Food, Environment and Health

Food affects our health and the environment in three main ways:

- It enables us to meet our bodies' needs in calories, proteins, vitamins and micronutrients but may also damage our health
- Its production and consumption fills our environment with a mass of different products, the effects of which are poorly understood
- It places tremendous pressures on our environment and on natural resources that could threaten our long-term future and even the survival of our species.

The global food system and the satisfaction of our food needs

To what extent, today, are our food needs satisfied in ways that enable people to live healthily?

Unfortunately, it appears that, though enough food is being produced for everyone to eat well, this is not generally reflected in healthier eating. To put it bluntly, the global food system is in a real mess: more than half of the world's 7.2 billion population is malnourished in one way or another, while a third of food output is wasted or thrown away[1]:

- Close to one billion people are chronically undernourished, trapped in a situation in which they fail to grow to their full potential, cannot learn well at school or compete for work, are highly susceptible to illness and die prematurely

[1] Trueba, I. and A. MacMillan, *How to End Hunger in Times of Crises: Let's Start Now!,* Fastprint Publishing, 2013

- More than two billion people suffer from nutritional deficiencies due to insufficient or imbalanced intake of minerals, vitamins and micronutrients, and these affect their physical and intellectual capabilities as well as their health
- A further 1.5 billion people are overweight, of whom around 500 million are obese, because they consume more than their life-styles require. The rapid rise in obesity is raising in the incidence of non-communicable diseases, including cardiovascular diseases, diabetes, various cancers and dementia, leading to shorter life expectancies. [for more details on these figures]

The global food system and the release of chemicals into the environment

Every year so-called 'modern' agriculture uses an impressive quantity of chemicals that are spread or sprayed in intensively cultivated areas. Part of these chemicals ends up in our food while the rest is released into the environment, contaminating soils and water resources: For example:

- 112 million tons of nitrogen were used in agriculture in 2011, some 30% more than in 2002
- 2.7 million tons of highly toxic phytosanitary products (pesticides, herbicides, fungicides, etc.) were sprayed on crops, an increase of 250% since 1990[2]
- The massive use of antibiotics in animal production made many bacteria more resistant to antibiotics; this is likely to cause 10 million deaths by 2050[3].

Moreover, the agrifood industry converts a growing proportion of raw agricultural products into processed food products and beverages. For this it uses considerable quantities of food colourings, food preservatives, antioxidants, emulsifiers, acidifying agents, thickeners, stabilizers, coatings, taste enhancers, sweeteners, salt and other substances. There are no reliable independent statistics on the scale on which these additives are incorporated in our food, and often little is known about their impact on our health.

The global food system and the use of natural resources

To produce all the food currently consumed by the world population, the global food system uses:

- One third of all the energy utilised by mankind
- More than one third of the land surface (approximately 5 billion hectares)
- 2,700km^3 of fresh water per year, equivalent to 70% of the water now used by mankind. This is about 3 times the volume of water in Lake Geneva.

The global food system is also one of the main sources of greenhouse gases produced by mankind: agriculture alone (not including agroindustry) produces around one third of the greenhouse gases emitted by human activities every year: this includes both the gases emitted by agriculture proper and those produced by deforestation, two thirds of which being to make space for agriculture.

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[2] FAOSTAT 2014

[3] J. Sundaram and T. Gen, Catastrophic Antibiotic Threat from Food, 2017

In addition, the global food system is literally destroying agricultural biodiversity by promoting the use of only a few varieties of a limited number of plant and animal species: it is estimated that 75% of agricultural biodiversity was lost during the past century and that, every week, six breeds of farm animals become extinct! This loss of biodiversity makes our food system more fragile as the reduction in genetic potential that it implies increases the vulnerability of the system to pests, diseases and climate change. Indeed, the loss of genetic information reduces the capacity of the animals and plants that we use to resist pests and diseases or to adapt to changing climatic conditions. [read more on genetic resources]

Finally, the consumption of all these natural resources goes along with an incredible level of food wastage: approximately *one third* of all food produced is wasted or lost, and part of this wastage contributes twice over to the pollution of our environment – first through its production and then its disposal. [read more on food waste]

How did we get into this situation?

It is important to question why and how we have arrived at such a worrying situation.

From the standpoint of ideas and principles, the main reason for what we have just described is that our economic system:

- Gives a *central importance to private property and interests*, which, since the time of Adam Smith (1723-1790), are considered the main drivers of the economy, and priority to individual *accumulation of wealth in the shortest possible time*. According to this principle, giving free rein to individual egoism contributes more effectively to desirable social ends than any effort undertaken (by the state, for example) to improve the social conditions of the population
- Relies fundamentally on *market mechanisms* according to which any ‘‘profitable’’ innovation is considered to be synonymous with progress in spite of the fact that associated environmental and social costs are not accounted for. This means that a significant share of the real costs of producing food - particularly the costs of environmental and health damage - is not counted or being met by anyone operating in the food chain, whether producers or consumers. These costs – and, in some cases, benefits – are not picked up by market mechanisms or reflected in prices and hence are referred to as “externalities”[4]
- Gives higher value *to costs and benefits occurring today than in a more distant and uncertain future*[5]

[4] An externality corresponds to a situation where the act of producing or consuming by an economic agent has a positive or negative impact on one or several other agents not directly part of the act, and where these affected agents do not have to pay for all the benefits that have accrued to them or are not fully compensated for the harm they have suffered. In practical terms, this often means that the costs of such externalities end up being met by future generations.

[5] This is reflected by the use of a discount rate for future costs and benefits at the time of calculation of the profitability of an investment. For example, if a yearly discount rate of 5% is used, then a cost or benefit of €100 that is predicted to occur 15 years from now, will only be counted as having a present value of €46 in the profitability calculation.

- Attaches low importance to the equitable distribution of the benefits of economic growth.

It is quite clear that, from this point of view, our current economic system is *in direct contradiction with the concept of sustainability* which has emerged over the last thirty-five years[6] and which is based on:

- A *perception of time within a long-term perspective*, whether from the collective, social or individual point of view (What implications does something done now have for me in the medium to long term? On my economic situation? On my health?);
- The idea of inter-generational equity.

If we look back in history we can trace the origins of “modern” agriculture to Justus Liebig (1803-1873) who came up with the idea of using mineral fertilizers on crops after he had found out that the ashes of plants that he had burnt contained nitrogen, phosphorus and potassium. This occurred at a time when industry, and particularly the chemical industry, was starting to develop and agriculture still accounted for two thirds of the economy in countries like France. But it was only after Fritz Haber (1868-1934) had invented the fossil energy-demanding process by which nitrogen from the air could be fixed, that the production of inorganic fertilizers (such as urea, ammonium nitrate) began. Significantly, the production of these synthetic fertilizers used raw material precursors that could also be used to produce explosives (TNT, nitro-glycerine) and poison gases (mustard gas).

During the two world wars, and particularly during World War II, there was a substantial development in the production of explosives. In the US, 18 large chemical factories were constructed between 1939 and 1945 to produce explosives, and at the end of the war, the tricky question of reorienting these factories was raised. A solution was quickly found and they were adapted for the production of synthetic fertilisers. In order to find a market for the produce, governments implemented a promotion and support policy for the use of chemical fertilisers that was quite successful, particularly in Europe, which was then suffering from food shortages and rationing. That is how the use of chemical fertilisers became a normal practice for European and North American farmers. During the 50s and 60s, through the promotion of the Green Revolution, synthetic fertilisers also became a normal practice for millions of farmers in the South, particularly in Asia. At the same time, agrochemical companies diversified their produce and offered farmers an increasing

[6] ‘‘Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs’’ United Nations report ‘‘Our Common Future’’, 1987.

choice of synthetic substances that could be used as pesticides, fungicides and herbicides. The demand for these rose as farmers increased fertilizer applications and thereby raised crop susceptibility to pests and diseases.

The food industry developed in parallel with this process, encouraged by the increasing urbanisation of the population that went together with the progressive industrialisation of the economy in rich countries. Very rapidly, encouraged by the opinions on nutrition expressed by influential scientists like Linus Pauling on the importance of minerals and vitamins, usefulness of food supplements, etc., a new food industry developed that led to the production of hundreds, if not thousands, of food additives that are claimed, often without scientific evidence, to be good for one's health.

Our 'modern' global food system, as we know it today, came gradually into being, encouraged by proactive economic policies.

What do we know about the impact the consumption of all these substances has on our health?

Very little, in fact. For a long time, this had been of little concern to both consumers and governments. Some rules and regulations, however, were created as early as the beginning of the 20th century in France. But these were essentially in order *to combat fraud*. It has only been since the 80s, with a rising incidence of food contamination scandals (e.g. dioxin, rapeseed oil), that lawmakers have become interested in *protecting consumers*.

Food norms and standards were established little by little, with the aim of avoiding negative consequences on consumer health. Although these norms were informed by scientific results from toxicity tests on animals, they were mostly the outcome of the balance of power between firms producing the chemicals, consumer associations and governments. At the international level, as regards food, these norms were negotiated in the framework of the Codex Alimentarius. They were later included into the Agreement on Sanitary and Phytosanitary Measures (SPS) signed at the time of the creation of the World Trade Organization (WTO): this gave them a legal and binding character. Progressively, in Europe, the precautionary principle [7] has become increasingly accepted. Food safety agencies were created at European Union level (European Food Safety Authority - EFSA) as well as at country level (in the UK, the Food Standards Agency). In the US the Food Safety and Inspection Service of the United States Department of Agriculture was established for a similar purpose.

Although very useful, this regulatory system has *flaws that give cause for concern.* Some of these were revealed to the public in 2012 when Professor Séralini conducted his study on the toxicity of Monsanto's transgenic maize NK603 [read more on this here]. This study demonstrated that the *experimental protocol* used in the European Union for tests that serve as a basis for approving the use of new substances, has important flaws:

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[7] 'The precautionary principle enables rapid response in the face of a possible danger to human, animal or plant health, or to protect the environment. In particular, where scientific data do not permit a complete evaluation of the risk, recourse to this principle may, for example, be used to stop distribution or order withdrawal from the market of products likely to be hazardous.' http://europa.eu/legislation_summaries/consumers/consumer_safety/l32042_en.htm

- The duration of tests made is too short (90 days) to detect potential negative effects on health and the environment of the tested substances (90 days)
- The toxicology studies are conducted by the same industrial firms that want to release the substance on the market. Moreover, the results obtained from *all* the experiments are not necessarily made available to the scientific community.

Other weaknesses in the system include, in particular:

- The lack of consideration for the *combined effect* that the simultaneous presence of several substances may have on consumer health. Tests conducted analyse separately the effect of individual substances, while in reality consumers are exposed to a cocktail of substances, the effect of which may be greater than that of each substance taken individually
- There is a particular problem with endocrine disruptors, present in some of the food items produced by agroindustries, which can affect health even when absorbed in micro-doses
- There are some doubts about the *independence of certifying organisations*, in particular EFSA. Some press articles have challenged its independence because of the close links that exist between some of its experts or executives and agroindustrial firms (for which some have previously worked) and lobbies
- As of today, only a small part only of all the substances that can be found in our food have really been tested. More generally, out of the 90 million or so chemical substances that can be found in our environment, only around 30,000 have been tested (to know more on this consult the REACH website[8]).

These weaknesses undermine the credibility of the regulatory system in place.

Is it worth the effort to review and reform our regulatory system?

Unfortunately, there are *very few major studies* that provide elements to build an accurate picture of the impact the use of synthetic fertilisers, pesticides and food additives on human health and the environment.

Some very partial studies indicate, however, that *this impact can be quite significant and imply considerable costs*.

For example, a study by the United Nations Environment Programme (UNEP) on the cost of utilisation of pesticides in 37 countries in Sub-Saharan Africa estimated that this was around $4.4 billion in 2005, equivalent to more than 4% of the total value of agricultural production. This amount was projected to reach an accumulated cost of $60 billion over the 2005-2014 period and $97 billion over the 2005-2020 period. These figures actually only included the costs incurred by farmers in terms of days of work lost in agriculture, costs of medical treatment and hospital admission. These estimates excluded deaths attributable to pesticides, their impact on consumer health and the value of environmental degradation such as the decrease in numbers of bees, etc. [read UNEP report here]

[8] REACH : regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry.

Another study, conducted in 2003 in the US, where the regulation on the use of pesticides is probably stricter than in Africa, estimated that the main economic and environmental costs incurred because of pesticides were as follows: $1.1 billion on public health, $1.5 billion for building resistance against pesticides among pests, $1.4 billion for loss of production due to pesticides, $2.2 billion for the loss of birds and $2 billion for water contamination. The total cost of pesticide use was estimated at $10 billion, comparable to the cost paid by farmers to purchase the pesticides that they applied. This corresponds roughly to 10% of the value of total US crop production. [read study report here]

The Report of the Special Rapporteur on the right to food,(2017) stresses the threat represented by a massive use of pesticides (including herbicides) for our environment and our health, and estimates that the use of pesticides causes every year around 200,000 deaths by acute poisoning, most of which taking place in poor countries where regulations are more flexible and less complied with[9].

It is quite clear from these figures that the cost of using pesticides is considerable. They are certainly comparable. To these costs should also be added those related to water pollution and soil degradation arising from the use of chemical fertilizers, along with those due to the use of various food additives of which the impact is not well known.

All these costs amply justify the revision and reform of our regulatory systems and sustained efforts that need to be made in order to replace a food and agricultural system that relies heavily on the use of chemical products by one that is more environment and health friendly.

Beyond reforming the regulatory system, there is a need to reorient our food and agricultural policies

It would be rather inefficient to reform the regulatory system and the experimental protocols to be used to determine the norms and standards to apply with regard to

[9] H. Elver, Report of the Special Rapporteur on the right to food, A/HRC/34/48, 2017

chemical substances found in our food or in the environment, if our economic policies provide incentives to their use.

Currently, agricultural policies largely provide subsidies for the use of agricultural inputs. In fact there are more resources spent to provide incentives for the use of these synthetic products in agriculture than for developing more environment-friendly agricultural production technologies that would provide for better and healthier food. Although it is difficult to find sufficiently disaggregated data to have a very precise idea of these incentives, the data in the table below shows that there is a long way to go for achieving a reformed public resources allocation in favour of a healthier and more environment-friendly agriculture. These figures, produced by OECD and FAO, clearly show that governments spend more to support agricultural input use (chemical fertilizer, pesticides, etc.) than to fund public agricultural research.

Support linked to the use of agricultural inputs and public agricultural research spending

Countries/regions	Support linked to the use of agricultural inputs (€ billion)	As a percentage of total public support to agriculture	Resources allocated to public agricultural research (€ billion)	As a percentage of total public support to agriculture
Africa*		30-50%		Less than 15%
China**	12	More than 10%	2.5	Less than 3%
US**	7	33 %	1.7	8 %
EU**	4.5	5 %	2	2 %

* Source: FAO/MAFAP 2013
** Source: OECD 2013

A strong public agricultural research system aiming to develop more sustainable technologies would offer producers technologies based on the use of knowledge rather than purchased inputs. This would make these technologies more easily accessible - as they would be less demanding in terms of cash for purchasing agricultural inputs - for the poorest producers than those technologies that are being promoted now. It would contribute to improve their economic welfare, reduce hunger and poverty in the world, while in the same time improving the quality of food and protecting the environment.

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To know more:

- J. Sundaram and T. Gen, Catastrophic Antibiotic Threat from Food, 2017

- H. Elver, Report of the Special Rapporteur on the right to food, A/HRC/34/48, 2017 mentioned in the article Production and use of pesticides: an infringement on the rights to food and health, 2017
- Hungerexplained.org, The large multinational corporations in charge of our agri-food system: upstream corporations, 2014
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