

An Analysis of the Economic Effects of a Federal Ultra-Processed Food Label

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Abstract

This paper evaluates the economic effects of federally mandating ultra-processed food (UPF) labeling. In August 2026, HHS and FDA forwarded a white paper to OMB for review on classifying ultra-processed foods. A federal definition could anchor a front-of-package label, restrict what federal and state benefits can offer, or supply the classification that pending litigation lacks. We focus on labeling because it is the most discussed use, including Secretary Kennedy, who has said front-of-package labeling would follow as soon as the definition is published, and because it has the richest evidence base. We apply the Healthy Eating Research definition published in May 2026 as the benchmark for a potential UPF definition. We then use the evidence base to estimate costs to industry and consumers, using the USDA Global Branded Food Products Database to identify which products meet the definition. We find that a UPF labeling mandate would capture 72% of in-scope packaged products and 51% of food-at-home spending. We estimate an additional annual cost of \$14.2 billion, or 142 times the \$100 million threshold that OMB uses to define economically significant actions. This cost would be recovered through food prices, whether or not a given food meets the UPF definition. This cost consists of \$9.5 billion a year to reformulate captured products, \$4.5 billion a year in higher ingredient costs for the reformulated products, and \$0.2 billion a year for classification, relabeling, and federal administration. Separately, we analyze the effects on suppliers and find that UPF labeling would cost domestic agriculture \$1.0 billion a year in lost revenue while increasing food imports by \$7.7 to 9.7 billion a year. These estimates are lower bounds. A UPF definition would likely raise industry costs further through food programs and litigation. The analysis also highlights the limits of assessing only the costs counted under the Paperwork Reduction Act. The underlying core problem is that there is no clear relationship between processing and nutritiousness. Ultra-processed describes a production process, not a food's healthiness. Consumer protection regulations like those intended for UPF are often well-intentioned but, because regulators lack an understanding of the regulated industry, often harm consumers. This could mean UPF regulations raise the cost of eating well while regulators claim a public health victory.

Section 1: Introduction

On August 3, 2026, the Department of Health and Human Services and the Food and Drug Administration sent the Office of Management and Budget a proposed federal definition of ultra-processed foods (UPFs). The document was filed as a white paper (RIN 0910-ZD60) rather than a proposed rule and therefore carries no comment period, no regulatory impact analysis, and, as of this writing, no published text. It argues that a definition is not an economically significant action under Executive Order 12866, which sets the economic-significance threshold at \$100 million in annual effect on the economy.

A federal definition could serve several purposes, and its cost depends on the use. It could anchor a mandatory front-of-package label, determine which products federal nutrition programs such as SNAP will pay for, or supply the official classification that pending litigation against manufacturers has so far lacked. We focus on labeling because it is the most discussed use. Secretary Kennedy has said that front-of-package labeling, possibly in a traffic-light format, would follow as soon as the definition is published, in a March 2026 podcast interview and again in June 2026 remarks to the International Fresh Produce Association, and he has also pointed to the definition as a basis for restricting what SNAP benefits can buy (Kennedy, 2026). The agencies' July 2025 Request for Information likewise asked what a definition would imply for labeling and for nutrition programs. Labeling also has the richest evidence base: four U.S. labeling rules include regulatory impact analyses, and front-of-package labels in Chile, Ecuador, and Mexico have been evaluated for their effects on demand, reformulation, and prices. Section 7 returns to program eligibility and litigation, under either of which costs would exceed the estimates here, because reformulation would become a condition of market access rather than a response to lost sales.

This paper estimates the full economic cost of a federally mandated UPF label, not only the narrower paperwork costs counted under the Paperwork Reduction Act. Our main finding is that labeling would cost \$14.2 billion annually, or 142 times the threshold for an economically significant policy. That cost has three parts. Reformulating captured products to remove marker ingredients costs \$9.5 billion a year. The substitute ingredients used in the reformulated products add \$4.5 billion a year in recurring costs. Classification, relabeling, and federal administration, the only costs a Paperwork Reduction Act analysis would count, add \$0.2 billion a year. Separately from the \$14.2 billion, we analyze the effects on suppliers and find that UPF labeling would cause \$1.0 billion a year in lost revenue for domestic agriculture, while increasing food imports by \$7.7 to 9.7 billion a year. Of the \$14.2 billion, \$8.1 billion reaches consumers through higher prices, or \$60 per household, and the consumer loss rises to \$9.8 billion if firms let product quality fall rather than pay for substitute ingredients. We report the import shift and the farm revenue loss alongside the \$14.2 billion rather than adding them, because the first is a shift in spending and the second is a transfer to other suppliers that the ingredient premium already counts.

In our analysis, we first classify the U.S. packaged food supply by whether each product fits a UPF definition. Without federal text, we use the definition in the May 2026 Healthy Eating Research report. We apply its sixteen ingredient-marker classes to the 462,719 products in the USDA Global Branded Food Products Database and weigh the result by household consumption. We find that 72% of in-scope packaged products and 51% of food-at-home spending would be classified as UPF.

We derive our cost estimates for this broad definition from evidence on what comparable policies have cost and produced, domestically from four federal labeling rules and internationally from Chile, Mexico, and Ecuador. Chile’s labeling experience is particularly useful for separating the demand, reformulation, and pricing effects that a mandated label would cause. Compared with our estimates, the costs counted under the Paperwork Reduction Act account for 1.4% of the domestic burden, because they ignore the demand- and supply-side effects of a mandate.

Section 2: UPF Categorization

Because no federal text has been published, we classify the U.S. packaged food supply product by product, at the level of the UPC (the barcode that identifies each item), using the definition in the May 2026 Healthy Eating Research (HER) report, *Ultra Processed Foods in the U.S.: Recommended Definitions and Policies* (Lott et al., 2026). Under the HER definition, a product is ultra-processed if its ingredient list contains at least one “marker” ingredient. Markers fall into two groups. The first is cosmetic additives in 13 functional classes (flavors, flavor enhancers, colors, non-sugar sweeteners, emulsifiers, emulsifying salts, thickeners, and bulking, gelling, glazing, anti-foaming, foaming, and carbonating agents). The second is non-culinary ingredients, meaning industrial carbohydrates, modified fats, and industrial proteins. Vitamins and minerals, herbs and spices, and yeast are not markers. We exclude products without a Nutrition Facts panel, culinary ingredients, and medical foods. The definition matches NOVA group 4, the ultra-processed category in the most widely used food-processing classification.

We apply this rule to the USDA Global Branded Food Products Database (bulk file of April 30, 2026). The database contains 462,719 products, of which 449,877 are in scope for classification. Excluded products include alcoholic beverages (2,948), pet food (5,112), dietary supplements (489), infant formula (139), records with no ingredient list (2,374), and single-ingredient culinary items (1,780). An ingredient list does not show how a product was made, so where an ingredient name is ambiguous, we follow HER’s rules for interpreting it. To check for errors, we reviewed the 33,137 products classified as not ultra-processed that have eight or more ingredients. The likely misclassifications we found (for example, lemon and lime juice concentrate, tapioca syrup, and MCT powder) amount to well under one percent of all products.

When we apply the definition to the USDA database, 72.3% of in-scope products (325,240) are classified as ultra-processed. This matches the share HER found when it applied the same definition to the Mintel food products database. The two results differ slightly in some categories but are consistent overall.¹ Some categories are almost entirely ultra-processed: 92–99.8% of confectionery, desserts, baked sweets, soda, pasta dinners, and frozen appetizers. The least affected categories are rice (7%), frozen vegetables (11%), and canned vegetables.

Because a single marker ingredient is enough, the definition reaches well beyond candy and snacks into products that consumers, retailers, and program administrators would not expect to see labeled ultra-processed. One ingredient is enough to capture chocolate and other flavored milks (carrageenan or natural flavor), yogurts, including plain yogurts thickened with pectin or gelatin, and even sparkling water with

¹ Cosmetic-only 69.2% (HER 71); flavors/colors/sweeteners 58.7% (57); 14-item state list 13.6% (9); 47-item list 18.6% (12). Share of full-definition UPFs captured by each variant: 95.7% / 81.2% / 18.5% / 25.4% (HER 98 / 79 / 13 / 17). 17% of UPFs carry a single marker (HER 18%). The classifier reproduces HER's ordering, capture ratios, and marker structure on an independent database five times Mintel's size.

natural flavor. As a result, the definition covers much of what the dairy, juice, bread, and cereal aisles sell as healthy. This is why it reaches 51% of food-at-home spending (Section 4.5), and why the reformulation and price effects estimated below are not limited to what consumers consider junk food.

The USDA database is larger than the Mintel database used by HER, but both underrepresent store-brand (private label) products and cover roughly half to two-thirds of the products in FDA's UPC universe. Our analysis shares that limitation.

Section 3: Direct Compliance Costs

This section reviews what earlier labeling rules cost and what they achieved. Section 3.1 draws on regulatory impact analyses of four U.S. food-labeling rules, which provide the per-product compliance costs we use in Section 4. Section 3.2 reviews front-of-package labeling in Chile, Ecuador, and Mexico, showing how consumers and firms respond to a label.

3.1 U.S. food-labeling regulation costs

Every major U.S. labeling rule includes a regulatory impact analysis (RIA) based on FDA's Labeling Cost Model (RTI International, 2015). The model measures costs per product, or stock-keeping unit (SKU), and identifies each product by its UPC. It also separates label changes timed to coincide with a scheduled package redesign ("coordinated") from those that are not, because coordinated changes are far cheaper. We use the same per-product unit, so the figures below apply directly to the 325,000 UPCs captured in Section 2.

3.1.1 Nutrition Facts revision (81 FR 33742)

FDA published the final rule revising the Nutrition Facts panel in May 2016, adding a line for added sugars, updating serving sizes and daily values, and changing the format (FDA, 2016). It applies to every packaged food required to carry nutrition labeling, about 760,000 UPCs in FDA's cost model. The original July 2018 compliance date was extended to January 1, 2020, for manufacturers with \$10 million or more in annual food sales and to January 1, 2021, for smaller manufacturers (FDA, 2018).

The preliminary analysis priced a label change at about \$6,188 per UPC when it was not coordinated with a scheduled redesign and about \$367 per UPC when it was (FDA, 2014a). The final analysis put annualized costs at \$0.2–0.8 billion per year (FDA, 2016). Most of that range comes from the assumed share of coordinated changes, which is the most important single assumption in every later labeling RIA.

3.1.2 Menu labeling (79 FR 71156)

The final rule requiring calorie declarations on menus and menu boards for restaurants and similar retail food establishments with 20 or more locations was published on December 1, 2014 (FDA, 2014b). It covers about 298,600 establishments in 2,130 chains. Compliance, originally due in December 2015, was extended until May 7, 2018.

FDA estimated initial costs of \$388 million and recurring costs of \$55 million per year. Annualized over 20 years, this is \$77 million per year at a 3% discount rate (range \$47–107 million) and \$85 million at 7%, with present values of \$1.17 billion and \$0.93 billion. Unit costs included \$280–1,030 per menu item for nutrition analysis, about \$3,700 per chain for menu-board redesign, and about \$1,239 per establishment up front plus \$162 per year (FDA, 2014b).

3.1.3 Bioengineered food disclosure (83 FR 65814)

USDA's Agricultural Marketing Service published the final rule implementing the 2016 National Bioengineered Food Disclosure Standard on December 21, 2018, with mandatory compliance on January 1, 2022, and a label use-up allowance (USDA AMS, 2018). The rule requires disclosure by text, symbol, digital link, or text message on foods containing detectable modified genetic material and exempts manufacturers with receipts under \$2.5 million.

USDA estimated one-time costs of \$570 million to \$3.9 billion and ongoing costs of \$52–118 million per year, or \$70–235 million per year annualized at 3% and \$92–392 million at 7% in perpetuity. Most of the one-time cost (\$401 million to \$3.1 billion, or 70 to 80% of the total) came not from relabeling but from manufacturers determining whether each product was covered. USDA assumed it had to check all 760,000 UPCs, whether or not a label resulted, at \$376–3,084 per UPC for simple determinations and \$811–6,106 for more complex ones. Relabeling itself cost only \$55–155 million for about 190,000 labeled food UPCs (about \$290–815 per label), because firms could use up existing labels over 36 months and fold the change into scheduled redesigns. USDA priced the same relabeling under Vermont's 12-month window at \$1.5–3.6 billion, 23 to 27 times more. This gap drives the coordination sensitivity in Section 4. USDA measured coverage with ingredient-level data from Label Insight (about 440,000 UPCs): 65% of food products contained a triggering ingredient, and about 25% were assumed to need a label after exemptions and testing. Sourcing non-bioengineered ingredients carried an 8% premium for keeping supplies separate, applied to 20% of labeled products, and testing for modified DNA cost \$153–431 per ingredient. Costs never exceeded 1% of revenue for any firm size, and the agency certified that the rule had no significant impact on small businesses (USDA AMS, 2018). In October 2025, after industry had already paid to comply, the Ninth Circuit held the rule's detectability exclusion and digital-disclosure provisions unlawful and ordered them vacated going forward (*Natural Grocers v. Rollins*, 2025).

3.1.4 Front-of-package nutrition labeling (90 FR 5426)

FDA proposed a mandatory front-of-package “Nutrition Info box” rating saturated fat, sodium, and added sugars as low, medium, or high on January 16, 2025. The proposed rule covers most packaged foods that carry a Nutrition Facts panel (about 322,000 UPCs), with compliance three years after a final rule for firms with \$10 million or more in food sales and four years for smaller firms (FDA, 2025). The rule is still pending.

The preliminary analysis estimated \$105 million per year in relabeling and \$227 million per year in reformulation, for a total of \$333 million per year (range \$191–530 million). That is \$1,033 per UPC per year including reformulation and \$326 without it. FDA priced reformulation at \$1 million per formula and assumed it for only 2,187 UPCs (0.68% of those covered), the products within 1% of a nutrient cutoff (FDA, 2025). The Small Business Administration's Office of Advocacy reported that stakeholders expect \$4,000–8,000 per label, based on Canada's front-of-package regime. It estimated that 96% of affected firms are small and that 20% would face costs above 3% of receipts, and it recommended that FDA withdraw the rule (SBA Office of Advocacy, 2025).

All four analyses count the cost of relabeling and administrative review, but none estimates the effect on consumer prices. FDA says only that costs “may” be passed through. Only the front-of-package analysis includes reformulation, and its rate is based on products near a nutrient cutoff.

3.2 International evidence on food labeling

No U.S. labeling rule has been evaluated for its effects on demand, reformulation, or prices. However, researchers have evaluated front-of-package labels in three Latin American countries. None of them is a UPF definition, but together they show separately how consumers, manufacturers, and prices respond to a label. We use this evidence to identify those responses and bound our model's parameters, not to directly predict U.S. outcomes.

3.2.1 Chile

Chile's Law 20.606, in force from June 2016, requires a black octagonal "ALTO EN" ("high in") warning on foods with calories, sugars, saturated fat, or sodium above set limits per 100 g or mL. The limits tightened over three phases (for sugars, from >22.5 g to >10 g per 100 g). The law also bans marketing labeled products to children and selling them in schools. Purchases of beverages carrying the warning fell 24%, and purchases of labeled products fell 26% relative to unlabeled ones (Taillie et al., 2020, 2021; Barahona, Otero & Otero, 2023). The drop was 40% among consumers who wrongly believed a product was healthy, and small and temporary among those who already knew it was not. The label worked mainly by correcting mistaken beliefs, not by adding information for consumers who were already informed. Sugar and calorie intake fell by 9% and 7%, respectively. On the supply side, the share of products above at least one limit fell from 51% to 44% (Reyes et al., 2020). This 7-point decline is a change in the mix of products on the shelf, not a direct measure of how many products were reformulated. Firms reformulated to just below the limits and adjusted prices at the same time (Barahona et al., 2023). Prices of labeled products did not change significantly relative to unlabeled products in the first 18 months, based on a price index of about 2,500 households' purchases (Paraje et al., 2023). A structural model found that unlabeled products rose 5.5% in price relative to labeled ones, with a small overall price effect and a net consumer gain of 1.8% of food spending (Barahona et al., 2023). Employment and real wages in food manufacturing did not change over 2016–19 (Paraje et al., 2022).

3.2.2 Ecuador

Ecuador phased in RTE INEN 022 from August to November 2014. The policy requires a front-of-package "traffic light" label grading each product's sugar, fat, and salt content. Purchases of carbonated soft drinks, including high-sugar ones, did not fall in the first year, and lower-income households spent more on soft drinks (Sandoval, Carpio & Sanchez-Plata, 2019). A later study of the same label found per-capita soft-drink consumption unchanged (−0.003 liters per month against a baseline of 1.678), while the sugar content of carbonated beverages fell (Peñaherrera et al., 2018). Consumers recognized and understood the label but acted on it only if they were already health-conscious. Ecuador shows two things: demand changes with how a label is presented, not just what it covers, and firms reformulate in anticipation of a label even when sales do not fall.

3.2.3 Mexico

Mexico's NOM-051, in force from October 1, 2020, places black octagonal warning seals on foods high in calories, sugars, saturated fat, trans fat, or sodium, with additional warnings for caffeine and non-caloric sweeteners and a ban on cartoon characters on sealed products. Reformulation was larger than in Chile and varied by category. The share of products above the sodium limit fell by up to 63 percentage points (bread and cereals), above the saturated-fat limit by up to 26 points (salty snacks), and containing non-caloric sweeteners by up to 29 points (solid dairy). The share of instant foods carrying any seal fell from 78% to 53% (Salgado et al., 2025). A national sales study attributes 90% of the resulting calorie reduction to reformulation rather than to consumers switching products (Garduño-Alanis et al., 2026). No peer-reviewed study of Mexico's price effects exists, and the October 2020 start date coincides with the pandemic and the 2021–22 global food-price surge, making it hard to isolate.

Section 4: Compliance Costs and Food Prices

This section estimates the total annual cost of the HER definition and its effect on food prices. We first explain how we adjust the international evidence to the U.S. definition and choose the reformulation rate (4.1), then estimate costs (4.2), the price increase on captured products (4.3), price spillovers to products that are not captured (4.4), the share of household food spending affected (4.5), and the combined effect on inflation (4.6). Section 4.7 summarizes. We spread one-time costs over ten years at a 3% discount rate, in current dollars.

4.1 Adjusting the evidence to the U.S. definition

The largest cost driver is the share of captured products that manufacturers reformulate, which we call r . Reformulation cost equals $r \times F \times c_R$, where F is the number of captured formulas (recipes), and c_R is the cost per formula (Section 4.2). We take r from Chile and Mexico, measured as the share of flagged products that stop being flagged. Both countries' warning labels flagged a smaller share of the market than the HER definition (51% of products in Chile and 63% in Mexico, against 72% here), and a product could avoid the warning by changing a single nutrient.

Two differences between these countries and the U.S. definition pull the rate in opposite directions. First, broader coverage lowers the payoff from reformulating. In Chile, a flagged product lost sales because consumers switched to a similar unflagged product, and the loss was largest when the warning corrected a belief that the product was healthy (Barahona, Otero & Otero, 2023). When 72% of the shelf is flagged, the nearest alternative to a captured bread, yogurt, or cereal is usually another captured product, and a label that most products carry tells consumers less. Ecuador, whose label covered a large share of packaged foods, is the closest example: consumers understood the label but did not change what they bought (Sandoval, Carpio & Sanchez-Plata, 2019), yet the sugar content of carbonated beverages still fell (Peñaherrera et al., 2018). Sales losses per formula under a U.S. definition should therefore be smaller than in Chile, which lowers the reformulation rate. Second, a product captured under the HER definition typically has several marker ingredients to remove, which raises the cost of each reformulation.

We therefore evaluate the cost model at three observed values of r : 0.26 in Chile after full implementation, 0.14 in Chile's first phase, and 0.12 in Mexico's first year. We use 0.26 as our main estimate for three reasons. First, it is the only observed rate that covers the ten-year period over which we spread costs; the first-year rates measure only the initial response, and Chile's flagged share kept falling in later phases. Second, at FDA's cost per formula, only high-sales products are worth reformulating (Section 5.2), and the 0.26 rate measures best-selling products, which also dominate the sales-weighted ingredient premium and price effects. Third, under an eligibility rule, such as restricting what SNAP benefits can buy, the sales at stake are program sales rather than a consumer response to a label, which removes the reason to expect a lower rate than Chile's. We report first-year results alongside the main estimate.

4.2 Total annual cost

This section adds up the annual cost of the definition, combining the number of captured products from Section 2 with the unit costs from the labeling rules in Section 3.

Section 2 identifies 325,000 captured UPCs (72.3% of the 449,877 in scope). Using the 0.8 formulas per UPC assumption in FDA's front-of-package analysis (FDA, 2025), this is $F = 260,000$ formulas. These

products account for \$430bn of retail sales, 51% of the CEX household food-at-home total of \$845bn (Section 4.5); on the broader ERS total of ≈\$1.0tn, the captured base is about \$510bn, and Table C3 reports consumer costs on that base in brackets. The same base is used for the price calculation, the consumer cost in dollars, and the demand-side terms of Section 5. Equation 4.1 combines these counts with the per-product and per-formula costs from the labeling rules in Section 3.

$$C = N_{scope} \cdot \kappa \cdot c_A + N_{cap} \cdot c_L + r \cdot F \cdot \kappa \cdot c_R + G + m \cdot r \cdot S \quad (4.1)$$

Variables in Equation 4.1

C = total annual cost of the definition

N_{scope} = *in-scope* UPCs (449,877), each of which must be checked for coverage; N_{cap} = *captured* UPCs (325,000), each of which is relabeled

c_A = one-time cost per UPC of determining coverage, including legal review (\$1,500; \$376 to \$3,084)

c_L = relabeling cost per UPC (\$326 per year when coordinated with a scheduled redesign; \$6,000 to 8,000 when not)

κ = capital-recovery factor, which converts a one-time cost into an equal annual payment (0.1172: ten years at 3%)

r = reformulated share of captured formulas (0.26; 0.12 and 0.14 at the first-year rates)

F = captured formulas (about 260,000, at 0.8 formulas per UPC)

c_R = one-time reformulation cost per formula (\$1.2 million; \$0.58 to 2.2 million)

G = federal administration and enforcement (\$20 million a year; \$10 to 30 million)

m = recurring ingredient premium on reformulated products (4% of sales; 3 to 5%)

S = retail sales of captured products (\$430 billion on the CEX base; \$510 billion on the ERS base)

Equation 4.1. The five terms are cost lines A to E in Appendix C Table C1: coverage determination on all in-scope UPCs (A), relabeling of captured UPCs (B), reformulation (C), federal administration (D), and the recurring ingredient premium (E). Appendix B, Table B1, gives the source and range for each input.

Cost per formula. We price reformulation using the FDA’s Reformulation Cost Model, as the FDA did in its front-of-package analysis. The model puts the cost at about \$1 million per formula, ranging from \$0.93 to \$1.51 million by food category (low estimates \$0.45 to \$0.72 million; high estimates \$1.67 to \$2.71 million). Weighted by FDA UPC counts across its ten categories, the central estimate is \$1.2 million, the low is \$0.58 million, and the high is \$2.2 million (FDA, 2025). The model covers project management, recipe development, and production process changes. It assumes a major ingredient is replaced and excludes the recurring cost of the new ingredient, so the ingredient premium (line E) is a separate cost, not a double count. Because the model already assumes a major ingredient is replaced, we do not scale costs up for the several markers a captured product typically contains. We annualize at 3% ($\kappa = 0.1172$), which yields an annual cost 5.3% higher than the FDA’s 2% rate. In short, Chile shows how many flagged products get reformulated, and FDA shows what each reformulation costs.

At full implementation, the definition costs \$14.2 billion a year: \$9.5 billion for reformulation, \$4.5 billion for the ingredient premium, and \$0.2 billion for coverage determination, relabeling, and federal administration. At the first-year rates, the total is \$6.7 to 7.7 billion.

Total cost exceeds the \$100 million threshold at every observed reformulation rate, by a factor of 67 to 77 at the first-year rates and 142 at full implementation, and stays far above it at FDA's low cost per formula (\$9.3 billion in total, \$6.0 billion of it passed to consumers) and even at the 0.7% reformulation rate FDA assumed for its own front-of-package rule (\$0.57 billion, against the \$333 million at which FDA found that rule economically significant).

4.3 Price increase on captured products

This section converts the costs in Section 4.2 into price increases on the products the definition captures.

$$g_c = \theta_F \cdot \frac{A_c + B_c + C_c^{R\&D}}{S_c} + \theta_M \cdot m_c \cdot r_c; \quad \frac{\Delta P}{P} = \sum_c s_c \cdot \omega_c \cdot g_c \quad (4.2)$$

Variables in Equation 4.2

g_c = percentage price increase on captured products in category c

θ_F = share of fixed costs passed on to consumers (0.35; 0 to 0.70)

$A_c, B_c, C_c^{R\&D}$ = annualized coverage-determination, relabeling, and reformulation costs in category c (lines A to C of Equation 4.1)

S_c = captured sales in category c

θ_M = share of the recurring ingredient premium passed on to consumers (0.70; 0.45 to 1.00)

m_c = ingredient premium on reformulated products (4%; 3 to 5%)

r_c = reformulated share in category c (0.26; 0.12 and 0.14 at the first-year rates)

s_c = captured share of spending in category c (Section 2)

ω_c = category c's share of food-at-home spending (BLS CEX, 2024)

$\Delta P/P$ = percentage change in the food-at-home price level

g_c has two parts. The first is the fixed compliance cost per dollar of sales, of which only part is passed on, because fixed costs are recovered slowly. The second is the recurring ingredient premium m_c on the reformulated share, which is passed on at the higher marginal-cost rate. The effect on the grocery basket as a whole weights each category by its captured share s_c and its share of spending ω_c . Appendix B, Table B2, gives the source for each input.

At full implementation, prices of captured products rise 1.52% (0.71 to 0.82% at the first-year rates): 0.77% from reformulation costs, 0.73% from the ingredient premium, and only 0.015% from coverage determination and relabeling (Table C2).

4.4 Price spillovers to products not captured

Products the definition does not capture can also become more expensive, as consumers switch toward them.

Equation 4.2 covers only captured products. Equation 4.3 adds the price change on the uncaptured share of spending:

$$\frac{\Delta P}{P} = \sum_c s_c \cdot \omega_c \cdot g_c + \sum_c (1 - s_c) \cdot \omega_c \cdot g_{N,c} \quad (4.3)$$

Variables in Equation 4.3

$g_{N,c}$ = price change on uncaptured products in category c , set at a share ρ_N of g_c between 0 and 0.5 (0.25 central)

All other variables are as in Equation 4.2.

$g_{N,c}$ is bounded by the soda-tax evidence. In Berkeley, the tax reduced sales of taxed beverages by 9.6%, while sales of untaxed beverages rose 3.5% (water 15.6%, untaxed fruit, vegetable and tea drinks 4.4%, plain milk 0.6%) (Silver et al., 2017). In Philadelphia, purchases of taxed beverages fell 46%, but more than half of the drop was offset by shopping outside the city within six miles, with no significant switch to bottled water and only modest switching to natural juices (Seiler, Tuchman & Yao, 2021). In Mexico, purchases of taxed beverages fell 6% in the first year and 8.7% by the second, while untaxed beverages rose 4% and bottled water 5 to 16% (Colchero et al., 2016, 2017).

Unlike studies of local taxes, we do not reduce the spillover or the cost estimates for avoidance. Local soda taxes were avoided mainly by shopping elsewhere: Berkeley's tax raised prices by only 43% of the tax, and less so near untaxed stores (Cawley & Frisvold, 2017). A federal definition leaves no border to shop across. Chile is the closer comparison: consumers switched to unlabeled products, whose prices rose 5.5% relative to labeled ones (Barahona, Otero & Otero, 2023). Under a definition covering 72% of the shelf, far fewer unlabeled alternatives exist, and lower-income households, which spend more of their budget on captured products, have the fewest. The spillover covers only uncaptured substitutes; complements of captured products, whose prices, if anything, fall slightly, enter the welfare discussion in Section 5.

The upper bound comes from Philadelphia, where untaxed beverage prices rose 0.76 cents per ounce against 1.56 cents for taxed beverages, about half the taxed increase (Cawley et al., 2018). A city tax invites store-wide repricing, and a definition carries no tax, so we use a range of 0 to 0.5 of the captured-product price change, with 0.25 as the central value. Chile's result falls within this range (Barahona, Otero & Otero, 2023).

At the central value, the spillover adds 0.19 percentage points to the food-at-home price level (0 to 0.37 across the range; Tables C2 and C3), so our conclusions do not depend on it.

4.5 Share of household food spending affected

Section 2 reports coverage as a share of products. What households experience depends on how much they spend on each product, so we re-weight the category coverage from Section 2 by the food-at-home spending shares in the BLS Consumer Expenditure Survey (CEX) for 2024. We assign each CEX category the coverage of the database categories within it, weighted by their approximate share of spending in that category (Appendix B Table B3). Weighted by spending, the definition captures 51% of food-at-home spending (± 5 points depending on how categories are matched), or \$430bn of the CEX household total and \$510bn of the broader ERS total, compared with 72% of products by count.

4.6 Combined effect on food prices and inflation

$$\pi_{FAH} = \bar{s} \cdot g_U + (1 - \bar{s}) \cdot \rho_N \cdot g_U; \quad \pi_{food} = \varphi_{FAH} \cdot \pi_{FAH}; \quad \pi_{CPI} = w_{FAH} \cdot \pi_{FAH}; \quad \Delta \text{inflation per year} = \frac{\pi}{T_p} \quad (4.4)$$

Equation 4.4 combines the results of this section into one effect on price levels and inflation. π_{FAH} is the one-time increase in the food-at-home price level. It equals the price change on captured products g_U from Equation 4.2, multiplied by the share of spending captured, $\bar{s} = 0.51$ (Section 4.5), plus the spillover from Equation 4.3 on the uncaptured share (Table C3). π_{food} converts this to the CPI food index using φ_{FAH} , food at home's share of food in the CPI (≈ 0.60 ; food at home is $\approx 8.1\%$ and total food $\approx 13.6\%$ of the CPI-U basket, BLS relative importance, Dec. 2024). π_{CPI} converts it to the all-items CPI using $w_{FAH} \approx 0.081$. Because relabeling and reformulation occur over the compliance period, we spread the level effect over $T_p = 3$ years (2–4) to get the annual inflation rate addition. The recurring ingredient premium continues after that.

Variables in Equation 4.4

$g_U = 1.52\%$ (0.71 to 0.82% at the first-year rates), the captured-category price change from Equation 4.2 (Table C2).

$\bar{s} = 0.51$, the share of food-at-home spending captured (Section 4.5).

$\rho_N = 0.25$, the repricing of uncaptured products as a share of g_U (Section 4.4), so that the second term of Equation 4.4 is the spillover on the uncaptured 49% of spending.

$\varphi_{FAH} = 0.60$, the food-at-home share of food in the CPI (food at home $\approx 8.1\%$ and total food $\approx 13.6\%$ of the CPI-U basket).

$w_{FAH} = 0.081$, the food-at-home weight in the all-items CPI-U (BLS relative importance, Dec. 2024).

$T_p = 3$ years, the compliance phase-in over which the level effect is spread.

Consumer cost in dollars applies π_{FAH} to the CEX food-at-home base of \$845bn; Table C3 shows the ERS base of $\approx \$1.0$ tn in brackets.

For comparison, food-at-home prices are rising 2.7% year over year, ERS forecasts 2.5% for 2026, and all-items CPI inflation is 3.4%. Including the spillover to uncaptured products (Section 4.4), the definition adds 0.32 percentage points to annual grocery inflation for three years, 12% of the current 2.7% rate. At the first-year reformulation rates, it adds 0.15 to 0.17 points to grocery inflation and 0.012 to 0.014 points to the all-items index. In dollars, consumers pay \$8.1bn more a year, \$60 per household. The increase is concentrated in captured categories, where prices rise 1.52%, compared with 0.96% across all food at home.

4.7 Summary

The HER definition would cost \$14.2 billion a year at full implementation (\$6.7 to 7.7 billion at the first-year rates), 142 times the economic significance threshold. At full implementation, the aggregate consumer cost burden is \$8.1 billion a year, \$60 per household. Prices of captured products rise 1.52%, and the food-at-home price level rises 0.96%, including spillovers, adding 0.32 percentage points a year to grocery inflation over three years.

Section 5: Demand Effects

Section 4 estimated how much more consumers pay. This section asks how consumers respond to a label, how well a label steers them toward healthier food, and what that implies for firms' decisions to reformulate. We review the evidence on how much purchases fall (5.1), explain why private incentives often do not line up with the policy's goals and calculate the sales loss at which reformulating pays off (5.2), estimate how much spending shifts toward imports (5.3), and compare two ways firms can absorb the cost of reformulating (5.4). We report the shift toward imports alongside the \$8.1 billion consumer price effect rather than adding it, because it is a shift in spending, not a cost. If firms keep ingredient costs unchanged and let product quality fall instead of paying for better substitutes, the consumer loss is \$9.8 billion.

5.1 How much labels change purchases

Labels have very different effects in different countries. A meta-analysis of 60 intervention studies with about two million observations across eleven countries finds wide variation, especially by region (Shangquan et al., 2019). Labeled products in Chile lost about 26% of sales relative to unlabeled ones, whereas Ecuador's label had almost no effect (Sandoval, Carpio & Sanchez-Plata, 2019). Graded labels change which products people choose within a category more than how much they buy. In a large randomized trial in French supermarkets, the Nutri-Score label raised purchases of products in the healthiest third of their category by 14% but did not change purchases of medium, low, or unlabeled products, and it improved the nutritional quality of the labeled basket by 2.5% (Dubois et al., 2021). The effects were larger where products within a category differed more in quality. Across three French randomized trials, the label improved purchase intentions in all income groups, but price remained the deciding factor for lower-income shoppers (Egnell et al., 2021).

U.S. evidence is the most mixed. Vermont's genetically-engineered (GE) label reduced sales of labeled soup by 5.9%, while non-GMO alternatives rose 2.5% (Stevens et al., 2022). Calorie posting on menus cut calories per Starbucks transaction by 6% (Bollinger, Leslie & Sorensen, 2011) and, on average, by about 18 kcal per restaurant order (Long et al., 2015), though several New York studies found no effect. Users of the Nutrition Facts label introduced under the NLEA gained less weight than non-users, but only among white women (Variyam & Cawley, 2006). New York menu labeling reduced BMI by about 0.4 kg/m² and obesity by 3 percentage points (Restrepo, 2017). Overall, purchases respond more strongly to labels in developing economies than in the U.S. or Europe because those labels are warnings, consumers' mistaken beliefs about products are larger, and food takes up more of the household budget. The U.S. evidence therefore points to a sales loss well below Chile's for any definition short of an eligibility rule.

5.2 Private incentives and public goals

These differences can be explained partly by the gap between private and public incentives. Consumers weigh health against price, taste, and convenience differently, and their choices often differ from policy goals, even when they have more information. This helps explain why U.S. labeling effects appear only in certain groups. Chile shows the same pattern. Labeled products lost about 26% of sales relative to unlabeled products, but the loss was concentrated among consumers who believed the product was healthy (−40%) and was small and temporary among those who already knew it was not (Barahona, Otero & Otero, 2023).

Firms face the same gap. For a firm, the payoff from reformulating is the sales it recovers, so it will remove whichever marker is cheapest to remove and will do so only where the label costs it enough in sales. The public payoff is better health, which depends on whether the ingredient removed actually matters for health and whether consumers respond to the label.

So if consumers valued the absence of these ingredients enough to pay the higher prices the definition implies, firms would already sell such products. The soda-tax evidence shows consumers switching to water rather than paying more for the same drink, and the Nutri-Score evidence shows them trading up within a

category only when a grade makes the comparison easy. The case for a definition is that consumers cannot tell from the ingredient list how a food was processed. Processing is a “credence” attribute, one that buyers cannot verify even after purchase, so voluntary disclosure by firms cannot be relied on to reveal it (Ippolito & Mathios, 1990; Dranove & Jin, 2010). That is a genuine market failure. But it means any benefit of the definition depends on consumers changing what they buy, and Section 5.1 shows that this response is weak and inconsistent in the U.S.

We can measure when reformulation pays off for a firm. A firm reformulates a product when the profit it expects to lose from being labeled exceeds the annual cost of reformulating:

$$\lambda_* = \frac{\kappa \cdot c_R}{R_f \cdot \mu} \quad (5.1)$$

Variables in Equation 5.1

R_f = annual revenue per captured formula (\$1.65 million: \$430 billion over 260,000 formulas),

μ = the net margin of food processors (7.4%, the figure the bioengineered-disclosure analysis adopts from Damodaran; USDA AMS, 2018)

κ is the capital-recovery factor (0.117)

c_R is the cost per formula from Section 4.2. Profit at risk is therefore \$122,400 per formula per year.

The break-even sales loss λ_* is 14% at $c_R = \$150,000$ per formula, 48% at \$500,000, and 115% at FDA’s \$1.2 million. At FDA’s cost, a product with average sales would never be reformulated for sales reasons alone. Reformulation pays off only for products with sales well above average, which is why Chile’s exits were concentrated among best-sellers, and why we expect reformulation under a U.S. definition to concentrate in high-volume products and in products consumers think of as healthy. At a \$500,000 cost, the break-even loss of 48% exceeds both Chile’s overall sales loss of 26% and the 40% loss for products consumers believed were healthy, so the observed Chilean exits cannot be explained by the demand response at average revenue; they are concentrated in best-selling products whose revenue is a multiple of the average. The pooled U.S. and European effects (−6.6% on calories, −13% on choosing “unhealthy” options; Shangguan et al., 2019) are below the break-even at any cost above the low end seen for trans-fat (PHO) reformulation.

Sections 5.3 and 6 need a single estimate of the U.S. sales loss, λ . We build it by applying the literature values to category-level captured spending, using the Section 4.5 spending weights. Roughly 15% of captured spending is in categories consumers think of as healthy (bread, cereal, yogurt, bars), where Chile’s −26% to −40% applies. About 45% is in categories consumers already see as unhealthy (confectionery, soda, snacks, desserts), where the response is close to zero. The remaining 40% falls in between, where we use the pooled −13% for “unhealthy” options. Weighted together, λ is about −9% (range −6% to −12%) for a warning-type label, about zero for a definition with no label attached (as in Ecuador), and, for an eligibility rule, −100% within the program and close to zero outside it. The −9% is one-third of Chile’s loss, consistent with the U.S. evidence in 5.1 and the break-even analysis above.

5.3 Shift from domestic to imported food

A UPF definition would also shift spending toward imports. Direct imports account for 15% of the \$2.92 trillion Americans spent on food and beverages in 2023. The other 85% comes from the domestic supply chain, with an additional 4% from imported inputs (USDA ERS Food Dollar Series, 2025). Imports are concentrated in foods the definition does not capture. 59% of fresh fruit and 35% of fresh vegetables available in the U.S. are imported (USDA ERS, 2024), as is 80 to 92% of edible seafood (FDA, 2022;

NOAA). Packaged and processed foods, by contrast, are mostly made in the U.S. Applying ERS import shares by category to the Section 4.5 spending weights, about 5 to 10% of captured spending is directly imported, compared with roughly 25 to 35% of uncaptured spending, which is dominated by fresh produce, seafood, and meat.

When consumers buy fewer captured products and more uncaptured ones, spending moves toward the more import-intensive part of the basket:

$$\Delta M = \lambda \cdot S_U \cdot (m_N - m_U) \quad (5.2)$$

Variables in Equation 5.2

S_U = captured food-at-home spending (\$430 billion on the CEX base)

λ = sales loss on captured products, entered as a positive magnitude (0.09; Section 5.2)

m_U the direct-import share of captured spending (5 to 10%)

m_N the direct-import share of uncaptured spending (25 to 35%), from the ERS category import shares applied to the Section 4.5 weights.

Each percentage point of captured demand that shifts moves \$4.3 billion of spending, of which \$0.9 to 1.1 billion goes to imports, given an import-share gap of 20 to 25 points. At $\lambda = 9\%$, this adds \$7.7 to 9.7 billion a year in direct food imports.

5.4 Two ways firms can absorb reformulation

When a product is reformulated, and consumers have no uncaptured alternative, they bear the cost either as a higher price or as a lower-quality product. A firm that removes a marker ingredient can pay more for a substitute that keeps the product the same (the ingredient premium, line E), or keep ingredient costs unchanged and accept a lower-quality product. Under the quality route, the loss on captured spending is about $0.05 \times 0.26 \times \$430 \text{ billion} \approx \$5.6 \text{ billion}$ a year. Removing the ingredient premium from the price calculation lowers the consumer price effect to about \$4.2 billion, so the total consumer loss under the quality route is about \$9.8 billion, compared with \$8.1 billion under the premium route. Soda taxes let consumers avoid the loss by buying water or shopping elsewhere, but a definition covering 72% of the shelf leaves little room to avoid it, and the loss falls most on households with the fewest alternatives.

5.5 Summary

Labels change purchases more in developing economies, where they take the form of warnings, consumers' mistaken beliefs are larger, and food takes up more of the budget, than in the United States or Europe, where effects are small, mostly shift choices within categories, and are often zero. Under a broad U.S. definition, the avoidance seen with local soda taxes is weak or absent, so we do not reduce the cost estimates for avoidance, and the cost falls mostly on households with the fewest alternatives. The definition would also shift demand from domestic manufacturing toward imported produce and inputs. And firms' incentives lead them to remove the cheapest markers, not the most harmful ones.

The consumer loss is therefore \$8.1 billion a year in higher prices if firms pay for substitute ingredients, or \$9.8 billion if they let quality fall instead. Separately, a warning label shifts \$7.7 to 9.7 billion a year of spending toward imported produce. The ingredient premium already counts spending on substitute ingredients, which is revenue to other suppliers, some of them domestic, so adding domestic corn growers' revenue loss (Section 6) would double-count it. The domestic burden is therefore the total economic cost from Section 4: \$14.2 billion a year at full implementation and \$6.7 to 7.7 billion at first-year rates, with spending shifts reported separately.

Section 6: Supply-Side Effects

Section 5 covered consumers. This section covers suppliers: how reformulation and lower sales reduce demand for farm commodities.

6.1 Evidence on supplier responses

Past rules show the same pattern on the supply side as on the demand side. When trans-fat labeling and the ban on partially hydrogenated oils (PHOs) moved manufacturers away from partially hydrogenated soybean oil, they turned to imported substitutes, and U.S. palm-oil imports doubled between 2007 and 2014 (Otitte et al., 2013; Santeramo & Searle, 2019). After the NLEA, competition shifted to taste, and firms with market power survived, favoring their existing suppliers (Moorman, Ferraro & Huber, 2012). Under Mexico's warnings, the largest reformulation was in sodium and non-caloric sweeteners, the cheapest inputs to change (Salgado et al., 2025). The U.S. sweetener market also has a long history of policy-driven switching between high-fructose corn syrup and cane or beet sugar (sucrose) under the sugar tariff-rate quota, under which additional sugar supply comes from abroad (USDA ERS Sugar and Sweeteners Yearbook).

6.2 Effects on farm commodity demand and prices

Demand for a commodity j (such as corn) falls for two reasons: consumers buy fewer of the captured products made with it, and reformulation replaces it with a substitute:

$$\frac{\Delta D_j}{D_j} = -\sum_c w_{jc} \cdot [\lambda_c + r_c \cdot (1 - \frac{a'_{jc}}{a_{jc}})] \quad (6.1)$$

Variables in Equation 6.1

$\Delta D_j/D_j$ = percentage change in demand for commodity j

w_{jc} = category c 's share of the use of commodity j

λ_c = sales loss for captured products in category c , entered as a positive magnitude (9% on average; Section 5.2)

r_c = reformulated share in category c (0.26)

a'_{jc}/a_{jc} = share of commodity j still used after reformulation (zero where sucrose replaces corn syrup or palm oil replaces soybean oil)

Each category counts in proportion to its share of the commodity, w_{jc} . Within a category, demand falls through lower sales, λ_c , and through reformulation of the share r_c , in proportion to how much of the commodity the new recipe no longer uses ($\frac{a'_{jc}}{a_{jc}}$ is the share still used); both the sales loss and the reformulated share are entered as positive magnitudes, so the leading minus sign gives the decline. The drop in demand lowers the farm price according to the price flexibility, the percentage change in price per percentage change in quantity. The flexibility is estimated from supply shocks that move buyers along the demand curve; applying it to a demand shift assumes the crop is fixed in the short run and that other users absorb the displaced bushels along the same curve, so the price must fall by the flexibility times the shift. The leading minus sign makes a decline in demand a decline in price when $\Delta D_j/D_j$ is negative and ϕ_j is negative. Because the crop is still sold in full at the lower price, the revenue loss is the price fall on the whole crop; counting the displaced bushels separately would double count them:

$$\frac{\Delta p_j}{p_j} = -\phi_j \cdot \frac{\Delta D_j}{D_j}; \quad \Delta R_j = R_j \cdot \frac{\Delta p_j}{p_j} \quad (6.2)$$

Variables in Equation 6.2

$\Delta p_j/p_j$ = percentage change in the farm price of commodity j

ϕ_j = price flexibility of commodity j (−1.35 for corn; Adjemian & Smith, 2012)

p_j = farm price (\$4.40 a bushel for corn)

ΔD_j = change in quantity demanded at the initial price (about −165 million bushels for corn, or −1.1%)

R_j = farm revenue from the whole crop before the change (about \$66 billion for corn: 15 billion bushels at \$4.40)

ΔR_j = change in farm revenue (about −\$1.0 billion a year for corn)

Corn is the main case because the definition's carbohydrate markers are made from corn. Corn used for high-fructose corn syrup is 425 to 520 million bushels a year, about 3% of the 15-billion-bushel 2024 crop that we use as the base (USDA ERS Sugar and Sweeteners Yearbook; USDA NASS, 2025); the 2025 crop was a record 17.0 billion bushels (USDA NASS, 2026). With a reformulated share of $r = 0.26$ and a 9% sales loss, reformulation removes about 122 million bushels of demand and lowers sales by another 42 million, for a total of about 165 million bushels, or 1.1% of the crop. With a price flexibility of −1.35 (Adjemian & Smith, 2012), corn prices fall about 1.5%. With the crop fixed and sold in full at the lower price, farm corn revenue falls by about \$1.0 billion a year, 1.5% of \$66 billion (about \$0.6 billion at the first-year rates). On the other side, the sugar that replaces corn syrup adds about 1.3 million tons of sugar demand, of which roughly 390,000 tons would be imported under the tariff-rate quota, and replacing fats adds palm-oil imports, as happened with trans fats. Wet-milling plants that convert corn to sweeteners and starches in Iowa, Illinois, Indiana, and Nebraska (USDA AMS, 2018) lose about a quarter of their sweetener volume, and their higher costs feed back into food prices in Section 4 through the pass-through rate.

Corn is not the only crop affected. The definition's modified-fat, industrial-protein, and emulsifier markers reach soybeans, which supply soybean oil (hydrogenated and interesterified soybean oil are modified fats), soy lecithin (an emulsifier), and soy protein isolate and concentrate (industrial proteins). The 2025 soybean crop was 4.26 billion bushels (USDA NASS, 2026), and soybean oil is the main edible oil in U.S. packaged food, although roughly half of domestic soybean-oil use now goes to biofuel, which cushions growers more than the sweetener market cushions corn. Reformulation away from modified soybean-oil fats would, as after the trans-fat rules, shift demand toward imported palm oil (Otite et al., 2013; Santeramo & Searle, 2019), and reformulation away from soy protein and lecithin would reduce crush demand at the margin. Wheat (1.9 billion bushels in 2025) and potatoes supply modified starches, maltodextrins, and vital wheat gluten; dairy supplies whey protein concentrates and isolates and caseinates, which the definition counts as industrial proteins; and sugar beet and sugar cane growers gain, since sucrose is the usual replacement for corn syrup, although under the tariff-rate quota much of the added sugar would be imported. We do not quantify these effects separately because, unlike corn's sweetener use, USDA does not report the share of each commodity that goes into marker ingredients. The direction is the same as for corn, but the size is smaller because a smaller share of each crop goes into marker ingredients, so the corn estimate should be read as the largest component of a broader loss to domestic suppliers of marker ingredients.

6.3 Summary

Under a binding use of the definition, corn demand falls by about 165 million bushels a year, moving about \$1.0 billion of revenue away from domestic corn growers (\$0.6 billion at the first-year rates). Soybean, wheat, potato, and dairy suppliers of modified fats, starches, and industrial proteins lose smaller, unquantified amounts in the same direction. Suppliers of sugar, palm oil, and other substitutes gain correspondingly; the ingredient premium

in Section 4 is what pays for those substitutes. This is a shift between suppliers, not an additional economic cost, so we report it alongside the burden rather than in it. Firms' private incentives drive the shift, and consumers do not care where the substitute comes from. A regulatory impact analysis would have had to address this effect; the white paper does not.

Section 7: Discussion

A new mandated UPF label is contested. The agencies' July 2025 Request for Information (90 FR 35305) states that no accepted operational framework for UPF exists, and rules built on contested categories have a poor survival record. Of the 17 major federal food and nutrition actions since 2006 listed in Appendix A, six were vacated, repealed, or withdrawn in whole or in part, and five more were delayed by a year or longer. Of the four measures based on a process or category rather than a nutrient standard that reached implementation, three have since been partially or fully repealed. The UPF definition belongs to that group and, unlike any of them, has no regulatory impact analysis.

Beyond the uncertainty of how the definition would be applied, the definition may lead to two more stringent uses which would cost the industry far more than the labeling case behind these estimates. The first is eligibility in federal food programs. If the definition restricted what SNAP benefits can buy, a captured product would lose program sales rather than sales lost to a label (Section 4.1), and firms would reformulate wherever technically feasible. SNAP spending alone was \$101.7 billion in fiscal year 2025 (Hodges & Jones, 2026), much of it on captured categories, and Section 2 shows the definition reaches the milk, yogurt, juice, bread, and cereal products these programs rely on.

The second is definition-based litigation. About a dozen personal-injury, class, and government lawsuits now allege that manufacturers of ultra-processed foods designed and marketed addictive products, modeled on the tobacco cases. The first of them, *Martinez v. Kraft Heinz*, was dismissed with prejudice on June 30, 2026, because the complaint could not tie any specific product or defendant to the plaintiff's illness and because the court declined to hold an entire industry liable under market-share or alternative-liability theories. The City and County of San Francisco's December 2025 lawsuit against ten manufacturers instead seeks to recover public-health costs under California's unfair-competition and public-nuisance law, and Vermont's attorney general has issued subpoenas to one of the manufacturers. These cases have lacked an official federal classification of which products are ultra-processed. A federal definition would provide one, and it would also sweep in products with no known health risk, as Section 2 shows. Under either use, costs would exceed the estimates here, because reformulation would become a condition of market access rather than a response to lost sales.

Section 8: Conclusion

We find that a UPF labeling mandate would capture 72% of in-scope packaged products and 51% of food-at-home spending. A federal definition could anchor a front-of-package label, determine what food programs can buy, or supply the classification that pending litigation has lacked. We focused on labeling because it is the most discussed use, Secretary Kennedy said front-of-package labeling would follow as soon as the definition is published, and four U.S. labeling rules and three Latin American front-of-package

labels provide the richest evidence base. The two other uses would cost more than the estimates here, because reformulation would become a condition of market access rather than a response to lost sales (Section 7). Our analysis finds that the total domestic burden is \$14.2 billion a year, \$104 per household: \$9.5 billion to reformulate captured products, \$4.5 billion in higher ingredient costs for the reformulated products, and \$0.2 billion for classification, relabeling, and federal administration. It raises the food-at-home price level by 0.96%, adds 0.078 percentage points to the all-items CPI, and adds 0.32 points a year to grocery inflation over the three-year phase-in. Of the total, consumers pay \$8.1 billion through higher prices, or \$60 per household (\$3.8 to 4.4 billion at the first-year rates). If firms let quality fall instead of paying for substitute ingredients, consumers lose \$9.8 billion. The definition also shifts \$1.0 billion of revenue away from domestic corn growers, with smaller losses for soybean, wheat, potato, and dairy suppliers of marker ingredients, and \$7.7 to 9.7 billion of spending toward imports. Paperwork accounts for only 1.4% of the domestic burden; most of the cost comes from reformulation, priced at FDA's own cost per formula, and from the recurring ingredient premium, neither of which a Paperwork Reduction Act analysis would count. Moreover, the health benefits these costs would offset are uncertain. U.S. information policies show small or no effects on body weight, and a definition covering 72% of the shelf leaves lower-income households, which have the fewest uncaptured alternatives, the least room to avoid the price increase. We also note that previous labeling interventions have produced disparate public health outcomes, especially in the U.S.

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Appendix A: Federal food-policy outcome record, 2006–2026

We collected evidence on major FDA, HHS, and USDA food, nutrition, and labeling actions from 2006 to 2026 from reginfo.gov and the Federal Register. We encoded outcomes based on whether they enforced statutes and used consensus-based coding from each action’s stated scientific basis (nutrient standard or safety finding = high; contested category or process disclosure = low).

Action (agency, year)	Consensus basis	Outcome	Public cost note
Trans-fat labeling (FDA 2003/2006)	High	In force	—
Country-of-origin labeling, meat (USDA 2009)	Low (process disclosure)	Repealed by Congress 2015 after WTO retaliation authorization (~\$1bn)	WTO litigation 2009–15; ~\$2.6bn industry compliance cost (USDA 2015) written off
Menu labeling (FDA 2014)	High	Delayed twice; in force May 2018	Two extension RIAs
Nutrition Facts revision (FDA 2016)	High	Delayed ~2 years; in force 2020/21	Extension rulemaking
PHO/trans-fat GRAS revocation (FDA 2015; 2023)	High	In force	—
School meal standards (USDA 2012; rollback 2018)	High	2018 rollback (83 FR 63775) vacated on APA grounds (CSPI v. Perdue, D. Md., Apr. 13, 2020); rescinded Nov. 2020; flexibilities re-proposed	Litigation; two further rulemakings
Sodium reduction targets (FDA 2016/2021)	Medium	Voluntary guidance; delayed 5 years	—
Bioengineered disclosure (USDA 2018)	Low (process disclosure)	Detectability exclusion and QR/text provisions held unlawful; prospective vacatur (Natural Grocers v. Rollins, 9th Cir. Oct. 2025)	\$570m–\$3.9bn implementation partly stranded
“Healthy” claim definition (FDA 2024)	Medium	Final rule Dec. 2024; effective Apr. 2025; compliance Feb. 2028; no court challenge to date	—
Food traceability, FSMA 204 (FDA 2022)	High	Compliance extended 30 months, from Jan. 2026 to July 2028	Delay rulemaking
Front-of-package labeling (FDA proposed 2025)	Medium	Pending; SBA Advocacy recommends withdrawal	—
Menthol cigarette ban (FDA proposed 2022)	High	Withdrawn Jan. 2025 after two years at OMB	Rulemaking cost written off
Graphic cigarette warnings (FDA 2011; 2020)	Medium	2011 rule vacated (R.J. Reynolds v. FDA, D.C. Cir. 2012); 2020 rule vacated by E.D. Tex. (2023), vacatur reversed by 5th Cir. (2024), cert. denied (2024); implementation stayed pending remand	Litigation since 2011
Deeming rule, e-cigarettes (FDA 2016)	High	Upheld; enforcement deferred	—
Gluten-free labeling (FDA 2013)	High	In force	—
Plant-based milk standards (FDA guidance 2023)	Low	Draft guidance only (Feb. 2023); state labeling laws proliferate	—
SNAP restriction waivers (USDA 2025–26)	Low (category-based)	Waivers approved in 23 states; five vacated by D.D.C. on June 22, 2026 (Aragon v. Rollins)	Litigation; retailer implementation cost in vacated states

Appendix B: Input tables for Section 4

Table B1. Inputs to the cost range (Section 4.2)

Input	Value	Source
Captured UPCs, N	325,000 (72.3% of 449,877 in scope)	Section 2 classification
Formulas, F	≈260,000 (0.8 formulas per UPC)	Section 2; FOP PRIA (FDA, 2025) formula convention
Captured retail sales, S	≈\$430bn (= 0.51 × CEX household base of \$845bn; ≈\$510bn on the ERS food-at-home base of ≈\$1.0tn, used only for the bracketed figures in Table C3)	Section 4.5; BLS CEX 2024; ERS Food Expenditure Series
Classification cost per UPC, C_A	\$376 / \$1,500 / \$3,084, one-time, on all 450k in-scope UPCs	NBFDS RIA low- and medium-complexity analysis costs
Relabeling cost per UPC, C_L	\$367 coordinated (one-time) / \$326 per year / \$6,000–8,000 uncoordinated	FDA 2014 PRIA; FOP PRIA; SBA Office of Advocacy 2025
Reformulated share of formulas, r	26% (Chile, full implementation); 14% (Chile, first phase); 12% (Mexico, first year); 0.7% (FDA's own FOP assumption, reported for comparison)	Chile full implementation 70.8%→52.5% among best sellers (Rebolledo et al. 2025), i.e. 0.26 of flagged products; Chile first phase 51%→44% of all products (Reyes 2020), i.e. 0.14 of flagged products; Mexico first year, mean across product groups of the reduction in share bearing any warning label over baseline share (Salgado et al. 2025), i.e. 0.12; FOP PRIA 2,187 of 322,326 UPCs (FDA 2025)
Reformulation cost per formula, C_R	\$1.2m (FOP PRIA per-formula primary estimate, weighted by FDA's UPC counts across its ten food categories; FDA low \$0.58m, high \$2.2m); one-time, major-ingredient substitution	FOP PRIA Table 9 (FDA, 2025); FDA Reformulation Cost Model
Federal resourcing, G	\$10m / \$20m / \$30m per year	GRAS rule PRIA (\$10.5m/yr); FTE estimate
Annualization	Capital-recovery factor 0.1172 (10 years, 3%); sensitivities at 2% and 7%	FDA/OMB convention

Table B2. Pass-through and price-effect inputs (Section 4.3)

Input	Value	Derivation and source
θ_M , marginal-cost pass-through	0.70 (0.45–1.00)	Literature review: manufacturing input-cost pass-through 0.70 across six industries incl. bread, range 0.33–0.96 (Ganapati, Shapiro & Walker, 2020); minimum-wage cost ≈1.0 in grocery (Renkin et al., 2022); beverage-tax strand 0.43 Berkeley (Cawley & Frisvold, 2017) to 0.97–1.0 Philadelphia (Seiler et al., 2021; Cawley et al., 2018), pooled 0.80 (Shen et al., 2023), over-shifting in Cook County, France, Mexico (Powell et al., 2020; Bonnet & Réquillart, 2013; Grogger, 2017); commodity-to-retail 0.30 in logs (Nakamura & Zerom, 2010), 2–18% farm-to-retail (Leibtag, 2009). Tax strand discounted as per-unit, salient and retail-levied; manufacturing strand adopted as the analog.
θ_F , fixed-cost pass-through	0.35 over ten years (0–0.70)	Theory: fixed costs are not passed through in the short run (Weyl & Fabinger, 2013); Chile shows no aggregate price effect despite relabeling (Paraje et al., 2023); set at half the marginal rate to allow recovery through later price rounds
Private-label multiplier	× 1.4	Hong & Li (2017): private label passes through ~40% more than national brands

m_c , reformulation premium	4% (3–5%)	Canadian low-trans-fat margarine price tiering; NuVal repricing; FDA 2003 assumption of zero proved wrong; PHO RIA substitute-ingredient premium 25% on the ingredient (not the product)
r_c , reformulated share	0.26 (0.12 and 0.14 at the first-year rates)	As in 4.2
s_c, ω_c	Category coverage from Section 2; CEX expenditure weights from Section 4.5	BLS CEX 2024; Section 2
S	\$430bn	As in 4.2

Table B3. Consumption weighting by CEX category (Section 4.5)

CEX food-at-home category (2024)	\$ per consumer unit	Basket share	Coverage s_c (Section 2; dollar-mix weighted)	Contribution
Cereals and cereal products	240	3.9%	0.50 (cereal 74%, processed cereal 91%, pasta 27%, rice 7%, flour 20%)	1.9%
Bakery products	539	8.7%	0.88 (bread 84%, cookies 94%, cakes 98%, crackers 68%, pastries 96%)	7.6%
Meats, poultry, fish and eggs	1,414	22.7%	0.22 (deli 86%, bacon/sausage 64%, frozen fish 62%, canned tuna 24%; fresh cuts and eggs out of scope)	5.0%
Dairy products	631	10.1%	0.65 (milk 40%, cheese 63%, yogurt 90%, ice cream 98%, cream/butter 55–69%)	6.6%
Fresh fruits and vegetables	749	12.0%	0.05 (pre-packaged produce 24%; fresh out of scope)	0.6%
Processed fruits and vegetables (incl. juices)	204	3.3%	0.40 (juices 65%, canned fruit 66%, canned veg 17%, frozen veg 11%)	1.3%
Sugar and other sweets	230	3.7%	0.85 (candy 99%, chocolate 92%, jams 92%, sugar 54%, syrups 69%)	3.1%
Fats and oils (incl. dressings, peanut butter)	125	2.0%	0.55 (dressings 88%, spreads 55%, nut butters 48%, oils 20%)	1.1%
Miscellaneous foods (frozen prepared, soups, snacks, condiments)	1,284	20.6%	0.75 (frozen dinners 87%, appetizers 92%, bars 89%, chips 66%, condiments 74%, seasonings 64%, nuts/popcorn 54%)	15.5%
Nonalcoholic beverages	714	11.5%	0.65 (soda 97%, water 89%, powdered 91%, sports/energy 96–98%, tea 41–84%; coffee out of scope)	7.5%
Food on out-of-town trips	94	1.5%	0.50	0.8%
Consumption-weighted coverage of food-at-home	6,224	100%	135.8m consumer units $\approx$ \$845bn	≈ 0.51

Appendix C: Result tables for Section 4

Tables C1 to C3 report the cost lines at each of the three observed reformulation rates from Section 4.1. Lines A, B and D and all unit costs are held at their point values.

Table C1. Annualized compliance and economic cost of the UPF definition (\$m per year), by observed reformulation rate

Cost line (\$m per year)	Mexico, first year ($r = 0.12$)	Chile, first phase ($r = 0.14$)	Chile, full implementation ($r = 0.26$)	parameter
A. Classification and legal review (450k UPCs $\times$ cA, annualized)	79	79	79	per-UPC analysis cost
B. Relabeling (325k UPCs $\times$ cL)	106	106	106	coordination window
C. Reformulation ($r \times 260k$ formulas $\times$ cR, annualized)	4,388	5,119	9,507	reformulated share r ; cR = \$1.2m (FDA)
D. Federal resourcing	20	20	20	—
E. Recurring ingredient-cost premium on reformulated products ($m \times r \times S$)	2,064	2,408	4,472	premium $m = 4\%$, share r
Direct cost (A–D)	4,593	5,324	9,712	
Total economic cost (A–E)	6,657	7,732	14,184	

Table C2. Price effects of the UPF definition by cost channel, by observed reformulation rate

Price effect	Mexico, first year	Chile, first phase	Chile, full implementation
Fixed-cost push, $(A + B)/S \times \theta F$	0.015%	0.015%	0.015%
Reformulation R&D push, $C/S \times \theta F$	0.36%	0.42%	0.77%
Ingredient premium on reformulated products, $m \cdot r \times \theta M$	0.34%	0.39%	0.73%
Captured-category price increase, g	$\approx 0.71\%$	$\approx 0.82\%$	$\approx 1.52\%$
Unflagged-product (substitute) repricing spillover, $(1 - \bar{s}) \times \rho N \times g$ (Section 4.4), food-at-home basis	$\approx 0.09\%$	$\approx 0.10\%$	$\approx 0.19\%$
Food-at-home basket, consumption-weighted ($\bar{s} = 0.51$; see 4.5) plus spillover	$\approx 0.45\%$	$\approx 0.52\%$	$\approx 0.96\%$

Table C3. Combined effect on the food-at-home price level, CPI, inflation, and consumer cost, by observed reformulation rate

Combined effect	Mexico, first year	Chile, first phase	Chile, full implementation
Captured-category price level, gU	0.71%	0.82%	1.52%
Food-at-home price level, $\pi_{FAH} = 0.51 \times gU + 0.49 \times 0.25 \times gU$	0.45%	0.52%	0.96%
CPI food index level, $\pi_{food} = 0.60 \times \pi_{FAH}$	0.27%	0.31%	0.58%
All-items CPI level, $\pi_{CPI} = 0.081 \times \pi_{FAH}$	0.036 pp	0.042 pp	0.078 pp
Food-at-home inflation rate, per year over a 3-year phase-in	+0.15 pp	+0.17 pp	+0.32 pp
All-items inflation rate, per year over a 3-year phase-in	+0.012 pp	+0.014 pp	+0.026 pp
Consumer cost, \$ per year ($\pi_{FAH} \times \$845bn$; ERS base in brackets)	\$3.8bn [4.1]	\$4.4bn [4.8]	\$8.1bn [8.8]
Consumer cost, \$ per household (135.8m households)	\$28	\$32	\$60