

► **ULTRA-PROCESSED FOODS**

Beyond Oversimplification:
From Classification to Smarter Prevention

A Practical Guide for Policymakers



About Competere

We are an independent advocacy group that develops and promotes public policies to advance innovation, free trade, and real opportunities for individuals.

In today's unstable, emotional, and polarized world, you need solutions grounded in evidence and responsibility, not ideology.

That's why we combine science, critical thinking, and a liberal vision to tackle the major challenges of our time: from public health to sustainability, from food systems to emerging technologies.

We advocate for balanced, actionable policies that foster peaceful coexistence, economic growth, and individual freedom of choice.

We collaborate with international institutions, large and small businesses, the media, and civil society to transform ideas into tangible change.

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Scientific Review Panel

This policy paper was validated by Competere's Scientific Committee, led by Prof. Michele Carruba and comprising experts in nutrition, obesity, metabolism, food science, and public health.

Executive Summary

Ultra-processed foods (UPFs) have become one of the most powerful concepts in nutrition and public health debate. They are often presented as a simple explanation for obesity, cardiovascular diseases (CVDs), type 2 diabetes, and other non-communicable diseases (NCDs). This guide argues that the concept can help draw attention to important changes in modern diets, but it is too broad, heterogeneous, and operationally weak to serve, on its own, as a reliable basis for regulation, labeling, or prevention.

The guide explains what UPFs are, why the NOVA classification became influential, and where its limitations begin. Processing alone cannot define health risk. Nor can a single ingredient, a list of ingredients, or a production category. What matters is how a food fits into overall diet quality, portion size, frequency of consumption, individual needs, lifestyle, and realistic alternatives. Observational evidence linking high UPF consumption to adverse health outcomes deserves attention, but remains limited by confounding, misclassification, and product heterogeneity.

The analysis then addresses the current search for new UPF definitions. Such definitions may help with research, monitoring, and comparison across countries. But they can also create the comforting illusion that a final answer has been found. Competing definitions may increase confusion, produce inconsistent classifications, and allow different actors to choose the version that best fits their agenda.

This guide therefore proposes moving beyond UPF classification alone toward a broader prevention framework, with greater emphasis on dynamic decision support. AI, wearable devices, QR codes, digital food information, and personalized nutrition can help citizens understand food in context and make better choices in real life.

Designed as a practical tool for policymakers, media, and public-health communicators, the guide offers a simple framework to interpret the UPF debate with scientific caution, policy realism, and a stronger focus on consumer empowerment.

Policy Snapshot

Food processing exists for a reason. Ingredients are combined to improve affordability, safety, shelf life, stability, texture, taste, convenience, transportability, or nutritional value. These functions matter. But they do not make every processed product nutritionally valuable. The policy question is not whether a food is processed, but what processing produces and how the final food fits into real diets.

UPFs are a useful signal, but a weak and potentially misleading policy shortcut. The category highlights real changes in modern diets, but it does not identify a specific causal mechanism. It is too broad and heterogeneous to guide regulation or prevention on its own.

Health risk is not determined by individual ingredients or the degree of processing alone. Foods should not be judged in isolation. What matters is the food matrix, the nutrient profile, and the role a food plays within the overall dietary pattern.

Processing is not inherently harmful. It has been used throughout human history to make food safer, more stable, more accessible, and, in many cases, more nutritious.

Observational evidence linking high UPF consumption to adverse health outcomes deserves attention, but remains limited by confounding, misclassification, and product heterogeneity.

UPF definitions may support research, but they are insufficient for prevention. Definitions can classify products, monitor trends, and compare data. But the race for a perfect definition can create conflicts, regulatory uncertainty, and economic incentives to shape what is included or excluded. Science does not end with a definition. Prevention must account for individual needs, portion sizes, frequency of consumption, and realistic alternatives.

Policymakers should avoid the UPF trap. Obesity, CVDs, type 2 diabetes, and other NCDs cannot be explained by one food category, one industrial process, or one regulatory definition.

Prevention needs better questions. Instead of asking only whether a food is ultra-processed, policy should ask whether it supports or harms balance for a specific person, in a specific portion, at a specific frequency, and within a specific lifestyle.

The next step is personalized prevention infrastructure. AI, wearable devices, QR codes, and digital food information can help citizens understand food in context. Public policy should make these tools accessible, transparent, and usable.

Innovation should be guided by empowered demand. Processing, formulation, and new ingredient combinations can help produce healthier, safer, more affordable, more sustainable, and more personalized foods. Better demand should guide better supply.

The path forward is empowerment. Definitions can create the illusion of a final answer. Digital personalization can help citizens better understand how food and lifestyle choices affect their individual health.

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Introduction: Why This Guide Is Needed

Ultra-processed foods (UPFs) have become one of the most widely discussed concepts in nutrition and public health. The term now features prominently in media debates, social media conversations, podcasts, and political agendas. It is used by very different actors: those who see UPFs as a symbol of industrial food systems, those who promote products outside the UPF category, and those seeking to reduce obesity, cardiovascular diseases (CVDs), and other non-communicable diseases (NCDs).

This broad attention is not accidental. UPFs are often presented as a simple explanation for some of the most difficult health challenges of our time: obesity, type 2 diabetes, CVDs, and other NCDs.

The appeal of this narrative is understandable. These conditions are complex, slow to prevent, and difficult to reverse. They are shaped by many interacting factors: diet quality, energy balance, physical activity, income, education, stress, sleep, family habits, urban environments, genetics, food accessibility, and individual behavior. In this context, the idea that a single category of foods could explain much of the problem offers a clear target and a simple message.

But visibility is not the same as causality. The concept of UPFs may help raise attention to poor dietary patterns. Yet, when used as a policy shortcut, it risks confusing the issue. It groups products with very different nutritional profiles, functions, and consumption contexts: sugar-sweetened beverages, salty snacks, whole-grain packaged bread, fortified breakfast cereals, fruit yogurts, plant-based beverages, protein bars, sports products, and foods for specific medical or nutritional needs.

This is the first paradox policymakers should consider. Consumers also perceive many products classified as UPFs as healthy, practical, or part of consolidated eating habits. In some cases, foods classified as UPFs may even be lower in calories, richer in fiber, protein, vitamins, minerals, or more nutrient-dense than comparable products that do not fall into the UPF category.

A second point follows from this. Many industrial processes and ingredients are not used simply to make foods more “artificial”. They often serve practical and socially relevant functions: improving safety, extending shelf life, reducing waste, preserving texture and taste, lowering costs, increasing convenience, or adding nutrients that may otherwise be missing from the diet. In other words, processing can also be a tool for accessibility, safety, and nutritional improvement.

This does not mean that every processed product is nutritionally valuable. It means that processing is a technology, not a diagnosis. Humans have always processed food – by cooking, fermenting, drying, salting, grinding, and preserving it. What matters is not processing in itself, but what processing produces in nutritional quality, safety, accessibility, and real-world consumption.

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This guide does not aim to defend UPFs. Nor does it deny that some products commonly classified as UPFs can contribute to unhealthy diets when consumed too frequently, in excessive portions, or as part of poor dietary and sedentary patterns. The aim is different: to help policymakers ask better questions.

The central question should not be only: Is this food ultra-processed? Nor should it be: Is this food industrial and therefore automatically unhealthy? The better questions are: What is its nutritional profile? How much energy does it provide? Is it nutrient-dense? What does it provide, and in what amount, in terms of free sugars, salt, saturated fats, fiber, protein, vitamins, and minerals? What is the portion size? How often is it consumed? Does it replace a better option, or does it help build a more balanced diet? What alternatives are realistically available and affordable? And for whom is the product consumed: a child, an adult, an older person, an athlete, a pregnant woman, or someone with specific nutritional needs?

This distinction matters for public policy. A black label or a binary warning may tell consumers that a product is “bad”. But it does not necessarily help them understand whether that product is appropriate for them, in that moment, in that quantity, and within their overall diet. Nor does it help if better alternatives are unavailable, unaffordable, or unrealistic.

The issue, therefore, is not whether consumers should receive information. They should. The issue is what kind of information helps them make better choices. A smarter prevention agenda should move beyond emotional approaches to food and public health. It should move from food panic to consumer empowerment. It should help citizens understand nutritional quality, nutrient density, portion size, frequency, context, and realistic alternatives. It should not replace one oversimplification with another.

Method and Scope

This guide is not a systematic review. It is a policy-oriented synthesis designed to help decision-makers interpret the UPF debate with clarity, proportionality, and scientific caution.

For this reason, the paper uses a limited number of selected references. The objective is not to reproduce the entire scientific debate, but to identify the key conceptual and policy issues that matter for decision-making. References are selected according to four criteria: relevance to the definition of UPFs, the NOVA classification, and emerging alternative classifications; usefulness in clarifying the limits of the available evidence; institutional or scientific credibility; and capacity to help policymakers distinguish between processing, nutritional quality, and real-world consumption patterns.

The paper therefore avoids excessive technical detail and focuses on the questions that should guide better policy: what is being classified, what risk is being measured, what mechanism is being assumed, and what kind of consumer behavior public policy is trying to improve.

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1. Understanding the UPF Debate

1.1 Why the UPF Narrative Is So Powerful

The UPF narrative is powerful because it turns food into a simple answer to a difficult health problem.

Obesity, type 2 diabetes, CVDs, and other NCDs are often framed primarily as nutrition problems. In this context, focusing on food is particularly attractive. Food is intimate, daily, and emotionally charged. A category of foods associated with industrial production is even more powerful because it can evoke distance from nature, loss of control, opacity, and profit-driven choices.

The idea that this category can explain much of the problem creates a clear target. It gives the media a simple story. It gives policymakers a visible area of intervention. It gives citizens an apparently easy rule: avoid this category.

But simple rules are not always good rules. Obesity, type 2 diabetes, CVDs, and other NCDs do not emerge from a single cause. Diet matters, but it is not the whole story. The World Health Organization (WHO, 2025a; WHO, 2025b) describes obesity as linked to the balance between energy intake and energy expenditure and, in most cases, as a multifactorial disease. It also identifies unhealthy diets as one major NCD risk factor among others, including physical inactivity, tobacco use, harmful alcohol consumption, and air pollution.

The risk is that the UPF concept transforms a multifactorial health challenge into a classification problem. Once a food is placed in the “ultra-processed” box, the debate easily moves from evidence to perception: industrial becomes suspicious, long ingredient lists become alarming, and processing becomes a proxy for risk.

This is understandable. But it is not sufficient for policy.

A category can be useful when it helps distinguish risk. It becomes problematic when it groups very different products, mechanisms, and consumption patterns. If the same category includes sugar-sweetened beverages, salty snacks, fortified cereals, whole-grain packaged bread, fruit yogurt, plant-based drinks, protein bars, and medical nutrition products, policymakers should pause before using it as a regulatory shortcut.

This does not mean that all these products are equally valuable. They are not. It means that the category alone cannot tell us enough. The more useful question is not whether a product belongs to the UPF category, but why, how, and in which context it may contribute to a healthier or poorer diet. Without this distinction, public policy risks fighting a label instead of addressing the real drivers of poor health.

1.2 What Are Ultra-Processed Foods?

Processing food is not new. Humans have always cooked, fermented, dried, salted, ground and preserved food. In this broad sense, processing is part of our nutritional

and cultural history.

What is newer is the category of “ultra-processed foods”, mainly associated with the NOVA classification developed by Carlos Monteiro and colleagues. First proposed in 2009 and later formalized around the extent and purpose of industrial processing, NOVA was created to shift attention from nutrients alone to the role of processing in modern diets (Monteiro et al., 2010; Monteiro et al., 2019).

Instead of asking only how much sugar, salt, fat, or calories a food contains, NOVA asks how far that food has moved from its original form, what ingredients have been used, and why it has been processed.

NOVA divides foods into four groups:

GROUP 1

unprocessed or minimally processed foods, such as fruit, vegetables, meat, fish, eggs, milk, grains, and legumes.

GROUP 2

processed culinary ingredients, such as oils, butter, sugar, and salt, usually used to prepare or season foods.

includes processed foods, such as cheese, canned vegetables, canned fish, bread, or other products made by adding Group 2 ingredients to Group 1 foods.

ultra-processed foods, described as industrial formulations made mostly or entirely from substances derived from foods and additives, with little or no intact Group 1 food. They typically contain ingredients of exclusive or rare culinary use, including additives used to modify characteristics such as flavor, color, texture, or palatability.

GROUP 3

GROUP 4

NOVA was originally intended to move the debate beyond single nutrients. Its underlying idea is that modern diets should not be assessed only by sugar, salt, fat, or calories, but also by how industrial processing may affect foods, eating habits, and dietary patterns.

This is why NOVA became influential: it offered a simple language to connect nutrition, industrial food systems, marketing, convenience, and the transformation of eating habits.

1.3 When a Category Becomes a Narrative

UPFs are not only a classification. They have become a narrative.

In public debate, “ultra-processed” often evokes industrial food, hidden ingredients, corporate power, artificiality, loss of tradition, and health risk. This symbolic power explains much of its success. But it also explains its danger: once a category becomes a symbol, it can shape perception faster than evidence can correct it.

1.4 Why NOVA Became Useful

NOVA became influential because it changed the question. For many years, nutrition policy focused mainly on nutrients: calories, sugar, salt, fat, saturated fat, fiber, and micronutrients. NOVA introduced a different perspective. It invited researchers and policymakers to look not only at what foods contain, but also at how they are made, why they are made in that way, and how industrial food systems may influence diets and eating habits (Monteiro et al., 2010; Monteiro et al., 2019; FAO, 2019).

This was its main contribution. NOVA helped connect nutrition with wider issues: convenience, marketing, availability, affordability, shelf life, food environments, and the transformation of traditional eating patterns. It gave public health a simple language to discuss the role of industrial food systems in modern diets. This is also why the concept entered policy-oriented debates, especially in Latin America, where PAHO used the UPF framework to analyze food and beverage products and their role in changing dietary patterns (PAHO, 2015; PAHO, 2019).

In this sense, NOVA should not be dismissed. It helped draw attention to real problems: poor dietary patterns, excessive consumption of energy-dense products, aggressive marketing, frequent snacking, displacement of fresh foods, and the growing availability of ready-to-eat products (FAO, 2019; PAHO, 2019).

Its success, however, also depends on its simplicity. NOVA suggests an intuitive association: the further a food moves from its original form, and the more ingredients or industrial steps it contains, the more suspicious it becomes. This intuition is powerful. But is it enough to guide policy?

1.5 How NOVA Is Supposed to Work

NOVA is not only a classification. It also implies a theory of prevention. The logic is relatively simple. If UPFs can be identified as a distinct category, their presence in the diet can be measured. If their consumption is associated with poorer diet quality, excess energy intake, weight gain, or higher risk of disease, then reducing their consumption should help improve diets and, over time, reduce obesity, CVDs, and other NCDs.

This is how the category is expected to work in public health. First, it makes UPFs visible. Then it allows researchers to estimate how much of the diet comes from these products. Finally, it gives policymakers a target: reduce the share of UPFs and promote diets based on unprocessed or minimally processed foods, culinary ingredients, and freshly prepared meals.

This logic is explicit in the NOVA literature. Monteiro and colleagues describe UPFs as industrial formulations designed to be convenient, palatable, profitable, and often consumed in place of freshly prepared foods. They argue that dietary guidelines and public policies should therefore discourage UPFs and support food systems based on minimally processed foods and culinary preparations (Monteiro et al., 2017; Monteiro et al., 2019; FAO, 2019).

In policy terms, this can translate into a sequence of interventions. Once products are identified or legally recognized as UPFs, policymakers may use the category to justify:

- marketing and advertising restrictions, especially for children;
- school food and public procurement rules;
- fiscal measures, including taxes or disincentives;
- reformulation targets or incentives;
- monitoring systems to reduce the share of UPFs in the population diet (PAHO, 2015; PAHO, 2019).

This is why the definition matters. A classification is not neutral when it becomes the basis for labels, restrictions, taxes, or reformulation strategies.

The expected mechanism is therefore not only nutritional. It is also behavioral and systemic: classify UPFs, make them visible, discourage their consumption, change purchasing habits, shift demand, and encourage food systems to move toward less processed dietary patterns.

This is the promise of NOVA: a simple way to connect individual food choices with wider food systems and public-health outcomes. The question is whether this promise is precise enough to become policy.

2. Where the UPF Framework Reaches Its Limits

2.1 Where the Limits Begin

This is where the promise of NOVA meets its main difficulty. NOVA can be useful as a warning signal. It draws attention to changes in food systems and dietary patterns. But it is weaker as a policy instrument. A category that helps raise concern is not necessarily precise enough to guide regulation, consumer information, or prevention.

The first issue is definitional. The UPF category is broad and heterogeneous. It includes

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products with very different nutritional profiles, functions, and roles in the diet. This concern has also been recognized by the UK Scientific Advisory Committee on Nutrition (SACN), which noted limitations in the practical application of NOVA and highlighted that its categories are broad, include foods with different nutritional attributes, and may be discordant with nutritional classifications (SACN, 2023; SACN, 2025).

The second issue is consistency. If a classification is used for research, public communication, or regulation, different experts should be able to apply it in the same way. Yet studies have shown that even food and nutrition professionals may classify the same products differently when using NOVA criteria (Braesco et al., 2022).

The third issue is nutritional relevance. NOVA does not primarily measure nutritional quality. It measures processing. This means that foods with very different compositions can end up in the same group, while foods with similar nutritional profiles may be placed in different groups.

This creates a practical problem. Products that fall into the UPF category may have very different nutritional profiles. A sweetened soft drink, an instant soup, a high-protein yogurt, a fortified cereal, a gluten-free packaged product, a plant-based beverage, or a clinical nutrition formula may all be classified as UPFs. Yet they do not provide the same calories, nutrient density, fiber, protein, micronutrients, portion size, satiety, or role in the diet.

It also creates a second problem. Some foods classified as UPFs may be lower in calories, richer in protein or fiber, or more nutrient-dense than foods that are unprocessed, minimally processed, or prepared at home. Conversely, a homemade dessert, a traditional fried dish, a large portion of lasagna, a restaurant meal, or a delivery order may be energy-dense, high in salt or saturated fats, and consumed in portions that contribute to excess energy intake.

This matters because people do not eat classifications. They eat meals, portions, snacks, habits, and routines. A system that focuses mainly on industrial packaged products may miss part of the real food environment: home cooking, restaurants, take-away meals, delivery platforms, workplace canteens, and ready-to-eat foods prepared outside industrial packaging.

Extending the classification to restaurants, delivery meals, and other food-service settings could partly address this gap. But it would also make the system more complex, harder to apply, and more distant from the simple message that made NOVA successful in the first place.

The fourth issue is scientific interpretation. Many studies report associations between high UPF consumption and adverse health outcomes, including cardiometabolic risk and mortality (Lane et al., 2024). These associations deserve attention. But they do not automatically prove that industrial processing itself is the causal mechanism. SACN has noted that the available evidence is limited by the predominance of observational

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studies and by possible confounding factors, including energy intake, body mass index, smoking, and socioeconomic status. It also concluded that it remains unclear whether these foods are inherently unhealthy because of processing itself or because many of them are high in energy, saturated fat, salt, and/or free sugars (SACN, 2023; SACN, 2025). Diet quality, total energy intake, food texture, eating speed, income, education, physical activity, and other lifestyle factors may all contribute to the observed risk.

The fifth issue is individual context. NOVA classifies products, not people. It does not account for age, health status, physical activity, metabolic needs, income, time constraints, cooking skills, pregnancy, sport, aging, or specific nutritional requirements. Yet the same product may have a different meaning in different lives and at different moments.

This is where a binary approach becomes weak. It can suggest that a food is good or bad in absolute terms, rather than asking whether it is appropriate for a specific person, in a specific portion, at a specific frequency, and within a specific diet and lifestyle.

The final issue is regulatory. If a category is too broad to distinguish risk, policy must create exceptions, subcategories, and reinterpretations. At that point, the category no longer simplifies reality. It becomes another layer that needs to be explained.

This is the key question for policymakers: Does the UPF category identify risk clearly enough to guide regulation, consumer information, and prevention? Or does it risk turning a useful warning signal into an imprecise policy shortcut?

In short, NOVA tells us something about how a product is made. But does it tell policymakers enough about what matters for prevention: nutritional quality, nutrient density, portion size, frequency of consumption, individual context, and realistic alternatives?

2.2 The Search for a Better Definition

The limits of NOVA are not only theoretical. They are visible in the current policy debate.

Across countries and institutions, policymakers and experts are trying to define more clearly what UPFs are, how they should be identified, and whether they can serve as an operational category for public health action. This search for a better definition shows two things at once: the concern is real, but the current category is not yet stable enough for policy.

In the United States, HHS, FDA, and USDA launched a process to develop a uniform federal definition of UPFs. The agencies explicitly recognized that there is currently no single authoritative definition for the U.S. food supply and that a common definition would be needed to improve consistency in research and policy (HHS, FDA and USDA, 2025).

In Europe, the discussion is also moving beyond general concern. The European Commission's Safe Hearts Plan announced work on the health impacts of UPFs, linking the issue to broader cardiovascular prevention and to foods high in sugar, saturated

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fats, and salt. This shows that UPFs are becoming part of the policy agenda, but also that regulators still need to understand whether the relevant risk comes from processing itself, from nutritional composition, or from specific consumption patterns (European Commission, 2025).

The scientific debate is moving in the same direction. Recent work has compared alternative definitions of ultra-processed or highly processed foods beyond NOVA, showing that several classification systems now exist, but that they differ in criteria, terminology, and operational use (Medin et al., 2025). This confirms that the field is still searching for a definition that is clear enough for research, communication, and regulation.

This is an important point. The search for new definitions does not mean that the UPF concern is disappearing. Many scholars and institutions are trying to preserve the intuition behind the concept while correcting its weaknesses: the idea that some industrial formulations, ingredients, textures, or patterns of consumption may raise legitimate health questions, but that NOVA alone may be too broad to identify those risks with enough precision.

The debate is therefore moving in different directions: some approaches try to refine the UPF category by focusing on specific industrial ingredients or additives; others combine processing with nutrient-profile criteria; others argue that the focus should shift from categories of products to dietary patterns, portions, and real-world consumption contexts (Medin et al., 2025; SACN, 2025).

This matters for policymakers. If every country, institution, or expert group develops its own definition, the result may be more confusion, not more clarity. Different definitions can produce different classifications, different labels, different restrictions, and different market effects. A product may be treated as problematic in one system and acceptable in another.

The risk is a paradox. A concept created to simplify the debate may end up multiplying categories, exceptions, and regulatory interpretations. It may shift attention from the real question – what makes a food or diet risky in practice? – to a procedural question: Which definition of UPF should be used?

The same caution should apply to international standard-setting. Asking WHO or another international forum to produce a single definition may appear to solve the problem. But if the underlying category remains weak, a global definition may simply institutionalize the weakness. Different countries may try to impose or negotiate different definitions, reflecting different food systems, regulatory cultures, commercial interests, and public-health priorities.

Scientific debate should continue. Definitions are necessary in science, but they are useful only when they help explain reality more precisely. They should remain open to revision, evidence, and falsification. A policy definition, by contrast, can quickly become

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rigid. If it is built on unstable criteria, it may create the appearance of certainty without solving the underlying problem.

This does not mean that the debate should be abandoned. It means that it should mature. If the policy concern is poor diet quality, excess energy intake, low nutrient density, high frequency of consumption, and unhealthy lifestyles, then the definition must capture those issues directly. Otherwise, a new definition may simply reproduce the same problem with different words.

2.3 Do We Need a Better Definition or Better Questions?

A better definition of UPFs may be useful. It can help researchers measure consumption, compare data across countries, monitor changes in diets, and understand how food systems are evolving.

But a better definition is not enough. Public health does not improve because a category becomes more precise. It improves when policy identifies the right drivers of risk and helps people change real behaviors in real contexts.

This is why the debate should not stop at the question: How should UPFs be defined? The more important question is: What are we trying to prevent?

If the concern is obesity, CVDs, type 2 diabetes, and other NCDs, then processing is only one part of the picture. Other relevant factors include excess energy intake, poor diet quality, low nutrient density, low fiber, insufficient protein in some contexts, high frequency of consumption, large portions, sedentary lifestyles, stress, sleep, income, education, and realistic access to better alternatives.

A definition can classify products. It cannot, by itself, explain whether a product is appropriate for a specific person, in a specific portion, at a specific frequency, and within a specific diet and lifestyle.

This distinction is essential. A product may be classified as UPF and still have a legitimate role in specific contexts or for specific individuals, such as people following medically required diets, managing food allergies or intolerances, addressing specific nutritional needs, or meeting dietary requirements, including those of some athletes or individuals following plant-based diets. Conversely, a minimally processed or homemade food can still contribute to excess energy intake, poor nutrient density, or unhealthy eating patterns.

The policy challenge, therefore, is not simply to define UPFs better. It is to identify risk better. This requires moving from a category-based approach to a question-based approach. Instead of asking only whether a food belongs to the UPF category, policymakers should ask what the food contributes, what it displaces, how often it is consumed, by whom, in what quantity, and compared with which realistic alternatives.

A better definition may support research. Better questions are needed for prevention.

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3. Processing, Ingredients, and Health

3.1 Food Processing: An Old Human Technology

If better questions are needed for prevention, the first one is simple: What do we mean by processing? Is processing dangerous in itself?

And why has it come to be perceived as a risk?

Food processing did not begin with the modern food industry. Humans have processed food for so long that it is difficult to identify a single starting point. It depends on what we mean by processing: cooking with fire, grinding grains, fermenting, drying, salting, smoking, or preserving food.

The timeline, however, is clearly ancient. Evidence suggests that hominins may have cooked fish as early as 780,000 years ago, while bread-like products made from wild cereals and tubers have been found in Jordan and dated to around 14,400 years ago, before the rise of agriculture (Zohar et al., 2022; Arranz-Otaegui et al., 2018). Food preservation practices such as drying, fermenting, salting, and smoking are also among the oldest ways humans learned to protect food from spoilage and extend its availability over time (Britannica, 2026; IFT, 2026).

Long before industrial production, food processing was a condition of survival. It made food more edible, safer, more digestible, easier to store, easier to transport, and easier to share.

Cooking, fermenting, drying, salting, grinding, smoking, and preserving are all forms of food processing. Bread, cheese, yogurt, wine, olive oil, cured foods, dried pasta, pickled vegetables, and many traditional foods exist because humans learned to transform raw ingredients into more stable, useful, and culturally meaningful foods.

► **In this sense, processing is not the opposite of tradition. Very often, it is how tradition was created.**

Modern food technology extends this long history. It allows food to be preserved for longer, transported more safely, fortified with nutrients, portioned, labeled, standardized, and made available to larger populations. It can reduce waste, improve microbiological safety, support affordability, increase convenience, and help meet specific nutritional needs. Food processing can also contribute to food and nutrition security by improving safety, extending shelf life, reducing losses and, in some cases, improving nutrient availability (Augustin et al., 2016).

This matters in contemporary societies. Urbanization, global supply chains, long working hours, smaller households, food insecurity, aging populations, and the need to feed billions of people have made food processing part of the infrastructure of modern life. Without processing, many foods would be less safe, less accessible, more expensive, more seasonal, more perishable, and harder to distribute.

Why, Then, Is Processing Often Perceived As **Dangerous**?

Modern industrial processing is frequently associated with distance from the original food, long ingredient lists, unfamiliar names, additives, standardization, intensive marketing, convenience, and highly palatable products designed for frequent consumption. These concerns should not be dismissed. Some processed foods are indeed energy-dense, nutritionally unbalanced, and easy to overconsume.

The challenge, however, is to distinguish the process from the product. Processing itself is neither inherently beneficial nor inherently harmful. It is a tool. Its health implications depend on what processing produces, how the food is formulated, and how it is consumed within the broader context of diet and lifestyle.

This does not make every form of processing beneficial. There are better and poorer uses of food technology. Processing should ultimately be assessed by its outcomes: what it produces in terms of safety, nutritional quality, accessibility, and its role within the broader diet.

3.2 What Matters Inside the Food?

If processing is a tool, the next question is not how industrial a food looks, but what the process has produced.

Ingredients matter. But they do not matter because they sound unfamiliar, technical, or industrial. They matter because of their function, safety, quantity, and effect on the final food: energy density, nutrient density, fiber, protein, fat quality, salt, free sugars, texture, satiety, shelf life, and ease of consumption.

This distinction is essential. Food safety and nutritional quality are related, but they are not the same thing. In the European Union, authorized food additives are assessed for safety before they can be used in food, and they must appear on labels when used. In the United States, the FDA regulates food additives and administers the GRAS system for substances “generally recognized as safe” (EFSA, 2025; FDA, 2024).

But safety authorization does not mean that every final product is nutritionally valuable. A product can contain authorized ingredients and still be nutritionally weak: energy-dense, low in fiber or micronutrients, poorly satiating, or formulated in a way that makes certain nutrients excessive in the context of frequent consumption, large portions, or an already unbalanced diet.

This is especially important when looking at food environments where innovation, marketing, and convenience have produced products that are legally safe but

nutritionally poor. Some products raise legitimate public-health concerns: large portions, very sweet taste profiles, low satiety, poor nutrient density, aggressive marketing, and constant availability can all contribute to unhealthy dietary patterns.

The answer, however, is not to treat every industrial ingredient as a threat. The answer is to assess what the ingredient does and what the final product becomes. An emulsifier may improve texture and stability. A fortifying ingredient may improve micronutrient intake. A fiber ingredient may increase the fiber content or improve the nutritional profile of a product. A sweetener may help reduce free sugars and, depending on the formulation, energy content. At the same time, formulation can also make products more energy-dense, more palatable, and easier to overconsume.

Ingredients: What Do They Do?

Food contains different types of components. Some are nutrients. Others are ingredients. Sometimes an ingredient provides nutrients; sometimes it serves a technological function by improving safety, texture, stability, taste, color, shelf life, or convenience.

Nutrients are what food provides to the body: energy, protein, fats, carbohydrates, fiber, vitamins, and minerals. Ingredients are what are used to make the food.

This matters because not all ingredients have the same role. Their value depends on function, dose, safety assessment, and impact on the final food.

Preservatives

Help slow spoilage and reduce microbiological risk. They may extend shelf life and reduce food waste.

Emulsifiers and stabilizers

Help mix ingredients that would otherwise separate, such as water and fat. They improve texture, consistency, and stability.

Antioxidants

Help prevent oxidation, rancidity, and quality loss, especially in foods containing fats or oils.

Fortifying nutrients

Vitamins, minerals, fiber, or protein may be added to improve nutritional value or meet specific dietary needs.

Sweeteners

May help reduce free sugars and, depending on the formulation, energy content. The overall nutritional value still depends on the final product and how it is consumed.

Colors and flavorings

May improve appearance, taste, or consistency between batches. They should not be judged only by whether they sound artificial, but by safety, function, and necessity.

Thickeners and gelling agents

Help create texture, viscosity, and structure, especially in sauces, desserts, plant-based products, and foods for people with swallowing or medical needs.

Processing aids

Used during production to make the process possible or safer, they may not always remain in significant amounts in the final food.

The relevant question is therefore not: Is the ingredient industrial? The relevant questions are: Is it safe? What function does it serve? What does it add or remove? How does it affect the nutritional profile? Does it improve or weaken nutrient density? Does it support satiety or encourage overconsumption? And how does the final food fit into the person's diet, lifestyle, and realistic alternatives?

3.3 Are UPFs Dangerous?

Once we understand that processing is a tool, and that ingredients must be assessed according to their function, dose, safety, and impact on the final food, the next question becomes unavoidable: Are UPFs dangerous?

The answer requires caution. Some foods classified as UPFs can contribute to unhealthy diets, especially when they are energy-dense, nutritionally weak, low in fiber or protein, poorly satiating, easy to consume frequently, heavily marketed, sold in large portions, or used to replace more balanced meals.

Many observational studies report associations between high UPF consumption and adverse health outcomes, including obesity, cardiometabolic disease, and mortality (Lane et al., 2024). These findings deserve attention. But they do not mean that all UPFs are dangerous, nor that industrial processing itself is always the causal mechanism (SACN, 2023; SACN, 2025).

The UPF category includes very different products. Some are clearly products that public health should be concerned about when consumed frequently and in excess. Others may be practical, safe, nutrient-dense, fortified, useful for specific needs, or compatible with a balanced diet.

This is why the question "Are UPFs dangerous?" is too broad. It treats a heterogeneous category as if it were a single substance, with a single mechanism and a single health effect. Food does not work that way.

A sweetened beverage consumed daily in large quantities, a fortified cereal eaten at breakfast, a protein product used by an older adult to support muscle mass, a plant-based drink used by a lactose-intolerant person, and a packaged whole-grain product used occasionally do not have the same meaning in the diet.

The same is true in the opposite direction. A food that is homemade, artisanal, traditional, or minimally processed is not automatically healthy. A large portion of homemade desserts, fried food, refined bread, cured meat, cheese, restaurant meals, or delivery food can still contribute to excess energy intake, poor nutrient density, or unhealthy dietary patterns.

The relevant issue is not whether a food belongs to a category. The relevant issue is whether it contributes to balance or imbalance.

Risk emerges from patterns: what people eat, how much they eat, how often they eat it, what the food replaces, what their lifestyle looks like, and what alternatives are

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realistically available.

For policymakers, this distinction is essential. If the goal is to reduce obesity, CVDs, type 2 diabetes, and other NCDs, the focus should be on the drivers that can actually be measured and changed: diet quality, nutrient density, energy intake, portion size, frequency of consumption, physical activity, food literacy, affordability, and individual context.

UPFs can be part of the problem when they contribute to poor dietary patterns. But the category itself is not the disease. The disease is the imbalance.

4. What the Evidence Really Shows

4.1 What Does the Evidence Really Show?

The scientific literature on UPFs is growing rapidly. This is important, but it should also be interpreted with caution. When a concept becomes prominent in public debate, research interest often accelerates. UPFs are now a major research trend. That does not make the evidence irrelevant. But it makes careful interpretation even more necessary.

This caution should also extend to how scientific findings are communicated. Research has shown that causal claims can become overstated already within scientific communication itself, including in article titles and abstracts, before findings reach the wider public (Isch et al., 2026). In a highly visible field such as UPFs, maintaining a clear distinction between what the evidence shows, what it suggests, and what it can support in policy becomes especially important. The evidence reviewed so far points to consistent associations between higher UPF consumption and adverse health outcomes, including obesity, cardiometabolic disease, and mortality (Lane et al., 2024). The important question is not whether these associations exist, but how they should be interpreted.

Association is not causation.

Most available evidence is observational. This means that researchers observe what people report eating and compare it with health outcomes over time. Such studies are useful for identifying patterns, but they cannot easily prove that UPFs themselves are the direct cause of disease. Several methodological issues matter.

First, confounding is difficult to eliminate. People who consume more UPFs may also differ in income, education, working patterns, smoking, physical activity, sleep, stress, access to fresh food, cooking skills, and overall diet quality. Even when studies adjust for some of these factors, residual confounding may remain.

Second, measurement is imperfect. Many studies rely on food-frequency questionnaires or dietary recalls. These tools are useful, but they depend on memory, self-reporting,

and broad food categories. They were not always designed to classify foods according to NOVA or to capture the exact formulation, brand, recipe, portion size, or processing method of each product.

Third, classification can be uncertain. The same food may be classified differently depending on available information, country, brand, recipe, or interpretation of NOVA criteria. This creates a risk of misclassification.

Fourth, the UPF category is heterogeneous. A soft drink, a packaged snack, a fortified breakfast cereal, a fruit yogurt, a protein product, a plant-based drink, and a clinical nutrition formula do not have the same nutritional profile, function, or role in the diet. Treating them as one exposure can hide important differences.

This is one of the main criticisms raised by several scholars. Visioli, Marangoni, Fogliano, and colleagues argue that the NOVA classification and the UPF hypothesis require critical reappraisal, especially when used to infer that ultra-processing is intrinsically harmful (Visioli et al., 2023). In a later analysis, Visioli, Del Rio, Fogliano, Marangoni, Ricci, and Poli note that different groups of UPFs often show markedly different associations with the same health outcomes, making it difficult to conclude that UPF consumption itself is the causal factor (Visioli et al., 2025). The UK Scientific Advisory Committee on Nutrition reached a similar cautionary conclusion. SACN recognized that systematic reviews consistently report associations between higher consumption of processed or ultra-processed foods and adverse outcomes. However, it also highlighted important uncertainties: the evidence is largely observational, confounding may not be adequately accounted for, and it remains unclear whether the risk is due to processing itself or to the fact that many products are high in energy, saturated fat, salt, and/or free sugars (SACN, 2023; SACN, 2025).

The controlled trial by Hall and colleagues is often cited as stronger evidence. In that study, participants consumed more calories and gained weight when offered an ultra-processed diet compared with an unprocessed diet, even though the diets were matched for presented calories, sugar, fat, sodium, fiber, and macronutrients (Hall et al., 2019). This is an important finding. It suggests that factors such as texture, eating speed, food form, palatability, or meal structure may influence energy intake.

But the Hall trial also has limits. It was conducted in a controlled inpatient setting, involved a small number of participants, and lasted only a few weeks. It does not prove that every food classified as UPF is harmful, nor that processing alone is the causal mechanism in real-life diets.

The Key Scientific Question

Does food processing itself have an independent causal effect on health, beyond nutritional composition, energy intake, portion size, frequency of consumption, and the overall dietary pattern?

The evidence therefore supports caution, not panic. It supports concern about dietary patterns dominated by energy-dense, poorly satiating, nutritionally weak products consumed frequently and in large portions. It does not support treating all UPFs as a single dangerous category.

For policymakers, the right conclusion is not to ignore the evidence. It is to interpret it correctly. The key question is not whether UPFs are associated with risk in general. The key question is what drives the risk: processing itself, nutrient composition, energy density, texture, eating speed, marketing, portion size, frequency of consumption, displacement of better foods, or the broader social and lifestyle context.

Until that question is answered more precisely, UPFs can serve as a useful research signal, but caution is needed when translating the category into regulation.

Country Comparisons: Useful, But Not Conclusive

Cross-country comparisons can help illustrate why the UPF debate requires caution.

In Europe, the estimated share of dietary energy from UPFs and drinks varies widely across countries. In the study by Mertens et al., Sweden and the United Kingdom appear among the highest consumers, while Italy and Romania appear among the lowest (Mertens et al., 2022). Yet cardiovascular outcomes do not follow a simple linear map of UPF consumption. European and global burden data show that cardiovascular mortality remains much higher in several Central and Eastern European countries than in many Western and Northern European countries (OECD/European Commission, 2024; IHME, 2024).

Many other variables matter: smoking, alcohol consumption, physical activity, obesity prevalence, hypertension, cholesterol, income, education, health-system performance, prevention, medication use, air pollution, diet quality, food culture, portion size, and the nutritional profile of the products consumed.

This is why country comparisons should not be used to dismiss the evidence. They should be used to interpret it more carefully.

The lesson is not that UPFs are irrelevant. The lesson is that UPFs are not a sufficient explanation. Cardiovascular risk is produced by patterns, environments, behaviors, and biological risk factors, not by one category alone.

Country/ Pattern	Estimated UPF consumption	Cardiovascular interpretation
Sweden	Among the highest in Europe	Relatively favorable cardiovascular outcomes compared with many European countries
UK	Among the highest in Europe	Significant public-health concerns, but shaped by obesity, inequality, and broader lifestyle factors
Italy	Among the lowest in Europe	Favorable dietary pattern and relatively strong cardiovascular profile, but not explained by UPF intake alone
Romania	Among the lowest in Europe	Lower UPF intake does not automatically translate into lower cardiovascular burden
Central and Eastern Europe	Variable UPF exposure	Higher cardiovascular burden often reflects multiple risk factors beyond food processing

Note: This table is illustrative. It compares country-level indicators and cannot be used to infer individual risk or causality. UPF exposure may matter, but it is not a sufficient explanation for cardiovascular outcomes.

UPFs should be used as a research signal, not as a regulatory shortcut.

4.2 The Better Questions to Ask

If the evidence supports caution but not panic, then public policy needs better questions. The first question should not be only: Is this food ultra-processed?

That question may be useful as a starting point. But by itself, it is too broad. It tells us something about how a product may have been made. It does not tell us enough about what the product provides, how it is consumed, what it replaces, or whether it contributes to balance or imbalance in a real diet.

A better policy framework should ask a different set of questions.

01 What is the nutritional profile of the food?

Does it provide fiber, protein, vitamins, minerals, or other useful nutrients? Or is it mainly energy-dense and nutritionally weak?

02 What is the energy density?

Does the product provide many calories in a small volume? Is it easy to consume quickly without producing satiety?

03 What is the portion size?

Is the product normally consumed in moderate amounts, or is it sold and consumed in portions that make excess intake more likely?

04 How often is it consumed?

A food consumed occasionally does not have the same meaning as a food consumed daily or several times a day.

05 What does it replace?

Does it displace a more balanced meal, fresh foods, legumes, fruit, vegetables, whole grains, or protein sources? Or does it help fill a practical nutritional need?

06 Who consumes it?

The same product may have a different role for a child, an older adult, an athlete, a pregnant woman, a person with limited income, a person with specific medical needs, or someone with little time or capacity to cook.

07 What is the broader lifestyle context?

Diet is only one part of health. Physical activity, sleep, stress, income, education, social habits, and food environments all shape the risk of obesity, CVDs, and other NCDs.

08 What realistic alternatives are available?

Policy should not assume that every consumer has the same time, money, skills, access, kitchen space, or cultural habits. A recommendation that is nutritionally ideal but socially unrealistic may fail in practice.

These questions are more demanding than a binary label. But they are also more useful. They move the debate from classification to understanding; from fear to literacy; from product panic to better choices; from abstract categories to real diets.

This is where public policy should focus: not on replacing one simplistic signal with another, but on helping consumers understand quality, quantity, frequency, context, and alternatives.

5. Beyond the Definition: A New Model of Prevention

5.1 Beyond the Definition: In Search of an Algorithm

At this point, our discussion reaches a practical limit. A definition of UPFs may help research, monitoring, and comparison across countries. It may help institutions measure how food systems are changing. It may help regulators speak a common language. But for prevention, a definition does not take us very far.

The search for a perfect definition risks becoming an endless exercise. The more the category is contested, the more regulators and experts may be tempted to go deeper into processing methods, ingredients, additives, formulations, and exceptions. But each new layer creates new gray areas. Each new criterion produces new borderline cases. Each new definition risks becoming more complex without becoming more useful for citizens.

A definition classifies products. It does not understand people. It does not know whether a person has already consumed enough energy that day. It does not know whether they need more fiber, more protein, fewer calories, more hydration, or simply a better meal structure. It does not know whether they have trained, slept badly, skipped lunch, eaten too little, eaten too much, are under stress, live in a food desert, work night shifts, move very little, or need a practical option in a supermarket, school, airport, office, or railway station. A definition knows nothing about the citizen.

This is why definition-based policy easily falls back into the old one-size-fits-all approach: one category, one signal, one recommendation, one rule for everyone.

But prevention is moving in the opposite direction. Science, data, and technology are opening the way to personalized prevention: prevention that can read food, lifestyle, and individual needs together.

This is why the next step should not be the illusion of a perfect UPF definition. The next step should be a decision-support system. In other words, prevention needs an algorithm.

Not an algorithm that forbids foods. Not an algorithm that replaces personal responsibility. Not a digital version of paternalism. An algorithm that helps citizens understand food in context.

A perfect definition may never exist. A useful algorithm can.

5.2 The New Infrastructure of Personalized Prevention

If prevention needs an algorithm, public policy must build the conditions that allow citizens to use it, understand it, and remain in control. This is not simply a technological question. It is a new model of prevention.

Personalized prevention does not replace the established goals and principles of prevention. It provides new tools to make them more individualized, practical, and actionable in everyday life.

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This approach starts from the person, not from the category. It helps citizens understand food, movement, portions, frequency, sleep, stress, energy balance, and lifestyle. It does not simply ask whether a product should be avoided. It asks a more useful question: what makes sense for this person, today, in this context?

This is where AI, wearable devices, QR codes, digital food information, and precision nutrition can change the debate. They can help citizens read food in relation to their own needs, habits, and goals. They can connect what people eat with how they move, how they sleep, how they live, and what they are trying to improve.

A digital assistant could help a citizen understand whether a product fits their day, not only whether it belongs to a category. It could suggest a smaller portion, a different frequency, a better combination, a more balanced alternative, or a need for more fiber, protein, hydration, movement, or meal structure. It could help translate general public-health advice into practical choices.

This approach does not exclude foods. It contextualizes them. It does not tell citizens that one category is forbidden. It helps them understand quantity, frequency, balance, and alternatives. It gives citizens tools to choose, rather than simply signals to obey.

This is why personalized prevention goes beyond traditional public-health instruments such as labels, taxes, restrictions, or imposed reformulation. These tools may attract attention and, in some cases, influence behavior. But they often assume that citizens must be corrected from outside, through a warning, a price signal, a ban, or a rule.

Personalized prevention moves in a different direction. It strengthens the citizen from within the decision process. This is especially important in the UPF debate. It would be paradoxical to invest enormous political energy in defining and labeling UPFs while many citizens still lack basic tools to understand nutrition, physical activity, portion size, energy balance, and the role of lifestyle in health.

The problem is not only information. The problem is capability. If AI, wearable devices, and digital tools can help citizens understand their choices, public policy should make these tools accessible, transparent, and usable. Citizens should be able to use the algorithm, not suffer it. They should understand the logic behind suggestions, keep control over decisions, and develop the critical literacy needed to question, adapt, and personalize guidance.

This is also a question of equity and freedom of choice. Personalized prevention should not become a privilege for those who can afford advanced devices, private coaching, or premium digital services. If these tools can improve prevention, they should be designed to be accessible to all citizens, transparent in how they work, and integrated into broader public-health strategies.

Governments and public institutions should not tell people what to eat, what to avoid, or how to behave. They should create the conditions that allow people to make better choices: access to reliable information, digital tools, food literacy, movement-friendly

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environments, healthier defaults, transparent data, affordable options, and protection from misleading claims.

This is not a retreat of public policy. It is a better use of public policy. The role of government should be to enable citizens, not to replace their judgment. It should make healthy and balanced choices easier, more understandable, and more accessible, while preserving personal responsibility and freedom of choice.

Through this approach, citizens do not passively receive instructions. They learn, interpret, and choose. Personalized prevention becomes a tool of empowerment and education. It helps citizens understand their own needs, read food information, connect choices with movement and lifestyle, and develop the critical capacity to decide what works for them.

This also changes the market. When people understand their needs, they generate better demand: more fiber, better nutrient density, appropriate portions, clearer information, better meal solutions, and more practical alternatives. This demand can push innovation more effectively than reliance on static categories alone.

Personalized prevention, therefore, does not exclude industry. It challenges it in a better way. It asks producers to respond to informed citizens, not only to regulatory pressure. It creates incentives for products and services that help people live better, move more, eat with balance, and adapt choices to real needs.

This is the paradigm shift.

- From static categories to dynamic guidance.
- From passive consumers to empowered citizens.
- From imposed reformulation to informed demand.
- From one-size-fits-all prevention to personalized prevention.
- From citizens as targets of policy to citizens as active agents of change.

The future of prevention should not be built only on fear, restriction, or classification. It should be built on capability, access, responsibility, and better understanding.

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Policy Conclusions

UPFs are a useful signal, but a weak shortcut. They draw attention to real problems: poor dietary patterns, excessive energy intake, aggressive marketing, and the transformation of food environments. But they are too broad and heterogeneous to serve on their own, as a reliable guide for regulation, labeling, or prevention.

Processing alone cannot define health risk. Nor can a single ingredient, or a list of ingredients. A food should be assessed according to what it provides, how it is formulated, how often it is consumed, in what portion, by whom, and within which food matrix, diet, and lifestyle.

The growing literature on UPFs deserves attention, but much of it remains observational and exposed to confounding, misclassification, and heterogeneity. The evidence supports caution toward certain products and dietary patterns. It does not justify panic toward an entire category.

The same is true for definitions. A definition may help research, monitoring, and comparison across countries. But for prevention, it does not take us very far. A definition classifies products. It does not understand people.

Policymakers should avoid reducing obesity, CVDs, type 2 diabetes, and other NCDs primarily to one food category, one industrial process, or one regulatory definition. The scientific and media debate around UPFs is expanding rapidly, but public policy should remain anchored in evidence, proportionality, and real-life behavior.

A better policy framework should move beyond UPF classification alone and avoid searching for a perfect definition as the primary policy objective. It should:

- address the complex causes of obesity, CVDs, and other NCDs, not only food;
- assess foods by nutritional quality, not only by processing category;
- distinguish safety from healthfulness;
- consider portion size, frequency, food matrix, context, and realistic alternatives;
- avoid treating all UPFs as if they had the same function and risk;
- focus on dietary patterns rather than isolated labels;
- invest in food literacy, consumer empowerment, and personalized prevention;
- use AI, wearable devices, and digital tools to help citizens understand their own needs and behaviors;
- make personalized prevention accessible, transparent, and usable for all;
- encourage innovation by stimulating better demand for nutrient density, appropriate portions, and clearer information;
- evaluate policy impact through health outcomes, not only through market signals, reformulation, or regulatory activity.

Policymakers should not ask only whether a food is processed, or how. They should ask whether it helps or harms an individual's balance at a specific moment, within their diet and lifestyle.

If public health wants to reduce obesity, CVDs, type 2 diabetes, and other NCDs, it must move beyond panic categories and binary labels. It must help citizens understand food, portions, frequency, movement, context, and choice.

Governments and public institutions should create the infrastructure that allows citizens to choose better: reliable, not simplistic, information; accessible digital tools; food literacy; movement-friendly environments; transparent data; and realistic alternatives.

Innovation should not be discouraged. Processing, formulation, and new combinations of ingredients can help produce foods that are healthier, safer, more affordable, more sustainable, and better adapted to different needs. They can improve nutrient density, increase fiber or protein, reduce waste, extend shelf life, and make balanced choices more practical in daily life.

But innovation works best when it is guided by empowered demand, not only by marketing or regulatory compliance. Citizens who understand their needs can ask for better products: appropriate portions, clearer information, stronger nutritional profiles, affordability, sustainability, and compatibility with different lifestyles. In this context, innovation, trade, and personalized prevention can help the market respond to real human needs.

Definitions can create the illusion of a final answer. But science does not end with a definition, and prevention does not begin with a label. Digital personalization can help make food and lifestyle more understandable and actionable for citizens. The future of prevention lies not in finding the perfect label for food, but in giving people better tools to understand, choose, and live well.

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Bibliography

Arranz-Otaegui, A., Gonzalez Carretero, L., Ramsey, M. N., Fuller, D. Q., & Richter, T. 2018. Archaeobotanical evidence reveals the origins of bread 14,400 years ago in northeastern Jordan. *Proceedings of the National Academy of Sciences*, 115(31), 7925–7930.

Augustin, M. A., Riley, M., Stockmann, R., Bennett, L., Kahl, A., Lockett, T., Osmond, M., Sanguansri, P., Stonehouse, W., Zajac, I., & Cobiac, L. 2016. Role of food processing in food and nutrition security. *Trends in Food Science & Technology*, 56, 115–125.

Braesco, V., Souchon, I., Sauvant, P., Haurogné, T., Maillot, M., Féart, C., & Darmon, N. 2022. Ultra-processed foods: how functional is the NOVA system? *European Journal of Clinical Nutrition*.

Britannica. 2026. Food preservation. *Encyclopaedia Britannica*.

European Food Safety Authority. 2025. Food additives. EFSA topic page.

European Commission. 2025. Questions and Answers on the EU Safe Hearts Plan. Press corner, 15 December 2025.

Food and Agriculture Organization of the United Nations. 2019. Ultra-processed foods, diet quality, and human health using the NOVA classification system. FAO.

Hall, K. D., Ayuketah, A., Brychta, R., Cai, H., Cassimatis, T., Chen, K. Y., Chung, S. T., Costa, E., Courville, A., Darcey, V., Fletcher, L. A., Forde, C. G., Gharib, A. M., Guo, J., Howard, R., Joseph, P. V., McGehee, S., Ouwerkerk, R., Raisinger, K., Rozga, I., Stagliano, M., Walter, M., Walter, P. J., Yang, S., & Zhou, M. 2019. Ultra-processed diets cause excess calorie intake and weight gain: an inpatient randomized controlled trial of ad libitum food intake. *Cell Metabolism*, 30(1), 67–77.e3.

Institute for Health Metrics and Evaluation. 2024. Global Burden of Disease Results Tool. Cardiovascular diseases, age-standardised death rates. IHME.

Institute of Food Technologists. 2026. Food Processing. IFT Food Processing Toolkit.

Isch, C., Dörr, T., Fasching, N., Jennings, G., & Watts, D. J. 2026. Quantifying the prevalence and impact of overreaching causal claims in social science. *Nature Human Behaviour*.

Lane, M. M., Gamage, E., Du, S., et al. 2024. Ultra-processed food exposure and adverse health outcomes: umbrella review of epidemiological meta-analyses. *BMJ*.

Medin, A. C., Gulowsen, S. R., Løvhaug, A. L., Carlsen, M. H., Terragni, L., & Varela, P. 2025. Definitions of ultra-processed foods beyond NOVA: a systematic review and evaluation. *Food & Nutrition Research*, 69.

Mertens, E., Colizzi, C., & Peñalvo, J. L. 2022. Ultra-processed food consumption in adults across Europe. *European Journal of Nutrition*, 61, 1521–1539.

Monteiro, C. A., Levy, R. B., Claro, R. M., Castro, I. R. R. de, & Cannon, G. 2010. A new classification of foods based on the extent and purpose of their processing. *Cadernos de Saúde Pública*, 26(11), 2039–2049.

Monteiro, C. A., Cannon, G., Moubarac, J.-C., Levy, R. B., Louzada, M. L. C., & Jaime, P. C. 2017. The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing. *Public Health Nutrition*, 21(1), 5–17.

Monteiro, C. A., Cannon, G., Levy, R. B., Moubarac, J.-C., Louzada, M. L. C., Rauber, F., Khandpur, N., Cediel,

- G., Neri, D., Martinez-Steele, E., Baraldi, L. G., & Jaime, P. C. 2019. Ultra-processed foods: what they are and how to identify them. *Public Health Nutrition*, 22(5), 936–941.
- Organisation for Economic Co-operation and Development, & European Commission. 2024. Health at a Glance: Europe 2024. State of Health in the EU Cycle. OECD Publishing.
- Pan American Health Organization. 2015. Ultra-processed food and drink products in Latin America: Trends, impact on obesity, policy implications. PAHO.
- Pan American Health Organization. 2019. Ultra-processed food and drink products in Latin America: Sales, sources, nutrient profiles, and policy implications. PAHO.
- Scientific Advisory Committee on Nutrition. 2023. Statement on processed foods and health. SACN.
- Scientific Advisory Committee on Nutrition. 2025. Processed foods and health: rapid evidence update. SACN.
- U.S. Food and Drug Administration. 2024. Food Additives and GRAS Ingredients – Information for Consumers. FDA.
- U.S. Food and Drug Administration and U.S. Department of Agriculture. 2025. Ultra-Processed Foods; Request for Information. Federal Register, 25 July 2025.
- U.S. Department of Health and Human Services, U.S. Food and Drug Administration, & U.S. Department of Agriculture. 2025. HHS, FDA and USDA Address the Health Risks of Ultra-Processed Foods. Press announcement, 23 July 2025.
- Visioli, F., Marangoni, F., Fogliano, V., Del Rio, D., Martinez, J. A., Kuhnle, G., Buttriss, J., Da Costa Ribeiro, H., Bier, D., & Poli, A. 2023. The ultra-processed foods hypothesis: a product processed well beyond the basic ingredients in the package. *Nutrition Research Reviews*, 36(2), 340–350.
- Visioli, F., Del Rio, D., Fogliano, V., Marangoni, F., Ricci, C., & Poli, A. 2025. Ultra-processed foods and health: are we correctly interpreting the available evidence? *European Journal of Clinical Nutrition*.
- World Health Organization. 2025a. Obesity and overweight. Fact sheet. WHO.
- World Health Organization. 2025b. Noncommunicable diseases. Fact sheet. WHO.
- Zohar, I., Alperson-Afil, N., Goren-Inbar, N., et al. 2022. Evidence for the cooking of fish 780,000 years ago at Gesher Benot Ya'aqov, Israel. *Nature Ecology & Evolution*, 6, 2016–2028.