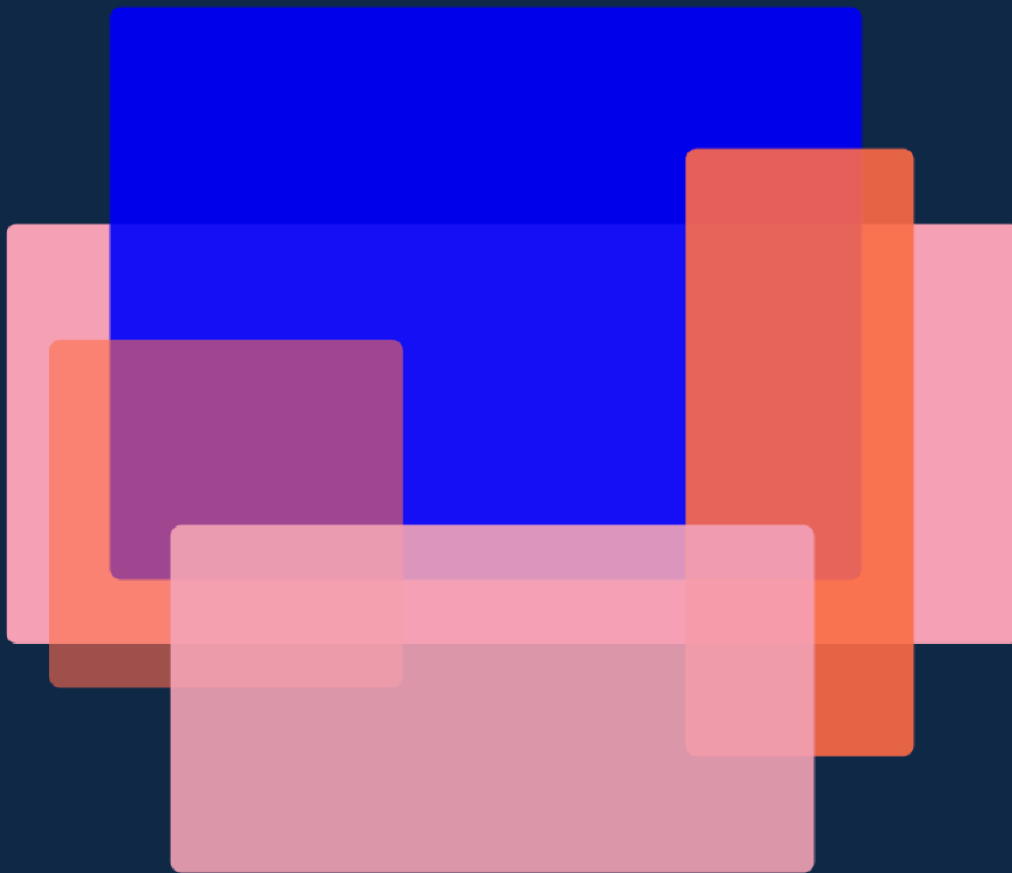


Blueprint for halving obesity: rapid review

Front-of-pack labelling (FOPL) interventions for reducing obesity



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Summary table

Title	Calorie (energy) labelling for changing selection and consumption of food or alcohol (Cochrane Review)
Author and year	Clarke et al. (2025)
Subset used in our modelling	Subset from Clarke et al. (2025) meeting the following criteria: (i) real-world study (as opposed to lab-based); (ii) involving packaged foods (eg, conducted in supermarkets, as opposed to out-of-home outlets). Only one study met the criteria: Dubois et al. (2021) , which is characterised below.
Type of study	Randomised controlled trial
Outcome variable	Impact on purchasing
Treatment	Interpretative FOPL (Nutri Couleurs and Nutri Repère), as meta-analysed in Clarke et al. (2025)
Control	No label
Magnitude of effect	Effect size as reported in Clarke et al. (2025): -0.05 kcal (standard mean difference) (95% CI: -0.08 to -0.01). Kcal SMD conversion: -0.05 kcal SMD is equivalent to a 0-54 kcal reduction in energy intake per person per day*

*Calculated using SMD conversation following extrapolation method used in [Clarke et al. \(2025\)](#)

Rapid umbrella review

Background

Front-of-pack nutritional labelling (FOPL) is a common and prominent policy tool being used by governments to promote healthier eating. Many governments in most high-income countries have already [mandated the display of nutritional information on pre-packaged foods](#). This policy/intervention is likely to work in two main ways. It may work as an educational tool to inform customers and producers about the nutritional content in the food and thereby its healthiness. This information is expected to lead to healthier food purchasing and consumption by customers, which motivates the reformulation of foods by industry. This eventually leads to healthier diets and a reduction in comorbidities such as obesity and other diet-related diseases. The logic model for this intervention is explained in [Crockett et al. \(2018\)](#) and shown in Figure 1 below:

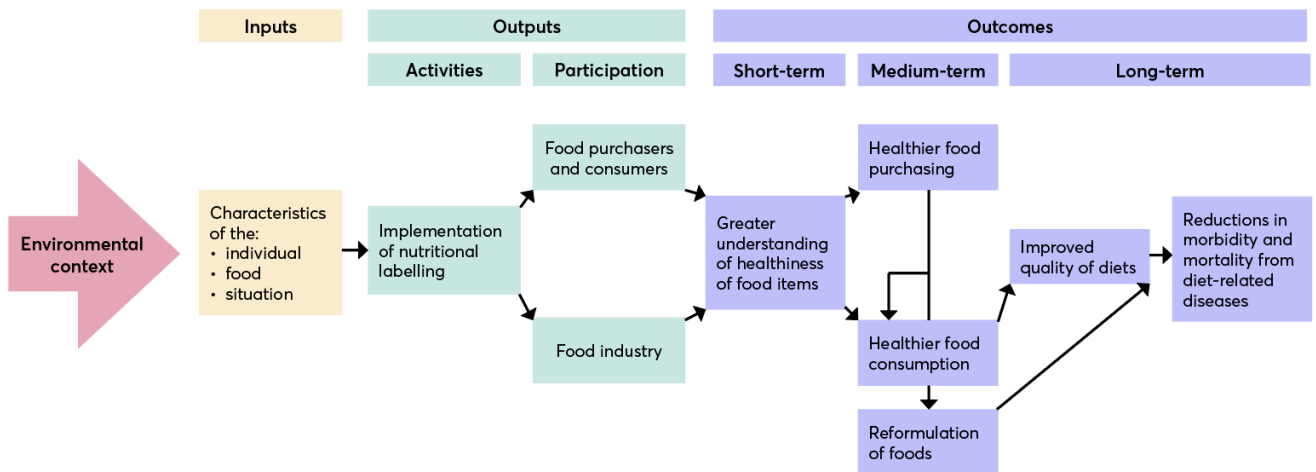


Figure 1: Logic model for intervention based on Crockett et al. (2018)

There are a variety of different front-of-pack nutritional labels that are used in countries around the world. There are many [classifications of front-of-pack labels](#), but the two major types are:

- Interpretative labels: These indicate a product's healthiness in a graphical manner, simplifying nutritional information in a way that is easy to understand and recognise. These graphical representations can consist of colour coding, scores, star ratings or a health logo. Examples of interpretative labels include traffic light labelling, Guideline Daily Amount (GDA) or reference intakes, nutrition/health warnings such as black octagonal 'High in...' logos, Health Star Rating (HSR), and Nutri-Score.

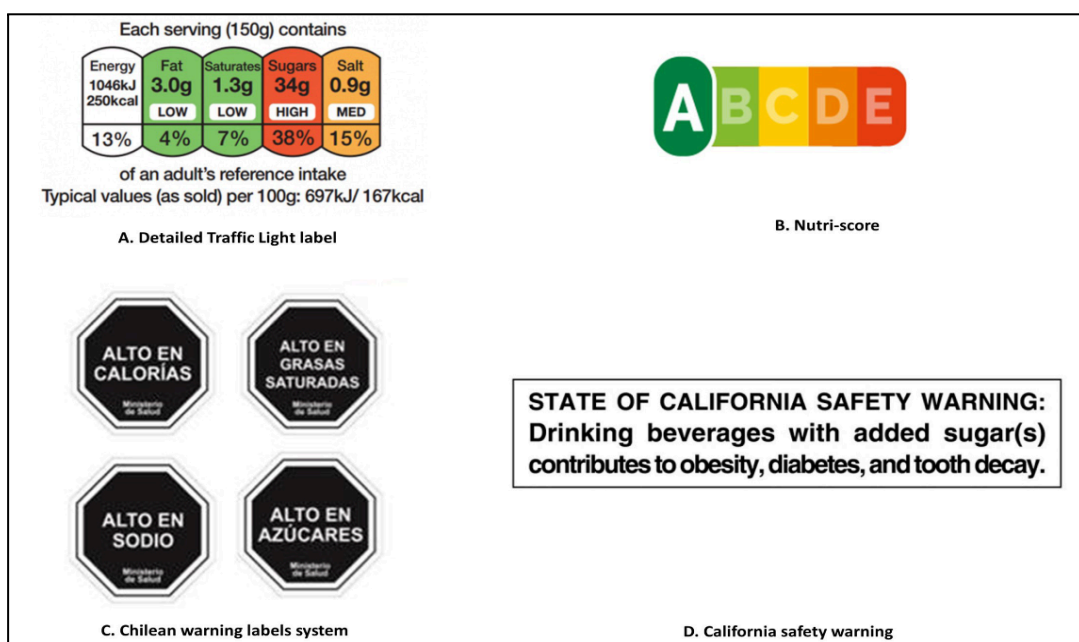


Figure 2: Figure taken from [Song et al. \(2021\)](#) indicating different types of interpretative front-of-pack labelling (FOPL)

- Non-interpretative labels: These are numeric in nature and require customers to interpret by themselves. Adequate levels of literacy are required for these to be effective and they are typically viewed as being less helpful.

Objective

To summarise the best available evidence on the impact of front-of-pack labelling (FOPL) on energy intake or body weight.

Methods

We aimed to identify reviews that included quantitative research synthesis (ie, meta-analysis or a government impact assessment) of the effectiveness of FOPL interventions on outcomes relevant to calorie consumption, energy intake, weight loss or obesity. If more than one review was identified that answered our research question, we aimed to identify the review that was reflective of the best evidence, based on (a) the year published and (b) the best fit to the research question.

Eligibility criteria

Types of review. To be eligible for inclusion, articles were required to use systematic review methodology (ie, use of systematic search and inclusion strategy to identify all available studies) and include quantitative data synthesis (ie, meta-analysis) of multiple studies that examined the effect of FOPL on outcomes relevant to calorie consumption, energy intake, weight loss or obesity. We did not set inclusion criteria on the number or type of databases searched in the reviews.

If the search did not identify any studies where a meta-analysis had been conducted due to heterogeneity of the outcomes of interest, we would use reviews with a narrative synthesis, a government impact assessment, or findings from a single study if this best represented our research question.

Participants. To be eligible for inclusion, articles could examine the effect of FOPL interventions on adults or children.

Intervention. Reviews were required to synthesise interventions that tested the effectiveness of FOPL on purchasing/eating behaviour or energy intake. Labels could include any type of FOPL (see Figure 2 for examples).

Comparator. The comparator could be no labels or other label types on food products.

Outcomes. To be eligible for inclusion, reviews needed to include either clinical (eg, weight, BMI, % fat change) or behavioural outcomes (including, but not limited to: purchasing behaviour, consumption behaviour, food diaries). Reviews that only included measures of intentions/plans for future behaviour were excluded due to evidence of the gap between intended and actual eating behaviour.

Information sources and article selection

The search strategy was designed to identify syntheses of research evidence, such as systematic reviews between the year 2010 and the date of search. Initial keywords were identified via a scoping review of relevant papers and reports, as well as via MEDLINE using the MeSH function. A search was performed in PubMed and the Cochrane Database of Systematic Reviews (see [appendix](#) for search strategy). We searched grey literature using Google Scholar and Google to identify relevant reports. The search was run in April 2025.

Screening

Due to the rapid nature of the reviews, a single reviewer screened titles and abstracts and discussed any uncertainty with a second reviewer. For relevant titles/abstracts, the full text was retrieved for full text review. One reviewer reviewed the full texts and discussed uncertainties with a second reviewer.

Assessment of methodological quality

As per our protocol, we were led first by the suitability of the study to our research question. If there were multiple relevant studies/reviews identified, we selected the best available evidence according to our expert consultation with members of our expert advisory group (EAG).

Data extraction

The following information was extracted:

- Review/study characteristics: author/year, objectives, participants (characteristics, total number), setting/context, interventions of interest.
- Results: findings of the review and comments.

Consultation with Expert Advisory Group (EAG)

Given there is a [known issue with lab-based FOPL studies leading to bigger effects than are seen in real-world studies](#), we were keen to select a paper with the greatest real-world generalisability. After running literature searches and reviewing the identified papers, no single systematic review or meta-analysis entirely answered our research question (eg, outcome measures not usable for our modelling; intervention

not meeting our inclusion criteria; skew towards lab-based findings). We consulted with the Blueprint EAG in order to determine the most suitable paper for modelling the impact of this intervention. The final paper selection was based on these discussions.

Results

Multiple systematic reviews and meta-analyses have been conducted to assess different types of FOPL. We identified a Cochrane Review (systematic review and meta-analysis) by [Clarke et al. \(2025\)](#) as the most appropriate source of evidence. Other papers were considered but ultimately excluded, and are summarised in Table 2.

The selected Cochrane Review as a whole explored the impact of calorie (energy) labelling on foods in different settings (eg, cafes, supermarkets) and in different contexts (both lab-based and real-world). For the purposes of the present review, we opted to extract the meta-analysis results from the most appropriate subset of studies included in this review (ie, those with the highest potential for real-world generalisability, focused on stores as a setting, ie, where food would be pre-packaged). Specifically, we used the meta-analysis in Analysis 1.2 (pg. 89), Comparison 1.2.2 ('Stores'), with results based on two eligible comparisons of [Dubois et al. \(2021\)](#). Below we summarise both the Clarke et al. (2025) Cochrane Review, from which we extracted a meta-analysed effect size, and also the Dubois et al. (2021) paper, which underpinned this meta-analysis.

Cochrane review: methods and key findings

The Clarke et al. (2025) Cochrane review used the following methods:

- Authors searched CENTRAL, MEDLINE, Embase, PsycINFO, five other published or grey literature databases, trial registries, and key websites, followed by backwards and forwards citation searches. Using a semi-automated workflow, records were searched for and corresponding reports of eligible studies were identified, with searches current to 2 August 2021. Updated searches were conducted in September 2023, but the results were not fully integrated into this version of the review.

- Cochrane RoB 2 tool and ROBINS-I were used to assess the risk of bias in included studies. Where possible, (random-effects) meta-analyses were used to estimate summary effect sizes as standardised mean differences (SMDs) with 95% confidence intervals (CIs), and subgroup analyses to investigate potential effect modifiers, including study, intervention, and participant characteristics. Data was synthesised from other studies in a narrative summary. The certainty of evidence was evaluated using GRADE.

The Clarke et al. (2025) Cochrane review found the following:

- They reviewed 25 studies (23 food, 2 alcohol and food), comprising 18 RCTs, one quasi-RCT, two interrupted time series studies, and four controlled before-after studies. These were predominantly from field settings (including restaurants, cafeterias and supermarkets) and naturalistic laboratory settings (aiming to mimic a real-world setting). Some, however, were purely lab-based. Most studies assessed the impact of calorie labelling on menus or menu boards (18/25); six studies assessed the impact of calorie labelling directly on, or adjacent to, products or their packaging; and one study assessed labels on both menus and on product packaging.
- However, as noted above, we were interested in studies meeting the following selection criteria:
 - a. Intervention involving packaged foods (eg, conducted in supermarkets, as opposed to out-of-home outlets);
 - b. Conducted in real-world settings.

Of the 25 studies included in the Clarke et al. (2025) Cochrane review, only one study met our selection criteria: [Dubois et al. \(2021\)](#) study. As a result, we focused on the Dubois et al. (2021) study and the corresponding meta-analysis within the Clarke et al. (2025) review.

Real-world store-based study subset: methods and key findings

- Dubois et al. (2021) conducted a randomised controlled trial in supermarkets in France, examining the impact of FOPL on packaged food. In their original study, four nutrition labels were selected, with the comparison being no label. The studies involved the general population and purposefully included supermarkets with shoppers of both high and low socioeconomic status. The

comparison sites (control supermarkets) had no additional FOPL. The trial took place from 26 September to 4 December 2016. This was before NutriScore was enforced in France.

- For the purposes of the Cochrane Review conducted by Clarke et al. (2025), only 2 of these 4 comparisons were included in the meta-analysis (specifically Nutri Repère and Nutri Couleurs), as these met the Cochrane Review's intervention criteria of being forms of calorie/energy labelling. The pooled results for the two eligible comparisons from Dubois et al. (2021) was a -0.05 (CI: -0.08, -0.01) kcal standard mean difference (SMD) in food selection/purchasing. These results can be found in the [original source](#) on Page 89: Analysis 1.2, Comparison 1.2.2 ('Stores'), and are also reproduced in Table 1 below. The risk of bias for the Dubois et al. (2021) study was rated as low. According to the conversion method used in [Clarke et al. \(2025\)](#), a kcal SMD of -0.05 is equivalent to an average 9 kcal reduction in energy intake per person (adult) *per meal*. We have further extrapolated this to correspond to an average 27 kcal reduction in energy intake per person (adult) *per day*, based on the assumption that most people eat three meals a day.

Table 1: Food selection/purchasing (kcal) in the setting 'stores' (Excerpt from Analysis 1.2 of Clarke et al., 2025)

Study	SMD	SE	Labelling Total	No labelling total	Std. Mean Difference IV, Random, 95% CI
Dubois 2021*	-0.062644	0.0245	10	10	-0.06 [-0.11, -0.01]
Dubois 2021*	-0.032787	0.0245	10	10	-0.03 [-0.08, 0.02]
Subtotal			20	20	-0.05 [-0.08, -0.01]

* Repeated mention of Dubois 2021 indicates two eligible comparisons from this study.

SMD = standard mean difference; SE = standard error; IV = independent variable; CI = confidence intervals

Excluded studies

Table 2: Summary of excluded studies found through our searches

Paper	Study Type	Intervention	Outcomes	Exclusion Reasons and Comments
Kelly et al. (2024)	Systematic review applying Cochrane methodology	Different types of FOPL on retail food and drinks	Mixture of outcomes comprising: consumer awareness of labels; consumer search or use of labels; consumer understanding of labels; consumer food choice; consumer food purchase; consumer diets; food composition change; body weight status; unintended consequences.	Outcomes were not usable for our research question and our impact modelling purposes (choice/intention to consume unhealthy food; healthiness of food choices).
Song et al. (2021)	Systematic review and network meta-analysis	Comparison of types of FOPL vs others or none	Measures regarding changes in consumers' purchasing (including calories purchased) and consumption behaviour (including choices/intention to purchase and healthiness of products).	Effect sizes split by FOP type, so no single effect size could be extracted to show the aggregated effect of FOPL. Most studies (95%) were carried out in laboratory settings so limited real-world applicability.
Croker et al. (2020)	Systematic review and meta-analysis	FOPL on pre-packaged food	Mixture of outcomes relating to purchasing and consumption.	Low real-world applicability as meta-analysis for consumption outcomes was done on experimental data only.
Crockett et al. (2018)	Cochrane review, including meta-analysis	Nutritional labelling on food and non-alcoholic drinks	Mixture of outcomes relating to purchasing and consumption.	Superseded by the Clarke et al. (2025) Cochrane review. Limited generalisability/real-world applicability - heavy skew towards lab-based studies and university populations. Inappropriate intervention type too as most (20/28) studies assessed the impact of labelling on menus or menu boards, or nutritional labelling placed on, or adjacent to, foods or drinks.

Appendix

Appendix 1: Search strategy

No.	Concept	PubMed Search Terms
1	Front-of-pack label	"Food labelling"[tiab] OR "Food Labeling"[Mesh] OR "front of pack labelling"[tiab] OR "front-of-pack labelling"[tiab] OR "Food Labelling"[tiab] OR "FOP"[tiab]
2	Weight loss and obesity	"Weight Loss"[Mesh] OR "Obesity"[Mesh] OR "obesity"[tiab] OR "overweight"[tiab] OR "over-weight"[tiab]
3	Calorie	"Energy Intake"[Mesh] OR "Calorie consumption"[tiab] OR "Calories consumed" [tiab] OR Calories [tiab] OR "Calorie intake" [tiab] OR "Caloric intake"[tiab] OR "Energy" [tiab] OR "Energy Intake" [tiab]
4	Eating behaviour	"Food consumed" [tiab] OR "Feeding Behavior"[Mesh] OR "Feeding Behavior*"[tiab] OR "Eating rate"[tiab] OR "Dietary intake" [tiab] OR "Diet"[Mesh] OR "Food preferences"[Mesh] OR "Consumer Behavior"[Mesh] OR "eating behaviour"[tiab] OR "consumption"[tiab]
5	Purchasing behaviour	"Purchas*"[tiab] OR "Purchasing behavior*"[tiab] OR "buying"[tiab]
6	Systematic review	"systematic review"[tiab] OR "systematic*"[tiab] OR "meta-analys*"[tiab] OR "narrative synthes*"[tiab]
7	Full search	(#1) AND (#2 OR #3 OR #4 OR #5) AND #6
8	Search limits	Limit to 2010 onwards