Ultra-Processed Foods: Definitions and Policy Issues

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ABSTRACT

Four categories of foods are proposed in the NOVA food classification, which seeks to relate food processing as the primary driver of diet quality. Of these, the category "ultra-processed foods" has been widely studied in relation both to diet quality and to risk factors for noncommunicable disease. The present paper explores the definition of ultra-processed foods since its inception and clearly shows that the definition of such foods has varied considerably. Because of the difficulty of interpretation of the primary definition, the NOVA group and others have set out lists of examples of foods that fall under the category of ultra-processed foods. The present manuscript demonstrates that since the inception of the NOVA classification of foods, these examples of foods to which this category applies have varied considerably. Thus, there is little consistency either in the definition of ultra-processed foods or in examples of foods within this category. The public health nutrition advice of NOVA is that ultra-processed foods should be avoided to achieve improvements in nutrient intakes with an emphasis on fat, sugar, and salt. The present manuscript demonstrates that the published data for the United States, United Kingdom, France, Brazil, and Canada all show that across quintiles of intake of ultra-processed foods, nutritionally meaningful changes are seen for sugars and fiber but not for total fat, saturated fat, and sodium. Moreover, 2 national surveys in the United Kingdom and France fail to show any link between body mass index and consumption of ultra-processed foods. The paper concludes that constructive scholarly debate needs to be facilitated on many issues that would be affected by a policy to avoid ultra-processed foods. *Curr Dev Nutr* 2019;3:nzy077.

Introduction

Individual nutrients and combinations of nutrients are the well-established drivers of risk factors for noncommunicable chronic disease (NCCD) and form the basis for the development of dietary guidelines. In recent years, the emphasis on nutrients (e.g., SFAs) or on single foods (low-fat spreads) has shifted to advice on overall dietary patterns ([1]). This strategy is clearly laid out in the *2015–2020 Dietary Guidelines for Americans*, which advocates the pursuit of healthy dietary patterns and also defines the elements of such patterns ([2]). Nonetheless, this advice to pursue a healthy dietary pattern is firmly based on data linking nutrient intakes with the prevention of NCCD. In general, the data on food patterns are secondary to data on the links between nutrient intake and risk of NCCD. Recently, a new public health nutrition strategy has evolved that advocates that foods defined as ultra-processed should be avoided ([3]). The term "ultra-processed food" was developed in a proposed new classification of foods known as the NOVA classification. It differs fundamentally from established advice on optimal dietary patterns in that it is based not on nutrient intake but on the degree of processing of foods. The definitions of this food category and its policy implications form the basis of this paper.

In its original form, 3 categories of foods were defined within the NOVA classification: group 1, unprocessed and minimally processed foods; group 2, processed culinary or food-industry ingredients; and group 3, ultra-processed foods. These broad categories would change with a redefinition of the original group 3, ultra-processed foods. This NOVA group was first divided into group 3.1, processed food products, and 3.2, ultra-processed food

products (4). Processed foods (group 3.1) were defined as "Generally produced to be consumed as part of meals or dishes or may be used together with ultra-processed products to replace food-based freshly prepared dishes and meals." Typical foods described for this category were canned or bottled vegetables and legumes (pulses) preserved in brine; peeled or sliced fruits preserved in syrup; tinned whole or pieces of fish preserved in oil; salted nuts; unreconstituted processed meats such as ham, ham bacon, and smoked fish; and cheese. Subsequently, groups 3.1 and 3.2 became groups 3 and 4, respectively (5). Currently the NOVA classification involves 4 food categories, defined thus: group 1, unprocessed or minimally processed foods; group 2, processed culinary ingredients; group 3, processed foods; group 4, ultra-processed foods. To date, the great majority, if not all, of the published articles examining the role of the NOVA classification focus solely on ultra-processed foods, and part of the goal of this manuscript is to explore the evolution on the definition of the term "ultra-processed foods."

The NOVA classification of foods is increasingly being used to evaluate trends relating dietary patterns to chronic disease, but it fundamentally differs from all previous approaches to defining healthy eating patterns in that it is not based on any nutritional parameters but rather is based on the degree to which foods are processed. Specifically, the proponents of the NOVA system explain their approach thus:

> The most important factor now, when considering food, nutrition and public health, is not nutrients, and is not foods, so much as what is done to foodstuffs and the nutrients originally contained in them, before they are purchased and consumed. That is to say, the issue is food processing—or, to be more precise, the nature, extent and purpose of processing, and what happens to food and to us as a result of processing. (6)

It is inferred that as a consequence of the ultra-processing of foods, which includes the compositional input of food ingredients, the methods of processing, and the subsequent retailing of the final products, the consumer is faced with cheap foods high in fat, sugar, and salt, which are mass produced mainly by global multinationals, are designed for a long shelf-life, are quasi-addictive, and are heavily advertised.

Given the growth in the use of the concept of ultra-processed foods, it is reasonable to explore the definition of this term as it currently stands and how it has evolved over time. Moreover, because such foods constitute more than half of the energy intake in the United States and because the policy of NOVA is to recommend avoidance of this food category in their proposed dietary guidelines, the total elimination of ultra-processed foods from the national diet could have profound and uncertain consequences (7). The present article sets out to address these 2 issues.

Definitions of Ultra-Processed Foods

Table 1 lists the main definitions of this proposed food category over the period 2009–2017. The definitions used in 2009, 2010, 2012, 2014, and 2016a represent the definitions used from publications devoted solely to that purpose and are heavily referenced in the literature on ultra-processed foods. The definitions used in years 2015, 2016b, and 2017 are from articles that focused on the relation between ultra-processed food intake and public health nutrition, in which definitions of ultra-processed foods are presented in detail in the article. The first definition alludes mainly to the use of both food additives and salt in food products (6). The second introduces the putative impact of ultra-processed foods on accessibility, convenience, and palatability of ultra-processed foods (8). Subsequently, the definitions become longer and include more elements. Thus, the third definition builds on previous definitions but introduces 2 new angles (9). One is the nonavailability of ingredients used in ultra-processed foods from retail outlets such as supermarkets, and the second introduces food additives as the most widely used ingredients, in numerical terms, in the manufacture of ultra-processed foods. The next definition now introduces the role of food fortification as a defining element of ultra-processed foods (4). Further definitions introduce new elements such as the importance of foods synthesized in a laboratory, based on organic materials such as oil- and coal-based additives and flavoring compounds (10), a specification for the minimal number of ingredients to be found in these foods (5), and then an emphasis on the inclusion of salt, sugars, oils, and fats as a starting point for defining ultra-processed foods. This definition gives details of specific categories of food additives and highlights how the intended use of these additives is to imitate sensory qualities of fresh or minimally processed foods (group 1) or to specifically disguise undesirable qualities of ultra-processed foods (11). The final definition from 2017 (12) is quite similar to that used in the 2016b publication (11). It is included to illustrate changes in published lists of typical examples of food, as will be discussed in the next section.

Clearly, the definition of ultra-processed food as expressed in the literature set out in Table 1 shows variability and could be open to several interpretations. In fairness to NOVA, the definitions are often accompanied by a lengthy text providing a context for the definition of ultra-processed foods. However, many of the articles that elaborate on the basis for these definition are not listed on PubMed. The European Prospective Investigation Into Cancer (EPIC) has also developed definitions of processed foods, with 3 categories: highly processed foods, moderately processed foods, and nonprocessed foods (13). In the case of the EPIC classification, each food category is considered separately, and the precise method of food processing applied to that category is clearly stated. For example, for the term "vegetables," the category of highly processed vegetables is defined on the basis of the following food technologies: salting, pickling, concentration, fermentation, drying, and canning in a commercial sauce or in fat. The category of moderately processed foods is defined as vegetables (and legumes) canned in their own juice or in water/brine. Thus, the widely consumed tin of baked haricot beans in tomato sauce is deemed to be highly processed, whereas the same beans canned in brine are moderately processed. The approach of EPIC to define levels of food processing on a category by category basis is thus quite different to that of the NOVA classification, and the entire extensive literature from the EPIC cohort focuses on the role of nutrients or phytochemicals on cancer risk. In contrast, NOVA defines an overall term, ultra-processed foods, that is then used to create 4 broad food categories that are based on degree of processing. Nonetheless, all studies to date with the NOVA classification focus on nutritional data rather than technology data. It should be noted that in the development of the NOVA classification, consideration was given to

TABLE 1 Evolution of definitions of the term ultra-processed foods (2010–2017)

Year	Reference	Definition
2009	6	These are made up from group 2 substances (Group 2 is of substances extracted from whole foods) to which either no or relatively small amounts of minimally processed foods (Group 1) are added, plus salt, and other preservatives, and often also cosmetic additives.
2010	7	This group is defined as a process that mixes Group 2 ingredients (processed culinary or food industry ingredients) and Group I foodstuffs (unprocessed or minimally processed foods) to create durable, accessible, convenient, and palatable ready-to-eat or ready-to-heat food products liable to be consumed as snacks or desserts or to replace home-prepared dishes.
2012	8	These are formulated mostly or entirely from ingredients and typically contain no whole foods. The purpose is to devise durable, convenient, high- or ultra-palatable, and profitable products. They typically are not recognized as versions of foods. Most are designed to be consumed by themselves or in combination as snacks or drinks. Most of the ingredients used by manufacturers are not available in supermarkets or other retail outlets. Although some are directly derived from foods, such as oils, fats, starches, and sugars, others are obtained by the further processing of food constituents. Numerically, the great majority of ingredients of ultra-processed products are additives of various types that include among others, bulkers, sweeteners, sensory enhancers, flavors, and colors.
2014	4	Formulated mostly or entirely from substances derived from foods. Typically contain little or no whole foods. Durable, convenient, accessible, highly or ultra-palatable, often habit-forming. Typically not recognizable as versions of foods, although may imitate the appearance, shape, and sensory qualities of foods. Many ingredients not available in retail outlets. Some ingredients directly derived from foods, such as oils, fats, flours, starches, and sugar. Others obtained by further processing of food constituents. Numerically the majority of ingredients are preservatives; stabilizers, emulsifiers, solvents, binders, bulkers; sweeteners, sensory enhancers, colors and flavors; processing aids and other additives. Bulk may come from added air or water. Micronutrients may "fortify" the products. Most are designed to be consumed by themselves or in combination as snacks. They displace food-based freshly prepared dishes, meals. Processes include hydrogenation, hydrolysis; extruding, molding, reshaping; preprocessing by frying, baking.
2015	9	The third group (ultra-processed foods) is composed of industrial products that are made entirely or mostly made from substances that have been extracted from food (oils, fats, sugar, starch, proteins), those that are derived from food constituents (hydrogenated fats, modified starches), or foods synthesized in a laboratory based on organic materials such as oil and coal (colorants, flavorings, flavor enhancers, and other additives used to give the products attractive sensory properties).
2016a	5	The fourth NOVA group is of ultra-processed food and drink products. These are industrial formulations typically with 5 or more and usually many ingredients. Such ingredients often include those also used in processed foods, such as sugar, oils, fats, salt, antioxidants, stabilizers, and preservatives. Ingredients only found in ultra-processed products include substances not commonly used in culinary preparations, and additives whose purpose is to imitate sensory qualities of group 1 foods or of culinary preparations of these foods, or to disguise undesirable sensory qualities of the final product.
2016b	10	Formulations of several ingredients that, besides salt, sugar, oils and fats, include food substances not used in culinary preparations, in particular, flavors, colors, sweeteners, emulsifiers, and other additives used to imitate sensorial qualities of unprocessed or minimally processed foods and their culinary preparations or to disguise undesirable qualities of the final product.
2017	11	Industrial formulations typically with 5 or more and usually many ingredients. Besides salt, sugar, oils, and fats, ingredients of ultra-processed foods include food substances not commonly used in culinary preparations, such as hydrolyzed protein, modified starches, and hydrogenated or interesterified oils, and additives whose purpose is to imitate sensorial qualities of unprocessed or minimally processed foods and their culinary preparations or to disguise undesirable qualities of the final product, such as colorants, flavorings, nonsugar sweeteners, emulsifiers, humectants, sequestrants, and firming, bulking, de-foaming, anticaking, and glazing agents.

the observed variation in the degree of processing within each category. However, it was felt that a single definition for each category would create least confusion (14). Adaptation to more complex classifications at national levels was envisaged, but no such development to the NOVA classifications has yet been put forward.

Examples of Ultra-Processed Foods

The data show considerable variability in the lists of foods deemed to be ultra-processed (**Supplementary Table 1**). However, it should be noted that any published list of ultra-processed foods in research papers

will vary according to the topic of the research paper. Thus, intakes of infant formulas, follow-on milks, and other infant products need not be listed in studies with a focus on adult nutrition. Equally, foods such as margarines and spreads may be excluded from studies with a focus on sugar intake. However, even allowing for this provision, there is marked variation in the terms used to define specific ultra-processed foods. Thus, in 2009, the terms "breads," "breakfast cereals," and "cereal bars" were introduced. The following year, the term "breakfast cereals" was redefined as "breakfast cereals with added sugar." However, in subsequent years, no qualification on the use of the term "added sugars" was apparent. Another cereal-based food, "bread," was defined as such in 2009. In subsequent years, bread included additional attributes such as "sliced," "sweetened," or "mass-produced." A similar level of variation is seen for other food groups. The initial definition used the term "sugared and other soft drinks." The terms "fruit and milk drinks" were then included, followed later by "calorie-free drinks," "cocoa drinks," "yogurt drinks," and "instant coffee." In the case of other foods such as jams and preserves, they appear in some but not all definitions. This leads to confusion and to subjective recoding of national food-consumption databases.

Consider bread, for example: In one paper from France, artisanal and home-made breads were excluded from the category "ultra-processed foods" (15). In another study on ultra-processed food intakes using household budget data, the proportions of sales in each country of "artisanal bread" and "industrial bread" are derived from a market report, with sales data used as a proxy for intakes of ultra-processed breads (16, 17). Although the term "artisanal bread" might imply small production systems using very traditional processing methods, the proxy sales term used in the above report also includes within artisanal breads the use of flour premixes (which would contain agents to facilitate the baking process) and breads produced at in-store baking units in some supermarkets, or at some restaurants. Another example of how broadening the initial definition of a highly or ultra-processed food may create confusion is the use of terms that, in themselves, are not precisely defined. For bread, initially defined as such in the NOVA food classification, examples might be the use of terms such as sliced, mass-produced, or sweetened (see Supplementary Table 1). Their exact interpretation is not self-evident. Artisanal bread may be sold as sliced or unsliced, and if in-house bread baking in supermarkets can also be defined as artisanal, it is debatable whether such breads produced in-house by large supermarket chains can also be considered as mass produced. It is important to note that the developers of NOVA specifically addressed the inclusion of bread as an ultra-processed food, concluding thus: "Bread by itself is fairly energy-dense and almost all bread now produced and consumed is grossly degraded and palatable only as a vehicle for what are usually fatty or sugary and also salted spreads, fillings and toppings" (14). No objective data are presented to support these views. Bread has a defined nutritional composition based on whether it is white, wholemeal, wheaten meal, rye, and the like. No objective evidence exists to suggest that processing changes the nutritional composition of these individual categories of bread; nor do data exist on how different production methods might influence any satiating properties of specific bread types.

Processed Foods and the Contribution to the Diet

The EPIC study of processed food intake across Europe showed that in the Nordic and central European regions, highly processed foods are the dominant source of nutrients, accounting for between 50% and 90% of nutrient intakes, with the exceptions of just 2 nutrients, vitamin C and beta-carotene (13). This is not surprising, considering that moderately and nonprocessed foods contribute only 30% of energy intake in the Mediterranean countries and 25% in all other countries. Similar values are found for the United States, where unprocessed foods contribute just 27% of energy intake (18). In the United States, the food-processing classification of the International Food Information Council has been used to study the contribution of processed foods to the national diet. Two of the main categories of food processing (minimally processed, processed for preservation, mixtures of combined ingredients and processed ready-to-eat and prepared foods/meals) (19) made the largest contribution to both macro- and micronutrient intakes. The category "mixtures of combined ingredients" accounted for on average 20% of nutrient intake, whereas ready-to-eat processed foods contributed on average 30% of nutrient intake. In the case of the latter, the contribution to added sugars rose to 60% (18). A number of studies are available that characterize the contribution of NOVA-defined ultra-processed foods to nutrient intake. These are given in **Table 2** for Brazil, Canada, France, the United Kingdom, and the United States (10, 12, 15, 20, 21). There is a clear tendency for sugars, either added or free, to rise quite sharply when comparisons of intake are compared across quartiles or quintiles of ultra-processed food intake. Equally, a clear trend in the opposite direction is observed for dietary fiber intake. The findings apply in each of the 5 countries studied and are not surprising because some of the main dietary sources of fiber (fresh fruits, vegetables, potatoes, rice, legumes, etc.) are excluded from the definition of ultra-processed foods, whereas all of the sources of added sugar are included in this category. However, for other nutrients, which are generally associated with ultra-processed foods, this is not the case. Thus, the intakes of fat across quintiles or quartiles of ultra-processed foods show little variation. This is true for fats for all countries except Brazil, where higher fat intakes were associated with higher proportions of dietary energy from ultra-processed foods. SFA intakes seem not to be influenced by the level of intake of ultra-processed foods. Sodium intake shows no tendency to rise across levels of ultra-processed food intake, and in Brazil, sodium levels actually decline across quintiles of the intakes of ultra-processed foods. The Brazilian data show that the mean intake of these nutrients is generally much lower in processed (group 3) foods than in ultra-processed foods. However, this does not explain why the lower quintiles of ultra-processed food intake (1.8% of energy intake) differ so little for intakes of fats, saturated fats, and sodium when compared with the upper quartile of ultra-processed food intake (49.2% of energy intake). Moreover, the intakes of food groups that would be generally associated with, for example, sodium intake, increase markedly when the top quintile is compared with the bottom quintile of ultra-processed foods (10).

TABLE 2 Nutrient and food intakes across quintiles or quartiles of ultra-processed food intake from the United Kingdom (20), Brazil (10), France (15), Canada (12), and the United States (21)[1].

Country	Q1	Q2	Q3	Q4	Q5
Energy, kcal					
United Kingdom	1732	1766	1784	1776	1763
Brazil	1708	1794	1841	1920	2067
France	1765	1854	1884	1911	NA
Canada	1936	2031	2109	2120	1911
United States	NA	NA	NA	NA	NA
Ultra-processed food, % of energy					
United Kingdom	35	49	57	65	78
Brazil	2	10	18	29	49
France	NA	NA	NA	NA	NA
Canada	24	39	49	60	76
United States	33	49	58	67	81
Carbohydrate, % of energy					
United Kingdom	46	47	49	50	52
Brazil	57	57	56	56	55
France	42	43	43	44	NA
Canada	49	50	51	53	54
United States	47	49	50	51	53
Free (f) or added (a) sugars, % of energy					
United Kingdom (a)	9.9	11.3	12.2	13.4	15.4
Brazil (f)	10.9	13.1	15.0	17.6	20.2
France (a)	6.5	7.2	7.9	9.4	NA
Canada (a)	7.7	11.7	13.4	16.1	19.4
United States (a)	7.7	11.0	13.4	15.7	19.2
Fat, % of energy					
United Kingdom	31	32	32	33	33
Brazil	24	25	27	28	30
France	39	39	40	40	NA
Canada	31	32	33	33	33
United States	31	32	33	33	33
Saturated fat, % of energy					
United Kingdom	11.7	12.2	12.2	12.2	12.2
Brazil	7.9	8.5	9.1	10.0	8.9
France	16.4	16.1	16.2	16.1	NA
Canada	10.2	10.8	10.9	10.9	10.6
United States	10.1	10.7	10.9	10.9	10.9
Fiber, g/1000 kcal					
United Kingdom	8.4	8.0	7.8	7.5	6.9
Brazil	13.0	11.9	11.3	10.3	8.9
France	12.3	11.0	10.3	9.7	NA
Canada	9.7	8.6	8.4	7.8	6.8
United States	9.6	8.9	8.2	7.4	6.7
Sodium, g/1000 kcal					
United Kingdom	1.1	1.2	1.2	1.2	1.3
Brazil	1.9	1.8	1.7	1.7	1.6
France	1.5	1.5	1.5	1.4	NA
Canada	1.5	1.5	1.5	1.5	1.5
United States	1.7	1.7	1.7	1.7	1.6

[1]NA, corresponding data not available; Q, quintile.

NOVA Food Classification and Public Health Nutrition Policy

The public health nutrition advice from the NOVA group arising from their definition of ultra-processed foods and the evidence accumulated as to their role in national diets and wellbeing is quite simple but quite stark: ultra-processed foods should be avoided. This is also reflected in the official Brazilian dietary recommendations (22). Given that the NOVA classification of ultra-processed foods accounts for about half the daily energy intake of populations in developed economies, it is reasonable to question how the replacement of that energy, in full or in part, might be achieved and to explore some issues of food

system policies that might merit further studies. The NOVA food classification describes all commercially produced infant formula and other infant foods as ultra-processed and thus to be avoided. Clearly, the promotion of exclusive breastfeeding to 6 mo of age would be a primary element of any national nutrition policy for infants. However, weaning to solid foods and or to formula milks would, under existing NOVA policy directives, require carers to be responsible for the direct preparation of such foods from unprocessed foods. To date, no study has been undertaken to explore the implications of such a policy for this vulnerable group. Equally, no scenario analysis or modeling has been conducted on other vulnerable groups such as older persons, those with very low incomes, and those with special clinical nutritional needs such as celiac disease, phenylketonuria, or the like. Moreover, it remains unknown what the impact of this policy would have on land use, food markets, food trade, food prices, and retail systems. Two important factors would have to be included in any such scenario analysis, and both have been studied in relation to ultra-processed food intake. In the United Kingdom, a negative relation was seen between home food-preparation skills and more frequent use of these skills and percentage of energy from ultra-processed foods (23). A second issue relates to the global increase in time scarcity and the associated decline in home cooking arising from longer working hours and longer work commutes. This negative relation of time scarcity to home cooking has been widely reported (24, 25). In a study in Norway on time scarcity and ultra-processed food intake, 3 examples of ultra-processed food consumption were related to measures of time scarcity. Controlling for body weight, age, sex, ethnicity, education, and family size, comparisons were made between those with high or low time scarcity. Those with the higher time constraints were 3 times more likely to use ultra-processed dinner products, 1.6 times more likely to consume snacks and soft drinks, and twice as likely to consume fast food away from home (26). All of these factors, agriculture, land use, markets, prices, retail systems, domestic food preparation skills, and time constraints, and many other issues, would need to be explored. Economic decline, which is a cyclical event in macroeconomics, is clearly associated with rising food insecurity, and that would also need to be factored into any analysis of the nutritional implications of a policy that proposes the avoidance of ultra-processed foods (27). Within this proposed scenario or modeling analysis, the data on the impact of ultra-processed food intake and target nutrient intake (fiber, sugar, fats, saturated fats, and sodium), as outlined in Table 2, need to be clarified. Equally, reported exceptions to the oft-cited linkage between ultra-processed food intake and obesity need to be explored. Both UK and French data show no relation between ultra-processed food intake and BMI (28, 29).

An alternative or a complementary strategy to improve the national diet is to target processed foods for reformulation. This is supported by the WHO and FAO, and represents a driving policy in many countries. The United Kingdom now seeks to reduce energy intake by 20% through reformulation and portion-size approaches (30). The NOVA group explicitly rejects food reformulation as a means to improving national diets. In a publication devoted solely to the rejection of reformulation as a means of improving the nutritional value of the modern diet, they build their case on the premise that ultra-processed foods are unhealthy, and tinkering with the composition will not make them healthy (31). The concept of a food as healthy or unhealthy is generally discouraged in human nutrition in favor of the view that there are good and bad diets,

not good and bad foods (32). Interestingly, in a study of the contribution of ultra-processed foods to nutrient intake in Brazil, the NOVA group embraces the possibility of food reformulation for all of the 3 NOVA food categories to reduce sodium intake (see Table 2). The actual sodium density of minimally processed foods (1.7 g/1000 kcal) exceeds the value for ultra-processed foods (1.4 kcal/1000 kcal). Processed foods (Group 2) have the highest salt density at 2.5 g/1000 kcal. Thus, the authors specifically state:

> The high sodium content found in the three fractions of the diet, considered in this study, indicates that the solution to the excessive sodium consumption in Brazil requires both a reduction in sodium content added by food manufacturers to processed and ultra-processed foods, and a reduction in salt quantities that are added to culinary preparations. (10)

Conclusions

Published data clearly show that the modern diet contains a majority of foods that are processed and have been so for centuries. The global concern is that rising incomes, urbanization, and employment levels, the rise of consumerism, and the time scarcity that arises from long working hours together with long school and work commutes, are all contributing to the transformation of social structures, such that an increasing proportion of processed foods are consumed. The strategy of the NOVA group is to recommend that ultra-processed foods should be avoided. The realistic feasibility of this strategy is worthy of debate. So too is their rejection of food reformulation as a contributor to improving nutritional profiles and consumers' nutrient intake. The general approach of the NOVA classification, using an all-embracing term that contrasts with the EPIC approach of definition of processed foods on a food-category-by-food-category basis is also worthy of scholarly debate. Finally, the concept of strategies to improve national diet patterns by approaching food processing rather than nutrient intake as the starting-point needs debate. The present article sets out to suggest some areas in which this debate and discussion might begin.

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