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ENVIRONMENTAL SUSTAINABILITY AND HUMAN HEALTH IN THE FOOD SYSTEM

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This work originates from the merging of a personal interest in nutrition and an academic interest in sustainable development. As consumers, it is a key point to ask oneself if there is a way to improve significantly the sustainability of personal dietary habits, while keeping a healthy lifestyle: choosing organic and fair trade products is effective? Or turning to vegetarianism or veganism would be better? Are these choices really beneficial to the body, in a world were diseases of affluence are so widespread and general knowledge about them so little? As academic students, it is interesting to understand how the non-sustainability of the current food system is connected to malnutrition, which dynamics and trends should be taken into account, and which solutions may improve both sustainability of the food chain and consumers’ health status. In particular, beyond a descriptive analysis of interconnected topics, it may be useful to find out which stakeholder(s) hold the main power within the food chain and which “part”, among producers, consumers, and public authorities, could concretely promote the adoption of sustainable diets.

The sustainability of the food production system and the correlation between diets and diseases of affluence have been treated as separate issues for a long time; dietary concerns systematically related to the inefficiencies of the food chain were those of food insecurity and subsequent undernutrition, which is only one half of malnutrition. Even though there are some studies from the ‘80s, a more or less consistent literature on sustainable diets and NR-NCD has developed only at the end of the ‘90s and in the 2000s. Yet, a comprehensive definition has been given by FAO only in 2010, addressing sustainable diets as “those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystem, culturally acceptable, accessible, economically fair and affordable; nutritionally

Key questions
- Which dynamics affect sustainability in the food system?
- How such connections affect our health?
- Who holds the power to shape the food chain?
Sustainable diets
Low environmental impacts;
Socially, culturally and economically fair;
Healthy.

adequate, safe and healthy; while optimizing natural and human resources”.
This definition summarizes all issues that had been investigated in earlier studies, and is widely recognized as the main and most complete one, in that it covers environmental sustainability, healthiness of diets, cultural acceptability, and economic issues, both in a present and future perspective.

Investigating the dynamics underlying all of the issues mentioned in the definition in one single research would have been too ambitious and would have probably generated too much confusion. This is the reason why some clear boundaries have been set to this study. Firstly, the research deals with agricultural and land livestock food products only, leaving out fishery and fish livestock; being aware that the two domains are too different to be treated together in an in-depth analysis, agriculture and livestock products’ chain has been chosen because the vast majority of the foodstuffs that we eat comes from fields and meadows, and because farming is still the main source of income for the vast majority of the world’s people. Second, the focus is centered on the two “extremes” of the chain, namely in-farm production and consumption, due already mentioned intention of providing a deeper analysis; however, the rest of the food chain has not been cut out completely: it has been included in essential points, where not considering the impact of all steps of food production would have severely diminished the value of this research. “Sustainability” is mainly taken as environmental sustainability, even though social and economic sustainability issues are covered when necessary. Last, “malnutrition” is mainly intended as overnutrition, since the primary interest of this research is to connect sustainable food with dietary habits preventing diseases of affluence, both in developed and developing countries.

The work is divided into four parts: the first chapter aims at providing an overview of socio-economic and demographic trends currently ongoing, environmental concerns,
and the dietary transition. The ongoing environmental depletion is connected to worldwide socio-economic and demographic trends (urbanization, population growth, globalization, economic growth); however, the key determinant of the current state of the environment is overconsumption of resources. In the food sector, overconsumption means both the excessive exploitation of natural resources and energy use, which make the conventional system not sustainable in the long run, as well as the increase of per capita consumption of energy-dense food, i.e. the global nutrition transition towards the Western diet.

The second part investigates the food production system, with special attention to farming and livestock, as previously explained, plus an overview on the rest of the food chain. Population growth and increasing per capita demand have led to the evolution of the food production system towards industrial agriculture, characterized by the use of fossil energy, external inputs, and intensive monocrop or livestock raising. Besides, dietary shifts towards more energy-dense (and resources-intensive) foods, like red meat, is worsening the pressure of farming activities on ecosystems. The way the conventional system is damaging the environment poses serious threats to future productivity and, thus, to future food security; such considerations have raised interest in sustainable farming practices. Sustainable production intensification, based on traditional knowledge and new technology in a locally-specific approach, would thus be environmentally and socio-economically sustainable, while representing a possible response to the increase in food demand. Globalization and dietary shift towards perishable foods have created remarkable
wastes along the food chain; the evidence presented by some researchers shows that local food systems are not necessarily more sustainable than long-distance food chains, so that it might be more important to implement the sustainability of the whole production through proper policies, rather than \textit{a priori} banning long food chains as a bad thing.

The third section deals with food consumption and enters more specifically the question of sustainable diets. The same overconsumption caused by the nutrition transition, which is making the food production system more and more inappropriate, is causing an epidemiologic transition \textit{from communicable to non-communicable (dietary-related) diseases}. Suggestions for a healthier diet include the reduction in excessive energy intake, as well as the reduction of consumption of animal source foods, sugars, and fats; from the research carried out, \textit{it seems that vegetarian alternatives are not necessarily healthier than (balanced) omnivore diets}. About the sustainability of foods, on the perspective of the consumer, the reduced intake of foods typical of the Western diet would significantly reduce per capita consumption, even though there are some trade-offs to take into account (like the meat-fish substitution). Again, \textit{vegetarian and vegan dietary styles have not proven to be necessarily more sustainable than omnivore diets including organic meat}, for instance. Some studies focus on the production side and the promotion of sustainable farming to foster sustainable diets, since the consumer is considered to have a limited power to affect food production impacts. So, although the ultimate choice of what to eat is given to the individual, the mainstream food production system unavoidably affects this choice.
The value of sustainable diets goes beyond healthiness and environmental sustainability: they can promote rural development and smallholders’ food security, reduced private and public health expenditure, conservation of some traditional cultures entailing sustainable food systems, like the Mediterranean or the Asian diets.

In the last chapter the focus is shifted of the main challenges for the implementation of sustainable diets, namely the need to operationalize the definition via proper indicators, investments in agriculture, the role of producers and food industry in promoting health, and the role of consumers’ behavior. This last part involves the potential task of public authorities, too. Even though some examples of sustainable diets can be found, there are still no complex indices to operationalize the concept and make complete information available to policy-makers. However, the lack of indicators and indices does not hinder completely the chance to act on the food production system to make it sustainable, even if in more uncertain conditions. The key for public authorities will be that of investing, especially in R&D, farmers’ education and smallholder farming development, and promoting investments in the conversion to sustainable farming through actions like the internalization of externalities and public procurement.

However, investing in sustainable agriculture is not enough to effectively foster sustainable diets on the supply side: a nutrition-sensitive food chain should be developed, so that not only investments in agriculture would encompass nutrition considerations, but the attention to healthiness of food should be spread all along the chain, too. Even though consumers may have some power, especially in developed countries with more or less strong associations, the food chain does affect food consumption choices. A conversion towards sustainable and healthy food implies, in first place, the re-gaining of both the agricultural sector and consumers of their decision power and, at the same time, a more active and positive role of the middle stages of the chain, such as retailers. Anyways, despite the influence of the food supply chain in

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**Challenges**

- To operationalize the concept of sustainable diet to create proper indicators;
- To invest in sustainable farming and R&D;
- To include nutrition concerns in the food chain;
- To properly inform and educate consumers.
shaping consumption styles (and, as a consequence, health status and environmental per capita impact), consumers do play a part; thus, they have to be properly informed, educated, and supported to be put in the conditions to turn their healthy (and sustainable) attitudes into a concrete behaviour. This is possible through public standards regulation, voluntary labeling, consumers’ education, and especially through market instruments incentivizing healthier and more sustainable choices. In the intention to reduce food environmental impact and increase people’s benefit, consumers have a (more or less limited) power to choose and to affect the market; on the other side, food producers, processing and retailing industries play a role in guaranteeing the availability of such a choice. However, both sides have to be somehow educated and encouraged towards the adoption of sustainable diets by public authorities: the Swedish experience on labeling has shown that food producers and industries’ commitment is essential, as well as the agreement among stakeholders may be crucial for policies effectiveness.

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**Key actors**

Retailers have gained a strong power in conditioning food demand and production methods, especially in developing countries, while in developed areas consumers and producers are re-gaining space.
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