What Do Nova and the Ultraprocessed Food Concept Offer to Policymakers? From Updating Dietary Guidance to Regulatory Action and Advancing Sustainable Food System Transitions

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See also Ultraprocessed Food, pp. 898–1029.

This article outlines applications of the Nova food classification system in policies aimed at reducing the share of ultraprocessed food (UPF) in population diets. Such policies are lagging far behind the growing scientific and public attention to UPFs and the mounting evidence of their harms, reflecting industry opposition and institutional inertia but also valid scientific critiques and policy concerns.

We examine how Nova and the UPF concept can inform and improve dietary guidance, dietary monitoring and target-setting, food regulation, and sustainable food system transitions.

We position UPF-based policies as complementary to, rather than in competition with, existing policies aimed at addressing dietary nutrient imbalances, offering a constructive way forward to enhance the promotion of healthy diets and facilitate the transition to healthier and sustainable food systems. (*Am J Public Health*. 2026;116(7):932–939. https://doi.org/10.2105/AJPH.2026.308509)

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As defined by the Nova food classification system, ultraprocessed foods (UPFs) are ready-to-consume industrial formulations of food substances and additives designed and marketed to displace unprocessed and minimally processed foods, as well as the preparation of dishes and meals based on them.[1,2] UPFs now dominate population diets in many high-income countries, and are rapidly expanding in the diets of populations in low- and middle-income countries.[3,4] A growing body of evidence links the ultraprocessed dietary pattern to multiple chronic disease outcomes.[3] In total, more than 3000 articles listed on PubMed use the UPF descriptor, jumping from just 1 in 2009 to 890 in 2025, indicating a rapid growth in research.

Yet government policy responses are lagging far behind this growing scientific attention and evidence of harm, with few governments having translated this accumulating knowledge into comprehensive policies.[5] This partly reflects the political influence of the UPF industry's leading corporations and front groups, which have sought to block, delay, and dilute policy responses, including by sharing disinformation about Nova, its UPF concept, and the supporting evidence base.[6] Policy responses are likely also delayed by institutional constraints, including the long review cycles associated with dietary guideline revisions and related food policies. Finally, this delay also reflects legitimate debate about what the Nova system and the UPF concept can offer to policymakers, and how these can be operationalized into policy applications. Critics often question the clarity of UPFs' operational definition, the legal feasibility of applying it in policy contexts, and whether it provides added value beyond existing methods for identifying unhealthy foods based on nutrient imbalances.

In this essay, we take several steps. First, we describe the Nova system and the contrasting dietary patterns that it reveals. Second, we set out how Nova has been used in research, along

with a summary of the body of evidence that supports urgent government policy interventions, to halt and reverse the global rise in the ultraprocessed dietary pattern. Third, we outline how the Nova system has been—and can be further—used in policymaking aimed at promoting healthy diets, protecting public health, and supporting the transition to sustainable food systems. We argue that UPF-based policies complement, rather than compete with, existing policies based on addressing dietary nutrient imbalances. By bridging science and policy, and integrating with rather than replacing existing policy approaches, we hope to propose a constructive way forward for addressing an urgent global health challenge.

THE NOVA SYSTEM AND ITS DEFINITION OF DIETARY PATTERNS

Initially proposed in 2009 and updated in subsequent years, the Nova classification system categorizes foods and food products—including individual ingredients used in culinary preparations—into 4 groups based on the extent and purpose of their industrial processing (Box 1).[1,2,7]

Collectively, the dietary share of Nova Groups 1 to 3 reflects adherence to long-established, whole-food and meal-based dietary patterns, which are consistently associated with health benefits across diverse global contexts. Well-studied traditional Mediterranean, Nordic, Meso-American, and other territorial diets constitute a diverse range of Nova Group 1 foods, along with moderate amounts of Groups 2 and 3 used in the preparation of dishes and meals. Together, these 3 groups form the foundation of culturally relevant cuisines, biodiverse food systems, and food economies that have long supported the livelihoods of billions of farmers and vendors worldwide.[5]

In contrast, the growing dietary share of UPFs reflects the displacement of long-established dietary patterns by the ultraprocessed dietary pattern—based on products manufactured largely by transnational corporations, derived from a limited number of high-yield crops, and produced using ingredients and processing techniques that represent, in the context of human evolution, entirely novel exposures in the human diet.[6] Although UPFs are also produced by small and medium-sized firms, it is transnational corporations who spread UPFs globally, spend large sums on marketing, and block government regulation through their political influence, and are therefore the primary drivers of this dietary displacement.[6]

APPLYING NOVA IN RESEARCH

To study the health impacts of the ultraprocessed dietary pattern and track how it is replacing long-established dietary patterns, researchers have used Nova's simple operational definition of UPFs: food and drink formulations that contain

BOX 1— The Nova Food Classification System

Group 1, *unprocessed or minimally processed foods*, includes vegetables, fruits, roots, tubers, grains, legumes, nuts, meat, milk, and eggs in their natural state or modified through methods such as chilling, freezing, pasteurization, fermentation, drying, and grinding. These techniques, often replicable in home or restaurant kitchens, largely preserve the structural integrity of the original foods; do not involve the addition of salt, sugar, or fat; and primarily serve to extend shelf life and facilitate or diversify their use in freshly prepared dishes and meals. This group also includes human breast milk, the food produced and delivered through breastfeeding, or when modified by chilling, freezing, or pasteurization.

Group 2, *processed culinary ingredients*, consists of substances extracted from Group 1 foods (or obtained directly from nature) that are used to prepare a wide variety of freshly made dishes and meals based on Group 1 foods. These ingredients are not intended to be consumed on their own. Examples include cooking oils, butter, lard, sugar, honey, and salt.

Group 3, *processed foods*, refers to Group 1 foods modified by the industry using methods similar to those applied to minimally processed foods, but with the addition of salt, sugar, oils, or fats to enhance preservation or sensory qualities. Processed foods—consumed by human societies for centuries or even millennia—are often incorporated into freshly prepared dishes and meals. Examples include vegetables in brine, fruits in syrup, tinned fish, breads, and cheeses.

Group 4, *ultraprocessed foods,* are industrial formulations made from inexpensive ingredients, engineered and marketed to displace the other 3 Nova groups and the preparation of dishes and meals based on them while maximizing industry profits. These products result from multiple processing steps applied to a few high-yield crops or their isolated components, such as extracted carbohydrates, proteins, fats, and fibers. The techniques used often have no equivalents in domestic kitchens and include processes such as hydrolysis, hydrogenation, extrusion, the incorporation of cosmetic additives, and packaging with synthetic materials.

The manufacture of UPFs typically involves a wide array of ingredients. These include salt, sugar, and fats, as well as substances used exclusively in industrial settings, such as protein isolates, hydrogenated or interesterified oils, modified starches, and added fibers. A long list of additives—particularly those with cosmetic functions, such as colorings, flavorings, emulsifiers, thickeners, and nonnutritive sweeteners, is also common. Whole foods are generally absent or make up only a minimal proportion of the total ingredients.

The processes and ingredients used to manufacture UPFs make them both highly profitable—because of their low-cost components—and likely to displace the other 3 Nova groups. This is largely attributable to their convenience (e.g., long shelf life and ready-to-eat, -heat, or -drink formats) and their hyper-palatability, or even addictive properties, which result from specific combinations of sugars and fats, carbohydrates and sugars, or carbohydrates and salt, along with the extensive use of cosmetic additives.

Examples include sodas; flavored "fruit" or "chocolate" drinks; flavored sweetened dairy drinks; extruded, flavored, sweetened breakfast cereals; potato chips, cereal bars, and other sweet or savory snacks; mass-produced packaged breads and buns; sausages, nuggets, hamburgers, and other reconstituted meat products; industrial sauces and spreads; instant noodles and other shelf-stable or frozen ready meals; and ice cream and many other industrial desserts.

either a food substance used exclusively or predominantly in industrial settings or an additive with a cosmetic function.[1,2,7]

Importantly, these food substances and additives are considered by Nova as markers of ultraprocessing because they are essential components of the UPF manufacturing process and business model. They serve 4 main purposes: to replace whole-food components with cheaper and long-duration alternatives, thereby reducing costs and extending shelf-life (e.g., protein isolates, added fibers, and hydrogenated oils); to stabilize processed mixtures and make them palatable (e.g., emulsifiers and thickeners); to enhance palatability and promote overconsumption by making reconstituted food components look and taste irresistible (e.g., flavors, flavor enhancers, colors, emulsifiers, emulsifying salts, sweeteners, thickeners, and antifoaming, bulking, carbonating, foaming, gelling, and glazing agents); and to help manufacturers sidestep existing regulations (e.g., modified starches replacing fats, nonsugar sweeteners replacing sugar, or flavor enhancers reducing sodium content). While salt, sugar, fats, and noncosmetic additives are also common in UPFs—often in large amounts—these components may also occur in processed foods (Nova Group 3) and therefore do not serve as specific markers of ultraprocessing.[1]

More than 100 large, mostly high-quality cohort studies using Nova's operational definition of UPFs have shown that a higher dietary share of these foods—or greater exposure to the ultraprocessed dietary pattern—is linked to increased risks of many adverse health outcomes. These include obesity, type 2 diabetes, dyslipidemias, hypertension, and cardio- and cerebrovascular diseases, and respiratory, gastrointestinal, hepatic, renal, and mental health disorders, as well as all-cause premature mortality.[3] Four crossover, randomized controlled trials and 1 community trial, also using Nova's operational definition of UPFs, have further corroborated part of these associations, linking ultraprocessed diets to increased energy intake and the accumulation of body and fat mass, relative to diets based on minimally processed foods.[3]

Mechanistic studies using the same definition have identified several factors likely responsible for the wide range of harmful effects linked to ultraprocessed diets. Besides major nutrient imbalances (e.g., excessive sugar and saturated fat, along with insufficient intake of protein, fiber, and micronutrients), these factors include features that encourage overeating (e.g., high energy density, hyper-palatability, soft texture, reduced chewing, and fast consumption); loss of beneficial bioactive compounds (e.g., flavonoids and phytoestrogens), and elevated levels of harmful xenobiotics, such as processing-related contaminants (e.g., acrylamide), chemicals leached from packaging (e.g., bisphenol), and various additives and mixtures of additives.[3,8]

The evidence outlined here meets all relevant Bradford Hill criteria, widely used in epidemiology for establishing causality.[3]

Studies of trends from the 1980s to the 2010s in 8 out of 9 middle- and high-income countries with 3 or more repeated national surveys using Nova and the operational definition of UPFs have shown an increase in the dietary share of UPFs. In 1 country, the United Kingdom, where UPFs represent more than half of total energy intake, this share remained stable.[3] Analysis of more recent data on per-capita annual sales of UPFs in 93 countries (2007–2022) has shown increasing sales in low- and middle-income countries and in most world regions, with stable sales in high-income countries and regions, where sales reached 200 kilograms per person or more by 2007.[3]

APPLYING NOVA IN POLICYMAKING

When taken together, the evidence on UPF harms and trends provides a strong rationale for policy intervention, which we consider across diverse applications of Nova, in the following sections.

Dietary Guidance

National dietary guidelines are essential to orient food education activities aimed at promoting healthy and sustainable diets and function as reference points for wider food policies and regulation. Policymakers can directly integrate Nova into dietary guidelines by recommending a variety of unprocessed and minimally processed foods (Nova Group 1), mostly plant-sourced, as the basis of diets; using small amounts of culinary ingredients like oils, fats, salt, and sugar (Nova Group 2) when seasoning food or cooking; and using, also in small amounts, processed foods (Nova Group 3)—preferably those low in added sugars, sodium, and saturated fats—to add variety to freshly prepared meals. UPFs (Nova Group 4), identified using Nova's operational definition, as in research, should be limited or avoided when possible.[9]

Brazil, in 2014, was the first country to use Nova in framing its national dietary guidelines, which included the recommendation to not replace unprocessed or minimally processed foods and their culinary preparations with UPFs.[10] The guidelines acknowledge

the importance of eating context, recommending eating with others when possible, and that, when eating outside of the home, to preference vendors serving freshly made meals based primarily on minimally processed foods. Since then, 14 countries have also integrated Nova into national dietary guidelines, recommending avoiding or limiting UPFs: Belgium, Chile, Colombia, Ecuador, France, India, Israel, Malaysia, Maldives, Mexico, Peru, Sri Lanka, Uruguay, and Zambia.[11,12] Nova-based recommendations have been tailored to promote culturally appropriate dishes, meals, and cuisines, constituting Nova Groups 1 to 3, and are intended to complement—rather than replace—other recommendations to encourage healthy and sustainable diets, including limiting sugar, sodium, and red and processed meat.[13,14]

Nova's operational definition of UPFs has also been adopted by consumer food education apps, including OpenFoodFacts, a barcode-scanning app that provides Nova classifications and NutriScore ratings,[15] and Perfact, a web-based platform that helps users identify non-UPFs in online food purchases.[16] The operational definition of UPFs has been used in thousands of media articles published by global news outlets,[6] often with the simple guidance to avoid products containing ingredients not commonly used in home kitchens.

By emphasizing food processing, Nova can also help to communicate how food is made, what food is made from, and who makes it. School lesson plans can use Nova to build food literacy, helping students to understand how industrial processing affects diet quality, health, and the environment; how to distinguish between Nova groups; the importance of food processing in human evolution, economies, and food culture; and how to identify misleading marketing practices. School kitchen gardens and cooking classes can reinforce ecological connections to food and emphasize preparing meals from Nova Groups 1 to 3. Behavior change communication, including mass-media campaigns, can use clear, actionable dietary messages—for example, to choose foods made from real ingredients or to avoid or limit ultraprocessed products.

Dietary Monitoring and Target Setting

Monitoring population dietary patterns is essential for assessing the progress of policies aimed at promoting healthy and sustainable diets. Adherence to the ultraprocessed dietary pattern can be monitored by using 2 metrics, which are suitable for integration into existing dietary monitoring systems.

A first metric is the share of UPFs in population diets, measured as the average percentage of total food energy (kilocalories) or weight (grams), assessed using Nova's operational definition of UPFs, as applied in research and dietary guidelines. Many studies have used this metric to document country-level transitions from long-established dietary patterns based on Nova Groups 1 to 3 to those increasingly dominated by UPFs.[3] For example, a Brazilian study showed a deceleration in the increase of the dietary share of UPFs in the overall population and a reduction in this share among more-educated and higher-income individuals, following the implementation of the 2014 Nova-based dietary guidelines.[17]

A second metric is the Nova UPF-score, which counts the number of commonly consumed UPF subgroups reported by the population on the previous day using brief, country-adapted screening tools lasting 2 to 3 minutes.[18,19] This metric has been validated against Nova's operational definition of UPFs in 5 countries[18–21] and is acknowledged jointly by the World Health Organization (WHO), Food and Agricultural Organization of the United Nations (FAO), and United Nations Children's Fund (UNICEF) as 1 of the 4 key metrics for the global monitoring of diet quality.[22] These metrics can be considered for integration into, for example, the WHO's Global Nutrition Monitoring Framework; the WHO, UNICEF and World Bank's Joint Child Malnutrition Estimates; and FAO's food balance sheets.

Both of these metrics can inform international and national target setting for policies aiming to reduce the share of UPFs in diets[23]—for example, achieving a population-level dietary share from UPFs of less than a certain percentage range (e.g., less than 10%), complementing existing nutrient-based targets like the WHO recommendation of consuming less than 5% to 10% of calories from free sugars. The establishment of feasible targets will be context dependent, based, first of all, on a given country's stage in the transition to the ultraprocessed dietary pattern.[9]

Regulation

The Nova classification system is grounded in evidence that the displacement of traditional dietary patterns by an ultraprocessed dietary pattern is adversely impacting population health. Existing food regulatory systems are poorly designed to respond to this challenge.[24] Codex and national food regulators permit many additives commonly used in ultraprocessing and,

hence, support the proliferation—rather than curtailment—of UPFs in diets. Reform proposals have called for changing the mandates, governance, and risk assessment frameworks used by food regulators, including by expanding the concept of food safety to incorporate cumulative long-term additive exposures and chronic disease endpoints associated with ultraprocessed diets.[9,24,25] In the United States, this includes calls to substantially reform or abolish the Generally Recognized as Safe pathway for additive approval.[26] These are important considerations for food regulatory reform over coming years.

More immediately, the UPF concept can be operationalized to identify food products for regulation, including taxation, labeling, marketing controls, and public procurement, among other key interventions to reduce the share of UPFs in diets.[27,28] Achieving this requires careful consideration of both public health objectives and the complexities of practical implementation. One such challenge is that food substances used exclusively or predominantly in industrial settings, and additives with cosmetic functions number in the thousands and continue to grow each year. Moreover, these markers of food ultraprocessing are not always consistently disclosed on ingredient lists, and some cosmetic additives may also serve other functional roles in processing, which manufacturers are not required to declare.

While these limitations may not affect most UPF categories (e.g., carbonated soft drinks, confections, packaged snacks, sweetened breakfast cereals, reconstituted meat products, and so on), because such products typically contain multiple markers of ultraprocessing, they may lead to misclassification in some cases. These inaccuracies are manageable in research (e.g., through sensitivity analyses) and in monitoring or consumer education (where minor misclassifications have limited impact), but they may pose legal challenges when applied in regulatory contexts. Feasibility could be strengthened by requiring food manufacturers to report, in a standardized way, all additives and substances that are markers of ultraprocessing.[1] It is also essential to recognize that food regulatory criteria must be tailored to national contexts, depending on the proportion of UPFs in the food supply, local legislative frameworks, the autonomy of regulatory bodies, and anticipated industry responses. Here we propose 2 pathways forward to identifying UPFs for regulatory purposes.

Pathway 1—Regulation based on Nova's operational definition of ultraprocessed foods. The first approach is to regulate all food and drink products that meet Nova's operational definition of UPFs—formulations containing either a food-derived substance used exclusively or predominantly in industrial settings or an additive with a cosmetic function.[29] This would involve developing classification algorithms similar to those used in the aforementioned consumer applications like OpenFoodFacts and Perfact.

Importantly, regulation of UPFs using this approach should be viewed as complementing—not competing with—existing regulations targeting products with high levels of added sugar, sodium, and saturated unbalanced nutrient profiles. For example, a proposal to combine UPF warnings with NutriScore rankings on front-of-pack labels has been shown to be both well-understood and accepted by consumers.[30] Nor should this approach be viewed as replacing single nutrient–based regulations—for example, sodium reduction or transfat elimination—or those restricting the use of food additives with evidence of harm.

This approach has several strengths: it directly translates scientific evidence into policy, it applies a UPF definition already familiar to many consumers and health professionals, and it can build on existing consumer information tools. Its main advantage is scientific fidelity—targeting what has been empirically shown to be harmful by studies using the Nova UPF definition. However, a drawback is the potential for legal challenges attributable to ambiguities in ingredient labeling and inconsistent classification of certain additives across jurisdictions.

Pathway 2—Expanded nutrient-based regulation incorporating ultraprocessed food markers. The second option seeks to capture most UPFs while addressing the legal complexities outlined previously. It involves regulating unhealthy foods more broadly without strictly distinguishing between ultraprocessed products, those with poor nutrient profiles, and those that fall into both categories.

This approach is supported by studies from Brazil,[31] the United States,[32] and the United Kingdom,[33] demonstrating substantial but not complete overlap between Nova-defined UPFs and foods with high levels of added sugar, sodium, or saturated fat. These findings suggest that expanding current nutrient-based criteria to include a limited set of easily identifiable UPF markers—such as nonnutritive sweeteners, colorings, and flavorings—would allow regulators to cover most unhealthy products, including all with

unbalanced nutrient profiles and nearly all UPFs. Under this model, regulations would apply to food items that (1) exceed thresholds for critical nutrients (e.g., saturated fat, added and total sugars, and sodium); (2) contain selected, easily identifiable markers of ultraprocessing (e.g., nonnutritive sweeteners, colorants, and flavorings); or (3) meet both conditions.

This approach is more legally defendable, aligns well with existing regulatory frameworks including nutrient profiling models, and would maintain high coverage of both foods with unbalanced nutrient profiles and UPFs, thereby enhancing regulatory effectiveness. Another important benefit is that it would prevent UPF manufacturers from gaming existing nutrient profiling models to avoid regulation. Its main limitation is that it does not align perfectly with the research evidence base, which has primarily relied on Nova's full operational definition of UPFs.

In contexts where nutrient profile–based regulations are already in place, this second approach would require only the integration of selected markers of ultraprocessing into existing criteria. Nonsugar sweeteners (including artificial, natural noncaloric, and caloric sweeteners) have already been integrated in nutrient-based regulatory framework in countries adopting the Pan-American Health Organization (PAHO) nutrient profile model,[34] such as Mexico, Argentina, and Colombia. In other contexts, criteria for identifying unhealthy foods should be developed to encompass both unbalanced nutrient profiles—such as those recommended by PAHO or other WHO regional offices—and selected UPF markers. Market-specific analyses of product composition[26,27] can inform the selection of nutrient thresholds and UPF markers.

This second pathway should not be interpreted as simply collapsing the UPF concept into a nutrient-profiling framework. Integration should prioritize regulatory approaches that clearly signal products to be avoided or limited, rather than positioning UPFs along a spectrum of perceived healthfulness. For example, threshold-based warning labels are more effective than graded schemes like the Health Star Rating system.[9]

Sustainable Food Systems Transition

Nova can also help in guiding policymakers seeking to strengthen local and territorial markets, and the transition to sustainable food systems provisioning nutritious, locally produced, culturally appropriate, and underutilized traditional foods.[6]

By recognizing profit maximization as the core purpose of ultraprocessing, the Nova classification foregrounds the business practices and financial incentives that drive UPF expansion.[6,35] The much higher average profitability of UPF manufacturers relative to firms producing Nova Groups 1 to 3 foods is essential to understand and for policy to respond to.[6,36] This is because higher profit margins both attract investment and incentivize ultraprocessing as a business model, while generating surplus resources that corporations can reinvest into marketing, product engineering, supply chain expansion, and political influence to further generate UPF market growth.[6,37] This results in the structural displacement of Nova Group 1 to 3 food producers and thereby undermines local agri-food systems supporting the food security and livelihoods of billions. This displacement coincides with a growing share of food-related income flowing from food producers in low- and middle-income countries to UPF corporations headquartered largely in high-income countries.[6,38,39]

Food policies informed by Nova would seek to counter this wealth and income extraction and rebalance power within food systems by limiting the structural dominance and profitability of UPF producers while fostering the conditions for alternative food economies, territorial markets, and traditional industries to grow and thrive.[6,9,27] The objective is to protect and stop the displacement of local agri-food systems and strengthen them to produce diverse Nova Group 1 to 3 foods that form the basis of long-established healthy dietary patterns. This could involve restricting foreign investment by UPF manufacturers and limiting their entry into national markets; dietary guidelines recommending to preference local producers, vendors, and culturally appropriate foods; repurposing public subsidies away from commodity crops that serve as inputs for UPF production toward diversified agroecological systems and producers; investing in infrastructure, research, and workforce development that supports short supply chains, local food vendors, and culturally appropriate diets; using state procurement (e.g., school feeding programs) to create demand for locally sourced foods; and imposing much stricter controls on UPF marketing.[6,9,37,40]

CONCLUSION

The evidence linking the ultraprocessed dietary pattern to diseases affecting nearly all body organ systems, along with documentation of the displacement of long-established, whole-food, and meal-based healthy dietary patterns by

UPFs, underscores the urgent need for policy action. By integrating Nova and the UPF concept into dietary guidance, monitoring systems, regulatory frameworks, and wider food policies, policymakers can complement existing nutrient-based policies and strengthen efforts to promote healthy diets and facilitate sustainable food system transitions. AJPH

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The authors report no conflicts of interest.

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