private contributors add to the public commitment, which can vary from €1.50 to €3 per year per inhabitant. The cities participating in the EDOPE project must be able to guarantee:

- recruitment of a local full-time project manager;

- the organization of specific activities each month;
- participation in national meetings of comparison with other member cities;
- financing of €1.50 per inhabitant per year for a period of five years.

The success of these initiatives can be appreciated when one considers the great participation of the local stakeholders registered in the eight French pilot cities: between 2003 and 2008, an encouraging reduction in the average BMI of children was registered.¹⁶

Between 2008 and 2011, in collaboration with DG Health and EC Consumers, a European plan was realized, EEN (EPODE European Network),¹⁷ with the objective of distributing the EDOPE project to other countries or implementing similar programs. Today, the EEN project involves about 4 million people in 226 French cities, 38 Spanish cities, 16 Belgian cities, and 13 Greek cities.



The Actionsanté program

Recognizing the necessity to realize a network of cooperation with government programs which covers as many phases of the food chain as possible, the project involves companies active both in the production and distribution of foods.

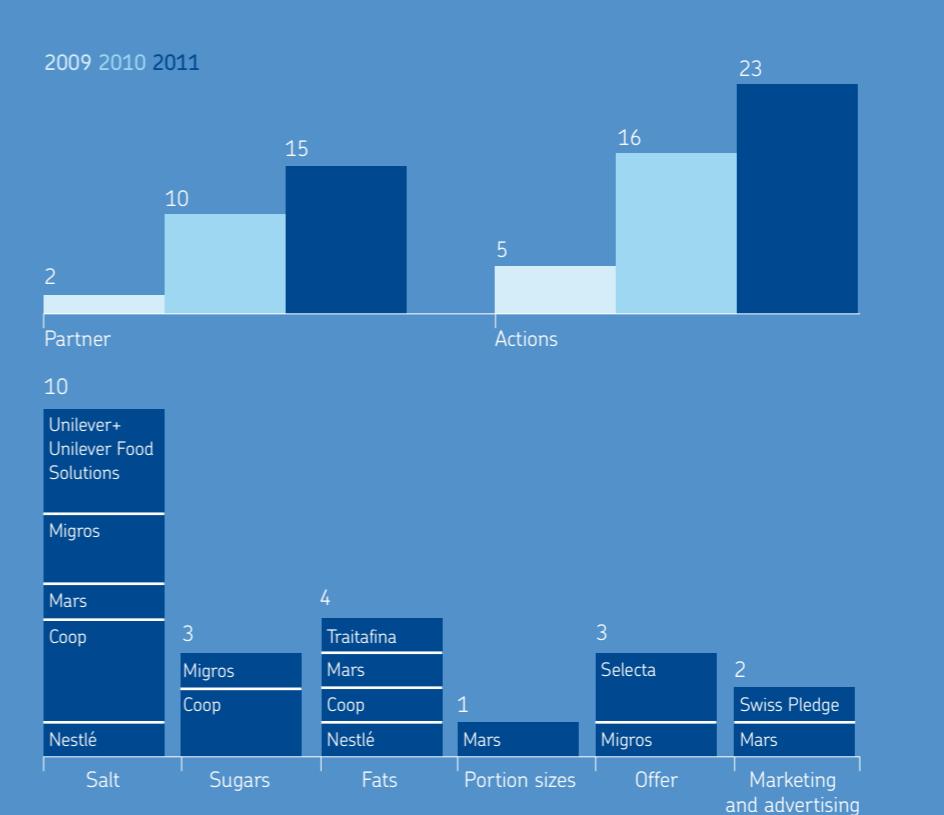
The partners in Actionsanté may choose to actuate a voluntary action in one of the following four fields of action:

- *information for consumers*: diffusion of complete and comprehensible information on the products in order to facilitate balanced diet choices;
- *marketing and advertising*: clear rules in the form of a code of conduct for

marketing and advertising, in order to reduce the exposure of sensitive categories of consumers to foods rich in calories;

- *composition and offer of foods*: easily-available foods and non-alcoholic beverages with a lower content of fats, salt, and sugar in order to facilitate a balanced diet;
- *promotion of an environment that favors physical activity*: promoting spaces that favor physical activity and building the necessary infrastructures in order to encourage the daily practice of a physical activity.

Figure 3.3. Development of the number of member partners and the actions implemented during the three years 2009-2011 (A); number of actions completed to date in relation to Actionsanté per category and promoting company (B)¹⁸



Source: Actionsanté, Activity Report, 2011.



Some of the results of this initiative are:

- *Salt*: reduction in the quantity of salt present in foods;
- *Sugars*: reduction in the quantity of sugars present in foods;
- *Fats*: replacement of saturated fats with unsaturated fats;
- *Portion sizes*: adjustment of portions based on the caloric content of the products;
- *Offer*: balanced dietary offer in schools;
- *Marketing and advertising*: renouncing advertisements on products for children younger than 12 years of age.

Figure 3.3. shows how the number of partners and actions implemented has significantly grown during the last three

years. Furthermore, it can be seen how these actions have been focused on reducing the average amount of salt and fats.

Despite the fact that it is not the nutritional characteristics of a single product which have negative effects on people's metabolisms, but the amount consumed and the frequency of consumption, the cases shown above outline how, in recent years, companies have implemented policies of placement, range development, marketing, and promotion of activities of dietary education, and physical activities aimed at supporting the governments' commitments in the fight against overweight and obesity.

In summary, an analysis of the sustainability reports of a number of major companies in the food industry¹⁹ reveals that food production and distribution companies are implementing actions aimed at:

- promoting correct lifestyles and eating habits starting from the earliest age through productive strategies and communication in line with the indications emerging from the most accredited and authoritative scientific studies concerning the relationship between food, lifestyle, and health;
- improving the available scientific knowledge by means of investments in applied research and the creation of mixed university-company groups which may lead to improved comprehension of the links between obesity and a set of external variables (environment, school, communication campaigns, etc.)
- improving the processes of communication on the matter of relations between eating, lifestyle, and health at a young age, spreading, in a simple and transparent manner, the nutritional values of various foods and good eating rules by means of the various communication channels available (web, advertising, packaging, etc.)

More specifically, four main areas of intervention have been identified for food production and distribution companies.

1 The corporate role of food industries:

- actively collaborate with public institutions for promoting and realizing plans aimed at opposing and reducing the current increase in prevalent obesity within the population;
- promote and realize activities of communication aimed at increasing awareness in people's choices;
- continued careful attention when implementing communication campaigns aimed at sensitive targets.

2 Product strategy:

- continue reformulating existing products, in relation to progressive technological ability;
- develop new products which can offer a wider choice in relation to individual nutritional requirements.

3 Information supplied to the consumer:

- facilitate access and understanding of nutritional information (nutrition labels, daily guidelines);
- implement communication campaigns with specific codes of self-regulation and independent procedures for verifying effectiveness;
- implement marketing campaigns for promoting the consumption of products which may significantly contribute to a correct diet and to inform people and make them aware of the comprehension of health claims.

4 Information and dialogue with stakeholders:

- monitor the results obtained by means of specific indicators and progressively improve the objectives to be reached, implementing strategies and actions aimed at the continuous improvement of the product offer.

In conclusion, the implementation of coordinated actions between governments and the industrial agro-food sector is one of the most important strategies for the realization of effective plans aimed at making the adoption of healthy eating habits and correct lifestyles easy for people.

ACTIONS IMPLEMENTED BY THE FOOD AND DISTRIBUTION INDUSTRIES

THE 4 AREAS OF INTERVENTION TO REMAIN FOCUSED ON

3.4 ASSESSING POSSIBLE INTERVENTIONS OF PREVENTION

In recent years, the governments of OECD countries have adopted a set of measures for improving the diet of its citizens, increasing practiced physical activity and, therefore, preventing obesity and its consequences.

The implemented interventions originate from the following three categories:

- ① Health education and promotion of healthy eating:
 - media campaigns;
 - interventions in schools;
 - interventions in the workplace.
- ② Regulation and tax measures:
 - tax measures aimed at lowering the price of fruits and vegetables and raising that of foods rich in fats;
 - public regulation or self-regulation by companies in the food sector concerning advertising of baby foods;
 - mandatory labeling of food.
- ③ Interventions related to primary healthcare:
 - medical consultancy for individuals at risk;
 - medical and intensive dietary consultancy aimed at individuals at risk.

Summarized in the following table are the effects on subjects involved and the costs of each intervention. The analysis resumes a study realized by the OECD,²⁰ which focuses on the following countries: Canada, Great Britain, Italy, Japan, and Mexico.²¹ The analysis only considers the costs sustained by the public sector, whereas those sustained by the private sector are excluded.

All the costs are shown on equal terms of buying power in American dollars in terms of purchasing power parity (USD PPP) and 2005 was chosen as the year of reference.

Some interesting messages have emerged from the study including:

- Combining various interventions in one strategy of prevention covering various age ranges and groups at risk can provide an effective solution at relatively sustained costs, guaranteeing notably higher gains in terms of health, compared to single interventions.
- Before showing the significant impacts and reaching a good cost-effectiveness ratio, the interventions aimed at the youngest age groups may require more time compared to the other interventions.
- It is estimated that each of the interventions presented each year could potentially save between 25,000 and 75,000 years of life accumulated in the five analyzed countries, compared to a situation in which there were no interventions of prevention and chronic diseases associated with obesity (ischemic heart disease, stroke, cancer, etc.) would only be treated on emergence. It has been calculated that the intervention with the highest

CATEGORY OF INTERVENTION	TYPOLOGY OF INTERVENTION	EFFECTS OF THE INTERVENTION ON THE INVOLVED SUBJECTS	COST OF THE INTERVENTION
Health education and promotion of healthy eating	Media campaigns	Increase in the consumption of fruits and vegetables equal to 18 grams per day Percentage of the population practicing physical activities increased by 2.35%	About 0.5-2 USD PPP per capita
	Interventions in schools	Increase in the consumption of fruits and vegetables equal to 38 grams per day Decrease in the consumption of fats of about 2% Reduction of about 0.2 of the BMI	About 1-2 USD PPP per capita
	Interventions in the workplace	Increase in consumption of fruits and vegetables equal to 46 grams per day Percentage of workers practicing physical activities increased by 12% Reduction of about 0.2 of the BMI	About 2.5 – 5.5 USD PPP per capita
Regulations and tax measures	Tax measures aimed at lowering the price of fruits and vegetables and raising that of foods rich in fats	Increase in the consumption of fruits and vegetables between 4 and 11 grams per day Decrease in the proportion of fats consumed ranging from 0.58% to 0.76%	About 0.03 - 0.13 USD PPP per capita
	Public regulation or selfregulation by companies in the food sector relating to advertising foods for children	Reduction of about 0.13-0.34 BMI points	Public regulation: about 0.14-0.55 USD Self-regulation of the sector: about 0.01-0.14 USD PPP per capita
	Mandatory labeling for foods	Increase in consumption of fruits and vegetables equal to 10 grams per day Decrease in the proportion of fats consumed by about 0.42% Reduction of about 0.02 BMI points	About 0.33 – 1.1 USD PPP per capita
Interventions relating to primary healthcare	Medical consultancy aimed at individuals at risk		About 4.5-9.5 USD PPP per capita
	Medical and intensive dietary consultancy aimed at individuals at risk	Decrease in the proportion of fats consumed by about 10% Reduction of about 2.32 BMI points	About 9-20 USD PPP per capita

impact in terms of saved years of life (therefore, with the highest savings in terms of health expenditure) is that linked to medical and dietary consultancy for individuals at risk (240,000 years of life saved in the five countries), which is also the most costly in terms of investment.

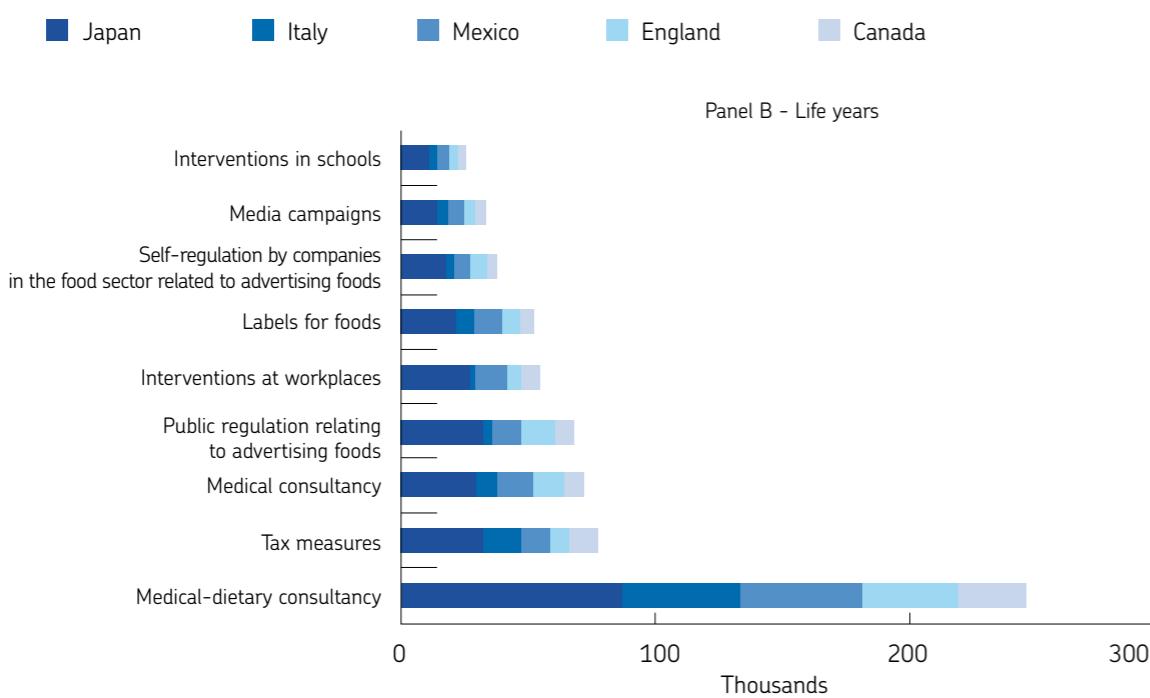
- The impact of these interventions on health expenditure are relatively limited (around 1% of the costs sustained for chronic diseases linked to the phenomenon of obesity), whereas the direct costs sustained for implementing the interven-

tions exceed the savings obtained on health assistance costs for most of such interventions.

- The interventions with the highest costs with respect to the expected savings are those concerning education on healthy eating, whereas those with the most favorable ratio are tax interventions, the only case in which the savings in healthcare costs exceed those sustained for realizing the measure.
- The effects of the interventions of prevention in the various social-economic groups are mostly determined by:
 - differences in morbidity and mortality: social-economic groups with less favorable risk profiles and with a higher level of diffusion of chronic pathologies will obtain a high-er benefit from the prevention initiatives compared to social-economic groups with a more favorable starting point;
 - differences between social-economic groups: social classes with a higher level of education are more attentive to the aspects of healthy eating, whereas social classes with a lower level of education are more sensitive to the variations in price of foods.
- The key factors for the success of these interventions of preventions appear to be the following:
 - high attendance by the population involved in the single interventions;
 - long-term sustainability of the effects of the interventions on people's behavior;
 - combination of multiple interventions producing their effects in different temporal horizons.

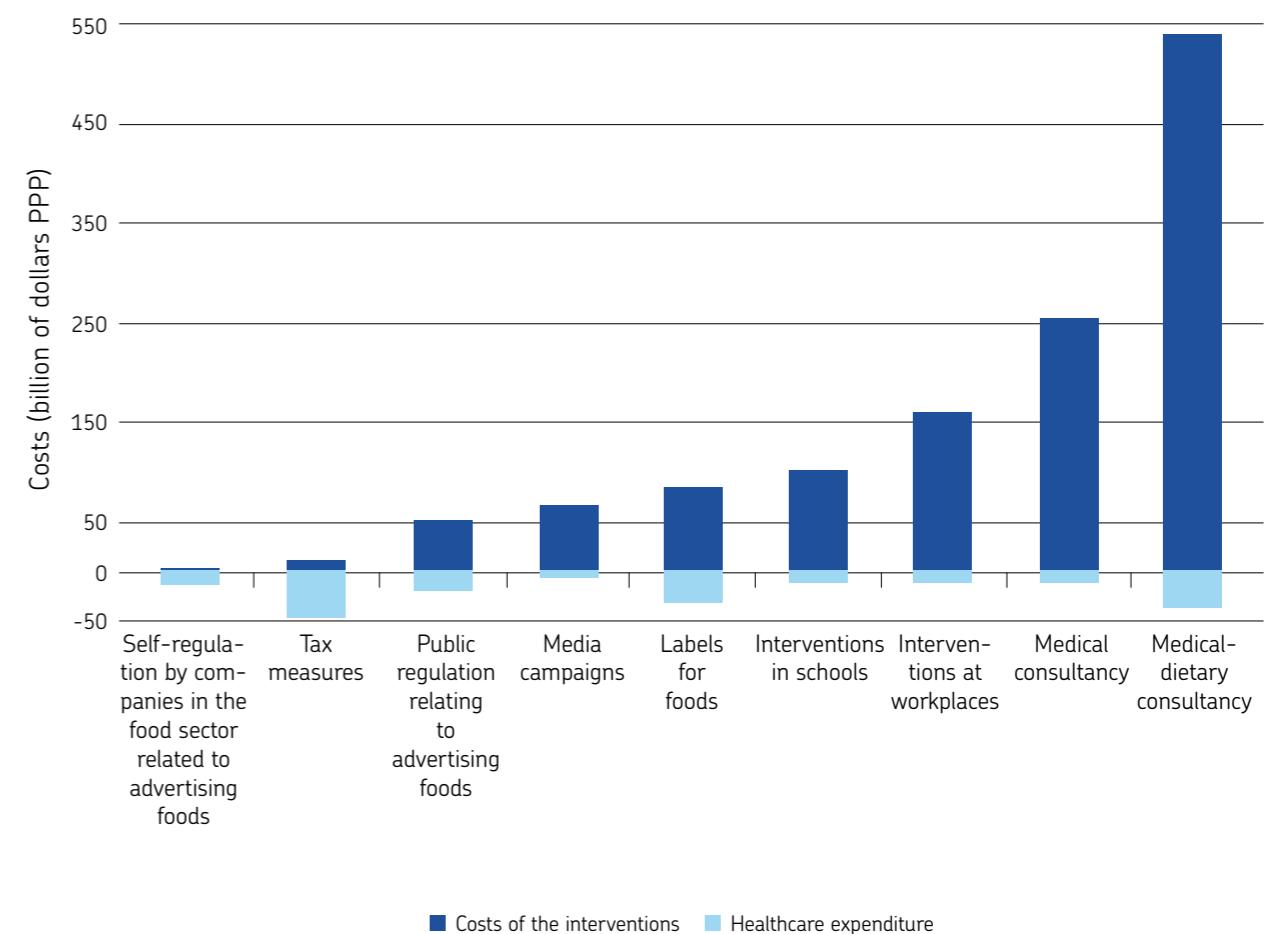
Another study²² analyzes the public health strategies of which some non-OECD countries have availed (Brazil, China, Mexico, Russia, and South Africa) in an attempt to combat the risk of emergence of chronic diseases directly linked to obesity. In the sample under analysis, Great Britain was also included as a means of comparison.

Figure 3.4. Years of life saved by effect of the interventions of prevention (yearly average)



Source: Sassi F., *Obesity and the Economics of Prevention. Fit non fat*, OECD 2010.

Figure 3.5. Costs of the interventions and savings in terms of healthcare expenditure (billions of dollars PPP)



Source: OECD, 2012.

With reference both to the effects and costs of the single interventions and to the key factors for the success of the interventions of prevention, also noted in these countries are dynamics similar to those found in the OECD countries considered in the OECD study *Fit not Fat*.

In particular, the interventions that influence prices and tax measures prove, in the short term, to produce the highest savings in terms of health expenditure. Nonetheless, it would be necessary to implement systems evaluating the effectiveness of the interventions not only from a merely economic viewpoint or the costs linked to the implementation of such interventions, but also the effects in the medium-long term, considering these interventions as true and real investments having long-term effects.

IT IS IMPORTANT TO EVALUATE THE EFFECTIVENESS OF INTERVENTION OVER THE MEDIUM- AND LONG-TERM

4. THE BCFN RECOMMENDATIONS



The BCFN has identified seven priority recommendations for dealing with the obesity epidemic.

- 1) *Inform and rally public opinion.* Make the public more aware and proactive regarding the consequences to health, social impact, and economic and environmental costs of obesity.
- 2) *Plan joint commitment of governments and the private sector.* Activate integrated and coordinated medium-long term plans for the fight against obesity which involve all the main parties.
- 3) *Spread the culture of prevention.* Educate people regarding the concept of *limitation* and transmit the culture of prevention so that healthy behavior becomes an increasingly more conscious choice.
- 4) *Teach healthy habits as early as childhood.* Reinforce supervision in education and information for young people.
- 5) *Use price leverage in a balanced manner.* Carefully assess the pros and cons of introducing tax disincentives such as taxes on junk food.
- 6) *Encourage the commitment of industry and distribution.* Involve the food industry and distribution in initiatives regarding public health promoted and led by governments.
- 7) *Fight the obesogenic environment.* Combat the factors leading to the assumption of incorrect lifestyles and eating habits making it hard to make healthy choices.

① *Inform and rally public opinion*

MAKE PUBLIC OPINION
MORE AWARE AND
PROACTIVE REGARDING
THE CONSEQUENCES TO
HEALTH, SOCIAL IMPACT,
AND ECONOMIC AND
ENVIRONMENTAL COSTS
OF OBESITY

The actual obesity epidemic which is affecting Western countries – and also emerging countries to an increasing extent – has serious consequences on the health of people who are affected by it, heavy implications on their social and working sphere, and a significant economic and environmental impact on all of society. Even more worrying is the fact that this phenomenon is also increasingly involving children.

Nonetheless, this problem is often seen as more linked to the individual - to aesthetics instead of to health - rather than to collectivity as a societal health problem, as is the case with smoking and pollution, for example.

There is a lack of awareness of the problem and its social-economic consequences in public opinion. At institutional level, in particular, there does not seem to be that sense of urgency which is necessary to deal with the problem of obesity in a systematic way.

It is, therefore, necessary to produce widespread information to promote an effective activation of public opinion for requesting interventions of prevention at all levels (social, environmental, food related, etc.).

② *Plan joint commitment of governments and the private sector*

ACTIVATE INTEGRATED AND
COORDINATED MEDIUM-
LONG TERM PLANS FOR
THE FIGHT AGAINST
OBESITY WHICH INVOLVE
ALL THE MAIN PARTIES

In order to effectively handle a multifactorial phenomenon like obesity, it is essential to operate in a coordinated manner on several fronts, using actions which involve institutions, companies, consumers, and informative bodies, and through the use of instruments and various initiatives inserted into an integrated program.

We expect government institutions (national and international) to conceive and lead the plans of action, actively involving all the players in a forceful, proactive, and tangible manner. Reliable systems of measurement must also be actuated, in order to assess the true efficiency of the actions, both in the short term and, above all, in the medium-long term.

In particular, this type of plans of action must foresee a medium-long term temporal horizon and commitment, because the results of the prevention activity can only be seen several years after the relative action was implemented and in order to limit delays and suspensions due to government's normal political alternation.

③ *Spread the culture of prevention*

Healthy eating choices and lifestyles should not be imposed by turning to new forms of “prohibitionism,” but should be the result of conscious choices stemming from better education and accurate information concerning the negative consequences to health deriving from incorrect habits.

In particular, in the specific case of eating, the greatest cause of overweight and obesity is not so much the assumption of certain specific foods, but the quantity (portions) and the frequency with which these foods are eaten, besides, of course, the lifestyle adopted.

For example, people must be educated to undertake healthy behaviors with a certain continuity, as opposed to extemporary actions dictated by current trends (as in the case of some diets, particularly advertised by the press), to constantly be aware of simple measures by which it is possible to combat sedentary lifestyles, etc.

Educating *beforehand* seems much more effective than forbidding *afterward*, therefore cases which convincingly demonstrate how prevention represents the main strategy for fighting obesity must be identified, as has been done for other pathologies (consider the screening campaigns for certain types of tumors).

④ *Teach healthy habits as early as childhood*

The fight against obesity must begin with education and information concerning the young, in that habits, lifestyle, and eating models are learned during adolescence and development and it has been scientifically proved that an obese child/adolescent is highly likely to remain so in adulthood.

The spreading of correct eating habits and physical education in children and adolescents should necessarily be the result of a collective attempt, the outcome of the contribution of several subjects (school, family, doctors, pediatricians, sporting associations, etc.) representing a point of reference for children during the various moments of the day.

In particular, family and school seem to be the main ways for effectively teaching the correct way to eat. Children “learn” to eat in the family and internalize the eating behavior which they will naturally be led to adopt afterward. On the other hand, schools could and should perform a truly active role in promoting balanced eating styles.

⑤ *Use price leverage in a balanced manner*

If on the one hand, the anticipated result of the “junk food taxes” is to reduce the consumption of food considered responsible for overweight and obesity, the introduction of taxes on certain foods, besides the uncertainty of which foods should be considered, might also generate unexpected effects that could limit the successful achievement of the objectives set by the legislators.

For example, some consumers reduce the consumption of more healthy foods in order to compensate the higher expense of taxed foods; others re-address their preferences toward equally damaging substitute foods; and lastly, a certain number of people (having a medium-high income) are able to absorb the increase in price easily and do not change their habits at all, whereas others (having a low income) suffer a significant drop in their buying power.

Apart from the aforesaid activities, it is also necessary to re-balance initiatives regarding the effects mentioned above, financed (at least in part) by the new collected tax revenue. For example, together with a tax which affects some types of food, incentives or instruments could be foreseen (for example *vouchers*) for buying fruits and vegetables by certain categories of consumers.

The use of price leverage on certain foods, without other interventions favoring healthier alternatives and their concrete accessibility for the consumer, does not seem capable of influencing behavior to a significant extent.

EDUCATE PEOPLE
REGARDING THE
CONCEPT OF LIMITATION
AND TRANSMIT THE
CULTURE OF PREVENTION
SO THAT HEALTHY
BEHAVIOR BECOMES AN
INCREASINGLY MORE
CONSCIOUS CHOICE

REINFORCE
SUPERVISION IN
EDUCATION AND
INFORMATION
FOR YOUNG PEOPLE

CAREFULLY ASSESS
THE PROS AND CONS
OF INTRODUCING TAX
DISINCENTIVES SUCH AS
TAXES ON JUNK FOOD

INVOLVE THE FOOD INDUSTRY AND DISTRIBUTION IN INITIATIVES REGARDING PUBLIC HEALTH PROMOTED AND LED BY GOVERNMENTS

6 Encourage the commitment of industry and distribution
In order to make government programs more effective, the involvement and close collaboration of manufacturing and distribution companies operating throughout the food chain are required, considering the important role played by the latter in creating the offer of products and the ability of communication, which can influence end demand and the composition of food consumption.

In recent years, with the progress obtained by nutritional science and with their social role, companies have already implemented policies of placement, range development, marketing, and promotion of food-related education, and sponsorship of sporting and physical activities aimed at supporting the commitment of governments in the fight against overweight and obesity.

Private operators must therefore continue their social commitment by means of promoting and realizing activities of communication aimed at increasing awareness in people's choices and, at the same time, they must also continue to pay the right attention to the realization of communication campaigns aimed at sensitive targets.

It is necessary to facilitate the usability and comprehension of information concerning the product through the use of nutritional labels and providing advice on consumption and daily guidelines. In addition, it is important to facilitate an understanding of *health claims*, together with implementing marketing campaigns for promoting the consumption of products which can significantly contribute to eating correctly.

Furthermore, there is hope in the continuous implementation of self-regulation and independent methods of assessment.

With regard to the food industry, in particular, it is necessary to continue with reformulating existent products in relation to progressive technological ability and new products must be developed which can offer an increasingly wide range to people in relation to individual nutritional requirements.

COMBAT THE FACTORS LEADING TO THE ASSUMPTION OF INCORRECT LIFESTYLES AND EATING HABITS MAKING IT HARD TO MAKE HEALTHY CHOICES

7 Fight the obesogenic environment
The wide availability and easy access to food having high caloric density and an increasingly sedentary lifestyle represent the two main factors upon which an environment favoring overweight and obesity is based (so-called "obesogenic environment").

Every individual can easily adopt certain behaviors able to limit these aspects. For example, people can follow the guidelines for a correct diet, which are easily found in the websites of official institutes and organizations,¹ favor more healthy ways to prepare food (cooking by steam, grill, oven, etc.) and spreading this habit among the family, and avoid eating high caloric snacks between meals, etc.

With regard to sedentary lifestyles, it is important to try and take a walk every day, avoid using the car for short journeys and reaching the city center, parking the car at a distance from the destination, always using stairs instead of elevators, playing with children, etc.

It is important to stress, nonetheless, that people should be put in the condition to effectively make these choices and adopt this behavior. In order to do so, actions are required which depend on a set of public and private subjects: we are referring, for example, to schools and employers concerning the availability of foods coherent with the nutritional guidelines in vending machines and refectories; to local public administrations concerning urban policies and transport, which define the availability of public means and safe cycling and pedestrian routes etc.; to the media, which should provide correct and balanced information, putting the emphasis on medical-scientific institutional sources rather than trendy diets.



Karen Kaszauskij/National Geographic Stock

BIBLIOGRAPHIC NOTES AND REFERENCES

CHAPTER 1

1. WHO European Regional Office(2002), *European Health Report 2002*.
2. <http://www.nih.gov>.
3. Egger G. and B. Swinburn (2002), *Preventive strategies against Weight Gain and Obesity*, in "Obesity Reviews", 3, 4, pp. 289-301.
4. Sharpe B., V. Parry and T. Barter (2007), *Future Trends in Technology and Their Impacts on Obesity*.
5. WHO (2010), *Global Status Report on Noncommunicable Diseases*.
6. Cecchini M., F. Sassi, J. A. Lauer, Y. Y. Lee, V. Guajardo-Barron and D. Chisholm (2010), *Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness*, in "Lancet", 376, 9754, pp. 1775-1784.
7. ISTAT [Italian National Statistics Agency], 2010.
8. Butland B., S. Jebb, P. Kopelman, K. McPerson, S. Thomas, J. Mardell and V. Parry (2004), *Foresight Tackling Obesities: Future Choices*, Project Report 2007.
9. Laurent S. R. and S. Vinter (2010), *F as in Fat: How Obesity Threatens American Future*, Trust for America's Health.
10. European Commission (2007), *European Community White Paper on Diet*.
11. WHO, 2008.
12. <http://www.epicentro.iss.it/okkioallasalute>.
13. Prospective Studies Collaboration (2009), *Body mass index (BMI) and cause-specific mortality*, *Prospective Studies Collaboration*, in "Lancet", 373, 9669, pp. 1083-1096.
14. Peeters A., J. J. Barendregt, F. Willekens, J. P. Mackenbach, A. Al Mamun and L. Bonneux, on behalf of NEDCOM (Netherlands Epidemiology and Demography Compression of Morbidity Research Group) (2003), *Obesity in Adulthood and Its Consequences for Life Expectancy*, in "Annals of Internal Medicine".
15. Butland B., S. Jebb, P. Kopelman, K. McPerson, S. Thomas, J. Mardell and V. Parry (2004), *Foresight Tackling Obesities: Future Choices*, Project Report 2007.
16. Michaud P-C., D. Goldman, D. Lakdawalla, A. Gailey and Y. Zheng (2009), *International Differences in Longevity and Health and their Economic Consequences*, in "NBER Working Paper", 15235, agosto.
17. Alley D. E. and V. W. Chang (2007), *The Changing Relationship of Obesity and Disability, 1988-2004*, in "Journal of American Medical Association", 298, 17, pp. 2020-2027.
18. The experiment identified six physical exercises to determine the ADL level in individuals who were of different weights: a quarter-mile walk, climbing ten stairs without stopping, stopping/

crouching/kneeling/carrying 10 pounds, walking inside a room, standing on a chair with no arms.

19. Hammond R. A. and R. Levine (2010), *The economic impact of obesity in the United States*, in "Diabetes, Metabolic Syndrome and Obesity", 3, pp. 285-295.
20. A QALY (acronym of *Quality Adjusted Life Years*) is a unit of measure that combines the duration and the quality of life. One QALY equals 1 and corresponds to a life expectancy of one year in a condition of good health; a 0 value equals death.
21. Withrow D. and D. A. Alter (2011), *The economic burden of obesity worldwide: a systematic review of the direct costs of obesity*, in "Obesity Reviews", 12, 2, pp. 131-141.
22. Tsai A. G., D. F. Williamson and H. A. Glick (2010), *Direct medical cost of overweight and obesity in the USA: a quantitative systemic review*, in "Obesity Reviews", 12, 1, pp. 50-61.
23. Sassi F. (2010), *Obesity and the economics of prevention. Fit not fat*, OECD.
24. Finkelstein E. A., J. G. Trodron, J. W. Cohen and W. Dietz (2009), *Annual Medical Spending Attributable To Obesity: Payer And Service-Specific Estimates*, in "Health Affairs".
25. Hammond R. A. and R. Levine (2010), *The economic impact of obesity in the United States*, in "Diabetes, Metabolic Syndrome and Obesity", 3, pp. 285-295.
26. Finkelstein E. A., J. G. Trodron, J. W. Cohen and W. Dietz (2009), *Annual Medical Spending Attributable To Obesity: Payer And Service-Specific Estimates*, in "Health Affairs".
27. There are two public assistance programs in the United States: *Medicare* and *Medicaid*. *Medicare* is the national assistance program for the elderly (over age 65), universal, since it is not income dependent. *Medicaid* is a program administered by the individual States (with a Federal contribution that covers 60% of expenses) and aimed at some low-income population groups (families with children, pregnant women, the elderly and the disabled).
28. CBO (Congressional Budget Office) Economic and Budget Issue Brief, "How does obesity in adults affect spending on health care?", September 2010.
29. In this case, the higher costs of transportation attributable to obese and overweight persons and the higher costs in terms of the development of human capital were not taken into account because, according to the latest scientific studies, these two cost categories must still be explored in-depth from a quantitative point of view.
30. Hammond R. A. and R. Levine (2010), *The economic impact of obesity in the United States*, in "Diabetes, Metabolic Syndrome and Obesity", 3, pp. 285-295.
31. Wang Y., M. A. Beydoun, L. Liang, B. Caballero and S. K. Kumanyika (2008), *Will all Americans become overweight or obese? Estimating the progression and cost of the US obesity epidemic*, in "Obesity", 16, 10, pp. 2323-2330.
32. Wang Y. C., K. McPearson, T. Marsh, S. L. Gortmaker and M. Brown (2011), *Health and economic burden of the projected obesity trends in the USA and the UK*, in "Lancet", 378, 9796, pp. 815-825.
33. Hammond R. A. and R. Levine (2010), *The economic impact of obesity in the United States*, in "Diabetes, Metabolic Syndrome and Obesity", 3, pp. 285-295.
34. Wang Y. C., K. McPearson, T. Marsh, S. L. Gortmaker and M. Brown (2011), *Health and economic burden of the projected obesity trends in the USA and the UK*, in "Lancet", 378, 9796, pp. 815-825.
35. Butland B., S. Jebb, P. Kopelman, K. McPerson, S. Thomas, J. Mardell and V. Parry (2004), *Foresight Tackling Obesities: Future Choices*, Project Report 2007.
36. Emery C., J. Dinet, A. Lafuma, C. Sermet, B. Khoshnood and F. Fagnani (2007), *Évaluation du coût associé à l'obésité en France*, in "La Presse Médicale", 36, 6, pp. 832-840.
37. *Quaderni del Ministero della Salute*, n. 10, [*Italian Ministry of Health Notebooks, issue 10*], luglio-agosto 2011.
38. Popkin B. M., S. Horton and S. Kim (2001), *Trends in diet, nutritional status, and diet-related non communicable diseases in China and India: the economic costs of the nutrition transition*, in "Nutrition Reviews", 59, 12, pp. 379-390.

39. Misra A. and L. Khurana (2008), *Obesity and the Metabolic Syndrome in Developing Countries*, in "The Journal of Clinical Endocrinology and Metabolism", 93, 11, p. s9.
40. Sichier R., S. do Nascimento and W. Coutinho (2007), *The burden of hospitalization due to overweight and obesity in Brazil*, in "Cadernos de Saúde Pública", 23, 7.

CHAPTER 2

1. Among the OECD countries, this trend has not always been confirmed, since there are cases where the prevalence of obesity in men is slightly higher than in women.
2. Chu S-Y., M. Grossman and H. Saffer (2002), *An economic analysis of adult obesity: results from the behavioral risk factor surveillance system*, in "NBER Working Paper", 9247, October.
3. Pickett K. E., S. Kelly, E. Brunner, T. Lobstein and R. G. Wilkinson (2005), *Wider income gaps, wider waistbands? An ecological study of obesity and income inequality*, in "Journal of Epidemiology of Community Health", 59, pp. 670-674.
4. Crosnoe R. (2007), *Gender, Obesity, and Education*, in "Sociology of Education", 80, 3, pp. 241-260; Pikhart H., M. Bobak, S. Malyutina, A. Pajak, R. Kubínová and M. Marmot (2007), *Obesity and education in three countries of the central and eastern europe: the hapiee study*, in "Central European Journal of Public Health", 15, 4, pp. 140-142.
5. Conley D. and R. Glauber (2007), *Gender, Body mass, and socioeconomic status: New evidence from the PSID*, Emerald Group Publishing, 17, pp. 253-275.
6. Sassi F. (2010), *Obesity and the economics of prevention. Fit not fat*, OECD.
7. Singh G. K., M. Siahpush, R. A. Hiatt and L. R. Timsina (2011), *Dramatic Increases in Obesity and Overweight Prevalence and Body Mass Index Among Ethnic-Immigrant and Social Class Groups in The United States, 1976-2008*, in "Journal of Community Health", 36, 1, pp. 94-110.
8. Sandhu J., Y. Ben-Shlomo, T. J. Cole, J. Holly and G. Davey Smith (2006), *The impact of childhood body mass index on timing of puberty, adult stature and obesity*, in "International Journal of Obesity", 30, pp. 14-22; William H. D. (1998), *Childhood Weight Affects Adult Morbidity and Mortality*, in "Journal of Nutrition", 128, 2, pp. s411-419.
9. Dehghan M., N. Akhtar-Danesh and A. T. Merchant (2005), *Childhood obesity, prevalence and prevention*, in "Nutrition Journal", 4, p. 24.
10. Maffeis C. (2000), *Etiology of overweight and obesity in children and adolescents*, in "European Journal of Pediatrics", 159, 1, pp. s35-44.
11. Maffeis C., Y. Schutz, A. Grezzani, S. Provera, G. Piacentini and L. Tatò (2001), *Meal-induced thermogenesis and obesity: is a fat meal a risk factor for fat gain in children?*, in "Journal of Clinical Endocrinology and Metabolism", 86, 1, p. 214.
12. Putnam J. and S. Gerrior, *Trends in the U.S. Food Supply, 1970-97*, in E. Fraza (1999), *America's Eating Habits: Changes and Consequences*, in "USDA Agriculture Information Bulletin", 750, Washington DC.
13. French S. A., Lin B. Hwan and J. Guthrie (2003), *National Trends in Soft Drink Consumption Among Children and Adolescents Age 6 to 17 Years: Prevalence, Amounts, and Sources, 1977/1978 to 1994/1998*, in "Journal of the American Dietetic Association", 103, 10, pp. 1326-1331.
14. Harris J. M., P. R. Kaufman, S. W. Martinez and C. Price (2002), *The U.S. Food Marketing System, 2002: Competition, Coordination, and Technological Innovations Into the 21st Century*, in "USDA Agricultural Economic Report", 811.
15. Lisa R. Y. and M. Nestle (2000), *The Contribution of Expanding Portion Sizes to the U.S. Obesity Epidemic*, in "American Journal of Public Health", 92.
16. Rolls B. J., D. Engell and L. L. Birch (2000), *Serving Portion Size Influences 5-Year-Old but Not 3-Year-Old Children's Food Intakes*, in "Journal of the American Dietetic Association", 100, pp. 232-234.
17. Duffey K. J., B. M. Popkin (2011), *Energy density, portion size, and eating occasions: Contributions to increased energy intake in the United States, 1977-2006*, in "PLoS Med.", 8(6), pp. e1001050.
18. Drewnowski A. (2004), *Obesity and the Food Environment: Dietary Energy Density and Diet Costs*, in "American Journal of Preventive Medicine", 27, 3, pp. 154-162; Drewnowski A., N. Damon and A. Briend (2004), *Replacing Fats and Sweets With Vegetables and Fruits - A Question of Cost*, in "American Journal of Public Health", 94, 9, pp. 1555-1559.
19. Philipson T. J. and R. A. Posner (2003), *The Long-Run Growth in Obesity as a Function of Technological Change*, in "Perspectives in Biology and Medicine", 46, 3, pp. 87-108.
20. Ewing R., R. Pendall and D. Chen (2002), *Measuring Sprawl and Its Impact*, Smart Growth America, Washington DC.
21. Cooper A. R., A. S. Page, L. J. Foster and D. Qahwaji (2003), *Commuting to School: Are Children Who Walk More Physically Active?*, in "American Journal of Preventive Medicine", 25, 4, pp. 273-276.
22. Maffeis C., M. Zaffanello and Y. Schultz (1997), *Relationship between physical inactivity and adiposity in prepubertal boys*, in "Journal of Pediatrics", 131, 2, pp. 288-292.
23. Community Preventive Services (2012), *Task Force on Community Obesity prevention: behavioral interventions to reduce screen time*, 2 april; Tremblay M. S. and J. D. Willms (2003), *Is the Canadian childhood obesity epidemic related to physical inactivity?*, in "International Journal of Obesity and Related Disorders", 27, pp. 1100-1105.
24. Rideout V. J., U. G. Foehr and D. F. Roberts (2010), *Generation M2. Media in the lives of 8- to 18-year-olds*, Kaiser Family Foundation Study.
25. The analysis includes the television, audio, music, computer, videogame, newspapers, books, magazines, and film content.
26. Gordon-Larsen P., P. Griffiths, M. E. Bentley, D. S. Ward, K. Kelsey, K. Shields and A. Ammerman (2004), *Barriers to physical activity: qualitative data on caregiver-daughter perceptions and practices*, in "American Journal of Preventive Medicine", 27, 3, pp. 218-223.
27. Swinburn B. and G. Egger (2002), *Preventive strategies against weight gain and obesity*, in "Obesity Reviews", 3, 4, pp. 289-301.
28. Dehghan M., N. Akhtar-Danesh and A. T. Merchant (2005), *Childhood obesity, prevalence and prevention*, in "Nutrition Journal", 4, p. 24.
29. French S. A., Lin B. Hwan and J. Guthrie (2003), *National Trends in Soft Drink Consumption Among Children and Adolescents Age 6 to 17 Years: Prevalence, Amounts, and Sources, 1977/1978 to 1994/1998*, in "Journal of the American Dietetic Association", 103, 10, pp. 1326-1331.
30. Anderson P. M. and K. F. Butcher (2005), *Reading, Writing and Raisinets: Are School Finances Contributing to Children's Obesity?*, in "NBER Working Paper", 11177.
31. Bochukova G., N. Huang, J. Keogh, E. Henning, C. Purmann, K. Blaszczyk, S. Saeed, J. Hamilton-Shield, J. Clayton-Smith, S. O'Railly, M. E. Hurles and I. Sadaf Farooqi (2010), *Large, rare chromosomal deletions associated with severe early-onset obesity*, in "Nature", 463, pp. 666-670.
32. Whitaker R. C., J. A. Wright, M. S. Pepe, K. D. Seidel and W. H. Dietz (1997), *Predicting obesity in young adulthood from childhood and parental obesity*, in "New England Journal of Medicine", 337, pp. 869-873.
33. For more complete additional information on obesity's effects on the health of children and adolescents, see: BCFN (2011), *Obesità e malnutrizione: il paradosso alimentare per i nostri figli [Obesity and Malnutrition: the dietary paradox for our children]*; BFCN (2009), *Crescita sana e nutrizione nei bambini [Healthy Growth and Nutrition in Children]*.
34. Franks P. W., R. L. Hanson, W. C. Knowler, M. L. Sievers, P. H. Bennet and H. C. Looker (2010), *Childhood Obesity, Other Cardiovascular Risk Factors, and Premature Death*, in "The New England Journal of Medicine", 362, pp. 485-493.

35. Cortese S., B. Falissard, M. Angriman, Y. Pigiaiani, C. Banzato, G. Bogoni, M. Pellegrino, S. Cook, F. Pajno-Ferrara, B. Della Bernardina and M-C. Mouren (2009), *The relationship between body size and depression symptoms in adolescents*, in "Journal of Pediatrics", 154, 1, pp. 86-90.
36. Paxton H. L. (2005), *The effects of childhood obesity on self-esteem*, College of Marshall University Huntington (WV).
37. Lobstein T., L. Baur and R. Uauy (2004), *Obesity in children and young people: a crisis in public health*, in "Obesity Reviews", 5, s1, pp. 4-85.
38. Cawley J. (2004), *The Impact of Obesity on Wages*, in "The Journal of Human Resources", 39, 2, pp. 451-474.
39. Selya B. (2005), *Prejudice and discrimination in employment and healthcare*, in N. Williams (2008), *Managing Obesity in the Workplace*, Radcliffe Publishing.
40. Health and Safety Executive (2006), *Horizon scanning intelligence group short report: Obesity as a workplace issue*.
41. Häkkinen J. (2007), *Labour force dynamics and the obesity gap in female unemployment in Finland*, in "Research on Finnish Society", 1, pp. 3-15; Häkkinen J. (2008), *The obesity gap in female unemployment in Finland: A dynamic analysis*, in "Research on Finnish Society", 1, pp. 3-15.
42. Australian Institute of Health and Welfare (2005), *Obesity and workplace absenteeism among older Australians*, in "Bulletin", 31.
43. Factors which contribute to the loss of productivity such as: the time lost between the moment of arrival at the workplace and the start of activity on days when the worker does not feel well, the lack of concentration, the repetition of a task, working more slowly than normal, feeling fatigued in the workplace, etc.
44. Heinen L. and H. Darling (2009), *Addressing obesity in the workplace: The role of employers*, in "The Milbank Quarterly", 87, 1, pp. 101-122.
45. Dor A., C. Ferguson, C. Langwith and E. Tan (2010), *A heavy burden: The individual costs of being overweight and obese in the United States*, The George Washington University, Washington DC.
46. Finkelstein E. A., K. L. Strombotne and B. M. Popkin (2010), *The costs of obesity and implications for policy makers*, in "Choices – The Magazine of Food, Farm and Resources Issues", 25, 3.
47. Finkelstein E. A., M. C. DiBonaventura, S. M. Burgess and B. C. Hale (2010), *The costs of obesity in the workplace*, in "Journal of Occupational and Environmental Medicine", 52, 10, pp. 971-976.
48. Australian Institute of Health and Welfare (2005), *Obesity and workplace absenteeism among older Australians*, in "Bulletin", 31.
49. Finkelstein E. A., I. C. Fiebelkorn and G. J. Wang (2005), *The costs of obesity among full-time employees*, in "American Journal of Health Promotion", 20, 1, pp. 45-51.
50. Arena V. C., K. R. Padiyar, W. N. Burton and J. J. Schwerha (2006), *The impact of body mass index on short-term disability in the workplace*, in "Journal of Occupational and Environmental Medicine", 48, 11, pp. 1118-1124.
51. Burton W. N., C. Y. Chen, A. B. Schultz and D. W. Edington (1998), *The economic costs associated with body mass index in a workplace*, in "Journal of Occupational and Environmental Medicine", 40, 9, pp. 786-792.
52. Arterburn D. E., M. L. Maciejewski and J. Tsevat (2005), *Impact of morbid obesity on medical expenditures in adults*, in "International Journal of Obesity", 29, pp. 334-339.
53. Finkelstein E. A., H. Chen, M. Prabhu, J. G. Trogdon and P. S. Corso (2007), *The relationship between obesity and injuries among U.S. adults*, in "American Journal of Health Promotion", 21, 5, pp. 460-468.
54. CDC (Centers for Disease Control and Prevention) (2007), *State-Specific Prevalence of Obesity among adults*.
55. It is estimated that in total, full-time employees who are overweight and obese number 74,197, 306, or 65. 9% of the total (112,590,754).
56. Friis K., O. Ekholm and Y. A. Hundrup (2008), *The relationship between lifestyle, working environment, socio-demographic factors and exclusion from the labour market due to disability pension among nurses*, in "Scandinavian Journal of Caring Sciences", 22, 2, pp. 241-248; Jusot F., M. Khlat, T. Rochereau and C. Serme (2008), *Job loss from poor health, smoking and obesity: A national prospective survey in France*, in "Journal of Epidemiology and Community Health", 62, pp. 332-337.
57. Smil V. (2004), *Improving efficiency and reducing waste in our food system*, in "Environmental Sciences", 1, pp. 17-26.
58. BCFN (2012), *Lo spreco alimentare: cause, impatti e proposte. [Food Waste: Causes, Impacts and Proposals]*
59. Edwards P. and I. Roberts (2008), *Transport policy is food policy*, in "Lancet", 371, 9625, p. 1661.
60. IEA (International Energy Agency) (2011), *World Energy Outlook*.
61. In Edwards' and Roberts' study, two samples were compared: a billion normal weight people with a BMI index equal to 24.5 and a billion obese people with a BMI index equal to 29.

CHAPTER 3

1. WHO (2008), *Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases*.
2. WHO (2008), *Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases*.
3. WHO (2004), *Global Strategy on Diet Physical Activity and Health*.
4. Sassi F. (2010), *Obesity and the Economics of Prevention*, OECD.
5. OECD (2009), *Survey on National Policies*.
6. Sassi F. (2010), *Obesity and the Economics of Prevention*, OECD.
7. www.epode.fr
8. <http://www.letsmove.gov>.
9. <http://www.nhs.uk/change4life/Pages/change-for-life.aspx>
10. http://www.bag.admin.ch/themen/ernaehrung_bewegung/05245/index.html?lang=it
11. BCNF (2009), *Alimentazione e salute [Diet and Health]*; BCFN (2010), *Crescita sana e nutrizione nei bambini [Healthy Growth and Nutrition in Children]*; BCFN (2011), *Obesità e malnutrizione: il paradosso alimentare per i nostri figli [Obesity and malnutrition: the dietary paradox for our children]*.
12. Quantità Giornaliera Indicativa (*Guideline Daily Amount*).
13. Asnières-sur-Seine, Beauvais, Béziers, Evreux, Meyzieu, Roubaix, Royan and Vitré.
14. Act no. 1-00212, published on December 3, 2009, session no. 296, Italian Senate.
15. Nestlé, Ferrero, Carrefour, Orangina Schweppes and Mars.
16. Ridinger R. (2009), *Childhood Obesity in France: Interventions Employed to Combat the Obesity Epidemic in French Elementary Schools*, Oregon State University.
17. <http://www.epode-european-network.com>
18. Actionsanté (2011), *Activity Report*.
19. Mc Donald's, PepsiCo, Coca Cola, Nestlè, Unilever, Kraft Foods, Cadbury Schweppes.

20. Sassi F. (2010), *Obesity and the Economics of Prevention. Fit non fat*, OECD.
21. The sampling of countries selected for the study includes some countries with the highest obesity rates in the OECD area (such as Mexico and England), the country with the lowest obesity rate (Japan) and another two countries with a moderate level of obesity (Italy and Canada).
22. Cecchini M., F. Sassi, J. A. Lauer, Y. Y. Lee, V. Guajardo-Barron and D. Chisholm (2010), *Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness*, in "Lancet", 376, 9754, pp. 1775-1784.

CHAPTER 4

1. For example: in Italy there is INRAN – Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione, [National Food and Nutrition Research Institute] *Linee guida per una sana alimentazione italiana, [Guidelines for a Healthy Italian Diet]*, http://www.inran.it/648/linee_guida.html; in France there is INPES – Institut National de Prévention et d'Éducation pour la Santé [National Institute of Prevention and Education for Health] *Le guide alimentaire pour tous, [Dietary Guide for Everyone]* <http://www.inpes.sante.fr/CFESBases/catalogue/detaildoc.asp?numfiche=581>; and in the United States, there is the USDA – United States Department of Agriculture, HHS – United States Department of Health and Human Services, *Dietary Guidelines for Americans*, <http://health.gov/dietaryguidelines/>, and *Physical Activity Guidelines for Americans*, <http://health.gov/paguidelines/>.

BIBLIOGRAPHY

- Alley D. E. and V. W. Chang (2007), *The Changing Relationship of Obesity and Disability, 1988-2004*, in "Journal of American Medical Association", 298, 17, pp. 2020-2027.
- Anderson P. M. and K. F. Butcher (2005), *Reading, Writing and Raisinets: Are School Finances Contributing to Children's Obesity?*, in "NBER Working Paper", 11177.
- Aranceta J., B. Moreno, M. Moya and A. Anadón (2009), *Prevention of overweight and obesity from a public health perspective*, in "Nutrition REviews", 67, s1, pp. s83-88.
- Arena V. C., K. Padivar, W. Burton and J. J. Schwerha (2006), *The impact of body mass index on shortterm disability in the workplace*, in "Journal of Occupational and Environmental Medicine", 48, 11, pp. 1118-1124.
- Arterburn D. E., M. L. Maciejweski and J. Tsevat (2005), *Impact of morbid obesity on medical expenditures in adults*, in "International Journal of Obesity", 29, pp. 334-339.
- Australian Institute of Health and Welfare (2005), *Obesity and workplace absenteeism among older Australians*, in "Bulletin", 31.
- Ball K. and G. Mishra (2002), *Which aspects of socioeconomic status are related to obesity among men and women?*, in "International Journal of Obesity", 26, 4, pp. 559-565.
- Banterle A. and A. Cavaliere (2009), *The social and economic determinants of obesity: an empirical study in Italy*, presented at the 113th EAAE Seminar, "A resilient European food industry and food chain in a challenging world," Chania, Crete (Greece), September 3-6, 2009.
- BCFN (2012), *Lo spreco alimentare: cause, impatti e proposte. [Food Waste: Causes, Impacts and Proposals]*
- Bhattacharya J. and K. Bundorf (2006), *The Incidence of the Healthcare Costs of Obesity*, Stanford University, Palo Alto (San Francisco).
- Biglia M. (2004), *Il peso irragionevole [The Unreasonable Weight]*, Gaffi, Roma.
- Biglia M. and C. Gargiulo (2012), *Togliamoci il peso. Riconoscere e combattere il sovrappeso e l'obesità, [Let's relieve ourselves of the burden. Recognizing and combatting overweight and obesity]* Mondadori Electa, Milano.
- Bochukova G., N. Huang, J. Keogh, E. Henning, C. Purmann, K. Blaszczyk, S. Saeed, J. Hamilton-Shield, J. Clayton-Smith, S. O'Railly, M. E. Hurles and I. Sadaf Farooqi (2010), *Large, rare chromosomal deletions associated with severe early-onset obesity*, in "Nature", 463, pp. 666-670.
- Bond M., M. Williams, B. Crammond and B. Loff (2010), *Taxing junk food: applying the logic of the Henry tax review to food*, in "Medical Journal of Australia", 193, 8, pp. 472-473.
- Brownell K. D., R. Kersh, D. S. Ludwig, R. C. Post, R. M. Puhl, M. B. Schwartz and W. C. Willet (2010), *Personal Responsibility And Obesity: A Constructive Approach To A Controversial Issue*, in "Health affaires", 29, 3, pp. 379-387.
- Butland B., S. Jebb, P. Kopelman, K. McPerson, S. Thomas, J. Mardell and V. Parry (2004), *Foresight Tackling Obesities: Future Choices*, Project Report 2007.
- Burton W. N., C. Y. Chen, A. B. Schultz and D. W. Edington (1998), *The economic costs associated with body mass index in a workplace*, in "Journal of Occupation and Environmental Medicine", 40, 9, pp. 786-792.
- Carter R., M. Moodie, A. Markwick, A. Magnus, T. Vos, B. Swinburn and M. M. Haby (2009), *Assessing Cost-Effectiveness in Obesity (ACE-Obesity): An overview of the ACE approach, economic methods and cost results*, in " BMC Public Health", 9, p. 419.
- Cawley J. (2004), *The Impact of Obesity on Wages*, in "The Journal of Human Resources", 39, 2, pp. 451-474.
- CBO (Congressional Budget Office) Economic and Budget Issue Brief, *"How does obesity in adults affect spending on health care?"*, September 2010.
- CDC (Centers for Disease Control and Prevention) (2007), *State-Specific Prevalence of Obesity among adults*.
- Cecchini M., F. Sassi, J. A. Lauer, Y. Y. Lee, V. Guajardo-Barron e D. Chisholm (2010), *Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness*, in "Lancet", 376, 9754, pp. 1775-1784.
- Charon R. (2008), *Narrative evidence-based medicine*, in "Lancet", 371, 9609, pp. 296-297.
- Charon R. (2008), *Honoring The Stories of Illness*, Oxford University Press, Oxford.
- Chu S-Y., M. Grossman and H. Saffer (2002), *An economic analysis of adult obesity: results from the behavioral risk factor surveillance system*, in "NBER Working Paper", 9247, October.
- Clarke P., P. M. O'Malley, L. Johnston and J. E. Schulenberg (2008), *Social disparities in BMI trajectories across adulthood by gender, race/ethnicity and lifetime socio-economic position: 1986-2004*, Oxford University Press on behalf of the International Epidemiological Association Oxford.
- Colditz G. (1992), *Economic costs of obesity*, in "The American Journal of Clinical Nutrition", 55, 2, pp. s503-507.
- Community Preventive Services (2012), *Task Force on Community Obesity prevention: Behavioral interventions to reduce screen time*, April 2.
- Conley D. e R. Glauber (2007), *Gender, Body mass, and socioeconomic status: New evidence from the PSID*, Emerald Group Publishing, 17, pp. 253-275.
- Cooper A. R., A. S. Page, L. J. Foster and D. Qahwaji (2003), *Commuting to School: Are Children Who Walk More Physically Active?*, in "American Journal of Preventive Medicine", 25, 4, pp. 273-276.
- Cortese S., B. Falissard, M. Angriman, Y. Pigiaiani, C. Banzato, G. Bogoni, M. Pellegrino, S. Cook, F. Pajno-Ferrara, B. Della Bernardina and M-C. Mouren (2009), *The relationship between body size and depression symptoms in adolescents*, in "Journal of Pediatrics", 154, 1, pp. 86-90.
- Crosnoe R. (2007), *Gender, Obesity, and Education*, in "Sociology of Education", 80, 3, pp. 241-260.

- Dehghan M., N. Akhtar-Danesh and A. T. Merchant (2005), *Childhood obesity, prevalence and prevention*, in "Nutrition Journal", 4, p. 24.
- Dietz W. H. (1998), *Childhood Weight Affects Adult Morbidity and Mortality*, in "Journal of Nutrition", 128, 2, pp. s411-414.
- Dor A., C. Ferguson, C. Langwith and E. Tan (2010), *A heavy burden: The individual costs of being overweight and obese in the United States*, The George Washington University, Washington DC.
- Drenkard S. (2011), *Overreaching on Obesity: Governments Consider New Taxes on Soda and Candy*, Tax Foundation, Washington DC.
- Drewnowski A., N. Damon and A. Briand (2004), *Replacing Fats and Sweets With Vegetables and Fruits - A Question of Cost*, in "American Journal of Public Health", 94, 9, pp. 1555-1559.
- Drewnowski A. (2004), *Obesity and the Food Environment: Dietary Energy Density and Diet Costs*, in "American Journal of Preventive Medicine", 27, 3, pp. 154-162.
- Emery C., J. Dinet, A. Lafuma, C. Sermet, B. Khoshnood and F. Fagnani (2007), *Évaluation du coût associé à l'obésité en France*, in "La Presse Médicale", 36, 6, pp. 832-840.
- Edwards P. and I. Roberts (2008), *Transport policy is food policy*, in "Lancet", 371, 9625, p. 1661.
- European Commission (2007), *European Commission White Paper on Diet*.
- Ewing R., R. Pendall and D. Chen (2002), *Measuring Sprawl and Its Impact*, Smart Growth America, Washington DC.
- FAO (2006), *The spectrum of malnutrition*.
- Finkelstein E. A., I. C. Fiebelkorn and G. J. Wang (2005), *The costs of obesity among full-time employees*, in "American Journal of Health Promotion", 20, 1, pp. 45-51.
- Finkelstein E. A., M. C. DiBonaventura, S. M. Burgess and B. C. Hale (2010), *The costs of obesity in the workplace*, in "Journal of Occupational and Environmental Medicine", 52, 10, pp. 971-976.
- Finkelstein E. A., K. L. Strombotne and B. M. Popkin (2010), *The costs of obesity and implications for policy makers*, in "Choices - The Magazine of Food, Farm and Resources Issues", 25, 3.
- Finkelstein E. A., H. Chen, M. Prabhu, J. G. Trodgon and P. S. Corso (2007), *The relationship between obesity and injuries among U.S. adults*, in "American Journal of Health Promotion", 21, 5, pp. 460-468.
- Finkelstein E. A., J. G. Trodgon, J. W. Cohen and W. Dietz (2009), *Annual Medical Spending Attributable To Obesity: Payer And Service-Specific Estimates*, in "Health Affairs".
- Franks P. W., R. L. Hanson, W. C. Knowler, M. L. Sievers, P. H. Bennet and H. C. Looker (2010), *Childhood Obesity, Other Cardiovascular Risk Factors, and Premature Death*, in "The New England Journal of Medicine", 362, pp. 485-493.
- French S. A., Lin B. Hwan and J. Guthrie (2003), *National Trends in Soft Drink Consumption Among Children and Adolescents Age 6 to 17 Years: Prevalence, Amounts, and Sources, 1977/1978 to 1994/1998*, in "Journal of the American Dietetic Association", 103, 10, pp. 1326-1331.
- Frenk D. J. (2003), *Carbohydrates: Good carbs guide the way*, Harvard School of Public Health, The Nutrition Source.
- Friis K., O. Ekholm and Y. A. Hundrup (2008), *The relationship between lifestyle, working environment, socio-demographic factors and exclusion from the labour market due to disability pension among nurses*, in "Scandinavian Journal of Caring Sciences", 22, 2, pp. 241-248.
- Gates D. M., P. Succop and B. J. Brehm (2008), *Obesity and Presenteeism: The Impact of Body Mass Index on Workplace Productivity*, in "Journal of Occupational and Environmental Medicine", 50, 1, pp. 39-45.
- Gordon-Larsen P., P. Griffiths, M. E. Bentley, D. S. Ward, K. Kelsey, K. Shields and A. Ammerman (2004), *Barriers to physical activity: qualitative data on caregiver-daughter perceptions and rac-tices*, in "American Journal of Preventive Medicine", 27, 3, pp. 218-223.
- Hammond R. A. and R. Levine (2010), *The economic impact of obesity in the United States*, in "Diabetes, Metabolic Syndrome and Obesity", 3, pp. 285-295.
- Härkönen J. (2007), *Labour force dynamics and the obesity gap in female unemployment in Finland*, in "Research on Finnish Society", 1, pp. 3-15.
- Härkönen J. (2008), *The obesity gap in female unemployment in Finland: A dynamic analysis*, in "Research on Finnish Society", 1, pp. 3-15.
- Harris J. M., P. R. Kaufman, S. W. Martinez and C. Price (2002), *The U.S. Food Marketing System, 2002: Competition, Coordination, and Technological Innovations Into the 21st Century*, in "USDA Agricultural Economic Report", 811.
- Heinen L. and H. Darling (2009), *Addressing obesity in the workplace: The role of employers*, in "The Milbank Quarterly", 87, 1, pp. 101-122.
- Hilbert A., J. Riedb, D. Schneiderc, D. Juttnerd, M. Sosnae, P. Dabrockb, M. Lingenfelderd, W. Voitc, W. Riefa and J. Hebebrand (2008), *Primary Prevention of Childhood Obesity: An Interdisciplinary Analysis*, in "Obesity Facts", 1, pp. 16-25.
- Højgaarda B., K. Olsenb and J. S. Thorkilda (2008), *Economic Costs of Abdominal Obesity*, in "Obesity Facts", 1, pp. 146-154.
- http://www.bag.admin.ch/themen/ernaehrung_bewegung/05245/index.html?lang=it.
- <http://www.letsmove.gov>.
- <http://www.nhs.uk/change4life/Pages/change-for-life.aspx>.
- IEA (International Energy Agency) (2011), *World Energy Outlook*.
- Jusot F., M. Khlat, T. Rochereau and C. Serme (2008), *Job loss from poor health, smoking and obesity: a national prospective survey in France*, in "Journal of Epidemiology and Community Health", 62, pp. 332-337.
- Koplan J. and K. D. Brownell (2010), *Response of the Food and Beverage Industry to the Obesity Threat*, in "The Journal of American Medical Association", 304, 13, pp. 1487-1488.
- Laurent S. R. and S. Vinter (2010), *F as in Fat: How Obesity Threatens American Future*, Trust for America's Health.
- Lévy E., P. Lévy, C. Le Pen and A. Basdevant (1995), *The economic cost of obesity: the French situation*, in "International Journal of Obesity and Related Metabolic Disorders", 19, 11, pp. 788-792.
- Lisa R. Y. and M. Nestle (2000), *The Contribution of Expanding Portion Sizes to the U.S. Obesity Epidemic*, in "American Journal of Public Health", 92.
- Lobstein T., L. Baur and R. Uauy (2004), *Obesity in children and young people: a crisis in public health*, in "Obesity Reviews", 5, s1, pp. 4-85.
- Maffeis C., Y. Schutz, A. Grezzani, S. Provera, G. Piacentini and L. Tatò (2001), *Meal-induced thermogenesis and obesity: is a fat meal a risk factor for fat gain in children?*, in "Journal of Clinical Endocrinology and Metabolism", 86, 1, p. 214.

- Maffeis C. (2000), *Etiology of overweight and obesity in children and adolescents*, in "European Journal of Pediatrics", 159, 1, pp. s35-44.
- Maffeis C., M. Zaffanello and Y. Schultz (1997), *Relationship between physical inactivity and adiposity in prepubertal boys*, in "Journal of Pediatrics", 131, 2, pp. 288-292.
- Mernagh P., D. Paech, K. Coleman, A. Weston, J. McDonald, J. Cumming and T. Green (2010), *Assessing the Cost-Effectiveness of Public Health Interventions to Prevent Obesity: Overview Report*, Health Research Council of New Zealand Partnership Programme.
- Michaud P-C., D. Goldman, D. Lakdawalla, A. Gailey and Y. Zheng (2009), *International Differences in Longevity and Health and their Economic Consequences*, in "NBER Working Paper", 15235, August.
- Misra A. and L. Khurana (2008), *Obesity and the Metabolic Syndrome in Developing Countries*, in "The Journal of Clinical Endocrinology and Metabolism", 93, 11, p. s9.
- OECD (2009), *Survey on National Policies*.
- Olshansky S., D. J. Passaro, R. C. Hershow, J. Layden, B. A. Carnes, J. Brody, L. Hayflick, R. N. Butler, D. B. Allison and D.S. Ludwig (2005), *A Potential Decline in Life Expectancy in the United States in the 21st Century*, in "The New England Journal of Medicine", 352, pp. 1138-1145.
- Paxton H. L. (2005), *The effects of childhood obesity on self-esteem*, College of Marshall University.
- Peeters A., J. J. Barendregt, F. Willekens, J. P. Mackenbach, A. Al Mamun e L. Bonneux, on behalf of NEDCOM (Netherlands Epidemiology and Demography Compression of Morbidity Research Group) (2003), *Obesity in Adulthood and Its Consequences for Life Expectancy*, in "Annals of Internal Medicine".
- Philipson T. J. and R. A. Posner (2003), *The Long-Run Growth in Obesity as a Function of Technological Change*, in "Perspectives in Biology and Medicine", 46, 3, pp. 87-108.
- Pickett K. E., S. Kelly, E. Brunner, T. Lobstein and R. G. Wilkinson (2005), *Wider income gaps, wider waistbands? An ecological study of obesity and income inequality*, in "Journal of Epidemiology of Community Health", 59, pp. 670-674.
- Pikhart H., M. Bobak, S. Malyutina, A. Pajak, R. Kubínová and M. Marmot (2007), *Obesity and education in three countries of the central and eastern europe: The hapiee study*, in "Central European Journal of Public Health", 15, 4, pp. 140-142.
- Popkin B. M., S. Horton and S. Kim (2001), *Trends in diet, nutritional status, and diet-related non communicable diseases in China and India: the economic costs of the nutrition transition*, in "Nutrition Reviews", 59, 12, pp. 379-390.
- Prospective Studies Collaboration (2009), *Body mass index (BMI) and cause-specific mortality*, Prospective Studies Collaboration, in "Lancet", 373, 9669, pp. 1083-1096.
- Putnam J. and S. Gerrior, *Trends in the U.S. Food Supply, 1970-97*, in E. Frazao (1999), *America's Eating Habits: Changes and Consequences*, in "USDA Agriculture Information Bulletin", 750, Washington DC.
- Quaderni del Ministero della Salute [Italian Ministry of Health Notebooks, issue 10]*, July-August, 2011.
- Rideout V. J., U. G. Foehr and D. F. Roberts (2010), *Generation M2. Media in the lives of 8- to 18-year-olds*, Kaiser Family Foundation Study.
- Rolls B. J., D. Engell and L. L. Birch (2000), *Serving Portion Size Influences 5-Year-Old but Not 3-Year-Old Children's Food Intakes*, in "Journal of the American Dietetic Association", 100, pp. 232-234.
- Sandhu J., Y. Ben-Shlomo, T. J. Cole, J. Holly and G. Davey Smith (2006), *The impact of childho-* od body mass index on timing of puberty, adult stature and obesity, in "International Journal of Obesity", 30, pp. 14-22.
- Sassi F. (2010), *Obesity and the Economics of Prevention in Four OECD Countries*, OECD.
- Sassi F. (2010), *Obesity and the Economics of Prevention. Fit non fat*, OECD.
- Selini Katsaiti M. and M. Cohen (2009), *The Macroeconomic Implications of the Health Care Cost of Obesity: Who is picking up the tab?*, Food Marketing Policy Center, University of Connecticut.
- Sharpe B., V. Parry and T. Barter (2007), *Future Trends in Technology and Their Impacts on Obesity*.
- Sichier R., S. do Nascimento and W. Coutinho (2007), *The burden of hospitalization due to overweight and obesity in Brazil*, in "Cadernos de Saúde Pública", 23, 7.
- Singh G. K., M. Siahpush, R. A. Hiatt and L. R. Timsina (2011), *Dramatic Increases in Obesity and Overweight Prevalence and Body Mass Index Among Ethnic-Immigrant and Social Class Groups in The United States, 1976-2008*, in "Journal of Community Health", 36, 1, pp. 94-110.
- Smil V. (2004), *Improving efficiency and reducing waste in our food system*, in "Environmental Sciences", 1, pp. 17-26.
- Swinburn B. and G. Egger (2002), *Preventive strategies against weight gain and obesity*, in "Obesity Reviews", 3, 4, pp. 289-301.
- Trembaly M. S. and J. D. Willms (2003), *Is the Canadian childhood obesity epidemic related to physical inactivity?*, in "International Journal of Obesity and Related Disorders", 27, pp. 1100-1105.
- Tsai A. G., D. F. Williamson and H. A. Glick (2010), *Direct medical cost of overweight and obesity in the USA: a quantitative systemic review*, in "Obesity Reviews", 12, 1, pp. 50-61.
- Visscher T., J. Seidell (2001), *The Public Health Impact of Obesity*, in "Annual Review Public Health", 22, pp. 355-375.
- Wang Y., M. A. Beydoun, L. Liang, B. Caballero and S. K. Kumanyika (2008), *Will all Americans become overweight or obese? Estimating the progression and cost of the US obesity epidemic*, in "Obesity", 16, 10, pp. 2323-2330.
- Wang Y. C., K. McPearson, T. Marsh, S. L. Gortmaker and M. Brown (2011), *Health and economic burden of the projected obesity trends in the USA and the UK*, in "Lancet", 378, 9796, pp. 815-825.
- Whitaker R. C., J. A. Wright, M. S. Pepe, K. D. Seidel and W. H. Dietz (1997), *Predicting obesity in young adulthood from childhood and parental obesity*, in "New England Journal of Medicine", 337, pp. 869-873.
- WHO (2004), *Global Strategy on Diet Physical Activity and Health*.
- WHO (2008), *Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases*.
- WHO (2010), *Global Status Report on Non-communicable Diseases*.
- WHO European Regional Office (2002), *European Health Report 2002*.
- Williams N. (2008), *Managing Obesity in the Workplace*, Radcliffe Publishing.
- Withrow D. and D. A. Alter (2011), *The economic burden of obesity worldwide: a systematic review of the direct costs of obesity*, in "Obesity Reviews", 12, 2, pp. 131-141.
- www.fastcodesign.com, *2011 Pasta, Not Bacon, Makes You Fat. But How? - an infographic laying out the surprising science behind why carbs make you fat, while fat doesn't*.
- Yaniv G., R. Lezion e R. Gan (2009), *Junk food, home cooking, physical activity and obesity: the effect of the fat tax and the thin subsidy*, in "Journal of Public Economics", 93, 5-6, pp. 823-830.

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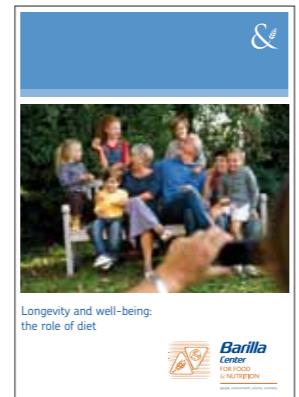
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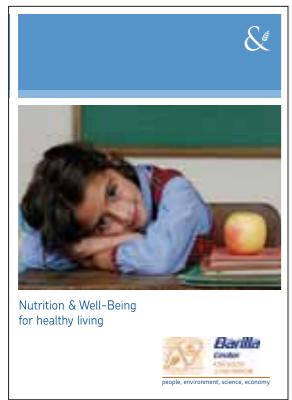
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