Abstract

At the beginning of the new millennium, we are still facing severe challenges. There are still 1 billion poor people suffering from hunger and malnutrition, while approximately 2 billion people suffer from malnutrition and micronutrient deficiencies. At the same time, approximately 2 billion people are overweight and/or obese, and this number is increasing in every country in the world. Food and diet are one of the important social determinants of health and well-being, but the current food system is deeply unfair and creates social injustice. Based on the experiences of the last half century and current trends, we are convinced that it has become very urgent to fundamentally change our nutrition strategy and to promote a fair, culturally appropriate and sustainable diet based on biodiversity. This is indeed a significant challenge for nutritionists.
This double burden exists in poor developing countries, as well as in Brazil, Russia, India, and China. It should be noted that a large part of the population in industrialized countries also suffers from poverty and insufficient food and nutrient intake. The recent trends in these patterns are so surprising (CDC, 2011) that they underscore the overall inadequacy of food supply and formula patterns worldwide as of the last few decades. In just a few decades, the multinational industry, the agricultural food system, has evolved globally, gradually changing production activities and consumer demands and attitudes. It is clearly shown that low-cost foods are energy-dense and lack nutrition (Maillot et al., 2007), resulting both deficiencies and overweight consequences of poor food selection due to household income and education levels. The rapid changes that have happened in most countries these days and are happening now seem to have started with the erosion of traditional lifestyles and cultures as new “Western/North American” food models and systems spread around the world. These “modern” trends are clearly facing the challenges of sustainability, both in terms of land use for food production, farmers’ income and poverty, water supply, environmental pollution from chemicals and pesticide residues, fossil energy reduction and cost, environment and biodiversity deterioration, climate change, and global warming. This global challenge (Godfray et al., 2010) urgently needs appropriate understanding as well as new attitudes and appropriate strategies from the R&D sector and stakeholders to really accommodate present and future population needs and well-being.

In reality, current food production, food supply and food consumption systems generally do not fit current and future human needs, for it cannot satisfactorily feed everybody and depends on the use of high fossil energy, chemical and energy input, long-distance transport, low cost human labour, and loss of culture. It induces overdose of fat and sugar, as well as a lack of micronutrients and fibre, and promotes overweight and obesity with the general tendency to reduce physical activity and energy consumption of the body. Food choices and their determinants are, in fact at the core of the current situation. It is well known that they are increasingly being pushed by the global economic sector through the simplification of industrialized production, generalized intensive food processing and refining and active food distribution and advertising. In contrast, they are increasingly subject to the influence of local cultural heritage and environmental integration.

This new food system has been developing since the middle of the 20th century, that is, only two generations ago. It is well known that it generates a large amount of greenhouse gas emissions and promotes important changes in the ecosystem, such as loss of biodiversity, deforestation, soil erosion, chemical pollution, and water scarcity. In particular, it relies heavily on a very low diversity of food crops and cultivars/varieties and on a clear but limited amount of food purchased, processed and consumed. While it is clearly not obvious, the complexity of the current food supply system makes it extremely vulnerable to any climatic, socioeconomic, political or as recently financial crisis. This recently happened with the rice financial crisis where prices quadrupled
in a matter of months in 2008, highlighting the implications of high food prices for global nutrition (Webb, 2010) or with the 2011 earthquake in Japan which depleted food stores in 3 days in highly urbanized areas.

The high energy content of most consumed foods can meet the vital needs of people with high energy expenditure, but is beyond that for most urban sedentary people. In addition, the low nutrient/fibre density of commonly consumed foods (raw and processed) is a widely recognized concern in all countries. For instance, in the case of the same energy content, the amount of fibre, minerals, vitamins and antioxidants in whole wheat bread is approximately three to four times higher than that of refined wheat bread. Compared to the minimum demand, the proportion of foods of animal origin (especially processed meat and whole dairy products) is usually a large surplus and significantly increases the cost of the daily diet (Maillot et al., 2007)

Therefore, there is an urgent need to launch a new strategy to develop the concept and use of sustainable diets in the different contexts of industrialized and developing countries to ensure food safety and quality. Such systems should be based on the production of low-yield agricultural staple foods, including limited animal husbandry, short-distance production and consumption networks, minimal food processing and refinement, important culinary skills, diet and nutrition education, ancestral local culture, and proper use of recent technical tools.

First, from the origin of agriculture to the 19th century, food production systems in different geographical and climatic settings around the world are low-input and must be ecologically integrated. Impressive skills have been developed over millennia and centuries to adapt to specific environments and the means available, and to improve farming methods to support the growth of people. While this process allows the human species to survive, it is not enough to provide adequate food for everyone at all times. This facilitated the emergence in the 20th century of intensive industrial farming systems based on the massive use of fossil fuels and fossil fuels. Despite short-term improvements in production, the current limit and survival of the 1 billion undernourished people require new directions, given the large and rapid growth of 32 populations in some parts of the world. In fact, it was advocated at a conference organized by FAO (El-Hage Scialabba, 2007) that appropriate agri-ecological food production systems can work better (around 180%) than agro-industrial systems to provide food to people in developing countries by combining traditional knowledge and traditional skills with more recent means and concepts. This can enable much needed improvements in staple food production in a sustainable manner, protecting natural biodiversity and agriculture, and preventing the poisoning of ecosystems and people. This was again recognized by O. De Schutter, the United Nations Special Rapporteur on the right to food, who said: “Small farmers can double their food production in 10 years in critical regions using ecological methods. Agroecology is a knowledge-intensive approach: it requires public policies that support agricultural research” (De Schutter, 2011). In industrialized countries, the agroecological food production system, often referred to as "organic" and supported by the Commission in Europe, already accounts for 10% or more of the agricultural sector, and has been shown to
provide high-quality food in an affordable way. Effective, with reasonable yields respecting the environment. This is a reasonable way to meet the necessary integration needs of nutrition and ecology (McMichael, 2005).

Second, producing most of your staples locally is the best way to ensure food security and avoid troubles caused by globalization and international uncertainty. Consistent with the above points, this involves developing seasonal production with a minimum of inputs to improve sustainability. This will stimulate the search for adapted species and varieties and thus increase the biodiversity to be cultivated.

These seasonally produced foods should best be eaten locally. This will optimize the flavour, taste and nutritional quality of those foods collected at maximum maturity, thereby benefiting their consumption (especially fruits and vegetables). Short-distance procurement will limit the use of transportation energy, and direct sales from farmers to consumers through new local organizations are the best way to get good prices in a fair trade, knowledge, understanding and trust, therefore the best way to reconcile the urban citizen and producers, and become a better part of the entire ecosystem.

Third, as mentioned above the general quality of food is a prerequisite for optimal nutrition. For raw food produced, the best quality lies in delicious products with high nutrient content and no contamination or minimal contamination by chemical poisons. Products produced using agro-ecological methods, such as certified organic products, generally meet these two requirements by increasing the content of dry matter and some nutrients and minimizing chemical and nitrate contamination (Rembialkowska, 2007; FSA, 2009; Lairon, 2010).

Minimal processing may be one of the best ways to maintain the original flavour and taste, without adding artificial flavours or additives, or excessive salt. This is also an effective way to retain most nutrients, especially the most sensitive ones, such as many vitamins and antioxidants. Grain milling is one of the most stringent processes and can significantly affect the nutritional content. Although grains are naturally very high in micronutrients, antioxidants, and fibre (i.e., whole wheat flour or flakes), milling generally removes most of the minerals, vitamins, and fibre to produce white flour. In the context of a sustainable diet aimed at achieving optimal nutrient density and health protection, this deterioration of key nutrients and fibre is no longer acceptable. On the contrary, the fermentation of various foods or germination of grains is a traditional, locally accessible, low-energy and high-nutrient process, which is very interesting.

Home cooking, essentially cooking, is the cultural heritage of all groups of people. With an energy source that does not affect the ecosystem, it allows preparation of easily digestible foods and different and interesting varieties. Cooking allows the use and mixing of a wide variety of foods, herbs and spices. It identifies individuals and groups of people around their cultural traditions, skills and way of life. Dietary patterns are recognized as the best description of daily eating habits and of recommended nutritional recommendations. They may depend more or less on diversity, cultural heritage or healthiness. In general, some patterns are considered quite harmful, such as the "Western diet", which is energy-dense, rich in
meat and dairy products, saturated fat and sugar, but lacks some micronutrients and fibre. Some of others of “prudent” type which are nutrient-dense and plant-based foods, with much vegetables, fruits, nuts, whole grains and fish are recommended. In addition, knowledge, concepts, and tools can now be used to scientifically design the minimum changes needed to consume food so that people can adjust to the recommended intake of nutrients and fibre needed to maintain and promote health (Maillot et al., 2010 and 2011). In addition to empirical knowledge and tools, this new method also helps identify and promote better food choices. Another necessary method is to analyse the sustainability of dietary patterns based on life cycle assessment and energy and land requirements (Carlsson-Kanyama et al., 2002; Duchin, 2005). In fact, most traditional local dietary patterns are of the “prudent” or "cautious" type, the most famous being the Mediterranean (Willet et al., 1995; Sofi et al., 2008; Bach-Faig et al., 2011) and Asia. Their unfortunate gradual demise has been linked to the erosion of local cultures and traditional food systems, and an important challenge is to prevent this negative trend and to enable innovation and updating of such dietary patterns. This goal is now achieved through the modern Mediterranean diet pyramid (Bach-Faig et al., 2011; Reguant-Aleix et al., 2009), which aims to coordinate traditional food production and lifestyle with reasonable food choices to meet nutritional needs and adapt to low energy consumption and environmental and biodiversity protection. Another example comes from Northern Europe, where healthy and environmentally friendly regional diets have been developed for the Nordic countries (Bere and Brug, 2008).

Information and education on appropriate food choices is therefore essential to improve the current situation in all countries as it is part of the sustainability framework, i.e. taking into account nutrition, culture, pleasure, equity, well-being and health, the environment and the protection of biodiversity for all.

In contrast to today's economic, technological and financial dominance, examples of local agro-ecological food systems have the potential to provide rural and urban populations with suitable foods. Quantity and quality must be taken into account. This implies that the great culinary heritage of the world be protected and further optimized to meet new challenges, in particular to ensure food security. Appropriate and diverse crop varieties should be planted or raised, agricultural practices should improve biodiversity, protect soils, forests and water, minimize chemical contamination of people and food, maintain long-term ecosystems and reduce global warming. Authorities should take urgent responsibility to manage and support adequate and sustainable food production and consumption.

Food and diet are one of the important social determinants of health and well-being, but the current food system is deeply unfair and creates social injustice. Based on the experiences of the last half century and current trends, we are convinced that it has become very urgent to fundamentally change our nutrition strategy and to promote a fair, culturally appropriate and sustainable diet based on biodiversity. This is indeed a significant challenge for nutritionists.

References