Front-of-Package (FOP) Food Labelling:
Empowering Consumers to Make Healthy Choices

GLOBAL FOOD RESEARCH PROGRAM
University of North Carolina at Chapel Hill

Unhealthy changes in the foods we eat

- Pre-packaged, ultra-processed foods and drinks have become readily available in virtually every community around globe, across all income levels and population densities.[1-5] This increased availability — combined with aggressive, pervasive marketing — has dramatically affected the way people eat in many countries and resulted in much less healthy diets.[6-9]
- Many of these packaged foods are processed with high levels of added sugars, sodium, saturated fats, and refined carbohydrates.[9-13] Research has connected these nutrients to increased risk and prevalence of obesity and other chronic, nutrition-related diseases.[6,14-18]
  - Substantial evidence shows that consuming too much sugar increases risks for type 2 diabetes, heart disease, liver and kidney damage, and some cancers.[14,15,19-24]
  - Global health experts recommend limiting sugar intake to less than 10% of total daily calories.[14-16,25-28]
  - Consuming too much sodium is associated with high blood pressure and increased risks for heart disease, stroke, and death.[29-32]
  - Replacing saturated fats with healthy polyunsaturated fats in the diet has been shown to improve blood sugar regulation and reduce heart disease risk in randomized controlled trials.[33-35] The World Health Organization and United States Department of Agriculture both recommend limiting intake of saturated fats in addition to reducing sugar and sodium intake.[16]
- High concentration of these harmful nutrients in products that offer few, if any, healthy vitamins or minerals is uniquely problematic. Consumers are increasingly replacing healthier foods with "empty-calorie" products that are high in sugar, saturated fat, and sodium.
- Increased consumption of ultra-processed foods and drinks[9,36] has been a major driver of the global obesity epidemic and increases in other nutrition-related diseases worldwide.[7,17,18,36-39]
- An estimated 650 million adults worldwide live with obesity and 1.9 billion with overweight — roughly 40% of the adult population.[40] Children and adolescents face a global obesity and overweight prevalence exceeding 340 million for ages 5-19 years and 38 million for children under 5 years of age.[40]
- Leading health organizations worldwide recommend reducing consumption of these energy-dense, micronutrient-poor foods and beverages as a critical measure to tackle the epidemic of obesity.[18,41-43]

Consumers need help making healthier choices

- Not only have food and beverage products become less healthy over time, the sheer number of choices in stores make it difficult and confusing for consumers to select healthier foods.[44]
- Simpler, more impactful labels are needed: Most shoppers spend less than 10 seconds selecting each item — not enough time to review current back-of-the-pack nutrition labels, which are complicated and ineffective for most consumers.[45-47]
- Adding to the confusion, unhealthy products also frequently feature misleading health and nutrition claims on their packages. Claims related to particular nutrients (e.g., "high in calcium") and claims about a food's potential health benefits (e.g., "heart healthy") can give an otherwise unhealthy product a "health halo," leading consumers to misunderstand its nutritional quality and consume even more than they would otherwise.[48-51]

Front-of-package (FOP) labels can help consumers make informed, healthier choices

- Consumers need a clear and easy way to make healthier choices among the vast array of products available to them.
- Shoppers prefer simple FOP labels that are immediately visible and require less time to assess.[52,53] Labels that minimize effort allow customers to quickly identify which products are less healthy, increase their intention to purchase a healthier product, and decrease their intention to purchase an unhealthy product.[47,54-57]
- While a variety of FOP labelling approaches and designs are now in use worldwide, simple, negative warning labels that clearly identify unhealthy products thus far appear most effective for discouraging junk food and ultra-processed food choices.[58]
- FOP warning labels such as those used in Chile (*right)*, Peru, Uruguay, Israel, and soon in Mexico require packaged foods and drinks that do not meet specific nutrition criteria to carry warning labels on the front of the package. These clearly identify the product as high in sugar, saturated or *trans* fats, sodium, and/or calories — whichever apply. These labels help consumers quickly identify foods that are less healthy.

- FOP warning labels may also encourage manufacturers to improve the nutritional qualities of their products in order to meet nutrition criteria to avoid carrying negative FOP labels.[59-61]
- Unlike FOP labels that score foods or ingredients on a negative (unhealthy) to positive (healthy) scale, warning labels only appear on products that pose the greatest nutritional health risk. This approach may be easier for consumers to notice (ie, warning labels are either present on a package or absent) and interpret (ie, less complex computations or comparisons between products).[62] Warning labels also do not carry the risk of creating a "health halo" around products with positive labels, which could lead to overconsumption of foods and drinks bearing higher-scoring labels.

Warning labels are the most effective FOP labelling system to date

Warning labels work by helping consumers identify unhealthy products and discouraging them from consuming these products. Evidence suggests that nutrient warning labels offer the strongest FOP labelling approach in use today.

Evidence from experiments and surveys:

- A 2020 meta-analysis of 14 experimental studies examining the main FOP label systems currently in use found that only "high in" warning labels significantly reduced the calorie and sugar content of purchased products compared to no label (-0.67 g sugar and 4.43 calories per 100 g) .[63] Warning labels also significantly reduced the sodium content of purchases (-34 mg/100 g), as did "traffic light" labels (-35 mg/100 g), but no effects on purchasing were found for Health Star Rating, NutriScore, or "Facts up Front"/Guideline Daily Amount labels.
- Studies using eye-tracking technology to evaluate warning labels compared to industry's Guideline Daily Amount (GDA) labels or to a no-label control have found that warning labels most effectively attract consumers' attention and help them more quickly and easily process and identify whether a product is unhealthy.[51,64-66]
- FOP warning labels on sugary drinks have been linked to decreased purchases of sugary beverages, decreased perceptions of their healthfulness, and decreased purchasing intent in studies from the United States and New Zealand.[67,68]

- A study comparing FOP warning labels to "traffic light" labels and industry GDA-style labels found that in Uruguay, warning labels were better able to help consumers correctly identify products with high content of unhealthy nutrients.[69] Consumers perceived products bearing warning labels as less healthy than the same products featuring GDA or traffic light labels.
- Also in Uruguay, warning labels on snack foods were shown to have a greater relative impact on children's choices than traffic light labels[70] and to better capture adult shoppers' attention and discourage choosing products with warnings compared to a GDA-style label[51] or alone.[66]
- 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."[71]
- A shopping experiment in Canada found that participants who saw "high in" nutritient warning labels purchased less calories, sugar, and saturated fat from beverages and less calories and sodium from foods, compared to participants who saw no FOP label.[72] These reductions were further enhanced in conditions with taxes on sugary drinks or snacks. Warning labels outperformed traffic light, Health Star, and nutrition grade (ie, Nutri-Score) labels.
- In Brazil, studies have found that warning labels significantly outperform traffic light labels and GDAs in capturing consumers' attention; improving their ability to identify healthier products and products high in nutrients of concern; and increasing their intention to buy a relatively healthier option.[73,74] Compared to only an ingredient list and a nutrition facts panel, the presence of warning lables improved understanding and perceptions of a product's nutrient profile, and was particularly helpful for identify nutrients in excess.[75]
- A large survey of parents from four Latin American countries found that the most vulnerable parents (i.e., those with low education and overweight) preferred a warning label FOP system over GDAs or traffic light labels.[76]
- 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. Warning labels were the easiest for subjects to understand: Subjects were 4.8 times more likely to report understanding the warning label compared to the nutrition facts table.[77]
- A survey of low- and middle-income Mexican consumers similarly found that warning labels outperformed both traffic light and GDA labels for consumer understanding: The odds of subjects correctly identifying a product with the lowest nutritional quality was 4.5 times greater for warning labels compared to GDAs.[77]
- 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.[78]

Momentum is building behind FOP warning label policies in countries around the world:

- Peru, Uruguay, and Mexico have recently enacted policies requiring FOP warning labels similar to Chile's (black-and-white stop sign warnings);[79-82]
- Canada, South Africa, and Colombia are currently developing FOP warning label policies;[83,84] and
- In 2020, Israel implemented a policy requiring negative warning labels for products high in sugar, sodium, or fat as well as a voluntary, positive label for products that meet very high nutrition standards (*right*).[85,86] It remains to be seen how this unique approach will compare in effectiveness to the stop sign warning label systems implemented in Latin American countries.

Evidence from the world's first mandatory FOP warning label policy in Chile:

Since Chile's FOP warning labels began appearing on packages in 2016 (*right*), they have contributed to shifts in social norms and behaviors around purchasing healthier foods and drinks as well as healthier product reformulation. Chilean consumers are aware of and understand the labels, and they are using them to make food purchase decisions.

Ministry of Health, Santiago, Chile

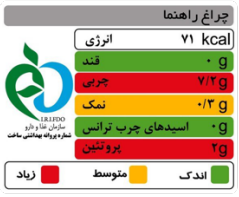
- Focus groups with low- and middle-income mothers suggest profound changes in attitudes toward food purchases, driven both by knowledge mothers gained from seeing these labels and by children telling their mothers not to purchase unhealthy products with warning labels.[87,88]
- Consumers in Chile understand that increasing numbers of warning labels on a package means that the product is less healthy and poorer choice than options with fewer or no warning labels.[89]
- In conjunction with other Chilean health regulations including a sugary drink tax and restrictions on junk food marketing to children, Chile's FOP warning label policy has been associated with a roughly 24% drop in sugary drink purchases in the year following implementation.[90]
- An evaluation comparing the nutritional profiles of products before and after the first year under Chile's FOP and other regulations found significant reductions in the proportion of products that would be required to carry "high in" sugar and sodium warning labels due to excessive content of those nutrients, suggesting that companies reformulated products to improve their health profile and avoid the FOP warning label requirement.[61]

Warning labels outperform other FOP label types

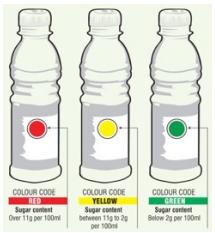
Traffic Light Labels (TLLs)

TLLs use green, amber, 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, as shown below in the mandatory labels from Ecuador, Iran, and Sri Lanka and the voluntary TLL-GDA hybrid used in the United Kingdom.

ECUADOR



IRAN



SRI LANKA

UNITED KINGDOM
(voluntary)

Experiments comparing different label types have found that while TLLs test moderately well for outcomes such as consumer liking/acceptibility, understanding, and improving behavioral intentions,[62] they are still generally outperformed by warning labels in these experimental outcomes and, importantly, in changing actual purchase behaviors.[63,90,91] TLLs can also confuse consumers by sending unclear messages about whether a product contains excessive amounts of added sugar, sodium, or saturated fats.[73,77,92]

- A 2017 study comparing different label types found that TLLs and GDAs were both worse than warning labels at helping consumers identify products with high content of unhealthy nutrients and that consumers perceived products with warning labels as less healthy than the same products featuring TLLs or GDAs.[69]
- Another 2017 study comparing Uruguyan children's perceptions of foods with TLLs vs warning labels found that warning labels had greater relative impact on children's food choices.[70]
- Qualitative research in Mexico found that TLLs confused consumers, who found the multiple colors difficult to compare across products and the intermediate/ amber color particularly hard to interpret.[92]
- In 2014, Ecuador implemented a mandatory TLL for packaged, processed food products.[79] Evidence thus far indicates that despite most consumers' awareness and understanding of the label, it has not led to the changes in purchase behaviors observed under Chile's warning label policy:
  - Data from Ecuador's 2018 National Health and Nutrition Survey indicate that while 79% of the nearly 41,000 participants reported to be aware of the country's TLL — of whom 88% said they understood the label —only 21% reported actually using the TLL to inform their food purchases.[93]
  - Two studies examined consumer purchases in the first year of regulation and found no evidence that TLLs significantly affected households' carbonated soft drink-buying habits.[91,94]
  - One study found evidence of modest product reformulation in the first year of Ecuador's TLL policy, with an observed average reduction of 0.93 grams sugar per 100 mL of beverage.[94]

Nutri-Score

Introduced as a voluntary label in France in 2017 and since taken up in a handful of other European countries, the Nutri-Score label (*right*) uses a color spectrum similar to TLLs along with letter grades to provide a summary indicator of product healthiness. The summary score is based on a nutrient profiling model that takes into account product ingredients' health risks as well as benefits (ie, a product's fiber, protein, or fruit, vegetable, legume, nut, or healthy oil content).[95]

Like TLLs, Nutri-Score labels have tested relatively well in surveys and laboratory experiments in terms of consumer acceptability and ability to correctly rank the healthiness of a given product set,[62,96-100] but a large field experiment prior to the label's adoption in France indicated that these measures of success in experimental settings may not necessarily translate into meaningful changes in consumer behaviors, particlarly with regard to reducing consumption of unhealthy, ultra-processed foods and beverages:

- A 2016 field experiment examined changes in the nutrient profile of food purchases after placing Nutri-Score labels (and three other FOP label types competing for adoption in France) on real foods in four product categories across 60 French supermarkets.[101]

  While the Nutri-Score label was associated with a 14% increase in the nutritional profile of purchases from the healthiest product categories (namely fresh, prepared foods), it had no impact on the nutritional profile of purchases from less-healthy categories. The label's net effect was a modest improvement of 2.5% in the average nutritional score of purchases.

  Notably, effect sizes observed in the study were 17 times smaller on average than those found in comparable laboratory studies, highlighting the importance of studying real-world effects of FOP labeling policies.[101]

Studies have not yet examined the real-world impact of Nutri-Score labels on purchase patterns, consumption, or product reformulation in the countries where they are now in use. It is also not yet known how widely food companies are choosing to apply the voluntary label and whether coverage differs by product category (eg, used more for healthy products vs. unhealthy products).

Industry-endorsed, voluntary FOP labels are not effective

The most common FOP system in use globally is industry's voluntary Guideline Daily Amounts (GDAs, also called "Facts Up Front," Reference Intakes, or Daily Intake Guides, depending on region).[102-105] GDA-style labels were developed by grocery manufacturing and distribution associations in the UK and US and later adopted with slight variations by industry associations in many other countries, despite little to no evidence of positive impact for consumers.[106] In the US, the 2011 introduction of "Facts Up Front" labelling 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 labelling policy.[107,108]

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 generally regarded as unhelpful or confusing for customers.

Limitations of the GDA/DIG/"Facts Up Front" label approach include:[109]

- Benchmark values are not based on international nutrition recommendations and are calculated using an average adult's intake, even on products specifically targeted to children or that are 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;
- Serving sizes are also graphically displayed in very small type, which could lead shoppers to think that label values refer to the full package contents;
- The nutrients included in a GDA label are inconsistent across products. For example, a product with very high sugar content may only feature a GDA label for calories.
- 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;
- Properly interpreting a GDA label takes more time most shoppers spend reading a nutritional label, and requires a high level of nutrition knowledge and mathematical skills.

GDAs perform poorly compared to other FOP labelling systems:

- Independent studies comparing GDA-style labels with other systems (e.g., multiple traffic lights, the Nutri-Score system, Choices International, HealthStar Rating, and warning labels) consistently find that GDAs are the most confusing, take the most time for shoppers to evaluate, and are ultimately the least effective for encouraging consumers to make healthier choices.[74,77,110-117]
- Studies in Mexico, Uruguay, Mexico, Ecuador, Chile, and Brazil have all found GDAs to be the weakest of any labelling system currently used in Latin America.[51,65,70,92,109,115,118-120]
- 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.[77,92,109,121,122]
- 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.[64,65,123]
- Studies in Australia and New Zealand found that GDAs (referred to there as 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.[124,125]
- In the United Kingdom, introduction of GDA labels did not affect shoppers' product choices among yogurts and ready-meals.[126]
- Companies often place GDAs on packages alongside other, more prominent labelling and marketing such as nutrient or health claims, which further confuses consumers.[48-50,127]

Key elements for developing an effective FOP labelling system

- Developing or selecting a **strong nutrient profiling model** is a key first step toward creating the FOP label policy.[128-130] The model should set clear and meaningful nutritional criteria to determine which products must carry labels.
- FOP labels should be **immediately and easily visible on the package**. Sizing and placement specifications should be made clear in the regulation. For example, the Chilean FOP policy sets specific size requirements for a wide range of packaging formats — from bubble gum to breakfast cereal — and offers a good starting point for other countries to consider.
- Label **designs should be simple and clear**:
  - Simple FOP labels enhance understanding and use of nutrition information, especially for consumers with less education and nutrition knowledge.[55,131,132]
  - Interpretive FOP labels work by using simple colors, icons, and 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.[55,132-135]
- A strong FOP label system must be **mandatory for all companies and apply to all product types**. Evidence indicates that applying a label to only some products can lead to misleading perceptions of the healthfulness.[136] Voluntary labelling systems can lead to multiple types of logos and labels, which increases confusion and decreases the usefulness of the logos.
- Ideally, where FOP warning labels are required, **health and nutrition claims should be prohibited**. Product packages that feature both warning labels and positive claims confuse consumers.
- **Endorsement of a FOP label by government or scientific organizations** increases credibility.[55]
- **Criteria for the labels should be made public** in advance to educate consumers and manufacturers and to encourage product reformulation.[59] Industry should be allowed to comment publicly on the criteria but should not be permitted to intervene in its development.

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