



## Invited Commentary

### Ultra-processing. An odd 'appraisal'

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#### Abstract

It is now generally agreed that the impact of the current nature, purpose and extent of food processing on human well-being, health and disease needs to be better understood and explained, in order to improve public health. The special issue of *Public Health Nutrition* devoted to the concept of ultra-processing of food, and the NOVA classification of which ultra-processed foods are one category, is a great step forward in this work. Coincidentally, a polemical 'critical appraisal' of ultra-processing was recently published in another journal. Debate and discussion are an essential part of the scientific endeavour. In this commentary, we correct inaccurate statements made about NOVA in the 'appraisal,' rebut points raised, and discuss the larger issue of scientific responsibility for publishing opposing views on controversial topics.

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Food processing  
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NOVA  
Diet quality  
Non-communicable diseases

The concept of NOVA as a way to classify foods is widely accepted in the scientific literature and official international reports<sup>(1)</sup>, and more recently also in leading lay media<sup>(2)</sup>, as crucial to the understanding of the current relationship between food, and nutrition, and well-being, health and disease. A recent special issue of *Public Health Nutrition* included many studies that examined the consumption of ultra-processed food and drink products and their effect on the quality of diets and on health and disease in dozens of countries. The authors of these studies have strengthened and advanced understanding of why these products, manufactured and consumed as they now are in ever-increasing quantity throughout the world, are severely damaging public health.

But some authors and interests do not accept the principle and practice of categorizing foods based on level and purpose of processing. A recent commentary published in the *American Journal of Clinical Nutrition (AJCN)* by Gibney *et al.* purported to be a 'critical appraisal' of NOVA as a system of classifying foods<sup>(3)</sup>. Here, we correct misstatements about NOVA in the 'appraisal' and rebut the authors' argument that 'there seems to be little advantage from the use of the NOVA classification compared with the

current epidemiologic approach'. We also consider the larger issue of scientific responsibility for publishing opposing views on controversial topics.

#### Corrections and clarifications

Claims made in the 'appraisal' are here shown in italics. Our response follows.

1. *'Because the definition of UPFDs [ultra-processed foods] is based on the macronutrient contents of foods, it is challenging to see how this classification could contribute to the study of dietary links to diseases that are not strongly related to overall energy intake, such as neural tube defects'*<sup>(3)</sup>.

Gibney *et al.*'s claim fails to understand NOVA criteria. The NOVA classification is based on the nature, purpose and extent of food processing, as described in detail in their reference number 60<sup>(3)</sup>. It is *not* based on macronutrient content, although ultra-processed foods are indeed strongly associated with dietary macronutrient imbalances. Additionally, the fact that ultra-processed foods are

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associated with macronutrient imbalances obviously does not imply that their consumption only affects diseases related to energy intake.

2. *‘To date, most of the studies that used the NOVA classification have been limited to quantifying the contribution of UPFDs to intakes of added sugar or energy or to variations in micronutrient intakes’*<sup>(3)</sup>.

The authors are unfamiliar with the NOVA literature. This claim refers to just two of the relevant studies. Most studies that use NOVA to assess the impact of ultra-processed foods on diet quality extend beyond sugar and micronutrients. For instance, studies conducted in Brazil<sup>(4,5)</sup>, the USA<sup>(6,7)</sup> and Canada<sup>(8)</sup> show that as well as increasing added sugar and decreasing micronutrients, the more ultra-processed foods consumed, the greater the energy density of the overall diet and total energy intake, the greater the content of unhealthy fats, and the lower the content of protein and dietary fibre.

3. *‘That the intake of UPFDs correlates highly with added sugar intake should not be surprising because the term “added sugars” is a major defining element of the UPFD classification system’*<sup>(3)</sup>.

This claim also fails to understand the criteria. Added sugars are contained in ultra-processed foods, but also in two other NOVA categories: processed culinary ingredients (as table sugar) and many processed foods (as for example fruits in syrup)<sup>(1)</sup>.

4. *‘To our knowledge no arguments have been offered as to how, or if, food processing in any way constitutes a risk to consumer health through adverse nutrient intake or chemical or microbiological hazards’*<sup>(3)</sup>.

This misstatement is based on shifting the focus from ‘ultra-processed’ to ‘processed’ foods. Practically all food is processed in some sense and in some way. The term ‘processing’ is very general and not helpful. Judgements on food processing as such have little or no meaning, as NOVA authors have constantly repeated<sup>(1,9,10)</sup>. Food scientists and technologists and food manufacturers rightly emphasize the benefits of originally ancient as well as some relatively novel processes such as drying, non-alcoholic fermentation, chilling and freezing, pasteurization and vacuum-packing. The NOVA classification makes distinctions between types, uses and effects of food processing. Definitions need to be meaningful, detailed and objective in order to move research away from vague language such as ‘food processing’ and towards terminology that is specific, coherent, clear, comprehensive and workable. This is what NOVA does<sup>(1)</sup>.

5. *‘The application of this system in these areas is not without substantial research challenges and contradictory findings. For example, in contrast to the*

*several data sets that support an association of obesity and intake of UPFDs ... an analysis of the UK National Diet and Nutrition Survey shows no such role, when such analysis was corrected for known confounders of obesity’*<sup>(3)</sup>.

In fact, all studies except the one cited in the ‘appraisal’ show associations of ultra-processed foods with negative health effects. Gibney *et al.* also fail to acknowledge two papers from a large well-controlled cohort study that show a clear dose–response between consumption of ultra-processed foods and 9-year incidence of obesity<sup>(11)</sup> and of hypertension<sup>(12)</sup> – the paper on obesity being published in 2016 in *AJCN*. The claim that only the UK cross-sectional study corrected for known confounders is also incorrect and misleading.

6. *‘With regard to the use of the NOVA food classification in the development of food-based dietary guidelines, we show that the very broad definition of UPFDs makes this impossible’*<sup>(3)</sup>.

In fact, it is obviously possible, as demonstrated by the official national guidelines issued by the Ministry of Health of Brazil in 2014<sup>(13)</sup>, the product of an extensive consultation with nutrition professionals from all regions and states, and then a further public consultation<sup>(14)</sup>. Based on a thorough review of national dietary guidelines, the FAO identifies Brazil as one of the four forward-thinking countries whose governments are now taking the lead in developing healthy and sustainable national dietary guidelines<sup>(15)</sup>. The recent official national dietary guidelines for Uruguay<sup>(16)</sup>, a country with innovative and efficient public health policies including on tobacco control<sup>(17)</sup>, are also based on the NOVA system.

7. *‘The globalization of food chain is almost always associated with large transnational food corporations [...] Nonetheless, only 10% of processed packaged food sales are considered “traded products”, that is, traded internationally [...] Evidence does not support the view that the globalization of food is the driver of increased intakes of UPFDs in low- to middle-income countries but rather that this is driven by small indigenous companies’*<sup>(3)</sup>.

Again, a lack of understanding of NOVA criteria. Processed packaged foods are not a proxy for ultra-processed foods. Processed packaged foods may be minimally processed foods (such as flour), processed culinary ingredients (such as vegetable oils) and processed foods (such as vegetables in brine), as well as ultra-processed foods. Further, this claim is contradicted by a report published by the Pan American Health Organization (their reference number 2) on annual sales of (correctly defined) ultra-processed products in thirteen Latin American countries. The report



concludes: 'The markets of several ultra-processed products are oligopolistic, dominated by transnational corporations. The market for two leading types of ultra-processed products – carbonated soft drinks and sweet or savory snacks – is highly concentrated, with more than two thirds of all sales captured by two companies<sup>(18)</sup>. The reference that the authors provide to support their claim 'that the dominant suppliers of packaged, and thus mainly processed, foods are, in fact, small-to medium-sized enterprises', their reference number 52, is a paper on food addiction.

The above claims are examples of factual and conceptual errors in the 'appraisal'. Following are statements that reflect differences in values and matters of judgement.

8. *'Thus, the NOVA classification is, by comparison, a rather simple and crude system of classifying foods into categories on the basis of their degree of processing and is in stark contrast to many existing food-classification systems'*<sup>(3)</sup>.

NOVA is simple, in that it places every foodstuff into one of four groups, but it is not crude. Rather than grouping foods according to the main nutrients they provide, foods are grouped according to the nature, purpose and extent of food processing, meticulously set out in the paper cited as Gibney *et al.*'s reference number 60<sup>(1)</sup>. But perhaps more important than level of complexity is whether the system of categorization works to predict the nutritional quality of diets and risk of disease. The evidence to date suggests that it does<sup>(1)</sup>.

9. *'To our knowledge, no data exist regarding the average consumer's ability in terms of income, culinary skills, available culinary facilities, and time or food availability to uphold the case that the abandonment of UPFDs would significantly alter nutritional well-being. Without such data, there may be some ethical issues that would need to be considered before the mass abandonment of UPFD intake is recommended'*<sup>(3)</sup>.

Where the cost of ultra-processed foods is generally lower than the cost of other food items, such as in the UK<sup>(19)</sup>, eating well is more expensive. Given known associations of ultra-processed foods with poorer nutrient adequacy, a more salient ethical issue is the affordability and achievability of healthy meals. Fiscal policies that combine taxation on ultra-processed foods with subsidies on whole or minimally processed foods can and should be used, as well as policies and programmes that alleviate poverty. Lack of knowledge of cooking, absence of proper kitchens and time pressures also all impede healthy eating. Where ultra-processed foods cost more, however, such as in Brazil<sup>(19)</sup>, eating well costs less, and displacement of freshly prepared meals by ready-to-consume

ultra-processed foods, including those now being reformulated, is the ethical issue.

10. *'... advocates of the NOVA food classification are critical of existing food categorizations, claiming that they are outdated and that their use in nutritional epidemiology focuses unnecessarily on nutrients and ignores the putative major impact of food processing, including the use of food additives on health and well-being ... To perpetuate the myth that the modern approach to food classification is both static and outdated is both untrue and irresponsible'*<sup>(3)</sup>.

While we do state that 'From the point of view of human health, at present, the most salient division of foods and drinks is in terms of their type, degree and purpose of processing<sup>(9)</sup>, the NOVA approach to food classification does not overlook differences in nutrient composition between foods that belong to a same NOVA food group. Actually, the NOVA approach is necessary to make meaningful the division of foods according to their content of specific nutrients, as it can be seen in the new nutrient profile model developed by the Pan American Health Organization<sup>(20)</sup>. The NOVA approach is a crucial development for a number of reasons. One is that it identifies ultra-processed foods. This is the food group consistently shown to be mainly responsible for currently common population dietary nutrient imbalances such as excessive intakes of total energy, added sugars and unhealthy fats, and the low intakes of dietary fibre, micronutrients and other bioactive compounds<sup>(1,21,22)</sup>. NOVA also identifies precisely the group of whole or minimally processed foods that, in great variety and mostly from plant sources, are the foundation for healthy and sustainable diets<sup>(23,24)</sup>. Further, NOVA identifies two other food groups, processed culinary ingredients and processed foods, that in modest amounts turn whole or minimally processed foods into diversified, nutritionally balanced, culturally sound, delicious, freshly prepared dishes and meals<sup>(14)</sup>. Use of NOVA in examination of population dietary data is in our view essential in shaping rational sustainable meal- and food-based dietary guidelines and subsequent policies and programmes needed to protect public health and to improve the food environment. On another note, the authors' choice of the word 'irresponsible' is regrettable and unproductive in terms of advancing scientific discourse.

### How to handle scientific controversy

A surprising observation about the 'appraisal' is the number of oversights that usually would not (and should not) escape peer review. One of the studies cited as supporting an association between ultra-processed foods and obesity (their reference 17) is a paper on famine in Somalia. Their reference 10 is repeated as reference 13 with incorrect authors.

And as noted above, their second reference 52, cited to support the claim ‘*that the dominant suppliers of packaged, and thus mainly processed, foods are, in fact, small-to medium-sized enterprises*’, is a paper on food addiction.

Also, while the conflicted interest of the lead author as a current consultant to Nestlé and to Cereal Partners Worldwide is acknowledged, the second author’s conflict of interest, his employment as a Senior Scientist at Nestlé’s Research Centre at Lausanne from April 2010 to October 2014 (<https://sg.linkedin.com/in/ciaran-forde-0766995>), was not mentioned. The fourth author has also consulted with a public relations firm (<http://www.ucd.ie/foodandhealth/oldsite/people/academicstaff/drei-leengibney/>) whose current clients include McDonald’s (<http://www.drurypn.ie/clients/>), although this consultation was possibly not within the past three years specified in *AJCN*’s conflict of interest policy.

Such errors and oversights detract from the more important scientific questions that need to be asked in an emerging area of research.

A common practice followed by journal editors when considering a polemical contribution is to invite a full response in the same issue of the journal. However, no such invitation was made in the case of the ‘appraisal’. Challenges and debates are an essential part of the scientific endeavour, but *AJCN* provided no forum for this either as an invited response or as a letter, leaving Gibney *et al.*’s inaccurate claims and statements unchallenged in the journal.

The NOVA classification system challenges a much older and dominant system of classifying foods based on nutrient composition. Of course, it should be appraised. But scientific advances come from the exchange of well-reasoned and supported arguments, and from balanced debate. We invite further discourse on the topic of ultra-processed foods, for the sake of science and public health. We also respectfully suggest that all journals take on the responsibility of encouraging the informed and constructive exchange of ideas in controversial areas.

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