2022_88_SPH_Vamos: Dual environmental and health impacts of industrialised food processing in Europe

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Dietary patterns and the food systems that support them have major implications on health and the environment. Globally, an alarming 34% of anthropogenic greenhouse gas (GHG) emissions is currently generated by the food system and is projected to increase. Half of the habitable land and 70% of freshwater are being used for agriculture. Dietary patterns therefore present a key opportunity for actions to combat climate change, reduce unnecessary use of natural resources, and revert biodiversity. However, the emergence of a global, industrialised food processing system in recent decades has led to a surge in the design and production of many cheap, packaged, ready-to-consume ultra-processed foods (UPFs). These UPFs, according to the NOVA food processing classification endorsed by the World Health Organization, are industrial formulations of substances (eg. oils, starch, protein) derived from high-yield crops and undergo a series of industrial processes not used in home cooking, and typically contain multiple food additives. Most breakfast cereals, soft drinks, mass-produced packaged breads, and many ready meals are UPFs.

Worldwide consumption of UPFs is increasing and displacing traditional dietary patterns largely based on fresh or minimally processed foods. In Europe, UPFs contribute up to 50% of daily calorie intake and vary widely across countries. There is substantial research linking higher UPF intake to elevated risk of obesity and diet-related non-communicable diseases. Similarly, the environmental impacts of major food commodities have been identified. However, the dual health and environmental impacts of dietary patterns factoring the consideration of industrialised food processing have not been quantified.

This PhD project extends from our funded research on the health impacts of UPF consumption and will use large-scale European cohort data (eg. EPIC), food environmental impact data (eg. SHARP-ID), and advanced modelling techniques to comprehensively evaluate the associations between individual dietary patterns with varying distribution of UPFs, processed foods, and minimally processed foods and their environmental (GHG emissions, land use) and health impacts (premature mortality, QALY, DALY). This includes an estimation of health and environment impacts of IPCC defined dietary patterns (eg. vegan, vegetarian, flexitarian). Multivariate regression (reduced-rank/partial least-squares) will be employed to identify dietary patterns that are both healthy and environmentally sustainable (ie. win-win diets), and those that are detrimental to both. Causal mediation analysis will be conducted to further examine the potential mechanistic pathways linking dietary patterns identified to harmful impacts on both health and the environment, which may be via overconsumption, food ingredients, packaging, food additives, contaminants, or a combination of these. Moreover, feasible options to achieve win-win diets will be explored.

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