

measures to ensure that there is no misappropriation of genetic resources in the public domain by enterprises and plant breeders. Patents should be given only for a genuine invention that has created a biological product significantly different from any that existed before, and the patent should cover only the inventive step itself, nothing beyond it.

Intellectual property rights, including on test data for agrochemicals, should be implemented in a way that contributes to agricultural production and poverty reduction through access to required inputs at affordable costs. Governments should avoid implementing legal regimes that create exclusivity over the use of such data.

### **FOOD SECURITY TO MEET DIETARY NEEDS FOR ACTIVE AND HEALTHY LIVES; ETHICAL CONSIDERATIONS IN CONNECTING ELEMENTS OF FAO'S MANDATE**

FAO is required under its Constitution of 1945 to collect, analyse, interpret and disseminate information relating to nutrition, food and agriculture. For many years, initiatives focusing on these various elements followed their own, specialized and mostly unrelated paths. In the FAO Secretariat, nutrition was left more or less isolated in a division conducting its work rather independently of what happened in the other parts of the organization. In the light of the implications for people's diet and nutrition of globalization processes as discussed below, the recent institutional reform within FAO, which has placed nutrition together with consumer protection in the Agricultural and Consumer Protection Department, should encourage stronger linkages with production issues besides emphasis on consumer protection for good nutritional health in the age of globalization.

In 1996, the Heads of State and Government at the WFS agreed on a definition of food security in a way that points to an explicit connection between the various mandates of FAO according to its Constitution.

*... Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. ...*

*World Food Summit Plan of Action, Para. 1 (FAO, 1998)*

The food security concept thus defined can serve to connect the fundamental tasks of the Organization related to food production, distribution and access, encompassing the interests of both producers and consumers, and the concern with sustainable environment. The Panel recommends that FAO use the food security definition systematically and encourage Member States to do so in the formulation of their agricultural as well as their food and nutritional policies.

In particular, the recognition that agricultural production should aim at providing "nutritious foods" to meet the "dietary needs" underlines the fact that a primary purpose of agriculture and food handling is to facilitate matters so that all people can eat satisfactorily in the pursuance of health and absence of disease and thereby lead an active (implying also productive) life. This should guide the production/processing/distribution chain and serve as a point of departure for checking whether developments in agricultural and food supply policies really serve the meaning and purpose expressed in the 1996

definition. A second major purpose of agriculture is to provide an adequate livelihood and income for rural people, focusing on their ability to feed themselves and having the necessary means to procure what they cannot themselves produce as well as to cover their other basic needs.

Most agricultural and rural planning has assumed that these goals would be the result over time of agricultural development, possibly by a trickle-down effect in the long run. It should, however, be an immediate concern. As the British economist John Maynard Keynes said in 1923: “The long run is a misleading guide to current affairs. In the long run we are all dead.” Waiting for things to happen can, particularly for young children, be disastrous even in the short run. Their “window of opportunity” for healthy nutritional development is set from their life within the womb of the mother until they are two years of age.

The IAASTD (2009) finds it important to put consumers and their dietary and nutritional needs and preferences at the centre of what should drive the decisions on agricultural policy and food production, and hints what might happen if this is not done:

*Despite the evident and complex links between health, nutrition, agriculture, and AKST<sup>2</sup> improving human health is not generally an explicit goal of agricultural policy. AKST policies and practices have increased production and new mechanisms for food processing. Reduced dietary quality and diversity and inexpensive foods with low nutrient density have been associated with increasing rates of worldwide obesity and chronic disease. Poor diet throughout the life course is a major risk factor for chronic diseases, which are the leading cause of global deaths. There is a need to focus on consumers and the importance of dietary quality as main drivers of production, and not merely on quantity or price. Strategies include fiscal policies (taxation, trade regimes) for health-promoting foods and regulation of food product formulation, labelling and commercial information.*

Johns and Sthapit (2004), who work with plant genetic resources, have examined the profound dietary changes and drawn attention to negative implications of the rapid changes in nutrition and health priorities in developing countries through the processes of the “nutrition transition” as further discussed below. They point out that:

*Healthy diets for populations depend on availability and accessibility, within a context that promotes and supports healthy behaviors, of a variety of plant and animal foods. Although both these resources and positive behaviours are characteristic of traditional food systems, contemporary trends simultaneously erode biodiversity and the sociocultural context in which it is conserved.*

### **Dietary change and nutritional health – a challenge to integrated public nutrition policies**

The Panel has considered three dimensions of dietary change and consequences for nutrition-related health, and corresponding ethical implications for public nutrition measures for which FAO should serve as ambassador:

- poverty-related malnutrition in the “nutrition transition”, including the global rise of obesity and related chronic diseases;

<sup>2</sup> AKST: agricultural knowledge, science and technology.

- the role of the corporate food sector in marketing non-healthy foods and recent attempts to control their behaviour;
- “nutrigenetics” and “nutrigenomics” for personalized diets – legitimate tools in forming individual tailor-made food choices, or diverting attention from public nutrition responsibilities?

### **Poverty-related malnutrition in the “nutrition transition”, including the global rise in obesity and related chronic diseases**

The WHO has defined “malnutrition” as encompassing all forms of ill health from inappropriate eating, thus undernutrition, overnutrition (especially of cheap energy-dense, nutrient-poor foods with resulting obesity [conditioning many chronic diseases]), and micronutrient deficiencies. The WHO warns that undernutrition and overnutrition problems and diet-related chronic diseases already account for more than half of the world’s diseases and hundreds of millions of dollars in public expenditure. Chronic non-communicable diseases account for tens of millions of deaths worldwide due to heart disease, stroke, cancer, diabetes and obesity.

A complex range of factors interacts to determine the nature and course of this evolving epidemic of chronic non-communicable diseases, which includes changes in food consumption patterns, habitual diets and life styles – together called the “nutrition transition”. While these diseases used to be associated with industrialized countries and the better-off in developing countries, they are now clearly associated with poverty for large numbers of people. Such diseases can now be seen side by side with undernutrition, especially of children, in the same family. Increased consumption of cheap calories from fat and sugar combined with a more sedentary lifestyle, particularly associated with urbanization, has led to a rapid rise in obesity.

Scientific documentation is found in the report of a group of independent experts jointly commissioned by the WHO and FAO and released in 2003 (WHO–FAO, 2003). The report led to the Global Strategy on Diet, Physical Activity and Health, adopted by the World Health Assembly in May 2004, which seeks to deal with these challenges and to which FAO has contributed.

Ethics require attention to the factors causing rising obesity, especially in regard to the diet of children and adolescents in the nutrition transition. The upward trend in obesity and associated diet-related non-communicable diseases in developing countries would undermine gains in development and efforts to tackle hunger and malnutrition. While hunger and poverty remain overriding priorities, the growing incidence of obesity in developing countries through the globalization of consumption and lifestyles of developed countries raises new challenges for the right to food and nutrition.

According to the WHO, there are now more than one billion overweight people in the world, and obesity is considered a world epidemic. Two out of three overweight and obese people now live in developing countries, the vast majority in emerging markets and transition economies.

By 2010, more obese people will live in developing countries than in the developed world.

Findings of a study in China revealed a disturbing increase in overweight and obesity from data collected in a national nutrition and health survey in 2002 (Wu, 2006). About 20 percent of the world's overweight or obese are Chinese.

Unhealthy diets and physical inactivity are among the leading causes of cardiovascular disease, type-2 diabetes and certain types of cancer. There are multiple reasons for the increase in overweight and obesity in developing countries (changes in diet, physical activity, health and nutrition).

The Panel notes that, according to its Constitution, FAO shall “promote and, where appropriate ... recommend national and international action with respect to scientific, technological, social and economic research relating to nutrition, food and agriculture and to the improvement of education and administration relating to nutrition, food and agriculture, and the spread of public knowledge of nutritional and agricultural science and practice.”

### **The role of the corporate food sector in marketing non-healthy foods, especially to children, and attempts to control their behaviour**

Irresponsible marketing behaviour by some parts of the transnational corporate food industry and related advertising companies has been found to contribute to malnutrition caused by marketing cheap, energy-dense and nutrient-poor diets, and thereby to the growing prevalence of obesity in most parts of the world, which is in turn associated with many so-called chronic nutrition-related diseases: diabetes, cardiovascular diseases, cancer and high blood pressure.

Other factors are at play, such as sedentary lifestyles with diminished physical activity (especially during urbanization).

Of particular concern is the marketing pressure directed at children and youth for whom exposure to such marketing can establish eating patterns and physiological processes that may be difficult to change later:

*As a result of increasing evidence that advertising induces children to eat too much of the wrong kinds of food, food marketing has emerged as an obvious target for action. Food (including beverage) companies have come under increasing pressure to produce more nutritious products and to market them more responsibly, and many have promised to do so. No agency, however, holds food companies accountable for such promises. (Lewin, Lindstrom and Nestle, 2006)*

Some recent studies have observed and concluded:

- The overwhelming majority of food product advertisements seen on television by United States children and adolescents are of poor nutritional content (Powell *et al.*, 2007).
- Branding of foods and beverages influences young children's taste perceptions. The findings are consistent with recommendations to regulate marketing to young children (Robinson *et al.*, 2007).
- The practice of “supersizing” (presenting the option of larger portion sizes at minimal additional cost) started by the United States food industry in the 1970s, and now widely criticized, is spreading to developing countries (Witkowski, 2007).
- With regard to the spread of global retailers such as Carrefour and Wal-Mart – the combination of greater availability and variety (of food products) with lower prices

at the wholesale and retail levels makes it possible for less affluent consumers to increase their energy intake (Witkowski, 2007).

- A Consumers International report (2004) for India, Indonesia, Malaysia, Pakistan, the Philippines and Republic of Korea found a substantial increase in commercials for foods high in fat, sugar and salt. In India, 40–50 percent of television advertisements shown during children’s programming were for food. In Malaysia, Pakistan and the Philippines, the percentages varied between 50 and 75 percent.

It is important to take note of the following considerations:

- The marketing activities have a strong impact on shaping preferences of young children and adolescents, according to recent evidence-based studies both in industrialized and developing countries, and the impact is stronger the more aggressive is the marketing behaviour.
- Voluntary or self-regulatory initiatives in the advertising and marketing of food and beverage products have been shown not to be effective.
- Claims of “healthy” foods or “free”, “low” or reduced calories, total fat, saturated fat, sodium or sugar are often inadequate or even misleading.
- “Science-based” standards and criteria are often fraught with economic considerations and the interests of industry, as seen in the sugar debate triggered by the WHO–FAO report *Diet, Nutrition and the Prevention of Chronic Diseases* (WHO–FAO, 2003);
- There are often double standards in the level of information provided to consumers in developed and developing countries.

A “European Network on reducing marketing pressure on children” was established under the auspices of the WHO Regional Office for Europe in collaboration with the Government of Norway in January 2008 and now counts 14 countries in the region as members, with a few UN agencies (including FAO) and voluntary organizations as observers. The members want to work together to find ways to reduce the marketing pressure on children for energy-dense, micronutrient-poor foods and beverages. Two working groups have been established to work on, respectively: (i) ways in which marketing regulation may be carried out in practice, including an examination of the content of regulations, aims and various approaches to regulation; and (ii) monitoring systems, entailing an assessment of various ways to monitor marketing, both in terms of extent and how marketing is done.

### **“Nutrigenetics” and “nutrigenomics” for personalized diets – legitimate tools in affecting individual choices, or diverting attention from public nutrition responsibilities?**

The newest and so far most exotic approach to choices of food and nutrients according to needs is that informed by the variation in individual persons’ gene expression vis-à-vis dietary factors (GeneWatch, 2006). Nutrigenomics refers to the application of genomics in nutrition research, enabling associations to be made between specific nutrients and genetic factors, e.g. the ways in which foods or food ingredients influence gene expression. Nutrigenetics is the study of how individual differences at the genetic level influence response to diet. These individual differences may be at the level of single nucleotide

polymorphisms, i.e. variations in a single base pair, rather than at the gene level. To some extent, the terms are used interchangeably.

GeneWatch UK asserts that the *focus* of commercial interest in nutrigenomics is in achieving two overlapping aims:

- developing new food products that can be marketed as providing health benefits to consumers (“functional foods”);
- *individualizing* diet, tailoring our diets to our genes and perhaps to other biological measurements.

The implied *health strategy* behind nutrigenomics depends on several assumptions:

- “*personalized nutrition*”, based on individual biological differences, should be the ultimate aim of nutrition research;
- people’s risk of obesity and of developing chronic diseases is different depending on their individual genes and other biological factors, and these differences can be identified and the risks quantified;
- people should therefore be tested to find out their genetic make-up, and perhaps monitored for other biological changes, and advised to eat different foods (or take different supplements) depending on the results;
- doing as indicated above will reduce their individual risk of common diseases and also reduce the incidence of obesity and chronic conditions in the population as a whole;
- people will want to take genetic tests, and perhaps other types of tests as well, and will change their diets as a result;
- this approach to health will be affordable, cost-effective and socially acceptable.
- Ethical issues fall into several categories. Below, the Panel lists and comments on those it finds most important.

### **Why nutrigenomics? Might an emphasis on nutrigenomics distract from other key issues, such as the right to food?**

Insofar as nutrigenomics requires large amounts of investment, a “personalized diet” may be implemented primarily in richer countries, where it would not directly be a threat to the right to food. However, poorer countries may still be liable to domination by the companies involved.

### **Might nutrigenomics be used for public health goals?**

A focus on personalized nutrition is arguably not a strategy most likely to further public health goals. Public health goals would rather need to focus on prevention and management of nutrition-related diseases, so identifying susceptible population and focusing on their needs. Identification of the potential impact on global food security would be an important prerequisite. Problematic is also the presentation of potentially confusing advice in the media on healthy consumption, especially when new technologies are involved.

### **Could nutrigenomics be used to benefit particular population groups?**

A focus on population groups might be more helpful than an emphasis on personalized nutrition, analogous to the strategy for pharmacogenomics outlined by Daar and Singer

(2005) where they criticize the “boutique” model of drug development and argue for resuscitation of abandoned drugs, informed by genomic research, for population groups (sorted by geographical ancestry) in developing countries. Although the flaws in this proposal have been pointed out by Holm (2006), there is an analogous point to be made about the difference between a “boutique” approach to food and one that focuses on groups, whether these are defined in terms of geographical ancestry or in some other way, e.g. groups who are undernourished or who are suffering from eating disorders. Here the relationship between nutrigenomics and taste becomes relevant. Given individual differences in perceptions of bitterness, which may have a genetic basis as well as being due to differences in age and ethnicity, the identification of these factors may facilitate the development of food products particularly suited to particular population groups.

The different kinds of groups at stake need to be considered. There are groups identified by disorders, such as (in the nutrition context, groups of patients with single-gene disorders such as phenylketonuria); then there are groups identified as being at higher than average risk of developing diet-related diseases (e.g. diabetes type 2), where there may be multiple factors involved; groups with allergies, and so on.

However, populations may also be categorized according to nutritional status, e.g. undernourished or not, overeating (who may still be undernourished) or not, or according to specific needs of other sorts – nutrigenomics may be regarded as particularly helpful, for example, for sportspersons. There may also be applications relating to taste and appreciation of food. These could also have health-related side-effects, such as enhancement of taste experiences for those who need to be encouraged to eat more. This may be useful in designing food products for particular population groups. Elderly people, for example, may have specific needs in this regard.

### **What is the relevance of cultural differences?**

This question has two aspects. The first is that nutrigenomics itself might be seen as expressive of a particular cultural perspective, with optimal or enhanced health as an aim. This might be described as a form of “health-ism”. In principle, however, there is no reason why nutrigenomics should aim at health rather than, for example, an increased enjoyment of taste, although this could also be culturally specific.

An additional point might be whether nutrigenomics research results from one culture, with one specific set of standard staple foods, can be transferred to other cultures with completely different sets of staple foods or whether gene–environment interactions are sufficiently complicated to undermine transferability. There might be a risk of providing harmful advice.

### **What would be the requirements for an ethically robust policy on nutrigenomics?**

There would need to be a secure evidence base, establishing the associations between genetic factors and dietary response; this would require large-scale biobank research applicable to the context in which results are to be implemented. In research priorities, public health dimensions should be prioritized, including research into population

variation in response to diet in affluent and poor populations. Food and health should be recognized as individual and collective rights.

Public health strategies should also involve environmental strategies including sustainable food production (i.e. not over-emphasizing genetic aspects, while giving them their due), as well as investigation of other technological possibilities such as functional foods.

There is reason for FAO to be aware of these developments as they will no doubt continue. Otherwise, few direct actions are foreseen for the Organization as such, except to be aware that parts of the commercial sector in both pharmaceuticals and nutrition are tempted to promote new but merely insignificant and costly “solutions” to very complex problems regarding household food security and nutritional health.

### **Preserving or resurrecting closer interfaces between producers and consumers**

In several developed countries, including the United States of America, “farmers’ markets” have increasingly become an integral part of the urban/farm linkage and have continued to rise in popularity, mostly owing to the growing consumer interest in obtaining fresh products directly from the farm. These markets enable farmers to develop a personal relationship with their customers, and cultivate consumer loyalty with the farmers who grow the produce. Reportedly, there are more than 4 300 farmers’ markets operating throughout the United States of America.

Attention to *integrated* food production–processing–distribution–consumption systems is necessary, and would make the many proposals for closer alliances between producers in the South and the North more realistic and meaningful.

In developing countries, the typical local markets in many rural and partly also in urban settings are traditional farmers’ markets. The distribution chains in many towns and cities also have their processing links in terms of street vendors. These realities are now under threat both as a source of income for some and as a neighbourhood site of access to food without too many interfering “value-adding” links that increase the transaction costs for the consumer and therefore also reduces the price obtained by the producer.

Local solidarity partnerships between producers and consumers appear to be spreading worldwide with a view to: maintaining and expanding peasant agriculture; enhancing local, regional and national protection of the access to food (often referred to as food sovereignty); improving health through food and fight against hunger and malnutrition; developing social networks of solidarity between producers and consumers and between people in urban and rural communities; and combating exclusion and poverty through the building of solidarity networks whether in rural peasant or urban contexts, or by bringing them together.

### **Recommendations**

Taking into account the implications for people’s diet and nutrition of several dimensions of the globalization processes, the Panel recommends that FAO place a stronger emphasis on consumer protection for good nutritional health in the age of globalization. This should



address *both* the production issues and measures to protect consumers, with a view to promoting their human right to adequate food and good nutritional health.

FAO has a clear ethical commitment to promote a diverse diet including traditional foods, which are generally balanced and high in nutrition. Taking into account that resources invested by the food industry to market their products can outweigh the resources of national governments to promote nutritional education and communication, FAO should encourage worldwide cooperation in developing market regulations that reduce marketing pressure for energy-dense, micronutrient-poor foods and beverages, particularly in regard to children.

FAO should be aware of the criticisms raised against the trends towards nutrigenomics, and should encourage its promotion only in cases where it can be used for the benefit of specific population groups, whether these are defined in terms of geographical ancestry or in some other way – e.g. undernourished or suffering from eating disorders.

FAO should encourage policies and studies that make it possible to *retain and strengthen, where appropriate, farmers' markets* in developing countries to serve as the closest link between the sites of production and the points of purchase for consumers. ●