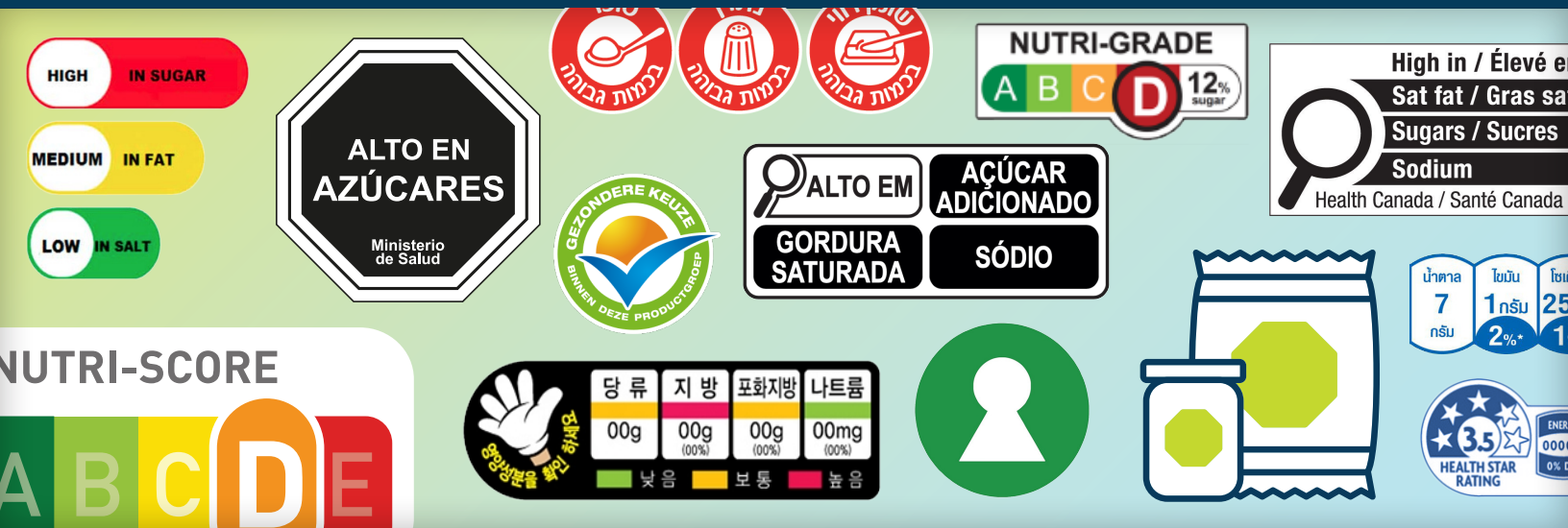


Front-of-package labeling

to empower consumers and promote healthy diets



Ultra-processed foods and drinks (UPFs) high in added sugars, sodium, saturated fats, and refined carbohydrates have become widely available virtually everywhere in the world, dramatically changing global diets. Excessive consumption of UPFs increases risks for obesity and many other chronic, nutrition-related diseases. Without policy actions to improve the food environment, these will continue to climb unchecked around the world.

Front-of-package (FOP) nutritional labels are one evidence-based policy tool that can nudge consumers towards healthier food and drink choices while also encouraging industry to improve the nutritional profile of their products. There are many forms of FOP labels in use around the world, but the best evidence currently supports labels that are mandatory; simple, clear, and immediately visible; interpretive in design (that is, interpreting and guiding consumers based on a product’s nutrition information rather than providing numerical nutrient content information without specific guidance or recommendations); and based on strong underlying nutritional profiling.

This fact sheet summarizes the evidence to date on how FOP labels work and which label types in use worldwide are most and least effective. The strongest real-world evidence supports mandatory FOP nutrient warning labels to reduce purchases of less-healthy products and encouraging shifts towards healthier product purchases and availability. This document concludes with evidence-based recommendations for developing or strengthening FOP nutritional labeling policies.

CONTENTS:

- Unhealthy changes in the foods we eat..... 2
- Front-of-package labels can nudge consumers and industry toward healthier products 3
- Types of FOP labels 4
- Evidence for nutrient warning labels 5
- Other FOP labels 11
- Industry-endorsed FOP labels are not effective14
- Developing labels.....15
- Best practices for effective FOP labeling systems.....17

Unhealthy changes in the foods we eat

Pre-packaged, ultra-processed foods and drinks have become readily available virtually everywhere in the world, to people of all income levels.¹⁻⁸ This increased availability, along with pervasive marketing, has dramatically affected the way people eat in many countries and resulted in less healthy diets.⁷⁻²² Many ultra-processed, ready-to-eat or ready-to-heat foods and drinks are high in added sugars, sodium, saturated fats, and refined carbohydrates. Excessive consumption of these nutrients increases risk of obesity and many other chronic, nutrition-related diseases.^{9,23-34}

- **Sugar:** Substantial evidence shows that consuming too much sugar increases risks for type 2 diabetes, heart disease, liver and kidney diseases, and some major cancers.³³⁻⁴⁰ Global health experts recommend limiting sugar intake to less than 10% of total daily calories.^{32-34,41-44}
- **Sodium:** Consuming too much sodium is associated with high blood pressure and increased risks for heart disease, stroke, and death.⁴⁵⁻⁴⁸
- **Saturated fats:** Replacing saturated fats with polyunsaturated and monounsaturated fats improves blood sugar regulation and reduces heart disease risk.⁴⁹⁻⁵¹ The World Health Organization and many national dietary guidelines worldwide recommend limiting intake of saturated fats.^{52,53}
- **Ultra-processed foods** are associated with a multitude of elevated health risks, including for obesity, type 2 diabetes, heart disease, stroke, depression, and early death, when comparing those with highest vs. lowest intake.^{54,55}

Evidence increasingly indicates that growing worldwide consumption of ultra-processed, nutritionally poor foods is a major driver of the global obesity epidemic and increases in prevalence of many other nutrition-related diseases.^{7,10,27,55-60} An estimated 2.5 billion adults worldwide are classified as overweight — 43% of the population over age 18, and over 890 million have obesity.⁶¹ Obesity prevalence among adults has more than doubled from 1990 to 2022. Among children and adolescents, prevalence of obesity and overweight exceeds 390 million for ages 5–19 years and 37 million for children under 5 years.⁶¹ Without policy actions to improve the food environment, incidence and prevalence of obesity and other diet-related diseases will continue to climb unchecked around the world.



Learn about **ultra-processed foods** — increasing intake, associated health risks, and environmental impacts — in our [fact sheet](#)

Below: Cereal packages with warning labels in Colombia





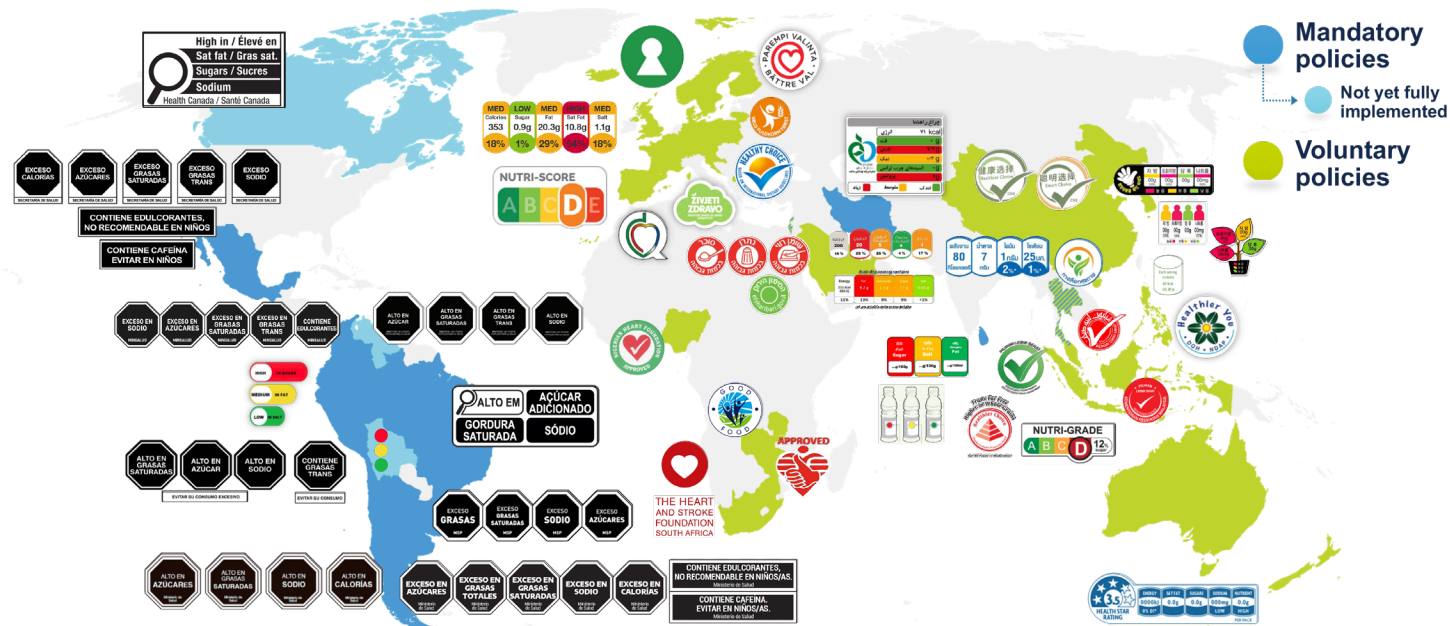
Mandatory nutrient declarations on food packages – typically presented as nutrition facts panels or tables on the back of packages – are not sufficient for helping all consumers understand a food or beverage’s nutritional profile, however these declarations are an important prerequisite for implementing FOP labeling systems.⁸¹

Front-of-package labels can nudge consumers and industry towards healthier products

The sheer number of choices when food shopping makes it difficult for consumers to select healthier options, especially as ultra-processed products become more readily available.^{7,8,11,56,62} Many countries require disclosure of ingredients lists and nutritional content on the back of food and beverage packages.⁶³ While back-of-package nutrient declarations and ingredients lists offer important information for consumers, they are not the most effective or used tool for guiding consumers towards healthier choices.^{64,65}

- Most consumers spend only seconds selecting each item while they shop — not enough time to review complicated, back-of-pack nutrition labels and make calculations.⁶⁶⁻⁶⁸
- Many consumers have difficulty understanding back-of-pack nutrition tables.⁶⁹⁻⁷¹
- Despite nutrition facts panels being required on the back of food packages in the United States for over 30 years, less than half of adults report using this information consistently while shopping, and those with lower educational attainment, resources, or English language fluency are even less likely to use them.⁷²
- Interpreting back-of-pack nutrition facts tables requires nutritional knowledge, literacy, and numeracy skills; accordingly, their use varies significantly depending on consumers’ education and income level, with disproportionate benefit going to those who have higher educational attainment and income.⁷³⁻⁷⁵
- Simple, clear front-of-package (FOP) labels are an evidence-based policy tool, backed by decades of research showing how they can effectively nudge consumers towards healthier foods and drinks while also encouraging industry to improve the nutritional profile of the products they sell.⁷⁶⁻⁷⁸
- The World Health Organization (WHO), World Cancer Research Fund International, and World Heart Federation all recommend FOP labeling as a key policy to promote healthy diets and prevent noncommunicable diseases (NCDs) worldwide, with a particular focus on reducing consumption of foods high in sodium, saturated and trans fats, and added sugars.⁸¹⁻⁸³
- Simple FOP labels that are immediately visible and require little time to assess minimize consumer effort and enable them to quickly identify which products are less healthy choices, decrease intention to purchase those, and increase intention to purchase a healthier product.⁸⁴⁻⁸⁷





Types of FOP labels

A wide variety of FOP labeling approaches and designs are now in use worldwide. These include nutrient warning labels; color-coded “traffic lights,” Nutri-Score, Health Star Ratings, and “Guidelines for Daily Allowance” (GDA) labels. FOP labels can be:

- **Interpretive** — guiding consumers based on nutrition information for one or more nutrients (e.g., a “high in [nutrient]” warning symbol or a “traffic light” that is color-coded according to nutrient content).^{63,79}
- **Non-interpretive** — providing numerical nutrient content information without specific guidance or recommendations for consumers (e.g., Guideline Daily Allowance; or “Facts Up Front” labels)

Labels may combine interpretive and non-interpretive elements, such as in the Health Star Ratings label (right), or a “multiple traffic light” that combines color coding with nutrient composition. **The World Health Organization recommends that FOP labeling systems should be interpretive.**⁶³

Some labels offer a **summary indicator** that uses multiple nutritional or ingredient criteria to determine an overall signal of the products’ healthiness (e.g., star-based systems such as Health Star Ratings, Nutri-Score, or health logos).

Labeling systems can also vary in whether they must be applied across *all* packaged foods and beverages. Voluntary labeling schemes are only applied at food manufacturers’ or retailers’ discretion (e.g., all GDAs, Health Star Ratings, Nutri-Score in European countries, and most traffic light labels). Other labeling systems are mandatory and required across the packaged food supply, as is the case with all warning label policies to date.

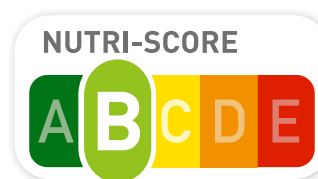
Above: mandatory and voluntary front-of-package labels in use around the world. View more at GlobalFoodResearchProgram.org.



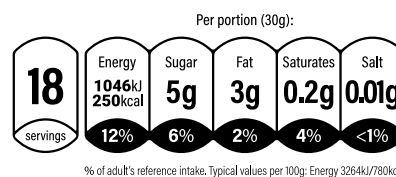
NUTRIENT WARNINGS (*interpretive*)



HEALTH STAR RATINGS
(*interpretive, summary indicator + non-interpretive*)



NUTRI-Score (*interpretive, summary indicator*)



GUIDELINES FOR DAILY ALLOWANCE (*non-interpretive*)

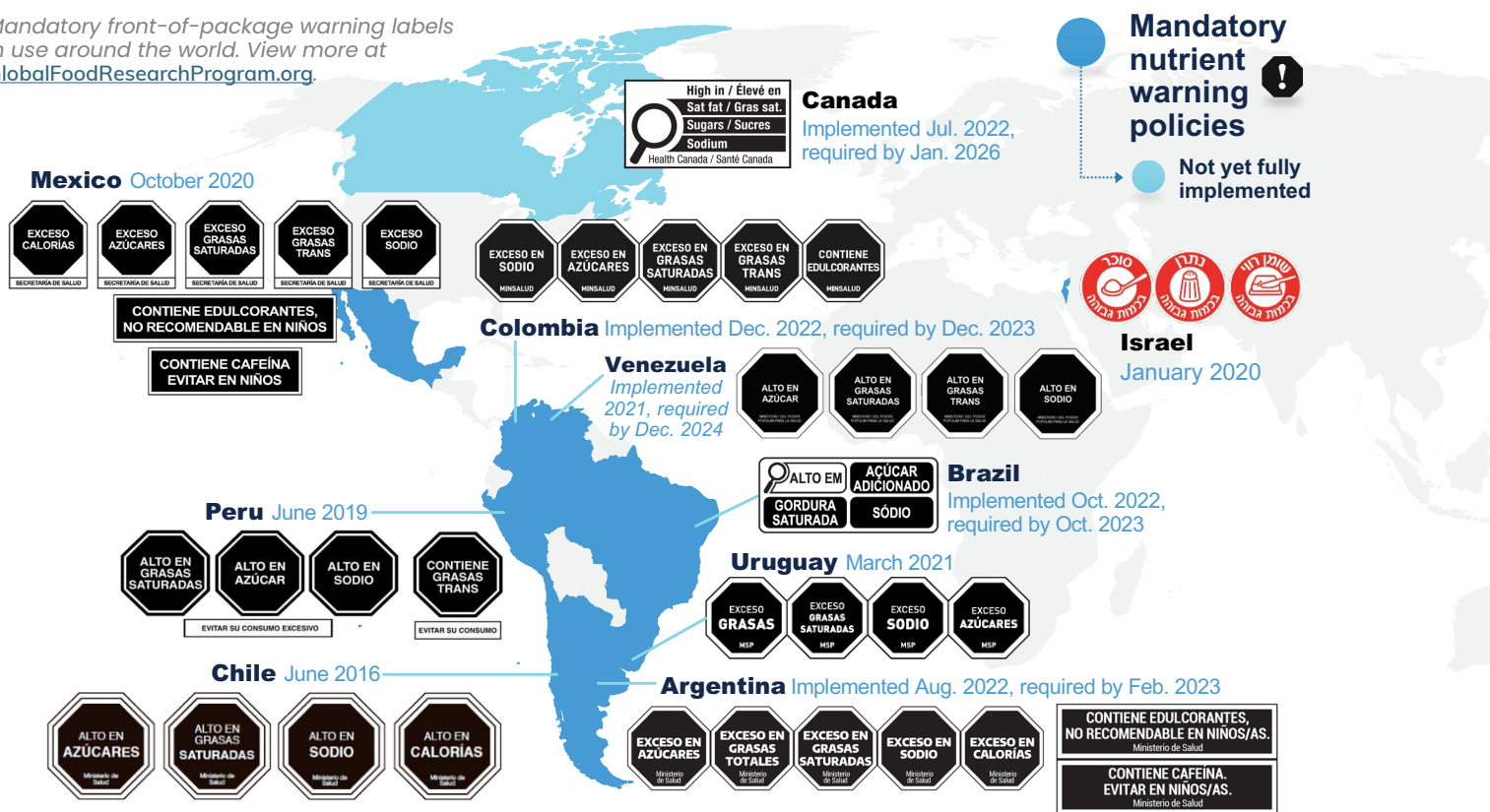
Evidence for nutrient warning labels

While a wide variety of FOP labels are now used worldwide, simple, mandatory warning labels that clearly identify unhealthy products have the strongest real-world evidence for effectiveness at discouraging food and beverage choices that can harm health.^{73,74,88-95} Warning labels work by helping consumers quickly identify less-healthy products and discouraging their consumption. Seeing warning labels on packages can disrupt habitual shopping decisions, even if consumers are not seeking out nutritional information.⁹⁶

Evidence below outlines why nutrient warning labels offer a strong FOP labeling approach, particularly for the goal of reducing consumption of ultra-processed foods and drinks that can harm health.

- Warning labels such as those used in **Chile** (since 2016), **Peru** (2019), **Israel** (2020), **Mexico** (2020), **Uruguay** (2021), **Brazil** (2022), **Argentina** (2022), **Colombia** (2023), **Venezuela** (2024), and **Canada** (2026) require packaged foods and drinks that do not meet specific nutrition criteria or that contain certain ingredients (such as non-nutritive sweeteners) to carry warning labels clearly indicating the product is high in sugar, saturated or trans fats, sodium, or calories — whichever apply. These labels help consumers quickly and easily identify unhealthy foods and drinks and make healthier choices from the array of available products.
- Requiring FOP warning labels can encourage manufacturers to improve the healthfulness of their products and portfolios to meet nutritional criteria and avoid carrying negative FOP labels.^{74,76,77}
- Warning labels only appear on products that pose the greatest health risk when consumed in excess. This approach can be easier for consumers to notice (i.e., warning labels are either present or absent on a package) and interpret (i.e., does not require complex computations).⁹⁷
- Unlike rating or scoring-based interpretive label systems (e.g., Nutri-Score or Health Star Ratings), warning labels do not risk creating a positivity bias or “health halo” around products with higher-scoring (i.e., “healthier”) labels that may still be high in calories, sugar, salt, or unhealthy fats.^{97,98} The health halo effect can lead to overconsumption and interfere with goals to reduce intake of excess nutrients of concern.^{99,100}
- Warning labels can also improve consumers’ food choices when they encounter products with health and nutrient marketing claims unrelated to the product’s overall nutritional profile (e.g., a “good source of vitamin c” claim on a drink that is also high in added sugar and calories).¹⁰¹⁻¹⁰³

Mandatory front-of-package warning labels in use around the world. View more at GlobalFoodResearchProgram.org.



Real-world evidence from implemented policies



Chile: The world's first mandatory FOP warning label policy, implemented in 2016

Since Chile's FOP warning labels began appearing on packages in 2016, they have contributed to shifts in social norms and behaviors around purchasing healthier foods and drinks as well as product reformulation to reduce nutrients of concern in the food supply. Real-world evidence shows that Chilean consumers are aware of and understand the labels and are using them to make food purchase decisions at the store. This has been achieved with no reductions to employment or average wages in the food and beverage sector compared to other sectors not impacted by the law and without increasing food prices for consumers.^{104,105}

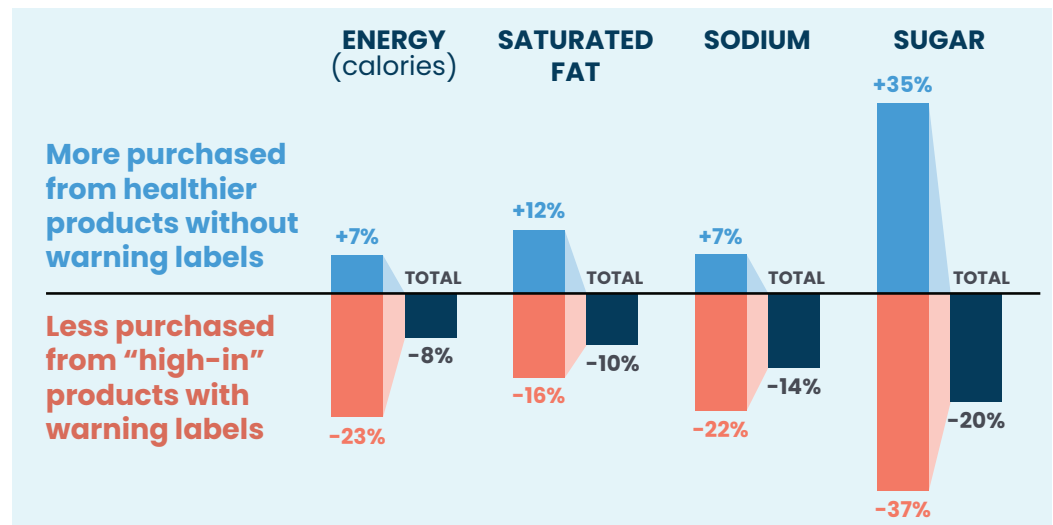


Alliance/Getty Images

- Purchase changes:** Chile's FOP warning label policy — alongside restrictions on food marketing to children and bans on the sale or promotion of regulated foods in schools — was associated with a 24% drop in sugary drink purchases⁸⁸ and declines in sodium (−37%), total calories (−24%), calories from sugar (−27%), and calories from saturated fat (−16%) purchased from all foods and beverages in the first year of the law.⁸⁹

By Phase 2, households' total food and beverage purchases contained 20% less sugar, 10% less saturated fat, 14% less sodium, and 8% less calories than was estimated had the warning label law not come into effect (see right). Households across all income and education levels shifted their food budgets away from products carrying warning labels.¹⁰⁶

Nutrients and calories purchased during Phase 2 of Chile's laws vs. hypothetical expected purchases with no policies¹⁰⁶



- Social norms:** Focus groups with low- and middle-income mothers suggest profound changes in attitudes toward food purchases, driven both by knowledge gained from seeing the labels and by children telling their mothers not to purchase unhealthy products with warning labels.^{91,92}
- Consumers in Chile understand** that a greater number of warning labels on a package means the product is less healthy than options with fewer or no warning labels.⁹³
- The food supply:** An evaluation comparing nutritional profiles of products before and one year after Chile's FOP labeling regulation found significant reductions in the proportion of products that would be required to carry "high in" sugar and sodium warning labels, suggesting that companies reformulated products to avoid the FOP warning label and other policy restrictions.⁷⁴ Food and beverage companies have also largely complied with the labeling law: In 2020, an estimated 94% of products qualifying for warning labels (i.e., high in sugar, saturated fat, sodium, or calories) had the mandated labels on their packages.¹⁰⁷

...She requests me salads; she doesn't accept snacks that have black labels.

And because I have adapted to that as well, when we go grocery shopping, I see a product and I'm like... 'No, she won't accept that if I buy it to her,' so I have to search for a product that at most contains 2 logos. But three, there is no way.

— Gina, mother of a 5-year-old⁹²



Israel, implemented 2020

In 2020, Israel began requiring red nutrient warning labels on products high in sugar, sodium, or fat. This policy also includes an optional green label for products that meet certain nutrition standards for healthy foods.^{108,109} (Products with red labels cannot qualify for a green label.) While changes in purchases and consumption have not yet been evaluated, evidence from surveys suggests the majority of Israeli consumers are aware of and intend to use the labels to make healthier choices:



- In the first month of labeling, nearly 60% of Israeli adults surveyed reported using the new FOP labels to some extent, and 70% said they were willing to change their purchases to buy healthier products.¹¹⁰
- During the first three months of labeling, over 80% of Israeli adults reported that intending to buy fewer red-labeled and more green-labeled products. These intentions were even higher for respondents with higher BMI or lower education, suggesting a greater impact for groups that may benefit most from the label policy.¹¹¹
- A survey among Israeli healthcare workers conducted in mid-2020 reported that 40% of nurses, 35% of physicians, and 60% of nutritionists instruct patients to utilize the labels to improve their diet.¹¹²
- By 2023, nearly 70% of respondents to a phone survey of 500 households reported checking for red labels while shopping, and 60% said they preferred products without red labels in unhealthy categories.¹¹³

Industry's response in terms of product reformulation has not yet been reported, however there are documented attempts by industry to undermine the effectiveness of FOP labels.¹¹⁴ Examples of "creative compliance" include changing the color of product packaging to red to "camouflage" red warning labels and adding round, green labels with health claims designed to mimic the regulated healthy seal.¹¹⁴



Example of product mimicking the color and style of Israel's green "healthy" label to market positive product claims.

Real-world evidence from other countries

- After **Peru** implemented FOP warning labels in 2019, food companies reformulated products to be lower in sugar and saturated fat, dropping the percentage of products in the food supply with a warning label from 82% to 62% by 2021.⁷⁵
- Parents interviewed in Montevideo two years after **Uruguay** implemented warning labels in 2021 said the labels were easy to understand and helped them make informed choices about their food purchases.¹¹⁴ Roughly half reported changing food choices because of the warning labels, most often by substituting to a product without labels, by consuming less of a warning label product, or by consuming labeled products less frequently.¹¹⁵
- Over a year after **Uruguay** fully implemented its warning label law, study participants in several cities reported very high awareness and understanding of the labels, and over half reported changing their purchase decisions because of the warning labels.¹¹⁶
 - Eye-tracking technology used on participants during a shopping trip revealed that participants used front-of-package warning labels more frequently than back-of-package nutrition information or ingredients lists when making purchase decisions.¹¹⁶
 - Eye-tracking also indicated, however, that they did not frequently seek out the warning labels while shopping, suggesting that these shoppers may have already shifted to new purchasing habits during earlier label implementation and/or that warning labels may primarily influence shopping decisions involving new or infrequently purchased items.¹¹⁶
- **Mexico's** warning labels have had a cross-border impact: A year after Mexico implemented warning labels, 64% of Mexican Americans surveyed noticed the warning labels in Mexican-oriented stores in the United States, and many reported purchasing less unhealthy foods due to the labels.¹¹⁷



Example of a "high in" or "excess" sugar warning label from Peru, Uruguay, and Mexico



More evidence for nutrient warning labels from experimental studies, surveys, and systematic reviews

- A report from the Health Evidence Network based on evidence from **15 countries in the WHO European Region** concluded that a FOP label system that is:
 - 1) mandatory;**
 - 2) provides negative, evaluative judgments; and**
 - 3) is consistent, government-led, and applied widely across all products**

is a more effective way to support consumers in making healthier choices.¹¹⁸

- Several large **systematic reviews and meta-analyses** of studies examining and comparing the effects of different FOP labeling systems have found that:
 - Warning labels were associated with significantly lower calorie, saturated fat, sugar, and sodium content of purchases.^{73,119}
 - Consumers who viewed nutrient warning labels had higher odds of choosing healthier products than those who saw traffic light or Nutri-Score labels and the lowest odds of choosing less-healthy products to purchase, compared to those who saw no FOP label.⁷³
 - FOP labels positively impacted the decision to purchase healthier foods in 100% of studies testing warning labels, 71% of studies testing Nutri-Score, 57% of studies testing Health Star Ratings, and 50% of studies testing multiple traffic lights.¹²⁰

OUTCOME: Consumer attention, perceptions, understanding, or preference

- Studies using eye-tracking technology to compare warning labels, GDA labels, and a no-label control found that warning labels were best able to attract consumers' attention and help them more quickly and easily identify whether a product is unhealthy.¹²¹⁻¹²⁴
- FOP warning labels on sugary drinks were linked to lower perceptions of the drinks' healthfulness in experimental studies from the **United States** and **New Zealand**.¹²⁵⁻¹²⁷
- Counter to industry's claims that consumers perceive "high in" FOP labels as too harsh or restricting of their control, a large survey of young adults in **Canada** viewing warning labels on beverages found that the vast majority (93%) felt either more or no change in their own level of control, and most thought that the symbols were either "about right" or "not harsh enough."¹²⁸
- A survey of nearly 1,000 parents of elementary-school-aged children from **Argentina, Chile, Costa Rica, and Mexico** found that parents with low education and overweight preferred warning labels over GDAs or traffic light labels.¹²⁹
- A survey of adults from **Mexico** and the **United States** (white and Latino) compared consumers' understanding of four FOP label types — warning labels, GDAs, multiple traffic lights, and Health Star Ratings — and a nutrition facts table.¹³⁰ Warning labels were the easiest for subjects to understand: Subjects were nearly 5 times more likely to report understanding the warning label compared to the nutrition facts table, whereas subjects who saw the traffic light and Health Star Rating labels were only 0.56 and 0.34 times more likely, respectively.¹³⁰
- In a survey of low- and middle-income **Mexican** consumers, warning labels outperformed both traffic light and GDA labels for consumer understanding.¹³¹
- In **China**, focus group participants found warning labels helpful for informing their food purchasing decisions and educating children on developing healthy eating habits.¹³² Participants also believed that requiring warning labels will positively influence the food industry by encouraging healthier product reformulation.
- In a **Guatemalan** randomized controlled trial among mothers and their children (ages 8–12 years), nutrient warning labels were significantly better able than a GDA label to reduce participants' purchasing intention and perception of healthfulness for unhealthy products and better helped participants understand the nutritional content of different food items.¹³³
- Compared to an ingredients list and a nutrition facts panel, the presence of warning labels improved **Brazilian** adults' understanding and perceptions of a product's nutrient profile, and was particularly helpful for identify nutrients in excess.¹³⁴



OUTCOME:
Correctly identifying healthy/least-healthy products or those highest in nutrients of concern

- Among adolescents in six countries (**Australia, Canada, Chile, Mexico, the United Kingdom, and the United States**), a study comparing five different FOP label types found that octagonal warning labels had the greatest impact on teens thinking a sugar-sweetened beverage was unhealthy in all but one country.¹³⁵ Roughly twice as many participants who saw the warning labels correctly identified that the sugary drink was unhealthy. While results varied by country, Nutri-Score, GDA, and Health Star Rating labels had the lowest odds of impact, overall.
- In a survey of low- and middle-income **Mexican** consumers, the odds of subjects correctly identifying a product with the lowest nutritional quality was 4.5 times greater for warning labels compared to GDAs.¹³¹
- A black octagonal “high in sugar” warning label was the only FOP label that consistently made a fruit drink appear less healthful to study participants in six countries (**Australia, Canada, Mexico, the United Kingdom, and United States**). The nutrient warning label outperformed GDA, Health Star Rating, and multiple traffic light labels in all countries.¹³⁶
- A randomized control trial in **Jamaica** found that participants exposed to a FOP warning label had double the odds of correctly identifying a food item least harmful to their health compared to a control group that saw a GDA-style “facts up front” nutrition label.¹³⁷ Magnifying glass-style warning labels and traffic light labels did not have significant impact.
- A randomized controlled experiment comparing the effects of warning labels compared to traffic light labels among **Brazilian** adults found that subjects who saw warning labels had greater improvements in their ability to identify the healthier product compared to those who saw traffic light labels (25% vs. 3%).¹³⁸
- In **Argentina**, a randomized controlled trial found that consumers who saw black octagonal nutrient warning labels on a sample of products were 7.5 times, 10 times, and 2.9 times more likely to correctly identify the least harmful product than respondents who saw no FOP label, a GDA label, or a traffic light label, respectively.¹³⁹ The warning label group’s likelihood of correctly identifying when a product contained excessive amounts of sugar, sodium, saturated fat, or trans fat was over 15 times higher than for the GDA and no label groups and 4.7 times higher than for the traffic light label group.

OUTCOME:
Purchase intentions or decisions, consumer choice, or nutrients purchased in shopping experiments

- FOP warning labels on sugary drinks have been linked to decreased purchasing intent and purchases of sugary beverages in experimental studies from the **United States** and **New Zealand**.¹²⁵⁻¹²⁷
- A shopping experiment in **Canada** found that participants who saw “high in” nutrient warning labels purchased less calories, sugar, and saturated fat from beverages and less calories and sodium from foods than participants who saw no FOP label.¹⁴⁰ Traffic light, Health Star Rating, and nutrition grade (i.e., Nutri-Score) labels had no significant impact on nutrients of concern purchased from beverages and limited effects among foods. The impact of warning labels was further enhanced in experimental conditions where they were combined with taxes on sugary drinks or snacks.
- A 2022 experiment conducted in a real grocery store in **Brazil** found that participants made faster and more healthful purchasing decisions when exposed to Mexican FOP warning labels compared to Brazil’s magnifying glass label.¹⁴¹
- In an online randomized controlled trial, **Brazilian** adults exposed to nutritional warning labels were more likely to either abandon a food category or substitute an item within a food category for a more healthful item than those who saw a GDA-style label.¹⁴²
- In **Argentina**, a randomized controlled trial found that subjects who saw black octagonal nutrient warning labels on a sample of products had double the odds of choosing to purchase of the least harmful product or no product compared to subjects who saw GDA labels or no labels.¹³⁹



Momentum continues to build for FOP warning label policies

Since Chile's first implemented FOP warning labels in 2016, six more Latin American countries have adopted similar octagonal, black labels and three countries have implemented nutrient warning labels in magnifying glass or circular styles: **Peru** (2019), **Mexico** (2020), **Uruguay** (2021), **Venezuela** (2024), **Argentina** (2022), and **Colombia** (2022) have implemented or passed policies requiring FOP warning labels similar to Chile's (black-and-white stop sign warnings).¹⁴³⁻¹⁴⁶

- **Brazil** (2020, right) and **Canada** (required by 2026) have implemented FOP warning labels featuring a magnifying glass design.^{147,148}
- Many other countries are currently developing FOP warning labeling policies, including but not limited to: **Bangladesh, Cameroon, Costa Rica, Ethiopia, India, Ghana, Guatemala, Kenya, Panama, the Philippines, and South Africa.**
 - In a randomized controlled trial using warning labels designed based on expert and focus group input, **South African** researchers found that warning labels outperformed GDAs and traffic light labels in helping consumers identify products high in nutrients of concern, identifying unhealthy products, and reducing their desire to purchase unhealthy products.¹⁴⁹ South Africa's National Department of Health released a draft front-of-package warning label regulation in April 2023, and is currently reviewing public comments and working on finalizing the regulation.
 - In a randomized controlled trial in **India**, participants rated warning labels easiest to understand, and they had the largest effect on ability to correctly identify unhealthy products compared to GDA, multiple traffic light, and Health Star Rating labels.¹⁵⁰



Example of Brazil's magnifying glass warning label (shown for a product high in added sugar, saturated fat, and sodium)



Right: Examples of South Africa's proposed warning labels on mock products¹⁴⁹



Countries developing front-of-package warning label policies.



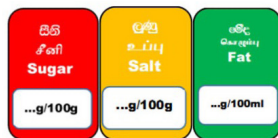
Other FOP labels

Each serving (150g) contains

Energy 1046kJ 250kcal	Fat 3.0g	Saturates 1.3g	Sugars 34g	Salt 0.9g
	LOW	LOW	HIGH	MED
13%	4%	7%	38%	15%

of an adult's reference intake

United Kingdom
(voluntary since 2006)



SRI LANKA
(mandatory on beverages since 2016, foods since 2019)



ECUADOR
(mandatory since 2014, but may appear on front, side, or back of pack)

Traffic Light Labels (TLLs)

TLLs use green, amber (yellow), and red colors to indicate whether a product has low, moderate, or high levels of nutrients of concern. TLLs can vary in complexity and appearance, from simple summary indicators (Sri Lanka, right) to nutrient-specific coloring (Ecuador) or TLLs combined with GDAs (United Kingdom).

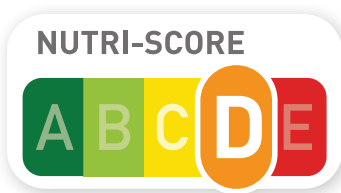
Experiments comparing different label types have found that while TLLs test moderately well for outcomes such as consumer liking, understanding, and improving intentions, they are still generally outperformed by warning labels in these outcomes and, importantly, in changing actual purchase behaviors.^{73,88,97,119,151,152} TLLs can also confuse consumers by sending mixed messages about whether a product is healthy overall, if it contains excessive amounts of some nutrients but not others.^{73,131,138,153}

- In a meta-analysis of experimental studies examining the effects of different label types, TLLs increased odds of selecting healthier products by 50% but did not significantly lower consumers' probability of making less-healthy choices.⁷³ Nutrient warning labels, however, increased odds of consumers selecting more healthful products by 261% and reduced odds of selecting less-healthy products by 35%.⁷³
- A 2023 systematic review of studies comparing major FOP labeling systems found that labels positively impacted the decision to purchase healthier foods in 50% of studies testing multiple traffic lights (4 out of 8 studies) compared to 100% of the 6 studies testing warning labels.¹²⁰
- A 2017 study comparing different labels found that TLLs and GDAs performed worse than warning labels at helping consumers identify products high in nutrients of concern and that consumers perceived products with warning labels as less healthy than the exact same products with TLLs or GDA labels.¹⁵⁴
- In an experiment in **Uruguay**, warning labels had greater relative impact on children's food choices than TLLs.¹⁵⁵ TLLs also confused consumers in **Mexico**, who found the multiple colors difficult to compare across products and the intermediate/amber color particularly hard to interpret.¹⁵³
- **Real-world evidence:** In 2014, **Ecuador** implemented a mandatory TLL for packaged, processed foods (left, top).¹⁴³ Unlike other mandatory policies, Ecuador's TLL is not required to appear on the front of packages and can be placed on the sides or back-of-pack. Evidence to date indicates that despite consumers' awareness, understanding, and self-reported use of the label, it has not led to the changes observed under Chile's warning label policy:
 - By 2018, 62% of people over age 10 in Ecuador report recognizing, understanding, and using the TLL, according to data from Ecuador's National Health and Nutrition Survey.¹⁵⁶
 - Studies that examined consumer purchases in the first year of Ecuador's regulation found no evidence that TLLs significantly affected households' carbonated soft-drink-buying habits.^{151,157}
 - In the first year of Ecuador's TLL policy, one study found evidence of modest beverage reformulation, with an observed average sugar reduction of 0.93 grams per 100 mL.¹⁵⁷
 - Another study found that only four of the top seven soft drink brands reduced their sugar content in the first two years of labeling, while the other three brands actually increased their sugar content.¹⁵⁸ These brands account for over 85% of the total carbonated soft drink market in Ecuador.
 - In 2016, focus groups reported high knowledge of TLLs but few changes in behavior.¹⁵⁹
 - Self-reported TLL use among adolescents and adults in Ecuador's 2018 national health and nutrition survey was associated with a slightly lower BMI (0.9–1.0 points for adolescents and 1.16–1.8 points for adults) and probability of obesity (4% for adolescents, 8.4% for adults).¹⁶⁰
 - Results from two choice experiments suggest that consumers, including adolescents, have a higher willingness to pay for yellow and green-labeled items.^{161,162}



Other FOP labels

Continued...



(voluntary in seven European countries beginning in 2017)

Nutri-Score

Introduced in France in 2017 and since implemented as a voluntary label by six other European countries (Spain, Belgium, Germany, Switzerland, Netherlands, Luxembourg),¹⁶³ the Nutri-Score label uses a color spectrum along with letter grades to provide a summary indicator of product healthiness. Scores are based on a nutrient profiling model that takes into account a products' nutritional content and how its ingredients (e.g., fruit, vegetable, legume, nut, or healthy oil content) may benefit or harm health.¹⁶⁴

As yet, no studies have examined real-world impact of Nutri-Score on purchase patterns, consumption, or the food supply in the countries where the label is in use. In experimental studies, Nutri-Score has tested well for helping consumers to accurately rank the healthiness of products within a given category.^{73,97,165-169} Some studies have also associated Nutri-Score with improvements in the nutritional quality of experimental shopping baskets¹⁷⁰⁻¹⁷² or meals in a cafeteria setting¹⁷³ compared to a no-label control condition. Research suggests that these improvements result from participants increasing purchases of higher-graded, healthier products without significantly reducing their purchases of lower-graded, less-healthy products:

- A 2016 field experiment in which Nutri-Score labels were placed on real foods across 60 **French** supermarkets observed a 14% increase in the nutritional profile of purchases from the healthiest categories examined.¹⁷⁰ No impact, however, was found on purchases from less-healthy categories, yielding a net improvement of just 2.5% in the average nutritional score of purchases.
 - Notably, this “real-life” study setting produced effect sizes 17 times smaller than comparable studies performed in simulated environments, highlighting the importance of evaluating FOP labeling policies beyond lab settings.¹⁷⁰
- A 2021 systematic review determined that warning labels have been more effective than Nutri-Score labels at discouraging unhealthy purchases and improving the overall healthfulness of purchases.⁷³

Nutri-Score's use of a nutrient profiling model that allows beneficial nutrients to offset nutrients of concern may limit the label's ability to reduce purchases of less-healthy products.⁹⁴ Furthermore, the voluntary nature of this policy may allow industry to avoid labeling or reformulating less-healthy products:

- While no research has yet characterized how many food producers have opted into using Nutri-Score labeling in **France**, one evaluation found that by 2023, 62% of France's total food sales volume was from brands applying Nutri-Score labels to at least some of their products.¹⁷⁵ This study did not indicate whether products with Nutri-Score labels were more or less high-scoring (i.e., healthy) than products that did not use the labels.
- In the first year of Nutri-Score use in **Belgium**, only an estimated 10% of products on the market featured the label, the majority of which displayed healthy “A” or “B” ratings.¹⁷⁶ This could have important implications for the label's effectiveness, as another study found greatly reduced benefits when labels are not widely adopted.¹⁷⁷
- A 2020 study observed minimal reformulation of breakfast cereals in the year before Nutri-Score was adopted in **Belgium**.¹⁷⁸
- In 2024, multi-national food company Danone announced that it would no longer apply Nutri-Score labels to its dairy products following updates to the label's algorithm that lowered these beverages' scores.¹⁷⁹ This highlights how companies can opt out of voluntary labeling schemes if they do not like the way their products would be labeled.

Finally, reports of low consumer trust for Nutri-Score may be due to lack of information on the label specifying which nutrients contribute to the product's overall score.¹⁸⁰

- A 2020 pilot study in the **Netherlands** found that while subjects noticed Nutri-Score labels on packages, they did not have a significant effect on attitudes, taste perceptions, and purchase intentions.¹⁸¹
- Three years after Nutri-Score's adoption in **France**, 57% of respondents to a government-sponsored survey claimed to have changed at least one of their shopping behaviors by utilizing Nutri-Score, up from 43% the year prior.¹⁸²

New variations on Nutri-Score labels in other countries*:



SINGAPORE

(mandatory since 2022)



INDONESIA

*(Implementing in 2025;
below: single-letter label
option for smaller packages)*



Other FOP labels

Continued...

Health Star Rating (HSR)

The Health Star Rating (HSR) system uses an algorithm that assesses a product's risk-increasing and risk-decreasing components to calculate a summary score ranging from 0.5 stars (least healthy) to 5 stars (most healthy).¹⁸³ HSR labels appear on packages either as a circular label showing only the star score or as a combined HSR-Guideline for Daily Allowance label that also lists calorie, saturated fat, sugars, sodium, and fiber content.



HSR labels were introduced in 2014 as a voluntary measure in **Australia** and **New Zealand**, where studies find that the labels are generally liked and understood by consumers.¹⁸⁴ This has not necessarily translated into meaningful change, however. Ten years later, there is little evidence of HSRs having a meaningful impact on the nutritional quality of people's food and beverage purchases.

**AUSTRALIA,
NEW ZEALAND**
(voluntary since 2014)



- Randomized controlled trials have found no significant impact of HSR labels on food purchases.¹⁸⁵⁻¹⁸⁷
- A meta-analysis examining HSR labels' impact on purchases found no significant effect on calories, sugar, saturated fat, or sodium purchased.¹¹⁹
- A 2022 study in New Zealand found that while the HSR label had little to no effect on the quantity of products purchased by households, industry reformulation may have contributed to small shifts in purchased sodium (-9%), protein (-3%), and fiber (+5%).¹⁸⁸
- HSR labels do not appear to have significantly reduced added sugar in the Australian food supply. From 2014 to 2020, the proportion of newly released, HSR-labeled products that contain added sugar increased each year, while rates of non-nutritive sweetener use in HSR-labeled products remained the same.¹⁸⁹

The lack of greater improvements in the food supply or shopping behavior associated with HSR labels could be due to the voluntary nature of existing HSR policies. For example:



- In both Australia and New Zealand, adoption of the voluntary label has been low. In Australia in 2023, consumers only saw HSR labels on 36% of products in stores (down from 40% in 2019), and only 30% of products in New Zealand.^{190,191}
- HSR labels have also been selectively implemented on higher-scoring products.¹⁹⁰⁻¹⁹² For example, 76% of products with labels in Australia were "healthier" options displaying ≥ 3 stars in 2019.¹⁹²
- In the online stores of two dominant supermarket retailers in Australia, HSRs were only displayed on 14% of products and were much more likely to appear on higher-scoring, healthier items: Less than 1% of products with scores under 3.5 stars had HSR labels vs. 22% of products with ≥ 3.5 stars.¹⁹³

Graphic showing changes in scores on Health Star Rating labels after nutrition standards for the voluntary labels were strengthened in 2019.

Source: API news

- In a study assessing awareness, use, and understanding of different FOP labels across countries, participants from Australia reported much lower awareness and use of HSR labels than was reported in other countries, likely due in part to lower uptake of the voluntary label.⁶⁴ In 2020, only 49% of respondents in Australia reported being aware of HSR labels vs. 81% of respondents in Mexico who were aware of warning labels. The same year, only 20% of Australian respondents reported using HSR labels 'often' or 'all the time' when deciding to buy a food product, compared to 41% in Mexico (in the first two months after warning labels appeared on packages).⁶⁴

Health scholars and advocates in the region have called for reforms to HSR labeling policies, including mandatory labeling requirement across all products, an strengthened nutritional profiling model, removal of positive health and nutrition claims from products with low HSR scores, and standardizing for label color, size, and placement on packages.^{191,194-197}



Industry-endorsed FOP labels are not effective

The most common FOP system in use globally is industry's voluntary **Guidelines for Daily Allowance (GDAs, also called Guideline Daily Amounts, "Facts Up Front," Reference Intakes, or Daily Intake Guides/DIGs, depending on region).**¹⁹⁸⁻²⁰⁰ GDA-style labels were developed by grocery manufacturing and distribution associations in the United Kingdom and United States and later adopted with slight variations by industry associations in many other countries, despite little to no evidence of positive impact for consumers. In the United States, the 2011 introduction of "Facts Up Front" labeling by the Grocery Manufacturers Association was viewed by health experts as a strategic — and successful — maneuver to pre-empt ongoing government development of a mandatory FOP labeling policy.^{201,202}

GDA-style labels typically display nutrient content per serving (not necessarily per package) for nutrients such as calories, saturated fat, sugars, and sodium, as well as the percentage of an average adult's recommended daily intake for each nutrient. Despite their ubiquity, these labels are regarded as unhelpful or confusing for customers.



Examples of a GDA-style label

Limitations of the GDA/DIG/"Facts Up Front" label include:²⁰³

- Benchmark values are not based on international nutrition recommendations and are calculated using an average adult's intake, even on products specifically targeted to or consumed by children.
- GDA labels are displayed in arbitrary serving sizes — making it difficult for consumers to compare different products in the same category — and are smaller than what people realistically consume.
- The nutrients included in a GDA label are inconsistent across products. For example, a product with very high sugar and saturated fat content may only show a GDA label for calories.
- Serving sizes are also shown in very small text, which could lead shoppers to think that label values refer to the full package contents.
- When fiber and micronutrients are included in the label, companies present percentages of minimum recommended intakes, whereas for sugars, fats, saturated fats, and sodium, they present percentages of upper consumption limits.
- Interpreting a GDA label takes more time than most shoppers spend reading a nutritional label and requires a high level of nutritional knowledge and mathematical skills.

GDAs perform poorly compared to other FOP labels and do not help consumers:

- Independent studies comparing GDA-style labels with other labeling systems consistently find that GDAs are the most confusing, take shoppers the most time to evaluate, and are ultimately least effective for encouraging consumers to make healthier choices.^{120,131,133,135,139,185,204-211}
- In Latin America, studies in Mexico, Ecuador, Chile, Brazil, and Uruguay have all found GDAs to be the weakest labeling system.^{122,123,135,153,155,203,210,213-214}
- In Mexico, studies show that consumers across age, education, and income groups have a hard time understanding GDA labels and do not use GDAs to make food choices.^{130,131,153,203,215}
- Eye-tracking studies from the United States, Uruguay, and Chile found that compared to warning labels, GDAs are less effective at getting consumers' attention, harder to process, and worse at helping to identify unhealthy products.^{121,123,216}
- In an online randomized controlled trial comparing Brazilian adults shopping choices when viewing products with FOP warning labels, traffic light labels, or GDAs, a higher percentage of participants who saw the GDA label selected the least healthful product to purchase in the choice experiment.¹⁴²
- Introduction of GDA-style labels in the United Kingdom did not affect shoppers' product choices among yogurts or ready-meals.²¹⁷
- Studies in Australia and New Zealand found that GDAs (there called Daily Intake Guides) were least-preferred by consumers and least helpful for discriminating between healthy and unhealthy products, compared to traffic light and Health Star Rating labels.^{218,219}
- Companies often place GDAs on packages alongside other, more prominent labeling and marketing such as nutrient or health claims, which further confuses consumers.²²⁰⁻²²⁴
- A study comparing GDAs and Nutri-Score on Greek adults found that participants preferred interpretive labels over the GDA numerical label and found Nutri-Score to be easier to understand, more clear, and more visible compared to the GDA.²²⁵
- When 14,880 Mexican adults with noncommunicable diseases were asked to classify the healthfulness of food products with either FOP warning labels or GDA labels, 70% of participants who saw GDAs misclassified foods' healthfulness.²²⁶
The group who saw warning labels had twice the odds of correctly classifying foods, and this difference was even more pronounced among participants with three or more noncommunicable diseases (i.e., overweight/obesity, type 2 diabetes, hypertension, and/or dyslipidemia).²²⁶



Developing labels

Interest is growing in supplementing or enhancing existing nutritional labeling systems with FOP labels that identify ultra-processed foods (UPFs) and/or foods and drinks that have a more negative environmental or ecological impacts.

Ultra-processed foods

To date, FOP labels have been based primarily on products' nutritional content, but given the large body of epidemiological evidence pointing to UPFs' health harms even independent of their nutritional profile, some researchers and health advocates are now calling for UPFs to carry warning labels indicating to consumers that they are ultra-processed.²²⁷⁻²³⁰ (See example, right.²³¹)



Proposed warning label for ultra-processed food²³¹

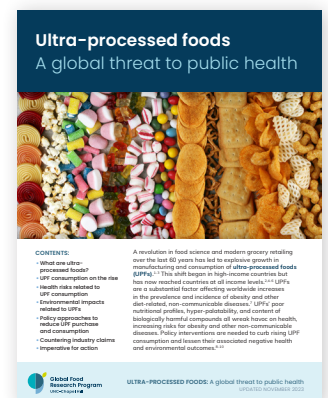
- A 2022 experiment found that including an “ultra-processed” declaration on Nutri-Score labels to UPFs increased participant understanding of products' nutrient profile and level of processing and was associated with positive impacts on purchasing intentions.²³⁰

Participants who were asked to choose between products with higher Nutri-Score grades (i.e., “A” or “B”) alongside an “ultra-processed” declaration vs. lower-graded products that were not ultra-processed more frequently selected the lower-graded products without UPF labeling, suggesting that inclusion of the UPF dimension in a FOP labeling system could influence overall quality of purchases beyond nutritional content, alone.²³⁰

- Conversely, an online experiment in Brazil wherein “ultra-processed” labels were added to ultra-processed products that already had nutrient warning labels found that while the added labels helped participants better identify UPFs, the added label did not significantly enhance the effect of the warning labels, alone, on their purchase decisions.²³²
- In Australia, researchers tested modifications to the Health Star Rating system that would account for markers of ultra-processing (i.e., inclusion of industrial food substances and/or costmetic additives on products' ingredients lists). They found that the adjusted HSR approaches were in greater alignment with Nova classification for food processing and that modifying the HSR profiling system to account for ultra-processing would lower the scores of some unhealthy products that still receive high scores under the current model.²³³
- A study testing U.S. adults' perceptions of an ultra-processed warning label found that participants who saw the UPF label thought more about the risks of consuming that product and were discouraged from buying it.²³⁴ Combining the UPF label with a nutrient content warning label (“high in sugar”) more successfully grabbed participants' attention and increased their risk perception and discouragement from purchasing more than the UPF label alone.
- Following the introduction of nutrient warning labels in Chile, manufacturers responded by reformulating many sugary products using non-sugar sweeteners to achieve sugar content below the thresholds of the law.²³⁵ While this resulted in significantly less sugar purchased throughout Chile,^{88,89} drinks and foods sweetened with non-sugar sweeteners are still ultra-processed and may pose a long-term health risk if consumed in high quantities.²³⁶ Because of this, other countries in Latin America including Mexico, Peru, and Argentina have included in an additional label disclosing content of non-sugar sweeteners in their FOP regulations. While these do not directly label products as UPFs, they do inform consumers that the product contains ingredients which may contribute to overall health harm.



Experimental UPF label from an [online experiment in Brazil](#)²³²



Read more about [health and environmental harms associated with high ultra-processed foods' consumption](#).

Eco-labels

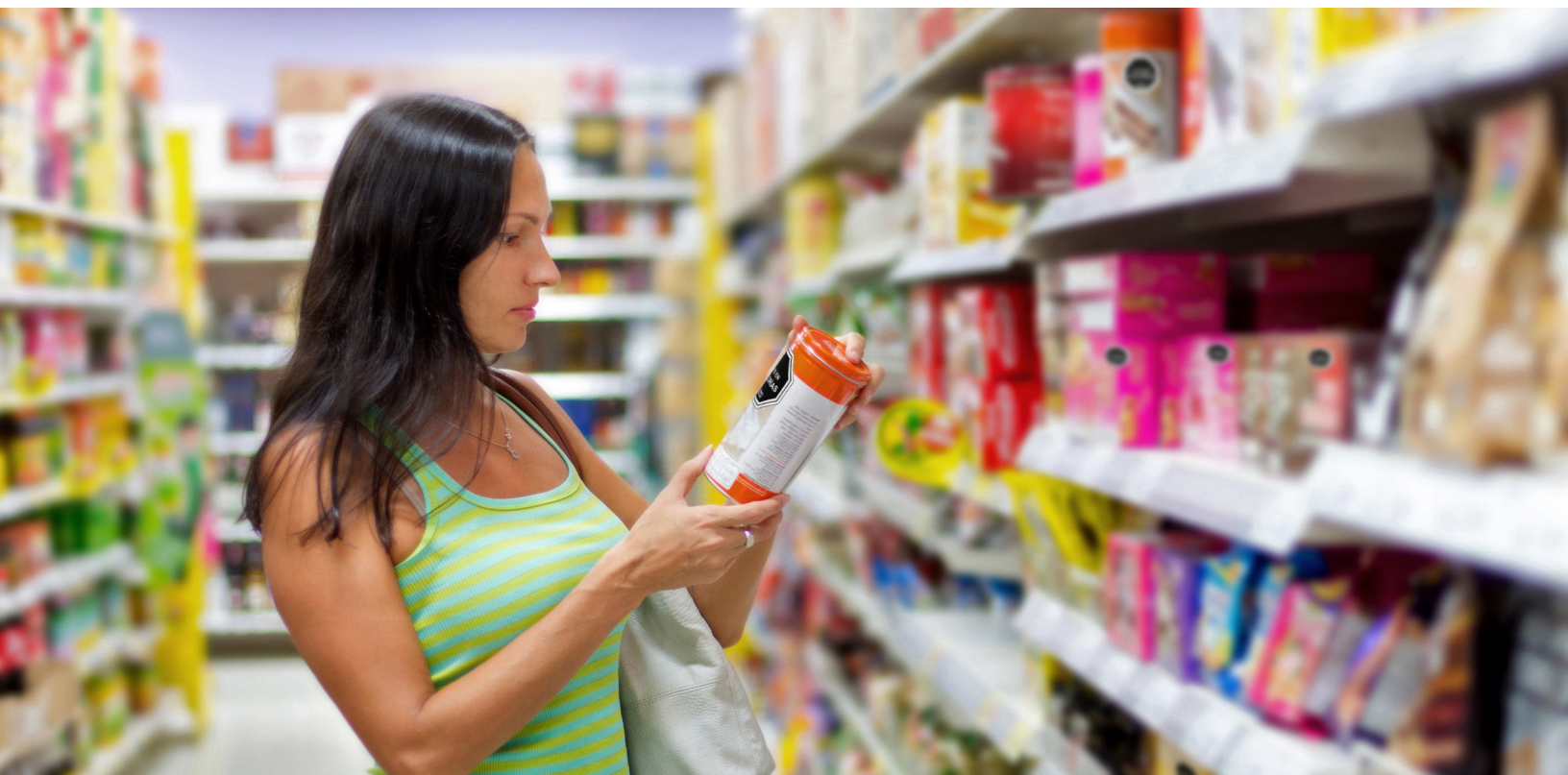
Food choices do not just affect health via dietary intake: They can also impact the environment via plastic pollution, increased greenhouse gas emissions, water use, and stress on ecosystems — all of which negatively impact both planetary and human health.²³⁷⁻²⁴¹ Early evidence suggests that eco-labels could be an effective policy tool to encourage more sustainable food choices by consumers and practices by food companies, but more research is needed to understand how eco-labels can be implemented alongside or integrated with other nutritional FOP labels.²⁴²⁻²⁴⁴



- A systemic review analyzing the impact of a variety of eco-label designs across 56 studies found that eco-labels can positively impact the selection, purchase, and consumption of more environmentally friendly drinks and foods.²⁴³
- In randomized controlled trial testing the impact of traffic light-style eco-labels on meal component purchases in a virtual reality supermarket, participants who were exposed to eco-labels composed meals with significantly better environmental footprints without compromising healthiness, cost, or enjoyment of their chosen meals.²⁴⁵
- In a simulated shopping study where participants saw products with one of three different eco-label designs — single traffic light, multiple traffic light, or a label that described each product's greenhouse gas emissions in terms of kilometers driven by an average car — participants' shopping basket choices had significantly lower net environmental impact when they viewed the label condition, regardless of which label type they saw.²⁴⁶ These more environmentally friendly shopping baskets were similar in price and nutritional content to the reference baskets selected by the same participants when no eco-labels were shown.²⁴⁶
- To date, no country has implemented a mandatory eco-label policy for foods, and it remains to be seen how these labels can best address consumer understanding and industry responsibility for the intersecting health impacts of foods' and beverages' environmental footprint, level of processing, and nutritional profile.



Examples of different potential eco-label designs



Best practices for effective FOP labeling systems

- **FOP labels should be based on a strong nutrient profiling model.**
 - The model should set clear and meaningful criteria based on evidence of diet-related health risk and nutritional guidelines to determine which products must carry labels.^{78,247-251}
 - The model should ideally include all nutrients of health concern and account for content of sodium, saturated fats, trans fats, and sugars.²⁵¹ Including non-sugar sweeteners in profiling can also capture products that are ultra-processed, even if not high in sugar.
 - Industry should not impact the adoption and implementation process of a profiling model.²⁵¹ The model should be based on PAHO, SEARO, or AFRO regional models to define products excessive in nutrients and ingredients of concern with adaptations for country context.²⁵¹
- **FOP labels should be interpretive, with a simple and clear design.**
 - Simple FOP labels enhance understanding and use of nutrition information, especially for consumers with less education and nutrition knowledge.^{85,252,253}
 - Interpretive FOP labels work by using simple designs and easy-to-understand language to draw attention to key nutrition information, facilitate rapid comprehension, encode information into working memory, and make it easier to discriminate between healthy and less healthy options.^{85,94,253-256}
 - To this end, labels should avoid numeric information; they should use symbols and shapes that leverage consumers' automatic associations, and warn or caution consumers using words or phrases such as "excess," "high," "avoid," or "warning."⁹⁴
- **FOP labels should be immediately and easily visible on the package.**
 - Sizing and placement requirements should be detailed clearly in the regulation, including specifications for a wide range of package formats — from bottles to boxes and small gum packages to large multi-packs.
- **FOP labeling should be mandatory and apply across all product categories.**
 - Applying FOP labeling selectively can create misleading perceptions of healthfulness across products.^{73,257} Voluntary labeling can also lead to multiple types of logos and labels appearing on packages, which increases confusion and decreases the usefulness of the labels.
 - Mandatory labels applied across the food supply enable consumers to more easily compare products within and across categories.^{258,259}
 - Food and beverage companies are more likely to reformulate their products under mandatory labeling policies, reducing sodium, sugar, and saturated fat content of their products and leading to healthier food supply.^{96,258-260}
- **Where FOP labels are required, health and nutrient claims should be prohibited.**
 - Health and nutrient claims are a marketing tool widely used by the food and beverage industry that frequently overstate or mask the overall nutritional quality of products and may promote overconsumption.²⁶¹⁻²⁶³
 - FOP labels can help mitigate but not eliminate the "health halo" effect of health and nutrient claims, which confuse consumers and undermine the purpose of using warning labels to discourage purchase and consumption of less-healthy products.^{102,103,264,265}
 - Prohibition of making nutrient or health claims on products with warning labels was a critical feature of Mexico's labeling regulation introduced in 2021 and Argentina's in 2022.^{145,266}
- **FOP labeling policies should be developed through a transparent, evidence-based process.**
 - Successful development and implementation of a FOP label policy will depend on strong supporting evidence, a transparent process that includes pilot-testing of label systems, collaboration by different stakeholders, and strong political leadership.^{267,268}
 - Criteria for the labels should be made public in advance to educate consumers and manufacturers and to encourage product reformulation.⁷⁷
 - Industry may be allowed to comment publicly on the criteria but should not be permitted to participate or intervene in its development.²⁶⁷
 - Endorsements by trusted government bodies or scientific organizations have been shown to increase label credibility.^{85,268,269}
- **FOP labeling policies should be monitored, enforced, and evaluated over time to ensure uptake, compliance, and intended impact.**
 - Ongoing monitoring and enforcement efforts should be established to ensure uptake and compliance, evaluate policy impacts, and inform continuous improvements and further policy updates, as needed.^{78,268} These should be coordinated through a government agency or independent group without conflicts of interest.
- **FOP labeling should be part of a comprehensive policy package.**

Warning labels should ideally be part of a broader package of policies that synergistically address multiple commercial and environmental determinants of diet and health, including:

 - Restrictions on marketing for unhealthy foods and drinks (including digital marketing);
 - Fiscal policies taxing unhealthy products and/or lowering the cost of healthier foods and drinks;
 - Protections for the school food environment (e.g., limiting access to unhealthy, ultra-processed foods and ensuring access to healthy foods and clean water in schools); and
 - Other policies addressing upstream determinants of healthy food access and intake.



References

1. Reardon T, Timmer CP, Barrett CB, Berdegue JA. The rise of supermarkets in Africa, Asia, and Latin America. *American Journal of Agricultural Economics*. 2003;85:1140-1146.
2. Reardon T, Timmer CP, Minten B. Supermarket revolution in Asia and emerging development strategies to include small farmers. *Proceedings of the National Academy of Sciences*. 2012;109(31):12332-12337. doi:10.1073/pnas.1003160108
3. Popkin BM. Nutrition, agriculture and the global food system in low and middle income countries. *Food Policy*. 2014;47:91-96. doi:<http://dx.doi.org/10.1016/j.foodpol.2014.05.001>
4. Zhou Y, Du S, Su C, Zhang B, Wang H, Popkin BM. The food retail revolution in China and its association with diet and health. *Food Policy*. 2015;55:92-100. doi:10.1016/j.foodpol.2015.07.001
5. Popkin BM, Reardon T. Obesity and the food system transformation in Latin America. *Obesity Reviews*. 2018;19(8):1028-1064.
6. Popkin BM, Ng SW. The nutrition transition to a stage of high obesity and noncommunicable disease prevalence dominated by ultra-processed foods is not inevitable. *Obesity Reviews*. 2022;23(1):e13366.
7. Monteiro CA, Moubarac JC, Cannon G, Ng SW, Popkin B. Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews*. 2013;14:21-28. doi:10.1111/obr.12107
8. Baker P, Machado P, Santos T, et al. Ultra-processed foods and the nutrition transition: Global, regional and national trends, food systems transformations and political economy drivers. *Obesity Reviews*. 2020;21(12):e13126.
9. Anand SS, Hawkes C, de Souza RJ, et al. Food Consumption and its Impact on Cardiovascular Disease: Importance of Solutions Focused on the Globalized Food System: A Report From the Workshop Convened by the World Heart Federation. *Journal of the American College of Cardiology*. 2015;66(14):1590-614. doi:10.1016/j.jacc.2015.07.050
10. Imamura F, Micha R, Khatibzadeh S, et al. Dietary quality among men and women in 187 countries in 1990 and 2010: A systematic assessment. *The Lancet Global Health*. 2015;3(3):e132-e142. doi:10.1016/S2214-109X(14)70381-X
11. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. *Nutrition Reviews*. 2012;70(1):3-21. doi:10.1111/j.1753-4887.2011.00456.x
12. Poti JM, Mendez MA, Ng SW, Popkin BM. Is the degree of food processing and convenience linked with the nutritional quality of foods purchased by US households? *American Journal of Clinical Nutrition*. 2015;99(1):162-171. doi:10.3945/ajcn.114.100925
13. Luiten CM, Steenhuis IH, Eyles H, Mhurchu CN, Waterlander WE. Ultra-processed foods have the worst nutrient profile, yet they are the most available packaged products in a sample of New Zealand supermarkets. *Public Health Nutrition*. 2016;19(3):530-538.
14. Steele EM, Popkin BM, Swinburn B, Monteiro CA. The share of ultra-processed foods and the overall nutritional quality of diets in the US: evidence from a nationally representative cross-sectional study. *Population Health Metrics*. 2017;15(1):6.
15. Cornwell B, Villamor E, Mora-Plazas M, Marin C, Monteiro CA, Baylin A. Processed and ultra-processed foods are associated with lower-quality nutrient profiles in children from Colombia. *Public Health Nutrition*. 2018;21(1):142-147. doi:10.1017/S1368980017000891
16. Koiwai K, Takemi Y, Hayashi F, et al. Consumption of ultra-processed foods decreases the quality of the overall diet of middle-aged Japanese adults. *Public Health Nutrition*. 2019;22(16):2999-3008.
17. Julia C, Martinez L, Allès B, et al. Contribution of ultra-processed foods in the diet of adults from the French NutriNet-Santé study. *Public Health Nutrition*. 2018;21(1):27-37.
18. Pries AM, Huffman SL, Adhikary I, et al. High consumption of commercial food products among children less than 24 months of age and product promotion in Kathmandu Valley, Nepal. *Maternal & Child Nutrition*. 2016;12:22-37. doi:10.1111/mcn.12267
19. Pries AM, Huffman SL, Mengkheang K, et al. High use of commercial food products among infants and young children and promotions for these products in Cambodia. *Maternal & Child Nutrition*. 2016;12:52-63. doi:10.1111/mcn.12270
20. Feeley AB, Ndeye Coly A, Sy Gueye NY, et al. Promotion and consumption of commercially produced foods among children: situation analysis in an urban setting in Senegal. *Maternal & Child Nutrition*. 2016;12:64-76. doi:10.1111/mcn.12304
21. Marriott BM, Campbell L, Hirsch E, Wilson D. Preliminary data from demographic and health surveys on infant feeding in 20 developing countries. *The Journal of Nutrition*. 2007;137(2):518S-523S.
22. Chollet-Hinton L, Demeké S, Fazzino TL, Kong KL, Rohde K, Sutton C. Change in hyper-palatable food availability in the US food system over 30 years: 1988-2018. *Public Health Nutrition*. 2023;26(1):182-189. doi:10.1017/S1368980022001227
23. World Health Organization. Reducing salt intake in populations: Report of a WHO Forum and Technical meeting 5-7 October 2006, Paris, France. Accessed December 9, 2024. https://iris.who.int/bitstream/handle/10665/43653/9789241595377_eng.pdf
24. World Health Organization. Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation. Accessed December 9, 2024 <https://www.who.int/publications/item/924120916X>
25. Pagliari G, Dinu M, Madarena MP, Bonaccio M, Iacoviello L, Sofi F. Consumption of ultra-processed foods and health status: a systematic review and meta-analysis. *British Journal of Nutrition*. 2021;125(3):308-318. doi:10.1017/S0007114520002688
26. Lane MM, Davis JA, Beattie S, et al. Ultraprocessed food and chronic noncommunicable diseases: A systematic review and meta-analysis of 43 observational studies. *Obesity Reviews*. 2020;doi:10.1111/obr.13146
27. Askari M, Heshmati J, Shahinfar H, Tripathi N, Daneshzad E. Ultra-processed food and the risk of overweight and obesity: a systematic review and meta-analysis of observational studies. *International Journal of Obesity*. 2020;44, pages 2080-2091.
28. Chen X, Zhang Z, Yang H, et al. Consumption of ultra-processed foods and health outcomes: a systematic review of epidemiological studies. *Nutrition Journal*. 2020;19(1):86. doi:10.1186/s12937-020-00604-1
29. Meneguelli TS, Hinkelmann JV, Hermsdorff HHM, Zulet MÁ, Martínez JA, Bressan J. Food consumption by degree of processing and cardiometabolic risk: a systematic review. *International Journal of Food Sciences and Nutrition*. 2020;71(6):678-692.
30. Elizabeth L, Machado P, Zinöcker M, Baker P, Lawrence M. Ultra-Processed Foods and Health Outcomes: A Narrative Review. *Nutrients*. 2020;12(7):1955.
31. Santos FSd, Dias MdS, Mintem GC, Oliveira IOd, Gigante DP. Food processing and cardiometabolic risk factors: a systematic review. *Revista de Saúde Pública*. 2020;54:70.
32. U.S. Department of Health and Human Services and the U.S. Department of Agriculture. Scientific Report of the 2015 Dietary Guidelines Advisory Committee. 2015;
33. World Health Organization. Guideline: Sugars Intake for Adults and Children. Accessed December 9, 2024. <https://www.who.int/publications/i/item/9789241549028>
34. World Cancer Research Fund International. Curbing global sugar consumption: Effective food policy actions to help promote healthy diets and tackle obesity. WCRF. Accessed December 9, 2024. <https://www.wcrf.org/wp-content/uploads/2024/11/Curbing-global-sugar-consumption.pdf>
35. Malik VS, Popkin BM, Bray GA, Despres JP, Willett WC, Hu FB. Sugar-sweetened beverages and risk of metabolic syndrome and type 2 diabetes: a meta-analysis. *Diabetes Care*. 2010;33(11):2477-83. doi:10.2337/dc10-1079
36. Malik VS, Popkin BM, Bray GA, Despres JP, Hu FB. Sugar-sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. *Circulation*. 2010;121(11):1356-64. doi:10.1161/CIRCULATIONAHA.109.876185
37. Malik M, Razig SA. The Prevalence of the Metabolic Syndrome among the Multiethnic Population of the United Arab Emirates: A Report of a National Survey. *Metabolic Syndrome and Related Disorders*. 2008;doi:10.1089/met.2008.0006
38. Ebbeling CB, Feldman HA, Chomitz VR, et al. A Randomized Trial of Sugar-Sweetened Beverages and Adolescent Body Weight. *New England Journal of Medicine*. 2012;0(0):null. doi:doi:10.1056/NEJMoa1203388



39. Morenga, Lisa Te, Mallard, Simonette, Mannjim., Dietary sugars and body weight: systematic review and meta-analyses of randomized controlled trials and cohort studies. *BMJ*. 23:31:43 2013;346doi:10.1136/bmj.e7492
40. Morenga LAT, Howatson AJ, Jones RM, Mann J. Dietary sugars and cardiometabolic risk: systematic review and meta-analyses of randomized controlled trials of the effects on blood pressure and lipids. *The American Journal of Clinical Nutrition*. 2014;100(1):65-79. doi:10.3945/ajcn.113.081521
41. Institute of Medicine Committee on Accelerating Progress in Obesity Prevention. *Measuring Progress in Obesity Prevention: Workshop Report*. The National Academies Press; 2012.
42. Institute of Medicine. *Food Marketing to Children and Youth: Threat or Opportunity?* The National Academies Press; 2006.
43. Johnson RK, Appel LJ, Brands M, et al. Dietary sugars intake and cardiovascular health: a scientific statement from the American Heart Association. *Practice Guideline. Circulation*. 2009;120(11):1011-20. doi:10.1161/CIRCULATIONAHA.109.192627
44. Pan American Health Organization. *Plan of Action for the Prevention of Obesity in Children and Adolescents*. Accessed October 25, 2024. <https://www3.paho.org/hq/dm-documents/2015/Obesity-Plan-Of-Action-Child-Eng-2015.pdf>
45. Graudal NA, Hubeck-Graudal T, Jürgens G. Effects of low-sodium diet vs. high-sodium diet on blood pressure, renin, aldosterone, catecholamines, cholesterol, and triglyceride (Cochrane Review). *American Journal of Hypertension*. 2012;25(1):1-15.
46. Barquera S, Campos-Nonato I, Hernández-Barrera L, Pedroza A, J R-D. Obesity in Mexican adults: results of Mexican National Health and Nutrition Survey 2012. *Salud Publica Mex*. 2013;55:(in press).
47. Mozaffarian D, Fahimi S, Singh GM, et al. Global sodium consumption and death from cardiovascular causes. *New England Journal of Medicine*. 2014;371(7):624-634.
48. Graudal N, Jürgens G, Baslund B, Alderman MH. Compared with usual sodium intake, low-and excessive-sodium diets are associated with increased mortality: a meta-analysis. *American Journal of Hypertension*. 2014;27(9):1129-1137.
49. Imamura F, Micha R, Wu JH, et al. Effects of saturated fat, polyunsaturated fat, mono-unsaturated fat, and carbohydrate on glucose-insulin homeostasis: a systematic review and meta-analysis of randomised controlled feeding trials. *PLOS Medicine*. 2016;13(7):e1002087.
50. Mozaffarian D, Micha R, Wallace S. Effects on coronary heart disease of increasing polyunsaturated fat in place of saturated fat: a systematic review and meta-analysis of randomized controlled trials. *PLOS Medicine*. 2010;7(3):e1000252.
51. Skeaff CM, Miller J. Dietary fat and coronary heart disease: summary of evidence from prospective cohort and randomised controlled trials. *Annals of nutrition & metabolism*. 2009;55(1-3):173-201. doi:10.1159/000229002
52. World Health Organization. Saturated fatty acid and trans-fatty acid intake for adults and children: WHO guideline. Accessed October 9, 2024. <https://iris.who.int/bitstream/handle/10665/370419/9789240073630-eng.pdf?sequence=1>
53. Herforth A, Arimond M, Álvarez-Sánchez C, Coates J, Christianson K, Muehlhoff E. A Global Review of Food-Based Dietary Guidelines. *Advances in Nutrition*. 2019;10(4):590-605. doi:10.1093/advances/nmy130
54. Srour B, Kordahi MC, Bonazzi E, Deschasaux-Tanguy M, Touvier M, Chassaing B. Ultra-processed foods and human health: from epidemiological evidence to mechanistic insights. *The Lancet Gastroenterology & Hepatology*. 2022;7(12):1128-1140. doi:[https://doi.org/10.1016/S2468-1253\(22\)00169-8](https://doi.org/10.1016/S2468-1253(22)00169-8)
55. Lane MM, Gamage E, Du S, et al. Ultra-processed food exposure and adverse health outcomes: umbrella review of epidemiological meta-analyses. *BMJ*. 2024;384:e077310. doi:10.1136/bmj-2023-077310
56. Popkin BM, Hawkes C. Sweetening of the global diet, particularly beverages: patterns, trends, and policy responses. *The Lancet Diabetes & Endocrinology*. 2016;4(2):174-86. doi:10.1016/S2213-8587(15)00419-2
57. Singh GM, Micha R, Khatibzadeh S, et al. Global, Regional, and National Consumption of Sugar-Sweetened Beverages, Fruit Juices, and Milk: A Systematic Assessment of Beverage Intake in 187 Countries. *PLOS One*. 2015;10(8):e0124845. doi:10.1371/journal.pone.0124845
58. Matos RA, Adams M, Sabaté J. The Consumption of Ultra-Processed Foods and Non-communicable Diseases in Latin America. *Frontiers in Nutrition*. 2021;8:110.
59. Srour B, Touvier M. Ultra-processed foods and human health: What do we already know and what will further research tell us? *EClinicalMedicine*. 2021;32
60. Ng M, Fleming T, Robinson M, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*. 2014;384(9945):766-781. doi:10.1016/S0140-6736(14)60460-8
61. World Health Organization. Obesity and overweight. Accessed October 10, 2024. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
62. Vandevijvere S, Jaacks LM, Monteiro CA, et al. Global trends in ultraprocessed food and drink product sales and their association with adult body mass index trajectories. *Obesity Reviews*. 2019;
63. World Health Organization. Nutrition labelling: policy brief. Accessed January 26, 2024. <https://www.who.int/publications/item/9789240051324>
64. Acton RB, Rynard VL, Adams J, et al. Awareness, use and understanding of nutrition labels among adults from five countries: Findings from the 2018–2020 International Food Policy Study. *Appetite*. 2023;180:106311.
65. Graham DJ, Orquin JL, Visschers VHM. Eye tracking and nutrition label use: A review of the literature and recommendations for label enhancement. *Food Policy*. 2012/08/01/2012;37(4):378-382. doi:<https://doi.org/10.1016/j.foodpol.2012.03.004>
66. Grunert KG, Wills JM, Fernández-Celemín L. Nutrition knowledge, and use and understanding of nutrition information on food labels among consumers in the UK. *Appetite*. 2010;55(2):177-189.
67. Machín L, Curutchet MR, Gugliucci V, et al. The habitual nature of food purchases at the supermarket: Implications for policy making. *Appetite*. 2020/12/01/2020;155:104844. doi:<https://doi.org/10.1016/j.appet.2020.104844>
68. Globe Newswire. In Front of the Supermarket Shelves no More Than 20 Seconds. Accessed January 10, 2025. <https://www.globenewswire.com/news-release/2024/11/06/2975877/0/en/In-Front-of-the-Supermarket-Shelves-no-More-Than-20-Seconds.html>
69. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: a systematic review. *Public Health Nutrition*. 2005;8(1):21-8.
70. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: a systematic review. *Public Health Nutrition*. 2011;14(8):1496-1506.
71. Patterson M, Bhargava S, Loewenstein G. An unhealthy attitude? New insight into the modest effects of the NLEA. *Journal of Behavioral Economics for Policy*. 2017;1:15-26.
72. Center for Science in the Public Interest. *Front-of-Package Nutrition Labeling: Leveraging food labels to inform consumers and promote public health-What is front-of-package nutrition labeling?* Accessed October 9, 2024. https://www.cspinet.org/sites/default/files/2023-01/FOPNL%20Fact%20Sheet_1.10.23_final.pdf
73. Greenthal E, Sorscher S. Can Food Labeling Policy Advance Health Equity? Accessed December 9, 2024. <https://www.fdi.org/2021/09/can-food-labeling-policy-advance-health-equity/>
74. Rothman RL, Housam R, Weiss H, et al. Patient understanding of food labels: the role of literacy and numeracy. *American Journal Of Preventive Medicine*. Nov 2006;31(5):391-8. doi:10.1016/j.amepre.2006.07.025
75. Nogueira LM, Thai CL, Nelson W, Oh A. Nutrition label numeracy: disparities and association with health behaviors. *American Journal Of Health Behavior*. 2016;40(4):427-436.
76. Song J, Brown MK, Tan M, et al. Impact of color-coded and warning nutrition labelling schemes: A systematic review and network meta-analysis. *PLOS Medicine*. 2021;18(10):e1003765. doi:10.1371/journal.pmed.1003765



77. Reyes M, Smith Taillie L, Popkin B, Kanter R, Vandevijvere S, Corvalán C. Changes in the amount of nutrient of packaged foods and beverages after the initial implementation of the Chilean Law of Food Labelling and Advertising: A nonexperimental prospective study. *PLOS Medicine*. 2020;17(7):e1003220. doi:10.1371/journal.pmed.1003220
78. Saavedra-García L, Meza-Hernández M, Díez-Canseco F, Taillie LS. Reformulation of Top-Selling Processed and Ultra-Processed Foods and Beverages in the Peruvian Food Supply after Front-of-Package Warning Label Policy. *International Journal of Environmental Research and Public Health*. 2023;20(1):424.
79. Shangquan S, Afshin A, Shulkin M, et al. A Meta-Analysis of Food Labeling Effects on Consumer Diet Behaviors and Industry Practices. *American Journal of Preventive Medicine*. 2019;56(2):300-314. doi:10.1016/j.amepre.2018.09.024
80. Vyth EL, Steenhuis I, Roodenburg A, Brug J, Seidell JC. Front-of-pack nutrition label stimulates healthier product development: a quantitative analysis. *International Journal of Behavioral Nutrition and Physical Activity*. 2010;7:65. doi:10.1186/1479-5868-7-65
81. World Health Organization. Guiding principles and framework manual for front-of-pack labelling for promoting healthy diets. Accessed January 26, 2024. <https://www.who.int/publications/m/item/guiding-principles-labelling-promoting-healthy-diet>
82. World Cancer Research Fund International. Building momentum: lessons on implementing a robust front-of-pack food label. Accessed October 9, 2024. <https://www.wcrf.org/wp-content/uploads/2021/03/PPA-Building-Momentum-2-WEB.pdf>
83. World Heart Federation. World Heart Federation Policy Brief: front-of-pack labelling. Accessed October 9, 2024. <https://world-heart-federation.org/wp-content/uploads/2021/05/WHF-Policy-Brief-on-Front-of-Pack-Labelling.pdf>
84. Wartella EA, Lichtenstein AH, Boon CS. Examination of front-of-package nutrition rating systems and symbols: Phase I report. National Academies Press; 2010.
85. Feunekes GJ, Gortemaker IA, Willems AA, Lion R, van den Kommer M. Front-of-pack nutrition labelling: Testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. *Appetite*. 2008;50(1):57-70. doi:<https://doi.org/10.1016/j.appet.2007.05.009>
86. Hamlin RP, McNeill LS, Moore V. The impact of front-of-pack nutrition labels on consumer product evaluation and choice: an experimental study. *Public Health Nutrition*. 2014;1-9.
87. Ares G, Varela F, Machin L, et al. Comparative performance of three interpretative front-of-pack nutrition labelling schemes: Insights for policy making. *Food Quality and Preference*. 2018;doi:<https://doi.org/10.1016/j.foodqual.2018.03.007>
88. Taillie LS, Reyes M, Colchero MA, Popkin B, Corvalán C. An evaluation of Chile's Law of Food Labeling and Advertising on sugar-sweetened beverage purchases from 2015 to 2017: A before-and-after study. *PLOS Medicine*. 2020;17(2):e1003015. doi:10.1371/journal.pmed.1003015
89. Taillie LS, Bercholz M, Popkin B, Reyes M, Colchero MA, Corvalán C. Changes in food purchases after the Chilean policies on food labelling, marketing, and sales in schools: a before and after study. *The Lancet Planetary Health*. 2021;5(8):e526-e533.
90. Taillie LS, Bercholz M, Popkin B, Rebolledo N, Reyes M, Corvalán C. Decreases in purchases of energy, sodium, sugar, and saturated fat 3 years after implementation of the Chilean food labeling and marketing law: An interrupted time series analysis. *PLOS Medicine*. 2024;21(9):e1004463. doi:10.1371/journal.pmed.1004463
91. Corvalán C, Reyes M, Garmendía ML, Uauy R. Structural responses to the obesity and non-communicable diseases epidemic: Update on the Chilean law of food labelling and advertising. *Obesity Reviews*. 2019;20(3):367-374. doi:doi:10.1111/obr.12802
92. Correa T, Fierro C, Reyes M, Dillman Carpentier FR, Taillie LS, Corvalán C. Responses to the Chilean law of food labeling and advertising: exploring knowledge, perceptions and behaviors of mothers of young children. journal article. *International Journal of Behavioral Nutrition and Physical Activity*. 2019;16(1):21. doi:10.1186/s12966-019-0781-x
93. Uribe R, Manzur E, Cornejo C. Varying the Number of FOP Warnings on Hedonic and Utilitarian Food Products: Evidence from Chile. *Journal of Food Products Marketing*. 2020;26(2):123-143.
94. Roberto CA, Ng SW, Ganderats-Fuentes M, et al. The Influence of Front-of-Package Nutrition Labeling on Consumer Behavior and Product Reformulation. *Annual Review of Nutrition*. 2021;41(1):null. doi:10.1146/annurev-nutr-111120-094932
95. Grummon AH, Hall MG. Sugary drink warnings: A meta-analysis of experimental studies. *PLOS Medicine*. 2020;17(5):e1003120.
96. Ares G, Antúnez L, Curutchet MR, Giménez A. Warning labels as a policy tool to encourage healthier eating habits. *Current Opinion in Food Science*. 2023;51:101011.
97. Taillie LS, Hall MG, Popkin BM, Ng SW, Murukutla N. Experimental Studies of Front-of-Package Nutrient Warning Labels on Sugar-Sweetened Beverages and Ultra-Processed Foods: A Scoping Review. *Nutrients*. 2020;12(2):569.
98. Franco-Arellano B, Vanderlee L, Ahmed M, Oh A, L'Abbé M. Influence of front-of-pack labelling and regulated nutrition claims on consumers' perceptions of product healthfulness and purchase intentions: A randomized controlled trial. *Appetite*. 2020;149:104629.
99. Talati Z, Pettigrew S, Dixon H, Neal B, Ball K, Hughes C. Do health claims and front-of-pack labels lead to a positivity bias in unhealthy foods? *Nutrients*. 2016;8(12):787.
100. Ikonen I, Sotgiu F, Aydinli A, Verlegh PWJ. Consumer effects of front-of-package nutrition labeling: an interdisciplinary meta-analysis. *Journal of the Academy of Marketing Science*. 2020;48(3):360-383. doi:10.1007/s11747-019-00663-9
101. Talati Z, Norman R, Kelly B, et al. A randomized trial assessing the effects of health claims on choice of foods in the presence of front-of-pack labels. *The American Journal of Clinical Nutrition*. 2018;108(6):1275-1282. doi:<https://doi.org/10.1093/ajcn/nqy248>
102. Prates SMS, Reis IA, Rojas CFU, Spinillo CG, Anastácio LR. Influence of nutrition claims on different models of front-of-package nutritional labeling in supposedly healthy foods: Impact on the understanding of nutritional information, healthfulness perception, and purchase intention of Brazilian consumers. Original Research. *Frontiers in Nutrition*. 2022;9doi:10.3389/fnut.2022.921065
103. Mediano Stoltze F, Busey E, Taillie LS, Dillman Carpentier FR. Impact of warning labels on reducing health halo effects of nutrient content claims on breakfast cereal packages: A mixed-measures experiment. *Appetite*. 2021;163:105229. doi:<https://doi.org/10.1016/j.appet.2021.105229>
104. Paraje G, Colchero A, Wlasiuk JM, Sota AM, Popkin BM. The effects of the Chilean food policy package on aggregate employment and real wages. *Food Policy*. 2021;102016. doi:<https://doi.org/10.1016/j.foodpol.2020.102016>
105. Paraje G, Montes de Oca D, Corvalán C, Popkin BM. Evolution of food and beverage prices after the front-of-package labelling regulations in Chile. *BMJ Global Health*. 2023;8(7):e011312. doi:10.1136/bmjgh-2022-011312
106. Paraje G, Montes de Oca D, Corvalán C, Popkin B. Socioeconomic Patterns in Budget Share Allocations of Regulated Foods and Beverages in Chile: A Longitudinal Analysis. *Nutrients*. 2023;15(3):679.
107. Rebolledo N, Ferrer-Rosende P, Reyes M, Taillie LS, Corvalán C. Food Industry Compliance With the Display of Front-of-Package Warning Labels at the Final Phase (2020) of Chile's Labeling and Advertising Law. *American Journal of Public Health*. 2024;0(0):e1-e8. doi:10.2105/ajph.2024.307843
108. Endevelt R, Itamar Grotto, Rivka Sheffer, Rebecca Goldsmith, Maya Golan, Joseph Mendlovic, Moshe Bar-Siman-Tov. Policy and practice - Regulatory measures to improve the built nutrition environment for prevention of obesity and related morbidity in Israel. *Public Health Panorama*. 2017;3(4):567-75.
109. Southey F. Israel: 'New opportunities' for reformulation as gov't imposes HFSS warnings front-of-pack. *Food Navigator*. Accessed August 7, 2020. https://www.foodnavigator.com/Article/2020/01/27/Israel-introduces-mandatory-HFSS-warnings-front-of-pack?utm_source=copyright&utm_medium=OnSite&utm_campaign=copyright



110. Shahrabani S. The impact of Israel's Front-of-Package labeling reform on consumers' behavior and intentions to change dietary habits. *Israel Journal of Health Policy Research*. 2021;10(1):44. doi:10.1186/s13584-021-00482-w
111. Bromberg M, Sinai T, Keinan-Boker L, Endevelt R, Frankenthal D. Current use of nutrition facts tables and attitudes towards new red and green front-of-package labels among Israeli consumers. *International Journal of Food Sciences and Nutrition*. 2021;1-8. doi:10.1080/09637486.2021.1955841
112. Accos-Carmel M, Blaychfeld-Magnazi M, Endevelt R, Furman-Assaf S, Kolobov T, Tamir O. Attitudes and perceived knowledge of health professionals on the food labelling reform in Israel. *Public Health Nutrition*. 2023;26(7):1513-1521. doi:10.1017/S1368980023000447
113. Samuel H, Katz E, Maoz Breuer R, Blaychfeld Magnazi M, Fliss Isakov N, Endevelt R. Evaluation of front-of-pack labeling's impact on unhealthy food consumption in Israeli households. *European Journal of Public Health*. 2024;34(Supplement_3):ckae144. 1548.
114. Yadin S. Manipulating Disclosure: Creative Compliance in the Israeli Food Industry Misinformation, Disinformation, and the Law. *Saint Louis University Law Journal*. 2021;66(1):[xiii]-166. 166.
115. Alcaire F, Machín L, Curutchet MR, Giménez A, Ares G. Parent Experiences With Warning Labels After Policy Implementation in Uruguay. *Journal of Nutrition Education and Behavior*. 2023;
116. Machín L, Alcaire F, Antúnez L, Giménez A, Curutchet MR, Ares G. Use of nutritional warning labels at the point of purchase: An exploratory study using self-reported measures and eye-tracking. *Appetite*. 2023;188:106634. doi:<https://doi.org/10.1016/j.appet.2023.106634>
117. Thrasher JF, Villalobos-Daniel VE, Fang D, et al. Assessing transnational spillover effects of Mexico's front-of-package nutritional labeling system among Mexican Americans in the US. *Preventive Medicine*. 2024;179:107855.
118. Croker H, Packer J, Russell SJ, Stansfield C, Viner RM. Front of pack nutritional labeling schemes: a systematic review and meta-analysis of recent evidence relating to objectively measured consumption and purchasing. *Journal of Human Nutrition and Dietetics*. 2020;n/a(n/a)doi:10.1111/jhn.12758
119. Bertorello NB, Minin F, Viscardi S, Junyent CR. Effects of nutritional profile system and front labeling in food selection during purchases: a systematic review. *Archivos Latinoamericanos de Nutrición (ALAN)*. 2023;73(2):144-153.
120. Kelly B, Jewell J. What is the evidence on the policy specifications, development processes and effectiveness of existing front-of-pack food labelling policies in the WHO European Region? World Health Organization, Health Evidence Network. Accessed November 4, 2023. <https://www.ncbi.nlm.nih.gov/books/NBK534354/>
121. Centurión M, Machín L, Ares G. Relative Impact of Nutritional Warnings and Other Label Features on Cereal Bar Healthfulness Evaluations. *Journal of Nutrition Education and Behavior*. 2019;
122. Tórtora G, Machín L, Ares G. Influence of nutritional warnings and other label features on consumers' choice: Results from an eye-tracking study. *Food Research International*. 2019;119:605-611. doi:<https://doi.org/10.1016/j.foodres.2018.10.038>
123. Alonso-Dos-Santos M, Quilodrán Ulloa R, Salgado Quintana Á, Viguera Quijada D, Fariás Nazel P. Nutrition labeling schemes and the time and effort of consumer processing. *Sustainability*. 2019;11(4):1079.
124. Machín L, Curutchet MR, Giménez A, Aschemann-Witzel J, Ares G. Do nutritional warnings do their work? Results from a choice experiment involving snack products. *Food Quality and Preference*. 2019;77:159-165.
125. Roberto CA, Wong D, Musicus A, Hammond D. The Influence of Sugar-Sweetened Beverage Health Warning Labels on Parents' Choices. *Pediatrics*. 2016;doi:10.1542/peds.2015-3185
126. Bollard T, Maubach N, Walker N, Ni Mhurchu C. Effects of plain packaging, warning labels, and taxes on young people's predicted sugar-sweetened beverage preferences: an experimental study. *International Journal of Behavioral Nutrition and Physical Activity*. 2016;13(1):95. doi:10.1186/s12966-016-0421-7
127. Hall MG, Lazard AJ, Grummon AH, et al. Designing warnings for sugary drinks: A randomized experiment with Latino parents and non-Latino parents. *Preventive Medicine*. 2021;148:106562. doi:<https://doi.org/10.1016/j.ypmed.2021.106562>
128. Acton RB, Hammond D. Do Consumers Think Front-of-Package "High in" Warnings are Harsh or Reduce their Control? A Test of Food Industry Concerns. *Obesity*. 2018;26(11):1687-1691.
129. Patino SRG, Carriedo Á, Tolentino-Mayo L, et al. Front-of-pack warning labels are preferred by parents with low education level in four Latin American countries. *World Nutrition*. 2019;10(4):11-26.
130. Nieto C, Jáuregui A, Contreras-Manzano A, et al. Understanding and use of food labeling systems among Whites and Latinos in the United States and among Mexicans: Results from the International Food Policy Study, 2017. *International Journal of Behavioral Nutrition and Physical Activity*. 2019;16(1):87. doi:10.1186/s12966-019-0842-1
131. Vargas-Meza J, Jáuregui A, Contreras-Manzano A, Nieto C, Barquera S. Acceptability and understanding of front-of-pack nutritional labels: an experimental study in Mexican consumers. *BMC Public Health*. 2019;19(1):1751. doi:10.1186/s12889-019-8108-z
132. Zhang X, Ouyang Y, Yin X, et al. Consumers' Perceptions of the Design of Front-of-Package Warning Labels—A Qualitative Study in China. *Nutrients*. 2023;15(2):415.
133. Kroker-Lobos MF, Morales-Juárez A, Pérez W, et al. Efficacy of front-of-pack warning label system versus guideline for daily amount on healthfulness perception, purchase intention and objective understanding of nutrient content of food products in Guatemala: a cross-over cluster randomized controlled experiment. *Archives of Public Health*. 2023;81(1):108.
134. Khandpur N, Mais LA, de Moraes Sato P, et al. Choosing a front-of-package warning label for Brazil: A randomized, controlled comparison of three different label designs. *Food Research International*. 2019;121:854-861. doi:<https://doi.org/10.1016/j.foodres.2019.01.008>
135. Hock K, Acton RB, Jáuregui A, Vanderlee L, White CM, Hammond D. Experimental study of front-of-package nutrition labels' efficacy on perceived healthfulness of sugar-sweetened beverages among youth in six countries. *Preventive Medicine Reports*. 2021;24:101577. doi:<https://doi.org/10.1016/j.pmedr.2021.101577>
136. Jáuregui A, White CM, Vanderlee L, et al. Impact of front-of-pack labels on the perceived healthfulness of a sweetened fruit drink: a randomised experiment in five countries. *Public Health Nutrition*. 2022;25(4):1094-1104.
137. White-Barrow V, Gomes FS, Eyre S, et al. Effects of front-of-package nutrition labelling systems on understanding and purchase intention in Jamaica: results from a multi-arm randomised controlled trial. *BMJ Open*. 2023;13(4):e065620.
138. Khandpur N, Sato PdM, Mais LA, et al. Are front-of-package warning labels more effective at communicating nutrition information than traffic-light labels? A randomized controlled experiment in a Brazilian sample. *Nutrients*. 2018;10(6):688.
139. Organización Panamericana de la Salud. Data from: La superioridad de los sellos octogonales de advertencia nutricional en Panamá. 2022. Washington, D.C.
140. Acton RB, Jones AC, Kirkpatrick SI, Roberto CA, Hammond D. Taxes and front-of-package labels improve the healthiness of beverage and snack purchases: a randomized experimental marketplace. *International Journal of Behavioral Nutrition and Physical Activity*. 2019;16(1):46.
141. Silva ARCS, Ni Mhurchu C, Anastácio LR. Comparison of two front-of-pack nutrition labels for Brazilian consumers using a smartphone app in a real-world grocery store: A pilot randomized controlled study. Original Research. *Frontiers in Nutrition*. 2022;9doi:10.3389/fnut.2022.898021
142. de Alcantara M, Ares G, Deliza R. How Do Nutritional Warnings Work on Commercial Products? Results From a Hypothetical Choice Experiment. *Frontiers in Nutrition*. 2022;9:921515.



143. World Cancer Research Fund International. NOURISHING database: Nutrition label standards and regulations on the use of claims and implied claims on food. Accessed August 1, 2024. https://policydatabase.wcrf.org/level_one?page=nourishing-level-one#-step2=0#step3=309
144. Ministerio de Salud Pública. Executive Decree No. 272/018. Accessed December 9, 2024. https://medios.presidencia.gub.uy/legal/2018/decretos/08/cons_min_705.pdf
145. Secretaría de Economía. MODIFICACIÓN a la Norma Oficial Mexicana NOM-051-SCFI/SSA1-2010, Especificaciones generales de etiquetado para alimentos y bebidas no alcohólicas preenvasados (Amendment to Official Mexican Standard NOM-051-SCFI/SSA1-2010, General labelling specifications for prepackaged food and non-alcoholic beverages). In: Economía Sd, editor. Ciudad de México: Diario Oficial de la Federación; 2020.
146. Davila J. Venezuela: Ministry of Health issues guidelines for the labeling of foods containing sugar and saturated and trans fat. Accessed August 1, 2024. <https://www.globalcompliancenews.com/2022/01/23/venezuela-ministry-of-health-is-sues-guidelines-for-the-labeling-of-foods-containing-sugar-and-saturated-and-trans-fat/>
147. Canada H. Front-of-package nutrition labeling. Government of Canada. <https://www.canada.ca/en/health-canada/news/2022/06/front-of-package-nutrition-labeling.html>
148. Diário oficial da União. Dispõe sobre a rotulagem nutricional dos alimentos embalados. In: Colegiada MdSAnDVSD, editor. 195 ed2020. p. 106.
149. Bopape M, De Man J, Taillie LS, Ng SW, Murukutla N, Swart R. Effect of different front-of-package food labels on identification of unhealthy products and intention to purchase the products—A randomised controlled trial in South Africa. *Appetite*. 2022;179:106283.
150. Singh SK, Taillie LS, Gupta A, Bercholz M, Popkin B, Murukutla N. Front-of-Package Labels on Unhealthy Packaged Foods in India: Evidence from a Randomized Field Experiment. *Nutrients*. 2022;14(15):3128.
151. Sandoval LA, Carpio CE, Sanchez-Plata M. The effect of 'Traffic-Light' nutritional labeling in carbonated soft drink purchases in Ecuador. *PLOS One*. 2019;14(10)
152. Bandeira LM, Pedroso J, Toral N, Guibert MB. Performance and perception on front-of-package nutritional labeling models in Brazil. *Revista de Saúde Pública*. 2021;55
153. De la Cruz-Góngora V, Torres P, Contreras-Manzano A, et al. Understanding and acceptability by Hispanic consumers of four front-of-pack food labels. *International Journal of Behavioral Nutrition and Physical Activity*. 2017;14(1):28. doi:10.1186/s12966-017-0482-2
154. Arrúa A, Machín L, Curutchet MR, et al. Warnings as a directive front-of-pack nutrition labelling scheme: comparison with the Guideline Daily Amount and traffic-light systems. *Public Health Nutrition*. 2017;20(13):2308-2317. doi:10.1017/s1368980017000866
155. Arrúa A, Curutchet MR, Rey N, et al. Impact of front-of-pack nutrition information and label design on children's choice of two snack foods: Comparison of warnings and the traffic-light system. *Appetite*. 2017;116:139-146. doi:https://doi.org/10.1016/j.appet.2017.04.012
156. Instituto Nacional de Estadística y Censos (INEC). Principales resultados ENSANUT 2018. Accessed January 28, 2024. https://www.ecuadorencifras.gob.ec/documentos/web-inec/Estadisticas_Sociales/ENSANUT/ENSANUT_2018/Principales%20resultados%20ENSANUT_2018.pdf
157. Peñaherrera V, Carpio C, Sandoval L, et al. Effect of traffic-light labeling on nutritional content and on consumption of carbonated beverages in Ecuador [Efeito da rotulagem nutricional com modelo de semáforo no consumo de refrigerantes no Equador]. *Revista Panamericana de Salud Pública/Pan American Journal of Public Health*. 2018;42:e177-e177.
158. Villacis A, Carpio CE, Boonsaeng T, Cabrera T, Alvarado R. Labels, taxes, and food reformulation: A tale of sugar in carbonated soft drinks in Ecuador. *International Food and Agribusiness Management Review*. 2023;1-16. doi:https://doi.org/10.22434/ifamr2023.0027
159. Freire WB, Nguyen T, Rivas P, Rivas-Mariño G, Waters WF. A qualitative study of consumer perceptions and use of traffic light food labelling in Ecuador. *Public Health Nutrition*. 2017;20(5):805-813. doi:10.1017/S1368980016002457
160. Ortiz C, Guaya V, Salinas A. Is nutrition labeling associated with decreased obesity? A quantitative approach to nutritional health policy in Ecuador. *Journal of Public Health Policy*. 2022;43(4):593-612. doi:https://doi.org/10.1057/s41271-022-00368-4
161. Cabrera T, Carpio CE, Sarasty O, Watson SE, Gonzalez M-S. Traffic light nutrition labeling preferences among children. *Agricultural and Food Economics*. 2023;11(1):41. doi:10.1186/s40100-023-00280-9
162. Sarasty O, Carpio C, Cabrera T. Effect of the traffic-light system on nutrition labeling in processed food products in the Ecuadorian population. *Q Open*. 2023;3(2)doi:10.1093/qopen/qoad018
163. Mertens E, Peñalvo JL. Mapping the nutritional value of diets across Europe according to the Nutri-Score front-of-pack label. *Original Research. Frontiers in Nutrition*. 2023;9doi:10.3389/fnut.2022.1080858
164. Sante Publique France. Nutri-Score Frequently Asked Questions. Accessed December 9, 2024. https://www.santepubliquefrance.fr/content/download/150263/file/QR_scientifique_technique_EN_12052020.pdf
165. Pettigrew S, Jongenelis MI, Jones A, Hercberg S, Julia C. An 18-country analysis of the effectiveness of five front-of-pack nutrition labels. *Food Quality and Preference*. 2023;104:104691. doi:https://doi.org/10.1016/j.foodqual.2022.104691
166. Egnell M, Talati Z, Galan P, et al. Objective understanding of the Nutri-score front-of-pack label by European consumers and its effect on food choices: an online experimental study. *International Journal of Behavioral Nutrition and Physical Activity*. 2020;17(1):146. doi:10.1186/s12966-020-01053-z
167. Batista MF, de Carvalho-Ferreira JP, Thimoteo da Cunha D, De Rosso VV. Front-of-package nutrition labeling as a driver for healthier food choices: Lessons learned and future perspectives. *Comprehensive Reviews in Food Science and Food Safety*. 2023;22(1):535-586. doi:10.1111/1541-4337.13085
168. Julia C, Fialon M, Galan P, et al. Are foods 'healthy' or 'healthier'? Front-of-pack labelling and the concept of healthiness applied to foods. *British Journal of Nutrition*. 2022;127(6):948-952. doi:10.1017/S0007114521001458
169. De Temmerman J, Heeremans E, Slabbinck H, Vermeir I. The impact of the Nutri-Score nutrition label on perceived healthiness and purchase intentions. *Appetite*. 2021;157:104995. doi:https://doi.org/10.1016/j.appet.2020.104995
170. Dubois P, Albuquerque P, Allais O, et al. Effects of front-of-pack labels on the nutritional quality of supermarket food purchases: evidence from a large-scale randomized controlled trial. *Journal of the Academy of Marketing Science*. 2020:1-20.
171. Egnell M, Galan P, Fialon M, et al. The impact of the Nutri-Score front-of-pack nutrition label on purchasing intentions of unprocessed and processed foods: post-hoc analyses from three randomized controlled trials. *International Journal of Behavioral Nutrition and Physical Activity*. Mar 17 2021;18(1):38. doi:10.1186/s12966-021-01108-9
172. van den Akker K, Bartelet D, Brouwer L, Luijckers S, Nap T, Havermans R. The impact of the nutri-score on food choice: A choice experiment in a Dutch supermarket. *Appetite*. 2022;168:105664. doi:https://doi.org/10.1016/j.appet.2021.105664
173. Julia C, Arnault N, Agaësse C, et al. Impact of the Front-of-Pack Label Nutri-Score on the Nutritional Quality of Food Choices in a Quasi-Experimental Trial in Catering. *Nutrients*. 2021;13(12):4530.
174. Vandevijvere S, Berger N. The impact of shelf tags with Nutri-Score on consumer purchases: a difference-in-difference analysis of a natural experiment in supermarkets of a major retailer in Belgium. *International Journal of Behavioral Nutrition and Physical Activity*. 2021;18(1):150. doi:10.1186/s12966-021-01207-7
175. Narayanan G, Graudeau B, Molina V, Allais O, Soler LG. Evolution des parts de marché des marques engagées dans la démarche



- Nutri-Score en France entre 2018 et 2023. INRAE. 2023. Accessed December 9, 2024. <https://hal.science/hal-04356926>
176. Vandevijvere S. Uptake of Nutri-Score during the first year of implementation in Belgium. *Archives of Public Health*. 2020;78(1):107. doi:10.1186/s13690-020-00492-1
 177. Hagmann D, Siegrist M. Nutri-Score, multiple traffic light and incomplete nutrition labelling on food packages: Effects on consumers' accuracy in identifying healthier snack options. *Food Quality and Preference*. 2020;83:103894. doi:<https://doi.org/10.1016/j.foodqual.2020.103894>
 178. Vermote M, Bonnefyn S, Matthys C, Vandevijvere S. Nutritional Content, Labelling and Marketing of Breakfast Cereals on the Belgian Market and Their Reformulation in Anticipation of the Implementation of the Nutri-Score Front-Of-Pack Labelling System. *Nutrients*. 2020;12(4):884.
 179. Bambridge-Sutton A. Why is Danone removing Nutri-Score? Accessed October 17, 2024. <https://www.foodnavigator.com/Article/2024/09/13/Danone-removes-Nutri-Score>
 180. Talati Z, Egnell M, Hercberg S, Julia C, Pettigrew S. Consumers' Perceptions of Five Front-of-Package Nutrition Labels: An Experimental Study Across 12 Countries. *Nutrients*. 2019;11(8):1934.
 181. Folkvord F, Bergmans N, Pabian S. The effect of the nutri-score label on consumer's attitudes, taste perception and purchase intention: An experimental pilot study. *Food Quality and Preference*. 2021;94:104303. doi:<https://doi.org/10.1016/j.foodqual.2021.104303>
 182. Sante Publique France. Nutri-Score: Évolution de sa notoriété, sa perception et son impact sur les comportements d'achat déclarés entre 2018 et 2020. Accessed December 9, 2024. <https://www.sante-publiquefrance.fr/determinants-de-sante/nutrition-et-activite-physique/documents/enquetes-etudes/nutri-score-evolution-de-sa-notoriete-sa-perception-et-son-impact-sur-les-comportements-d-achat-declares-entre-2018-et-2020>
 183. Food Standards Australia New Zealand. Health Star Rating System. Accessed December 9, 2024. <https://www.foodstandards.gov.au/consumer/labelling/Pages/Health-Star-Rating-System.aspx>
 184. Jones A, Thow AM, Ni Mhurchu C, Sacks G, Neal B. The performance and potential of the Australasian Health Star Rating system: a four-year review using the RE-AIM framework. *Australian and New Zealand Journal of Public Health*. 2019;43(4):355-365.
 185. Neal B, Crino M, Dunford E, et al. Effects of different types of front-of-pack labelling information on the healthiness of food purchases—a randomised controlled trial. *Nutrients*. 2017;9(12):1284.
 186. Ni Mhurchu C, Volkova E, Jiang Y, et al. Effects of interpretive nutrition labels on consumer food purchases: the Starlight randomized controlled trial. *The American Journal of Clinical Nutrition*. 2017;105(3):695-704.
 187. Acton RB, Hammond D. The impact of price and nutrition labelling on sugary drink purchases: Results from an experimental marketplace study. *Appetite*. 2018;121:129-137. doi:<https://doi.org/10.1016/j.appet.2017.11.089>
 188. Bablani L, Mhurchu CN, Neal B, Skeels CL, Staub KE, Blakely T. Effect of voluntary Health Star Rating labels on healthier food purchasing in New Zealand: longitudinal evidence using representative household purchase data. *BMJ Nutrition, Prevention & Health*. 2022;5(2):227.
 189. Russell C, Dickie S, Baker P, Lawrence M. Does the Australian Health Star Rating System Encourage Added Sugar Reformulation? Trends in Sweetener Use in Australia. *Nutrients*. 2021;13(3):898.
 190. The George Institute for Global Health. Food industry failing to meet Government's Health Star Rating targets. Accessed May 2, 2024. <https://www.georgeinstitute.org.au/media-releases/food-industry-failing-to-meet-governments-health-star-rating-targets#no-back>
 191. Mackay S, Pakenham L, Ni Mhurchu C. Health Star Rating Label Uptake in NZ: Analysis in 2023 relative to target. The University of Auckland. Accessed May 2, 2024. https://figshare.com/articles/report/Health_Star_Rating_Label_Uptake_in_NZ_Analysis_in_2023_relative_to_target/25710348
 192. Shahid M, Neal B, Jones A. Uptake of Australia's Health Star Rating System 2014–2019. *Nutrients*. 2020;12(6):1791.
 193. Maganja D, Davies T, Sanavio L, et al. Current food labelling practices in online supermarkets in Australia. *International Journal of Behavioral Nutrition and Physical Activity*. 2023;20(1):105. doi:10.1186/s12966-023-01504-3
 194. Judkins R. Is the health star system past its use-by date? Accessed May 2, 2024. <https://thespinoff.co.nz/kai/29-04-2024/is-the-health-star-system-past-its-use-by-date>
 195. Obesity Evidence Hub. Health Star Rating System: proposed improvements. Accessed May 2, 2024. <https://www.obesityevidencehub.org.au/collections/prevention/health-star-rating-system-proposed-improvements>
 196. The George Institute for Global Health. Food labelling must be stepped up to stem rising tide of diet-related disease. Accessed May 2, 2024. <https://www.georgeinstitute.org/media-releases/food-labelling-must-be-stepped-up-to-stem-rising-tide-of-diet-related-disease>
 197. Stuthridge L, Alexander D, Stubbe M, Eme P, Smith C. "It's All Just Marketing", a Qualitative Analysis of Consumer Perceptions and Understandings of Nutrition Content and Health Claims in New Zealand. *International Journal of Environmental Research and Public Health*. 2022;19(6):3510.
 198. Queen's University Belfast. Food Labelling and GDA's. December 9, 2024. <https://www.qub.ac.uk/elearning/public/HealthyEating/FoodLabellingandGDAs/#:~:text=The%20GDA%20label%20shows%20the%20your%20Guideline%20Daily%20Amount.>
 199. Consumer Brands Association. A Consumer Brands led program: Facts up Front. Accessed December 9, 2024. <https://consumerbrandsassociation.org/facts-up-front/>
 200. Australian Food and Grocery Council. Daily Intake Guide. Accessed Aug 28th, 2019. <https://www.afgc.org.au/wp-content/uploads/2019/06/AFGC-Best-Practice-Guide-DIG-Style-Guide-June-2016.pdf>
 201. Nestle M. Public Health Implications of Front-of-Package Labels. *American Journal of Public Health*. 2018;108(3):320-321. doi:10.2105/AJPH.2017.304285
 202. Center for Science in the Public Interest. "Facts Up Front" is Marketing, Not Nutrition Labeling: Statement of CSPI Executive Director Michael Jacobson. Accessed June 28, 2020. <https://cspinet.org/new/201403031.html>
 203. Stern D, Tolentino L, Barquera S. Revisión del etiquetado frontal: análisis de las Guías Diarias de Alimentación (GDA) y su comprensión por estudiantes de nutrición de México. Accessed December 9, 2024. <https://www.insp.mx/epppo/blog/3225-etiquetado-alimentacion.html>
 204. Siegrist M, Leins-Hess R, Keller C. Which front-of-pack nutrition label is the most efficient one? The results of an eye-tracker study. *Food Quality and Preference*. 2015;39:183-190. doi:<https://doi.org/10.1016/j.foodqual.2014.07.010>
 205. Ducrot P, Méjean C, Julia C, et al. Effectiveness of Front-Of-Pack Nutrition Labels in French Adults: Results from the NutriNet-Santé Cohort Study. *PLOS One*. 2015;10(10):e0140898. doi:10.1371/journal.pone.0140898
 206. Ducrot P, Julia C, Mejean C, et al. Impact of Different Front-of-Pack Nutrition Labels on Consumer Purchasing Intentions: A Randomized Controlled Trial. *American Journal of Preventive Medicine*. 2016;50(5):627-636. doi:10.1016/j.amepre.2015.10.020
 207. Julia C, Péneau S, Buscail C, et al. Perception of different formats of front-of-pack nutrition labels according to sociodemographic, lifestyle and dietary factors in a French population: cross-sectional study among the NutriNet-Santé cohort participants. *BMJ Open*. 2017;7(6):e016108. doi:10.1136/bmjopen-2017-016108
 208. Talati Z, Norman R, Pettigrew S, et al. The impact of interpretive and reductive front-of-pack labels on food choice and willingness to pay. *International Journal of Behavioral Nutrition and Physical Activity*. 2017;14(1):171.
 209. Jáuregui A, Vargas-Meza J, Nieto C, et al. Impact of front-of-pack nutrition labels on consumer purchasing intentions: a



- randomized experiment in low- and middle-income Mexican adults. *BMC Public Health*. 2020;20(1):463. doi:10.1186/s12889-020-08549-0
210. Temple NJ. Front-of-package food labels: A narrative review. *Appetite*. 2020;144:104485. doi:<https://doi.org/10.1016/j.appet.2019.104485>
211. Scapin T, Fernandes AC, Curioni CC, et al. Influence of sugar label formats on consumer understanding and amount of sugar in food choices: a systematic review and meta-analysis. *Nutrition Reviews*. 2021;79(7):788-801.
212. Ares G, Aschemann-Witzel J, Curutchet MR, et al. Nutritional warnings and product substitution or abandonment: Policy implications derived from a repeated purchase simulation. *Food Quality and Preference*. 2018;65:40-48. doi:<https://doi.org/10.1016/j.foodqual.2017.12.001>
213. Machín L, Aschemann-Witzel J, Curutchet MR, Gimenez A, Ares G. Does front-of-pack nutrition information improve consumer ability to make healthful choices? Performance of warnings and the traffic light system in a simulated shopping experiment. *Appetite*. 2018;121:55-62. doi:10.1016/j.appet.2017.10.037
214. Lima M, Ares G, Deliza R. How do front of pack nutrition labels affect healthfulness perception of foods targeted at children? Insights from Brazilian children and parents. *Food Quality and Preference*. 2018;64:111-119.
215. Nieto C, Alcalde-Rabanal J, Mena C, Carriedo Á, Barquera S. Perception of the use and understanding of nutrition labels among different socioeconomic groups in Mexico: a qualitative study. *Salud Pública de México*. 2020;62(3, May-Jun):274-283.
216. Popova L, Nonnemaker J, Taylor N, Bradfield B, Kim A. Warning Labels on Sugar-sweetened Beverages: An Eye Tracking Approach. *American Journal of Health Behavior*. 2019;43(2)
217. Boztuğ Y, Juhl HJ, Elshiewy O, Jensen MB. Consumer response to monochrome Guideline Daily Amount nutrition labels. *Food Policy*. 2015;53:1-8. doi:<https://doi.org/10.1016/j.foodpol.2015.03.002>
218. Pettigrew S, Talati Z, Miller C, Dixon H, Kelly B, Ball K. The types and aspects of front-of-pack food labelling schemes preferred by adults and children. *Appetite*. Feb 1 2017;109:115-123. doi:10.1016/j.appet.2016.11.034
219. Talati Z, Pettigrew S, Ball K, et al. The relative ability of different front-of-pack labels to assist consumers discriminate between healthy, moderately healthy, and unhealthy foods. *Food Quality and Preference*. 2017;59:109-113. doi:<https://doi.org/10.1016/j.foodqual.2017.02.010>
220. Abrams KM, Evans C, Duff BR. Ignorance is bliss. How parents of preschool children make sense of front-of-package visuals and claims on food. *Appetite*. 2015;87:20-29.
221. Andrews JC, Burton S, Netemeyer RG. Are some comparative nutrition claims misleading? The role of nutrition knowledge, ad claim type and disclosure conditions. *Journal of Advertising*. 2000;29(3):29-42.
222. Sundar A, Kardes FR. The role of perceived variability and the health halo effect in nutritional inference and consumption. *Psychology & Marketing*. 2015;32(5):512-521.
223. Talati Z, Pettigrew S, Hughes C, et al. The combined effect of front-of-pack nutrition labels and health claims on consumers' evaluation of food products. *Food Quality and Preference*. 2016;53:57-65. doi:<https://doi.org/10.1016/j.foodqual.2016.05.016>
224. Acton RB, Hammond D. Do manufacturer 'nutrient claims' influence the efficacy of mandated front-of-package labels? *Public Health Nutrition*. 2018;21(18):3354-3359. doi:10.1017/S1368980018002550
225. Kontopoulou L, Karpetas GE, Kotsiou OS, et al. Guideline Daily Amounts Versus Nutri-Score Labeling: Perceptions of Greek Consumers About Front-of-Pack Label. *Cureus*. 2022;14(12)
226. Sagaceta-Mejía J, Tolentino-Mayo L, Cruz-Casarrubias C, Nieto C, Barquera S. Understanding of front of package nutrition labels: Guideline daily amount and warning labels in Mexicans with non-communicable diseases. *PLOS One*. 2022;17(6):e0269892.
227. Haridy R. Researchers call for health warning labels on ultra-processed foods. Accessed September 21, 2023. <https://newatlas.com/health-wellbeing/ultra-processed-foods-cancer-warning-labels/>
228. Touvier M, Srour B, Hercberg S, Galan P, Kesse-Guyot E, Julia C. Health impact of foods: Time to switch to a 3D-vision. *Frontiers in Nutrition*. 2022;9:966310.
229. Cotter T, Kotov A, Wang S, Murukutla N. "Warning: ultra-processed" — a call for warnings on foods that aren't really foods. *BMJ Global Health*. 2021;6(12):doi:10.1136/bmjgh-2021-007240
230. Srour B, Hercberg S, Galan P, et al. Effect of a new graphically modified Nutri-Score on the objective understanding of foods' nutrient profile and ultraprocessing: a randomised controlled trial. *BMJ Nutr Prev Health*. 2023;6(1):108-118. doi:10.1136/bmjnph-2022-000599
231. Cotter T, Kotov A, Wang S, Murukutla N. "Warning: ultra-processed" — a call for warnings on foods that aren't really foods. *BMJ Global Health*. Dec 2021;6(12):doi:10.1136/bmjgh-2021-007240
232. D'Angelo Campos A, Ng SW, Duran AC, et al. "Warning: ultra-processed": an online experiment examining the impact of ultra-processed warning labels on consumers' product perceptions and behavioral intentions. *International Journal of Behavioral Nutrition and Physical Activity*. 2024/10/09 2024;21(1):115. doi:10.1186/s12966-024-01664-w
233. Barrett EM, Pettigrew S, Neal B, et al. Modifying the Health Star Rating nutrient profiling algorithm to account for ultra-processing. *Nutrition & Dietetics*. 2024.
234. D'Angelo Campos A, Ng SW, McNeel K, Hall MG. How Promising Are "Ultra-processed" Front-of-Package Labels? A Formative Study with US Adults. *Nutrients*. 2024;16(7):1072.
235. Zancheta Ricardo C, Corvalán C, Smith Taillie L, Quitral V, Reyes M. Changes in the use of non-nutritive sweeteners in the Chilean food and beverage supply after the implementation of the food labeling and advertising law. *Frontiers in Nutrition*. 2021;8:773450.
236. Borges MC, Louzada ML, de Sá TH, et al. Artificially Sweetened Beverages and the Response to the Global Obesity Crisis. *PLOS Medicine*. 2017;14(1):e1002195. doi:10.1371/journal.pmed.1002195
237. Kim D, Parajuli R, Thoma GJ. Life cycle assessment of dietary patterns in the United States: a full food supply chain perspective. *Sustainability*. 2020;12(4):1586.
238. Campbell-Lendrum D, Neville T, Schweizer C, Neira M. Climate change and health: three grand challenges. *Nature Medicine*. 2023;29(7):1631-1638.
239. Fardet A, Rock E. Ultra-Processed Foods and Food System Sustainability: What Are the Links? *Sustainability*. 2020;12(15):6280.
240. Anastasiou K, Baker P, Hadjidakou M, Hendrie GA, Lawrence M. A conceptual framework for understanding the environmental impacts of ultra-processed foods and implications for sustainable food systems. *Journal of Cleaner Production*. 2022;368:133155. doi:<https://doi.org/10.1016/j.jclepro.2022.133155>
241. Ercin AE, Aldaya MM, Hoekstra AY. Corporate water footprint accounting and impact assessment: the case of the water footprint of a sugar-containing carbonated beverage. *Water Resources Management*. 2011;25:721-741.
242. Marette S. Ecological and/or Nutritional Scores for Food Traffic-Lights: Results of an Online Survey Conducted on Pizza in France. *Sustainability*. 2021;14(1):247.
243. Potter C, Bastounis A, Hartmann-Boyce J, et al. The effects of environmental sustainability labels on selection, purchase, and consumption of food and drink products: a systematic review. *Environment and Behavior*. 2021;53(8):891-925.
244. Vlaeminck P, Jiang T, Vranken L. Food labeling and eco-friendly consumption: Experimental evidence from a Belgian supermarket. *Ecological Economics*. 2014;108:180-190.
245. Arrazat L, Chambaron S, Arvisenet G, et al. Traffic-light front-of-pack environmental labelling across food categories triggers more environmentally friendly food choices: a randomised controlled trial in virtual reality supermarket. *International Journal of Behavioral Nutrition and Physical Activity*. 2023;20(1):7.
246. Muller L, Lacroix A, Ruffieux B. Environmental labelling and consumption changes: A food choice experiment. *Environmental and Resource Economics*. 2019;73:871-897.



247. Jones A, Neal B, Reeve B, Mhurchu CN, Thow AM. Front-of-pack nutrition labelling to promote healthier diets: current practice and opportunities to strengthen regulation worldwide. *BMJ Global Health*. 2019;4(6):e001882.
248. Pan American Health Organization. PAHO Nutrient Profile Model. Accessed December 9, 2024. <https://www.paho.org/en/nutrient-profile-model>
249. World Health Organization. WHO Regional Office for Europe nutrient profile model. Accessed December 9, 2024. <https://www.who.int/publications/i/item/WHO-EURO-2015-6894-46660-67850>
250. Poon T, Labonté M-È, Mulligan C, Ahmed M, Dickinson KM, L'Abbé MR. Comparison of nutrient profiling models for assessing the nutritional quality of foods: A validation study. *British Journal of Nutrition*. 2018;120(5):567-582.
251. Gitz E, Orlan, E., Rincon, S., Patino, G., Schoj, V. Nutrient Profile Models: A valuable tool for developing healthy food policies. 2024. February 21, 2024. https://assets.advocacyincubator.org/uploads/2024/NPM_Position_Paper.pdf
252. Grunert KG, Fernández-Celemín L, Wills JM, genannt Bonsmann SS, Nureeva L. Use and understanding of nutrition information on food labels in six European countries. *Journal of Public Health*. 2010;18(3):261-277.
253. Kelly B, Hughes C, Chapman K, et al. Consumer testing of the acceptability and effectiveness of front-of-pack food labelling systems for the Australian grocery market. *Health Promotion International*. 2009;24(2):120-129.
254. Becker MW, Bello NM, Sundar RP, Peltier C, Bix L. Front of pack labels enhance attention to nutrition information in novel and commercial brands. *Food Policy*. 2015;56:76-86. doi:<https://doi.org/10.1016/j.foodpol.2015.08.001>
255. Bialkova S, van Trijp H. What determines consumer attention to nutrition labels? *Food Quality and Preference*. 2010;21(8):1042-1051. doi:<https://doi.org/10.1016/j.foodqual.2010.07.001>
256. Antúnez L, Giménez A, Maiche A, Ares G. Influence of Interpretation Aids on Attentional Capture, Visual Processing, and Understanding of Front-of-Package Nutrition Labels. *Journal of Nutrition Education and Behavior*. 2015;47(4):292-299.e1. doi:<https://doi.org/10.1016/j.jneb.2015.02.010>
257. Andrews JC, Burton S, Kees J. Is simpler always better? Consumer evaluations of front-of-package nutrition symbols. *Journal of Public Policy & Marketing*. 2011;30(2):175-190.
258. Bustamante AV, Felix Beltrán L, Melgoza E, Méndez C. Front-of-package warning labels, taxes on sugar-sweetened beverages, television advertising, and portion control in Latin American countries: Implementation Lessons from Latin America to Prevent and Reduce Childhood Obesity in the United States. Accessed December 9, 2024. <https://escholarship.org/uc/item/379973rh>
259. Pettigrew S, Jongenelis M, Maganja D, Hercberg S, Julia C. The Ability of Nutrition Warning Labels to Improve Understanding and Choice Outcomes Among Consumers Demonstrating Preferences for Unhealthy Foods. *Journal of the Academy of Nutrition and Dietetics*. 2024;124(1):58-64.e1. doi:<https://doi.org/10.1016/j.jand.2023.08.135>
260. Ganderats-Fuentes M, Morgan S. Front-of-Package Nutrition Labeling and Its Impact on Food Industry Practices: A Systematic Review of the Evidence. *Nutrients*. 2023;15(11):2630.
261. Taillie LS, Ng SW, Xue Y, Busey E, Harding M. No Fat, No Sugar, No Salt . . . No Problem? Prevalence of “Low-Content” Nutrient Claims and Their Associations with the Nutritional Profile of Food and Beverage Purchases in the United States. *Journal of the Academy of Nutrition and Dietetics*. 2017;117(9):1366-1374.e6. doi:<https://doi.org/10.1016/j.jand.2017.01.011>
262. Parra-Murillo M, Lowery CM, Gómez LF, Mora-Plazas M, Taillie LS, Dillman Carpentier FR. Claims on Ready-to-Eat Cereals: Are Those With Claims Healthier? *Frontiers in Nutrition*. 2021;8:770489. doi:10.3389/fnut.2021.770489
263. Kaur A, Scarborough P, Rayner M. A systematic review, and meta-analyses, of the impact of health-related claims on dietary choices. *International Journal of Behavioral Nutrition and Physical Activity*. 2017;14(1):93. doi:10.1186/s12966-017-0548-1
264. Delivett CP, Farrow CV, Thomas JM, Nash RA. Front-of-pack health imagery on both 'healthy' and 'unhealthy' foods leads people to misremember seeing health claims: Two memory experiments. *Appetite*. 2022;174:106013. doi:10.1016/j.appet.2022.106013
265. Castronuovo L, Tiscornia MV, Guarnieri L, Martins E, Gomes FS, Allemandi L. Efficacy of different front-of-package labeling systems in changing purchase intention and product healthfulness perception for food products in Argentina. *Revista Panamericana de Salud Pública*. 2022;46:e137.
266. Global Health Advocacy Incubator. Argentina's Health Food Policy Goes Into Effect. Accessed October 17, 2024. <https://www.advocacyincubator.org/news/2022-08-19-argentinas-health-food-policy-goes-into-effect>
267. World Health Organization. Implementing nutrition labelling policies: A review of contextual factors. Accessed December 9, 2024. <https://www.who.int/publications/i/item/9789240035089>
268. Crosbie E, Gomes FS, Olvera J, Patiño SR-G, Hoepfer S, Carriedo A. A policy study on front-of-pack nutrition labeling in the Americas: emerging developments and outcomes. *The Lancet Regional Health—Americas*. 2023;18
269. Acton R, Vanderlee L, Roberto C, Hammond D. Consumer perceptions of specific design characteristics for front-of-package nutrition labels. *Health Education Research*. 2018;33(2):167-174.

This content of this fact sheet was finalized in December 2024 with research published through September 2024. It was prepared with support from the Bloomberg Philanthropies [Food Policy Program](#).

