

## HEALTH EVIDENCE NETWORK SYNTHESIS REPORT 61

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?

Bridget Kelly | Jo Jewell



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# 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?

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## Abstract

Interpretive front-of-pack food labelling (FOPL) is a policy priority for promoting healthy diets. Research evidence indicates that consumers have a reasonable understanding of interpretive FOPL systems and their understanding improves with label familiarity and consistency within the market. A government-endorsed interpretive FOPL policy was found in 15 Member States of the WHO European Region, and this report summarizes the evidence on their development and implementation to support policy-makers in navigating these processes. Most existing policies have been implemented under voluntary arrangements, with variable penetration into the marketplace. Policy development that is led by government and based on formative research, and that engages stakeholders and the public, is most likely to lead to acceptable, credible and effective policies. FOPL implementation is best supported by policy provisions that encourage widespread uptake of the system and allow for formal evaluation of both implementation and impact.

## Keywords

FOOD LABELLING; LEGISLATION, FOOD; HEALTHY DIET; CONSUMER BEHAVIOUR; FOOD PREFERENCES/ PSYCHOLOGY; HEALTH PROMOTION; PROGRAM EVALUATION

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## ABBREVIATIONS

Codex	Codex Alimentarius Commission
EU	European Union
FOPL	front-of-pack labelling
FSA	British Food Standards Agency
FSA-NPS	British Food Standards Agency Nutrient Profiling System
GDA	Guideline Daily Amount
HFSS	high fat, sugar and/or salt (foods)
NCD	noncommunicable disease
NGO	nongovernmental organization
RI	Reference Intake

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# SUMMARY

## The issue

Poor diet is the leading cause of mortality and morbidity globally and across the WHO European Region, including by contributing to noncommunicable diseases (NCDs) such as type 2 diabetes mellitus, cardiovascular diseases and some types of cancer. Nutrition labelling is one of the policy tools that can support healthy diets, both in stimulating consumers to make informed healthier food choices and in driving manufacturers to reformulate products to avoid making unfavourable nutrient content disclosures. Front-of-pack labelling (FOPL) for nutritional information with interpretational aides (e.g. words, colours or symbols) is more likely to be used and understood by consumers. Consequently, the WHO European Food and Nutrition Action Plan 2015–2020 identified the introduction of interpretative, consumer-friendly FOPL as a priority policy issue. Based on surveys undertaken by the WHO Regional Office for Europe, most European countries have some form of FOPL, although fewer countries have interpretive systems that provide judgements about the relative healthfulness of foods.

## The synthesis question

This report has synthesized information on the development and implementation of interpretive FOPL policies across the WHO European Region in order to support policy-makers in navigating these processes. It was guided by the synthesis question: "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?"

## Types of evidence

Countries in the WHO European Region with interpretative FOPL policies were identified from WHO databases of Member State policies and online repositories of global food policies. In none of the identified 15 countries was Russian widely used; therefore, the review of evidence was not undertaken in the Russian language. Evidence for each identified country was retrieved from peer-reviewed and grey literature, including official documents on the websites of relevant government ministries. The focus was on government-endorsed FOPL policies.

## Results

Fifteen countries were identified as having a government-endorsed policy on interpretive FOPL, with 13 of these adopting endorsement logos. These logos serve to signpost better-for-you choices but provide no direct information to indicate whether a product is unhealthful. Governments in three countries had endorsed FOPL policies that provided directive information about product unhealthfulness, including nutrient-specific warning labels (Israel), a summary indicator system providing information about a product's overall nutritional quality (France) and an interpretive system providing both numeric information and colour coding on the contribution that a food makes to recommended daily intakes for a nutrient (United Kingdom).

This report identified common steps involved in FOPL policy development, including establishing FOPL as a nutrition policy priority, engaging stakeholders and the public, and collecting formative evidence on which to base the FOPL system. In all but one country, FOPL policies have been implemented under voluntary arrangements, with variable penetration of the labels into the marketplace. There was limited information on formal provisions for evaluation of FOPL policies as part of label implementation, although academic publications provided evidence on performance in supporting the consumer and reformulation objectives. Across countries, consumers have a reasonable understanding of interpretive FOPL systems and understanding was shown to improve with label familiarity and with consistency of labelling in the marketplace. Labels that included information on product unhealthfulness appear to better support consumers to choose nutritionally favourable products.

## Policy considerations

Based on the evidence synthesized in this report, a number of considerations can be identified for the adoption or review of FOPL policies at the national or regional level:

- establish a consistent FOPL system to aid consumer use and understanding of the label;
- utilize a system of interpretive FOPL that can provide evaluative judgements about product unhealthfulness, which appears to be a more effective way to support consumers to choose nutritionally favourable products – it may also highlight better-for-you choices, thus providing both positive and negative evaluative judgements;

- consider that endorsement logos alone may encourage consumers to overestimate the healthfulness of products and may engender a price premium, which may have implications for low socioeconomic groups;
- choose to have government-led FOPL policy development rather than a commercially based system as consumers perceive the latter as less credible;
- develop the scope of FOPL policies based on stakeholder engagement and formative research to ensure that the right policy is chosen for the population;
- explore ways to overcome issues with uptake of the FOPL system in the marketplace, including through mandatory implementation;
- support implementation through the development of guidance documents for industry to facilitate label adoption and public education initiatives to stimulate consumer demand for the label and improve awareness and understanding; and
- create a formal and comprehensive FOPL policy monitoring and evaluation programme to assess implementation and impact (e.g. outcomes such as knowledge, attitudes and behaviour; purchasing and consumption changes; reformulation; and potential health effects).





# 1. INTRODUCTION

## 1.1 Background

### 1.1.1 Food choices and health

Poor diet is the leading cause of total mortality and morbidity globally (1) and across the WHO European Region (2). This refers specifically to excessive intakes of energy, saturated and trans-unsaturated (trans) fatty acids, sodium and free sugars and low intakes of fruits, vegetables and polyunsaturated fatty acids. Such dietary practices contribute to metabolic risk factors, including high blood pressure, high body mass index (commonly referred to as overweight and obesity), high fasting plasma glucose and high total cholesterol, which, in turn, increase risk for diet-related NCDs, including type 2 diabetes mellitus, cardiovascular diseases and some types of cancer (3). Overweight and obesity plus high blood pressure and low intakes of fruit and vegetables are among the leading causes of disease burden across the WHO European Region specifically (1). Dietary choices are influenced by a range of individual, societal, economic and environmental factors. Consequently, interventions to support the adoption of healthy diets need to take a broad approach (4).

Within the food retail environment, major drivers of food choice include product taste, price, brand, convenience, use-by date, nutrition knowledge and cultural and family preferences. Modern food retail environments offer extensive selections of processed packaged foods high in saturated and trans fatty acids, sugar and/or salt (HFSS). Typically, retail shelf space and in-store promotions favour HFSS foods over healthier options (5,6). Evidence indicates that over one quarter of all foods purchased by households across Europe is highly processed, and countries with the highest household availability of highly processed foods also have the highest rates of adult obesity (7).

### 1.1.2 Nutrition labelling

Nutrition labelling is one of the policy tools that can partially rebalance unhealthful retail food environments. The primary objective of nutrition labelling is to support consumers to make informed healthier food choices (8,9). Where labelling would result in manufacturers having to disclose unfavourable amounts of negative nutrients on labels, an additional proposed benefit is the reformulation of products (10). The nutrition labelling systems and elements that best facilitate


information use and comprehension, and drive food product reformulation, have been a topic of much research and vigorous policy debate globally.

The Codex Alimentarius Commission (Codex) is the Joint WHO/Food and Agriculture Organization of the United Nations body that produces internationally adopted food standards and guidelines intended to facilitate international trade and promote food safety and public health. Codex categorizes nutrition labelling into two components: nutrient declarations and supplementary nutrition information (11). A nutrient declaration is a standardized listing of the nutrient content of a food, usually positioned on the back or the side of the package. Since 2012, Codex guidelines have recommended the mandatory use of nutrient declarations on food packages, even in the absence of nutrition and health claims. More recently, the European Union (EU) mandated the inclusion of nutrient declarations on pre-packaged foods, with full compliance required from December 2016. Since this time, much progress has been made in the WHO European Region, with more than three quarters of countries now mandating the use of nutrient declarations on pre-packaged foods (12). However, research evidence consistently identifies that consumer use and understanding of this type of labelling is poor, particularly for low socioeconomic groups, because of the complexity of the numerical information, small print size and positioning on the back or side of packs (13,14).

### 1.1.3 Using labels on the front of packaging

Supplementary nutrition information is intended to increase people's understanding of the nutritional value of a food and assist in interpreting the nutrient declaration: this information is provided in addition to, not as a replacement of, nutrient declarations. This type of labelling is commonly referred to as FOPL. The WHO European Food and Nutrition Action Plan 2015–2020 identified the introduction of "easy-to-understand or interpretative, consumer friendly labelling on the front of packages" as a priority policy issue (4).

While Codex recognizes that there are diverse ways of presenting supplementary nutrition information, it does not currently define or outline guidelines for this type of labelling. Other regional intergovernmental bodies, such as the EU, make provisions for the voluntary use of the Reference Intake (RI; see the Glossary) information to be included on the front of food packages (15). The EU allows some freedom to Member States to interpret the regulations with regards to the development of national schemes.



To date, a small number of countries in the WHO European Region have implemented policies on interpretive FOPL that provide directive information to support consumers in making judgements about the nutritional quality of foods. A survey in 2017 among Member States of the WHO European Region assessed progress against the WHO European Food and Nutrition Action Plan. Of the 50 Member States that responded, 36 reported having introduced voluntary FOPL. However, only 13 of these reported having interpretative systems currently implemented (12).

#### 1.1.4 FOPL nomenclature and taxonomy

Beyond Codex, multiple taxonomies of nutrition labelling are available, each with varying classifications of specific types of labelling and system (e.g. that of the Institute of Medicine (16) or Rayner et al. (17)).

FOPL systems have been grouped in several ways: non-interpretive/reductive and interpretive systems (with interpretive systems providing some evaluative judgement about nutritional quality); nondirective, semidirective and directive systems (according to the degree to which labels provide a direct judgement about product healthfulness (18)); or nutrient-specific and nutrition summary systems. FOPL systems differ in the extent to which they provide consumers with nutrient information versus nutrition advice. At one end of this spectrum, non-interpretive nutrient-specific systems provide a summary of nutrient information from nutrient declarations and little advice or judgement on the nutritional value of the food to assist with purchasing decisions. At the other end of the spectrum, interpretive systems may provide no nutrient information but only at-a-glance guidance on the relative healthfulness of a product. There is a range of variations between these two extremes.

This report uses the division into interpretive and non-interpretive systems, which is in alignment with terminology used in other WHO reports (4). There are four major types of FOPL system used in the WHO European Region that include evaluative judgements about the nutritional quality of food products:

- **endorsement logos:**
  - nutrient levels combined to give an overall assessment of absolute healthfulness;
  - positive evaluative judgement only (on better-for-you foods);
  - products are eligible to carry the endorsement symbol only if a nutrition standard is met;

- nutrient cut-off points binary (i.e. if a product meets the standard it can carry the label); and
- example, Keyhole;
- **summary indicator systems:**
  - nutrient levels combined to give an overall assessment of relative healthfulness;
  - both positive and negative evaluative judgements (graded directive assessment of food overall);
  - can appear on all eligible products;
  - nutrient cut-off points graded (e.g. high, medium, low); and
  - example, French Nutri-Score;
- **nutrient-specific warning labels:**
  - information on individual nutrients kept separate;
  - products that exceed a nutrition standard identified (negative judgements of worse-for-you foods);
  - nutrient cut-off points binary (i.e. if a product exceeds the threshold, it must carry the label); and
  - example, Israeli red warning label;
- **nutrient-specific interpretive label:**
  - information on individual nutrients kept separate;
  - both positive and negative evaluative judgements (graded directive assessment of nutrients);
  - nutrient cut-off points graded (e.g. high, medium and low);
  - can appear on all eligible products; and
  - example, multiple traffic light colour coding.

While nutrient-specific systems such as %RIs do provide some assessment of the contribution that a serving of food makes to nutrient intakes and can appear on all foods, such systems do not provide an evaluative judgement about how numerical values should be interpreted and, consequently, are referred to as a non-interpretive. In a study of 28 European countries, an average of 25% of retail food products across all countries displayed the Guideline Daily Amount (%GDA; see the Glossary) labelling (19). However, as %GDA is not an interpretive system, it is not analysed in this report.

It should be noted that while most research studies identify endorsement symbols as a form of FOPL, logos that identify better-for-you products are referred to as health claims under Codex guidelines (20) and EU regulations (21).





### 1.1.5 FOPL policy development and policy specifications

To date, little research attention has been given to synthesizing evidence on the processes of FOPL policy development and policy specifications. Such evidence would provide practical support for countries considering implementing policies for nutritional FOPL by identifying the labelling options available and the steps required for the development and implementation of effective systems. Consequently, this report focuses on the policy development process rather than simply consumer-related outcomes. The latter has been the subject of multiple evidence reviews, which have considered the systems that consumers most prefer, use and understand; the systems that best guide healthier food choices and diets; and the systems that stimulate product reformulation (22–28). Typically, these reviews have examined experimental and observational consumer reactions to FOPL systems, with two specifically assessing evidence from Europe (24,27). Some of these reviews assessed the quality of the included papers based on the transparency and appropriateness of the study design, study sampling and reporting (21,26,29). These reviews concluded that consumers were more likely to attend to or look at FOPL than nutrient declarations. FOPL for nutritional information with interpretational aides (e.g. words, colours or symbols) was more likely to be used and understood by consumers. Although consumer use of nutrition labels, in general, was moderate to low, the presence of FOPL may increase consumers' use of nutrition information while shopping.

European countries have a long history of developing and implementing FOPL systems. For example, Sweden introduced the Keyhole label in 1989 and its revision and expansion to include Norway and Denmark occurred in the late 2000s (30). Consequently, there is considerable experience within Europe to inform regional and global processes on this topic.

### 1.1.6 The objectives of this report

If policy-makers are deciding on which FOPL system to introduce to support healthier choices, it is important that they have the information on which to assess these systems for their relative advantages and disadvantages. In this report, nutrition information was considered to be FOPL if it was typically displayed in the principal field of vision (19) and if the intention of the label was to guide healthier food choices. The report uses the term **core** to refer to those products that are recommended to be consumed as part of a healthy diet in most national nutrition guidelines and **non-core** for those products that are not considered as necessary for a healthy diet (see the Glossary).

The report collates and synthesizes information on the development and implementation of FOPL policies for interpretive systems. It was guided by the synthesis question: "What is the evidence on policy specifications, development processes and effectiveness of existing front-of-pack food labelling policies in the WHO European Region?"

## 1.2 Methodology

Fifteen countries in the WHO European Region with interpretative FOPL policies were identified from WHO databases of Member State policies and online repositories of global food policies. For each identified country, evidence published from 1 January 1980 to 31 March 2018 was retrieved from peer-reviewed and grey literature, policy reports and government websites, with a focus on government-endorsed policies, including those developed by government, nongovernment organizations (NGOs) and the food industry. In none of the identified 15 countries was Russian widely used; therefore, the review of evidence was not undertaken in the Russian language. Evidence from countries outside the Region was only considered where this explicitly informed the development of European systems. Data extracted for each country were cross-checked with in-country representatives to ensure completeness and accuracy.

A total of 178 articles were identified and assessed based on their abstracts and then on the full text, giving 137 articles (13,15,21–27,30–157).

Further details of the search strategy including the inclusion criteria and data extraction are provided in Annex 1.



## 2. RESULTS

The findings described in this report are based on the 13 countries identified by the 2017 survey (12) as having a government-endorsed policy on interpretive FOPL (Croatia, Czechia, Denmark, Finland, France, Iceland, Israel, Lithuania, Norway, Poland, Slovenia, Sweden and the United Kingdom) plus Belgium (72) and the Netherlands (38). See Annex 2 for a glossary of terms used in the report.

### 2.1 FOPL systems used across the WHO European Region

The four major types of FOPL system used across the WHO European Region that include evaluative judgements about the nutritional quality of food products are summarized in Table 1: endorsement logos, summary indicator systems, nutrient-specific warning labels and nutrient-specific interpretive systems.






Only three FOPL systems were identified that provided an indicator of unhealthfulness (i.e. directive information about products with poor nutritional quality): the Nutri-Score system in France (a summary indicator system) (32–34), the red warning label in Israel (nutrient-specific warning labels) (35) and the colour-coded and %RI system in the United Kingdom (nutrient-specific interpretive system) (15).

Label development was led by the government for all but the Slovene Protective Food logo and the Finnish Heart Symbol (NGOs) and the Choices logo (food industry; see section 2.4.2).

#### 2.1.1 Endorsement logos

Endorsement logos are the most commonly used FOPL and have been adopted by 13 countries (Belgium, Croatia, Czechia, Denmark, Finland, Iceland, Israel, Lithuania, the Netherlands (withdrawn 2016), Norway, Poland, Slovenia and Sweden). These logos signpost healthier choices using a range of symbols (a tick, a heart symbol, a green keyhole, a green cloud and a green squiggle) but provide no information on product unhealthfulness. As endorsement logos are only displayed on products that achieve a defined nutrition standard, the majority of available products will not carry a label. Nutrient criteria for endorsement logos mostly vary across food groups in terms of the nutrients and values applied, seeking to represent key



Table 1. FOPL systems in the WHO European Region

System type	System and graphic example
Endorsement logo (positive directive overall assessment)	<p>Choices logo</p> 
	<p>Green endorsement logo</p> 
	<p>Healthy Living Guarantee Mark</p> 
	<p>Heart Symbol</p> 
	<p>Keyhole logo</p> 



Brief description	Interpretive element	Countries where system is in use or proposed
<p>Netherlands had two versions of the logo</p> <ul style="list-style-type: none"><li>▶ Green logo with text "healthy choice" representing healthy choices within basic categories essential to a healthy diet (including bread, milk, fruit and vegetables)</li><li>▶ Blue logo with text "conscious choice" to assist consumers to select healthier options within non-basic products</li></ul>	Text and tick symbol	Belgium, Czechia, Netherlands (withdrawn 2016), Poland
Squiggle within a green circle		Israel
Green cloud with the text "Live well"	Text	Croatia
Heart symbol with encircling text stating "better choice"	Heart symbol and text	Finland
<p>Always green with a white keyhole (black with a white keyhole if colour not available), followed by the registered trademark symbol</p> <ul style="list-style-type: none"><li>▶ Partner slogan "Healthy choices made easy" is not displayed on the FOPL</li></ul>	Keyhole symbol	Denmark, Iceland, Lithuania, Norway, Sweden

Table 1. FOPL systems in the WHO European Region (contd)

System type	System and graphic example															
Endorsement logo (positive directive overall assessment) (contd)	Protective Food logo (Little Heart logo) 															
Summary indicator system (graded directive assessment)	Nutri-Score 															
Nutrient-specific warning label (negative directive assessment of content)	Red warning label 															
Nutrient-specific interpretive system (graded directive assessment of nutrients)	Colour-coded %RI <table border="1" data-bbox="617 1214 925 1329"> <thead> <tr> <th colspan="5">Each grilled burger (94g) contains</th> </tr> </thead> <tbody> <tr> <td>Energy 924 kJ 220 kcal</td> <td>Fat 13g</td> <td>Saturates 5.9g</td> <td>Sugars 0.8g</td> <td>Salt 0.7g</td> </tr> <tr> <td>11%</td> <td>19%</td> <td>30%</td> <td>&lt;1%</td> <td>12%</td> </tr> </tbody> </table> <p>of an adult's reference intake Typical values (as sold) per 100g: Energy 966 kJ / 230 kcal</p>	Each grilled burger (94g) contains					Energy 924 kJ 220 kcal	Fat 13g	Saturates 5.9g	Sugars 0.8g	Salt 0.7g	11%	19%	30%	<1%	12%
Each grilled burger (94g) contains																
Energy 924 kJ 220 kcal	Fat 13g	Saturates 5.9g	Sugars 0.8g	Salt 0.7g												
11%	19%	30%	<1%	12%												



Brief description	Interpretive element	Countries where system is in use or proposed
<p>List below heart symbol gives the product's specific nutritional properties that make it a healthier choice compared with other food products in the same category</p>	<p>Heart symbol</p>	<p>Slovenia</p>
<p>Scale of five (dark green to dark red; letters A to E) according to healthfulness of products, with dark green and A indicate the best nutritional quality</p>	<p>Traffic light colour coding and lettering</p>	<p>France</p>
<p>Separate symbols for sugar (spoon), sodium (salt shaker) and saturated fat (solid fat and knife), with text "High in [nutrient]"</p> <ul style="list-style-type: none"><li>▶ Back of pack displays the amounts of calories, sugar, sodium and saturated fat in bold type</li><li>▶ Total sugar content is expressed in teaspoons (1 teaspoon equivalent to 4 g)</li></ul>	<p>Text, graphics to represent nutrients</p>	<p>Israel</p>
<p>Both interpretive (colours) and non-interpretive (%RI)</p> <ul style="list-style-type: none"><li>▶ Colour coding indicates high (red), medium (amber) and low (green) levels of negative nutrients</li><li>▶ Energy displayed in greyscale</li><li>▶ Optional interpretive text may be used, stating the amount of each nutrient as high, medium or low</li></ul>	<p>Traffic light colour coding, optional text</p>	<p>Ireland, Portugal, United Kingdom</p>

nutrients of concern within food groups (e.g. the Keyhole logo applies different conditions to 33 different food groups).

Six different logos are in use, two of which have been adopted across multiple countries: the Keyhole logo (Denmark, Iceland, Lithuania, Norway and Sweden) and the Choices logos (Belgium, Czechia, the Netherlands (withdrawn 2016) and Poland).

There is some research evidence to suggest that consumers may misunderstand endorsement logos in terms of healthier choices overall (36) through inferring that a product displaying a logo is good for health, thereby leading to the overconsumption of labelled foods in HFSS categories (see section 2.5.2) (23). This issue has been addressed through a combination of approaches: restricting the foods on which the logo is used, adding interpretive text, defining the specific nutrient criteria and using different versions of a logo. Countries using the Keyhole logo have tried to prevent its use on non-core foods. The Finnish Heart Symbol and the Choices logo incorporate interpretive text stating "conscious/better" choice. In Slovenia, the Protective Food logo includes a statement about the specific nutrient criteria that a product achieved in order to carry the logo, thereby implying that the product met a particular criterion rather than being generally healthful (21,37). The Choices Foundation defines two groups of foods: basic (i.e. core) and non-basic. The Choices label in the Netherlands had two variants: a green logo representing healthy choices within so-called basic product categories and a blue logo representing healthier choices within non-basic product categories (38).

There are no evaluation or formative research data available to ascertain whether these approaches improve consumers' understanding of the labelling system, although an online survey of consumers indicated that they preferred the accompanying text "Protect your health" in association with the Slovene Protective Food logo (39).

### 2.1.2 Summary indicator systems

The French Nutri-Score FOPL is a summary indicator system that provides aggregated information about a product's overall healthfulness or unhealthfulness (32–34). Traffic light colour coding (from dark green to dark red) with corresponding letters (from A to E) provides a five-item scale of product healthfulness. The letters were included to ensure better visibility of the label, especially for people who have difficulties with colour.





### 2.1.3 Nutrient-specific warning labels

Nutrient-specific warning labels have been adopted in Israel based on research in South America indicating their effectiveness (41–43). To this was added a positive endorsement logo, thereby signposting both "better-for-you" and "worse-for-you" foods (35). In Israel, separate warning indicators are used for individual negative nutrients, including both graphics (spoon, salt shaker, solid fat and knife) and interpretive text (high in [nutrient]). Graphics were included to increase accessibility of the label for those with low literacy. In 1993, warning labels for salt when specific high-salt thresholds were exceeded were introduced in Finland for certain food groups, including cheese, processed meats, bread and bread products, breakfast cereals, ready meals and snacks (44); however, as these appear on the back of the pack, next to the nutrient declaration, they have not been discussed further in this report.

### 2.1.4 Nutrient-specific interpretive systems

The United Kingdom's FOPL system provides numeric information on the percentage contribution that a serving of food provides to a nutrient's RI (non-interpretive) plus interpretive colour coding information. Red represents high levels of a nutrient, amber moderate levels and green relatively low levels.

A traffic light system is proposed for Portugal and currently is used by one food retailer, Continente, where it is applied across all of the retailer's private-label products (45). In Ireland, it is used by the retailers Tesco and Lidl (46).

## 2.2 Nutrient profiling criteria in FOPL systems

Nutrient profiling is the science of classifying or ranking foods according to their nutritional composition for reasons related to preventing disease and promoting health. Nutrient profiling methods may use criteria specific to particular food groups or ones that are consistent across most foods. The value of each approach depends on the extent to which consumers use this information to compare products within or across food groups (158). For example, nutrient criteria for endorsement logos mostly vary across food groups in terms of the nutrients and values applied, seeking to represent key nutrients of concern within food groups (e.g. the Keyhole logo applies different conditions to 33 different food groups) whereas nutrient-specific warning labels, the French Nutri-Score and the British colour-coded %RI apply consistent thresholds across major food

categories, such as foods and beverages, which may have benefits in facilitating comparisons across product groups. There are four key considerations for nutrient profiling for FOPL that are used in Member States of the WHO European Region:

- nutrients included
- reference amounts
- nutrient criteria
- food groups covered.

Table 2 describes various nutrient profiling criteria used in the WHO European Region.


Most FOPL systems in operation across the WHO European Region had their policy specifications/nutrient profiling criteria established by national government agencies or NGOs.

### 2.2.1 Nutrients included

For all the identified FOPL policies, nutrient information focuses predominately on the key negative nutrients of concern for diet-related NCDs, including saturated and trans fatty acids, sodium (or salt) and free/added/total sugars. Total fat is also included in the United Kingdom system, the Finnish Heart Symbol and the Keyhole logo. Fruit and vegetable content is considered in two systems: the Finnish Heart Symbol and the French Nutri-Score system. Criteria for ingredients apply to certain food groups with the Finnish Heart Symbol either as a guideline for quantities of ingredients in the product (e.g. for vegetable side dishes, potatoes should make up a maximum of 30% of the product's weight) or for ingredients that can or cannot be included (e.g. vegetables and side dishes cannot contain cereal products) (47). The French Nutri-Score system allocates positive points for fruit and vegetable content as part of a product's overall nutritional assessment. It is worth noting that Regulation (EU) 1169/2011 on the provision of food information to consumers adopted by the EU in 2011 precludes information on any nutrients other than total fat, saturated fat, sugars, salt and energy as FOPL (15).

### 2.2.2 Reference amounts

Ideally, the reference amount used for FOPL should give the consumer a good basis for making an informed choice on the healthfulness of the product. All the FOPL policies identified for this review applied nutrition criteria on a per 100 g/100 ml basis (see section 2.2.3) although some also made additional provisions: United Kingdom (per portion, see below) and the Keyhole logo (giving saturated fatty acids as percentage of total fat content, fat as percentage of total energy content and salt per serving for some food groups).



In the United Kingdom system, an option is available to present %RI information on a per serving basis, although colour banding is based on the nutrient content per 100g/100 ml unless sold in portions larger than 100g/150 ml. For these, a per portion criterion is used to determine high (red) nutrients. This ensures that products that contain more than 30% (food) or 15% (beverages) of the recommended energy intake per portion are labelled high regardless of the content on a 100g/100 ml basis (48). Where the %RI is provided per 100 g/100 ml, the following statement is also required: "Reference intake of an average adult (8400 kJ/2000 kcal)" (48). Portion sizes also should be expressed in a meaningful format, such as one burger.

Provision of information on individual nutrients per serving allows consumers to identify the specific amount of a nutrient consumed in a likely eating occasion. The European Commission defines a serving as the amount of a given food or drink reasonably expected to be consumed by an individual during a single consumption occasion (15). Two potential issues have been identified for interpreting nutrition information given on a per serving basis. First, recommended serving sizes often bear little resemblance to consumers' habitual eating patterns and also typically vary from recommended serving sizes in government nutrition guidelines (49). The amount consumed is often greater than the amount recommended on labels. This would mean that consumers reading the label would likely underestimate the amount of a nutrient in the typical portion that they consume. Second, inconsistencies in serving sizes across food products within the same food category are possible as serving sizes on nutrition labels are not standardized in most countries (27). This can create confusion among consumers and limit comparability across products. Manipulation of the serving size of a product can make the nutritional content appear more favourable (49).

Research evidence indicates that consumer understanding of per portion nutrient information is poor. A study involving telephone interviews with 7500 adults from 16 European countries in 2011 assessed participants' self-reported preferences and understanding of reference amounts on FOPL compared with objective assessment of these (31). Overall, 70% of participants self-reported that they understood the per portion nutrition information but only 19% were objectively assessed as understanding the definition of this reference amount. This compared with 25% who self-reported understanding of per 100 g information but 41% who could actually understand it when objectively tested (31).

A study based on consumers from six European countries (France, Germany, Poland, Spain, Sweden and the United Kingdom) found that the smaller the reference amount used to present nutrient information the more healthful a food

Table 2. Nutrient profiling criteria from FOPL policies in the WHO European Region

FOPL system (country)	Nutrients/ingredients included	Application of nutrition criteria
Choices logo (Belgium, Czechia, Netherlands (withdrawn 2016), Poland)	<ul style="list-style-type: none"> <li>▶ Saturated and trans fat, sodium, added sugar apply across all foods</li> <li>▶ Specific criteria for products where other nutrients considered important</li> <li>▶ Energy criteria for non-basic food groups</li> </ul>	Threshold criteria set for each nutrient within food categories, with those for non-basic foods stricter than for basic foods
Green endorsement logo (Israel)	Sugar, sodium, saturated fat and fibre (criteria not yet published)	Criteria vary across food product groups, seeking to identify more healthful food choices based on Israeli Mediterranean diet guidelines
Healthy Living Guarantee Mark (Croatia)	Total fat, saturated fat, sugar, sodium, fibre, with wholegrain considered for cereals	Threshold criteria vary across food product groups based on daily RI for energy and selected nutrients for adults as in EU Directive (see text)
Heart Symbol (Finland)	Total fat, saturated and unsaturated fat, sodium, sugar and fibre; certain food groups have criteria for ingredients (e.g. no cereals and a maximum amount of potato in vegetable side dishes)	Threshold criteria vary across food product groups and developed based on Finnish nutrition recommendations taking into consideration nutritional composition of market products



Food groups covered	Group responsible for criteria development and review
Pre-packaged products in two groups basic (part of a healthy diet) and non-basic (discretionary)	Criteria developed by an independent Dutch scientific committee advising the Choices Foundation Board in the Netherlands; reviewed every four years by an independent scientific committee (most recently 2015)
Mainly natural products or minimally processed foods; logo cannot be applied to products displaying the companion red warning label or products containing sweeteners	Criteria set by independent scientific committee, comprising nutritionists, physicians and food technologists, based on the Keyhole logo criteria, with adaptations for local products and eating patterns
Pre-packaged and unpackaged products in nine food groups (basic and non-basic); logo automatically applied to fresh fruit, vegetables, water but not to concentrated fruit juice or products containing sweetener s	Criteria developed by the Croatian Institute of Public Health
Pre-packaged products; 22 food groups outlined, representing basic and non-basic foods	Criteria developed by Finnish Heart Association and Finnish Diabetic Association, with input from experts in nutrition and medicine and the Finnish Food Safety Authority; criteria regularly updated by an expert group, including six professionals in medicine or nutrition appointed by the Associations

Table 2. Nutrient profiling criteria from FOPL policies in the WHO European Region (contd)

FOPL system (country)	Nutrients/ingredients included	Application of nutrition criteria
Keyhole logo (Denmark, Iceland, Lithuania, Norway, Sweden)	Total fat, saturated and trans fat, added sugar, salt, dietary fibre and wholegrains	Criteria vary across food product groups with thresholds set by four Nordic countries (Denmark, Iceland, Norway, Sweden) underpinned by the Nordic Nutrition Recommendations
Protective Food logo (Slovenia)	Fat, ratio of fatty acids, salt, added sugar, energy and fibre	Threshold criteria based on European Commission Regulation
Nutri-Score (France)	Balance between negative (unhealthy) and positive (healthy) foods (see Box 1)	Five colour (and letter) categories of nutritional quality for a product indicating healthfulness based on French dietary recommendations
Red warning label (Israel)	Negative nutrients (sugar, sodium and saturated fat)	Mandatory implementation of criteria, phased over two years
Colour-coded %RI (United Kingdom)	Energy, total fat, saturated fat, sugars and salt; uncoloured energy-only label for packs where size is an issue	Separate criteria for foods and beverages, with %RI and colour coding based on published recommendations (see text)



## Food groups covered

## Group responsible for criteria development and review

Pre-packaged and unpackaged products for 33 food product groups representing basic foods, pre-prepared meals, dressings, sauces; automatically applied to fresh fruit, fish, seafood; logo cannot be applied to non-basic foods

Original criteria developed by the Swedish National Food Agency in 1989; criteria reviewed five times since logo inception (latest 2014) with industry and consumer organizations consulted in revisions

Pre-packaged products and menus in public canteens (latter discontinued in 2017)

Criteria developed by the Society of Cardiovascular Health of Slovenia

Pre-packaged products for general and specific cases (i.e. beverages, cheeses and edible fats)

Criteria developed by Santé publique France

Pre-packaged products in two groups: food and beverages

Threshold criteria developed by the Israeli Ministry of Health, with input from international and national experts in nutrition and food policy and in consultation with the food industry

Pre-packaged products in two groups: food and beverages

Department of Health

was perceived to be (50). For small items, including biscuits, the food was thought to be more healthful when information was per serving or half-serving (9–18 g) than when given per 100 g. Consequently, presenting information on a per portion basis, particularly for items where the typical volume of food is small, may lead consumers to overestimate the healthfulness of products. A further experimental study from France found that consumers did not alter the intended portion size that they would consume of sweet biscuits or cheese when presented with a multiple traffic light logo displaying information on a per portion basis; in the case of sweet spreads it actually encouraged consumers to estimate a larger portion size (51). When presented with the Nutri-Score label or multiple traffic light label displaying information per 100g, consumers reported that they would consume significantly smaller portion sizes.

### 2.2.3 Nutrient criteria

There are three main approaches for applying nutrient criteria for FOPL:

- enumerating a nutrient's contribution in a food to recommended nutrient intakes (e.g. RI values);
- setting threshold amounts (i.e. cut-off points) for individual nutrients to interpret the nutrient contribution that food makes; and
- using algorithms to derive an overall nutritional profile for a product.

All of these approaches have been used in FOPL systems identified across the WHO European Region (Table 2).


#### Enumeration of a nutrient's contribution

The United Kingdom's FOPL system considers the contribution that a food provides in relation to recommended nutrient intake and gives a %RI value (15). Because the logo carries quite a lot of information, a label without the interpretive colour and only giving the energy value may be used for small packs, multi-language packs and products with limited space (48). The RI amounts are based on the EU FIC (Food Information for Consumers regulation) Annex XIII part B for FOPL (48). The possibility of misinterpretation when using the %RI information for buying products for children and others with lower energy requirements has been identified (52).

#### Setting threshold amounts

Threshold amounts are used for endorsement logos, nutrient-specific warning labels and nutrient-specific interpretive FOPL systems.





The threshold criteria for the Finnish Heart Symbol were developed in consideration of the Finnish recommendations for nutrient intake and recommendations of the Finnish Heart Association, taking into consideration the nutritional composition of market products as well as feasible nutrient reformulation with future food technology.

In Israel, the Government set thresholds for negative nutrients based on recommendations from international and Israeli experts in nutrition and policy, and in consideration of the current WHO recommendations (53). A two-phased approach to threshold criteria was used with incrementally stricter criteria established over two years. This was in response to food industry requests that companies be allowed to proceed gradually with product reformulation (54). The food industry has until January 2020 to implement the FOPL with the second set of stricter maximum thresholds for the label coming into effect in January 2021.

The United Kingdom applies threshold amounts to set colour-coded banding for nutrient levels. The green band is based on the EU Nutrition and Health Claims Regulation (EC) 1924/2006, for foods eligible to carry a "low in [nutrient]" claim (48). Cut-off points for amber and red are based on recommendations from the United Kingdom Committee on Medical Aspects of Food and Nutrition Policy and Scientific Advisory Committee on Nutrition, where high is set at 25% of RI per 100 g and 30% (40% for salt) per portion (48).

Where nutrient criteria apply to specific food groups, these are typically informed by the nutrient content of products on the market, with incremental contraction of thresholds over time with technological advancements and population taste acceptance. The Choices system sets threshold criteria for each nutrient within food categories. Criteria for non-basic foods are stricter than for basic (core) foods (55). The thresholds are based on population nutrient intake targets and the composition of market products. In setting the criteria, the target was to have at least 20% of products complying with the criteria within a given basic product group, and about 10% for non-basic product groups (56). Specific criteria can also be set for product groups where other nutrients are considered important, for example the Choices logo criteria include fibre from bread (55,57).

### Using algorithms to derive an overall nutritional profile

Nutrient profiling algorithms attempt to categorize foods according to their overall nutritional composition and give a single score to indicate how healthful a particular product is. Nutri-Score uses this approach to establish its five graded levels of healthfulness. The algorithm and cut-off points were developed by testing an existing nutrient profiling algorithm developed in the United Kingdom (for

use in marketing restrictions (58)) for applicability to the French food supply and consistency with French nutrition guidelines (Box 1) (59).

### Box 1. Development of the nutrient profiling algorithm underpinning the French Nutri-Score

The nutrient profiling algorithm underpinning the French Nutri-Score system (59) was derived from the British Food Standards Agency (FSA) Nutrient Profiling System (FSA-NPS), which was originally developed to categorize food and beverages that were inappropriate to be marketed to children (58). This created a single score as the difference between two values: one for the negative nutrient components (calories, saturated fat, sugar and sodium) and the other for positive components (fruits, vegetables, legumes, nuts, fibre and protein).

The ability of FSA-NPS to appropriately rank foods according to their healthfulness in the French context was evaluated through its application to several French food composition databases, including the French NutriNet-Santé food composition database, which included generic foods in the French diet and branded products sold in France, and the Open Food Facts database, a food composition database, which reflected foods sold in France (32–34,40,60).

The overall classification of foods in comparison with French food-based dietary recommendations and the ability to derive five categories of nutritional quality of foods from this classification (which determine the thresholds for the five colours) were also evaluated. This included profiling the diets of 4225 subjects from the NutriNet-Santé study using the FSA-NPS and the recommendations of the Programme national nutrition santé. Classification of foods and diets were similar using the two criteria, suggesting that the FSA-NPS adequately complemented the French public health recommendations (40).

The Haut Conseil de la santé publique (French High Council of Public Health) was commissioned to confirm thresholds for the algorithm and to make necessary adaptations to ensure consistency with the French dietary recommendations (32,33). These adaptations included modifications to the allocation of points for saturated fatty acids, energy, sugars for beverages and modification of the overall algorithm (taking protein into account) for cheese. For example, the updated FSA algorithm allowed differentiation between vegetable oils rich or low in polyunsaturated fatty acids. The final thresholds for the Nutri-Score colour and letter bandings were set in order to enhance the distinction between products within a food category (32).



## 2.2.4 Food groups covered

FOPL, and nutrition labelling in general, is mostly only applied to pre-packaged foods, with no such information available on unpackaged foods. The exceptions are the Keyhole logo, Croatian Healthy Living Guarantee Mark and Israeli Green endorsement logo, which apply to both pre-packaged and unpackaged foods. The Keyhole logo can be applied to unpackaged fruits, vegetables, bread, cheese, meat and seafood (61). The Healthy Living Guarantee Mark can be automatically applied to fresh fruit, vegetables and water (62). Proposals for the Israeli Green endorsement logo outline that this will apply to natural and minimally processed foods. The Slovene Protective Food logo was also applied to menus in public canteens up to 2017 (37). Keyhole menu labelling in restaurants was introduced in Sweden and Denmark in 1992 but was discontinued in February 2017 (61).

Use of the Keyhole logo and the Israeli Green endorsement logo is also precluded on products that contain artificial sweeteners. In Israel, this stipulation was set in response to experiences in Chile, where the food industry responded to the introduction of warning label regulations by replacing added sugar with artificial sweeteners (35). While the nutrient profiling system for the Israeli red warning label does not include provisions on artificial sweeteners, less healthful products that are reformulated to avoid the red warning label by replacing sugar with artificial sweetener will not be eligible to carry the Green endorsement logo (35). The Keyhole logo also cannot be used on non-core foods, such as snack foods. This eliminates the potential for misclassification of these foods as part of a healthy diet. FOPL policies also preclude label use on certain products, including those intended for infants and alcoholic beverages. Corresponding with resolutions of the World Health Assembly, infant and follow-up formula should not be promoted in any way (159), including through the use of FOPL. Similarly, FOPL systems that promote so-called healthier choices (e.g. endorsement logos, summary indicator systems) are not appropriate for alcohol, given the association between alcohol and health harms.

There has been some formative research undertaken in the United Kingdom on which food groups should have FOPL. Based on public consultation, there was consensus that the labelling would be most useful for composite foods, such as frozen or ready-made meals. However, there was no consensus on the foods that should not carry the label (48,63). The FSA's initial recommendation in 2006 stipulated that the label should be used on seven categories of composite foods: sandwiches, wraps or similar; hot and cold prepared or ready meals; burgers and sausages; pies, pastries and quiches; crumbed, coated or formed meat; pizza;

and breakfast cereals (64). However, in practice, the British colour-coded %RI label is now found on a great number of products.

In countries applying an endorsement logo system, the absence of logos may be either a result of poor uptake to voluntary labelling policies or an indication that only a small number of products comply with nutritional standards. This means that consumers in such countries may find themselves in a situation where they (i) have no FOPL to guide their decisions for the majority of products on the market and (ii) cannot be certain of the reason behind its absence; evidence suggests that non-occurrences tend to be overlooked, with lack of a label not considered by customers as necessarily indicating a less healthful product (23,26).


## 2.3 FOPL policy development

This section outlines the key steps undertaken by countries in the development of FOPL policies, from initial conception through to adoption. The time frame has varied across countries from just a few years to over a decade, with longer periods when policy discussions were initiated when research on FOPL was in its infancy (e.g. starting in the United Kingdom in 2006). Despite this variable time frame, common steps can be identified for countries with government-endorsed FOPL. These steps include the establishment of FOPL as a nutrition policy priority, engagement with stakeholders and public consultation, and the collection of formative evidence to inform the design of a system that will best support the public health objectives of the labelling. The experiences of various countries in undertaking these key steps are outlined below.

### 2.3.1 Establishing FOPL as a nutrition policy priority

Most government-endorsed FOPL systems form part of policy measures to improve population nutrition.

In France, FOPL was initially identified as part of the Programme national nutrition santé (National Nutrition Health Programme) in 2001, which included recommendations for a combination of nutrient-related laws, regulations and incentives with the aim of improving population health (32). In 2014, a report contained 15 new proposals to intensify the actions of the Programme, including the introduction of the 5-Colour-Nutrition-Label (now referred to as Nutri-Score) (32). In Lithuania, the Government applied to the European Commission for an order to enable the installation of "a food labelling system promoting Lithuanian food manufacturers to improve the composition of foods that helps users to



easily choose healthy foods" (65). The stimulus was the drive within the 2012–2016 action plan to improve the nutrition of the population and reduce morbidity from NCDs (160).

### 2.3.2 Engagement and consultation with stakeholders

Broad stakeholder engagement and consultation has been a cornerstone in establishing feasible and acceptable FOPL policies. Importantly, successful consultations have been government led and engagement with stakeholder groups has occurred at discrete time points after interpretive FOPL has been identified as a policy priority by government. Engagement has included consecutive formal consultations with the food manufacturing and retail industries, public health organizations, health services and authorities, consumer groups, scientists and the public, and the establishment of formal committees for steering the policy's development (Box 2). In France, Israel and the United Kingdom, FOPL system development has been led by the governments, with stakeholder input managed with government oversight. Considerations for nutrient profiling criteria are not typically the topic of public consultations or industry engagement, but rather these criteria are developed or informed by independent nutrition experts, health organizations or government agencies (see Box 1).

#### **Box 2. Stakeholder consultation processes to inform the United Kingdom's FOPL policy**

At least three formal consultation periods have been undertaken in the United Kingdom to inform FOPL policy. The FSA carried out a qualitative study in 2001 testing a range of FOPL to determine the elements that consumers found most useful and easy to understand (66). The results from this research were used to inform discussions with stakeholders on possible systems. A government agency steering group was established and in 2006 agreed to evaluate the impact of FOPLs on consumer knowledge and purchasing behaviour. Subsequently, a project management panel, the British Market Research Bureau, was set up to provide "independent oversight of the evaluation to ensure its independence, integrity and robustness" (64). In 2008, the Bureau, in collaboration with the Food Consumer Behaviour and Health Research Centre (University of Surrey), used a citizen's forum to assess consumer comprehension and use of the three major FOPL systems in existence in the United Kingdom market at that time (67). While consumers perceived FOPL to be potentially useful in guiding healthier food choices, the existence of numerous systems in the marketplace created confusion (67).

**Box 2. (contd)**

In July 2009, a formal consultation was held by the FSA to address the issue of adopting a single FOPL in the marketplace. This consultation received 96 responses from industry, consumer groups, public health bodies and advisory committees. There was general support for adopting a single system that incorporated traffic light colours, interpretive text and %RI information (64).

In 2012, the Health Secretary launched a nationwide consultation in recognition of the various FOPLs in use (63), and the new EU regulation on food information to consumers, which again sought to ensure consistency in the presentation of FOPL (15). A total of 191 responses were received from individuals, health services, NGOs, trade associations, food retailers, food manufacturers and academics (63). There was wide agreement that consistency in the presentation of FOPLs would be beneficial to consumers, and businesses indicated a willingness to help on this issue (64). Subsequent to these consultations, the Department of Health and the FSA committed to working with interested parties and organizations to develop the underlying criteria and presentation of the FOPL system.

In France, following the proposal for the introduction of the 5-Colour-Nutrition-Label (see above), the principle of a simplified FOPL to be included in legislation for the health system was discussed. This included an extended consultative process with the food manufacturing and retailing industry, scientists and consumers from March 2015 to April 2017. These consultations led to the proposal of several FOPL systems, which were then tested for their utility in a real-world experimental trial in 60 supermarkets in 2016 (32). Ultimately, the Nutri-Score system proved to perform best in influencing the nutritional quality of consumers' food purchases and was put forward as the recommended system in October 2017 by the Ministry of Health, the Ministry of Agriculture and Food and the Ministry for the Economy and Finance (32,59).

The Israeli Government and affiliated ministries established the Healthy Israel 2020 policy in 2011 with an action plan including a range of legislative and regulatory proposals, including nutrition labelling, to shape the food environment in which food choices were made (68). A draft proposal for mandatory FOPL was challenged by the food industry and did not progress until 2016, when the Ministry of Health established the Regulatory Committee for Promotion of Healthy Nutrition, which included representatives from government ministries,



academia, civil society organizations and the food industry. The Committee met with international experts in consumer behaviour, a leading industry economic consulting company, industry and organizations involved in public health nutrition. The Committee processes and decisions were transparent to the public, with journalist access to meetings, open discussions and publically available recordings of the meetings. Public opinion was also sought through consultation, with over 1000 submissions made (53). As a result, the Committee put forward recommendations for clear and informative FOPL, with both positive and negative signposting.

The Government of the United Kingdom has conducted at least three formal stakeholder consultations since 2009 to inform policy development (Box 2). The ultimate adoption of the colour-coded %RI label system in the United Kingdom was in response to the Government's formal public consultations and stakeholder engagement, as well as consumer research commissioned by the FSA. The coexistence of multiple FOPL in the marketplace, and the reported consumer confusion that this created, was a major driver in the Government's endorsement of a single FOPL (48,63,64,69).

The Choices logo was introduced in the Netherlands in 2006 after a request to the food industry by the Dutch Government for a single healthy choices logo (56). The Choices FOPL system was initially developed by the Choices Foundation Board, with input on the nutrition profiling criteria from an independent Dutch scientific committee (56). The Choices logo was then endorsed by the Dutch Government and later received approval for use from the European Commission in 2013 (70). Over time, the Choices logo was adopted by Belgium (2007), Poland (2008) and Czechia (2011) (71). Today, the Choices Programme is a multistakeholder initiative under the remit of the Choices International Foundation, with technical input from an industry advisory group and a separate scientific advisory group responsible for periodic review of the criteria (70). The Choices logo was rejected from consideration in Israel's FOPL policy because of questions about potential conflict between corporate interests and public health (see section 2.3.3) (73).

### 2.3.3 Collection of formative evidence to inform FOPL policy design

Although most FOPL policies across the WHO European Region have been informed by scientific evidence on label format, content and nutrient profiling criteria to ensure these have maximal utility with the target population (22–28), no publically available information was identified for countries other than France, Israel, Norway, Portugal, Slovenia and the United Kingdom. Information on formative evaluation

to inform FOPL labelling is particularly detailed for France and the United Kingdom, where such research was undertaken over a period of three and 10 years, respectively.

In France, multiple studies were undertaken by the Nutritional Epidemiology Research Team at the University of Paris 13 to examine the proposed Nutri-Score FOPL system for its applicability in discriminating the nutritional quality among products (e.g. breakfast cereals (34); see Box 1). The association between dietary quality, as assessed using Nutri-Score, and population health outcomes was also measured using data from a large French cohort study. Prospective associations were found between lower dietary quality, as reflected by higher consumption of products with poorer nutrient profiling scores, and increased weight gain (74), metabolic syndrome (75), cardiovascular risk (76), overall cancer risk (77) and breast cancer risk (78).

In Israel, the Government-led Regulatory Committee for Promotion of Healthy Nutrition noted that Israel's literacy proficiency was lower than the average for Organisation for Economic Co-operation and Development countries, particularly for mathematics, and so simplified logos were preferred (53). The nutrient-specific red warning labels introduced in Chile in 2015 were adapted for use in Israel, based on the South American consumers' comprehension of these labels (41,42,54). Although the Choices logo had been launched in Israel with criteria adapted for the Israeli market in 2011, uptake of the logo by industry was minimal (73), and formative research led to its rejection as FOPL. The Choices Israel Association interviewed key opinion leaders, including senior dietitians, and 15 officials from the Ministry of Health on their perceptions of the logo (73). Respondents were supportive of the introduction of an interpretive FOPL to facilitate consumers' purchase decisions. However, the Choices logo was not perceived to be appropriate given its links with the food industry and possible conflicts between corporate and public health interests (73).

In Norway, the introduction of the Keyhole logo in 2009 was influenced by the Nordic Council of Ministers' efforts to harmonize various Nordic labelling schemes (79). Formative investigations included a consumer survey of attitudes towards various FOPL systems (80). Consumer research identified endorsement logos to be familiar to consumers; easy to understand, requiring minimal literacy; and potentially less challenging to the food industry as they promoted healthier choices rather than discouraging less healthy products (80). It also identified that consumers supported the implementation of FOPL that would assist healthier food choices and that they would have confidence in an official state-led scheme (79).





In 2016, the Portuguese Ministry of Health in collaboration with the WHO Regional Office for Europe undertook research to investigate Portuguese consumers' use, preferences and understanding of FOPL (81). This included an online survey with 1127 adults, plus four focus groups, including one with adolescents. Based on the quantitative survey, more than 50% of respondents preferred to have at least some nutrition information on the front of packets. The most important nutrients to be included were perceived to be sugar, salt, fat and saturated fat, and calories. Symbolic, coloured systems were preferred. Based on the focus groups, traffic light labelling was perceived to be the best understood by all consumer groups and would facilitate faster decision-making at the point of sale (81). Draft legislation was submitted to the Portuguese Parliament in 2017 for industry-wide traffic light food labelling (82) but in 2018 this system has only been adopted by one Portuguese food retailer on its private-label products (45).

The Protective Food logo was initiated by the Slovenian Heart Foundation in 1992. In 2014, a specific research project was launched by the Ministry of Health and the Slovenian Research Agency to evaluate consumers' familiarity with, and perceptions and understanding of, the logo (39). This online survey of 1050 adults found that almost three quarters associated the logo with health or healthy lifestyle and they preferred the Protective Food logo to the Choices or Keyhole logos. Consumers also preferred the inclusion of the text "Protects your health" when used in association with the logo. Most participants reported having seen the Protective Food logo previously and associated the symbol with the Slovenian Heart Foundation (37).

In the United Kingdom, research to support adoption of the best FOPL system for the country's needs started in 2001 and involved ministries, government departments, a private marketing company, a university, consumer surveys and discussions with stakeholders. Consumers strongly supported the idea of FOPL and considered that it would make it easier to access nutrition information and make healthier choices. A major recommendation from this research was for the United Kingdom Government to propose a single standardized system for use. The research suggested that FOPL that integrated interpretive colours, interpretive text and %GDA numerical information best aided consumer understanding (64).

## 2.4 FOPL policy frameworks

### 2.4.1 Voluntary versus regulatory arrangements

Most of the identified FOPL policies in the WHO European Region have been implemented under voluntary arrangements. This is at least partly a result of existing EU regulations that prevent national governments within the EU from implementing mandatory national FOPL policies (15). The exception is the Israeli red warning label, for which regulations approved by the Knesset Health, Labour and Welfare Committee in December 2017 stipulated mandatory implementation across eligible foods. The Protection of Public Health Regulations (Food) (Nutritional Labelling) allowed a two-year grace period, giving the food industry until January 2020 to implement the first stage of FOPL. A second phase of stricter sodium, sugar and saturated fat maximum thresholds for the label come into effect in January 2021. The decision to apply a phased approach to implementation was in response to food industry requests that companies be allowed to proceed gradually with product reformulation (54). Following the phased introduction of the labelling, the final nutrient thresholds will correspond to the third stage of the Chilean regulations on warning labels from June 2016. The companion Green endorsement logo will be voluntarily adopted.


### 2.4.2 Government- or nongovernment-led policy

The endorsement logos in use across the WHO European Region are mostly implemented by government, with the Slovene Protective Food logo and the Finnish Heart Symbol implemented by NGOs and the Choices logo by the food industry.

The Keyhole logo is implemented by the food safety authorities in Denmark, Iceland, Norway and Sweden. As the Keyhole logo is a trademarked symbol, any food producers voluntarily wishing to use the logo must ensure the format adheres to the published design specifications and that nutrient profiling criteria are correctly applied.

The Healthy Living Guarantee Mark in Croatia was developed by the Croatian Institute for Public Health and approved by the Croatian Ministry of Health with thresholds based on daily RI for energy and selected nutrients for adults in the EU Directive (15).

Both the Finnish Heart Symbol and the Slovene Protective Food logo are voluntary policies developed and implemented by NGOs in their respective countries.



The Finnish Heart Symbol is implemented by the Finnish Heart Association and the Finnish Diabetes Association (47,83), with the criteria regularly updated by an expert group, while the Slovene Protective Food logo is implemented by the Slovenian Heart Foundation.

Lastly, the Choices logo is a voluntary and self-regulated scheme funded and implemented by the food industry. It was first introduced in the Netherlands (as the Dutch Healthy Choices logo) before being taken up by Belgium, Czechia and Poland. A survey in the Netherlands indicated that consumers were unclear about the difference between the blue and green logos; in addition, because not all manufacturers participated in the scheme, it was not clear if absence of the logo implied an unhealthy product (72). Consequently, as of 2016 it has no longer been endorsed by the Dutch Government (84) and no products can carry the Choices logo in the Netherlands after October 2018. In 2018, the Dutch Parliament debated the introduction of a new FOPL policy (85). The Ministry for Health, Welfare and Sport has been tasked with investigating alternative labelling formats that can be widely applied, possibly on all available products. The Government is also introducing an app that will scan barcodes to retrieve nutritional information (72).

The Keyhole logo, Finnish Heart Logo and Choices logo have been notified as claims in the context of amendment of the EU Regulation on nutrition and health claims made on food (86). Given that these are all voluntary in implementation, the absence of an endorsement logo on products may either mean that the product does not comply with nutrient cut-off points or that the company has declined from participating.

Other types of FOPL, including the Nutri-Score and the United Kingdom's colour-coded %RI, policies were developed and endorsed by government, although food industry and retailers are responsible for implementation of the label on a voluntary basis (48,59,87).

## 2.5 FOPL evaluation

Evaluation of FOPL policy spans process, impact and outcome measures:

- process evaluation indicators measure policy implementation progress, including the activities undertaken and their quality and reach;
- impact evaluation is used in this report to define the assessment of short-term results of a policy or programme (e.g. changes to knowledge, attitudes and behaviour); and

- outcome evaluation indicators refer to measurement of the ultimate effects of an intervention, such as the impact on nutrition or health outcomes.

Monitoring and evaluation are recognized as key elements in policy implementation in general, to understand the impact of actions, rationalize ongoing commitment and to guide future activities or improvements (88). Most information on FOPL performance relates to more proximal impacts of label implementation, including label understanding, and relatively less on longer-term dietary and health outcomes (22,23).

Limited information was available on formal provisions for evaluation of FOPL policies as part of label implementation by administering organizations or agencies, which may reflect poor documentation of evaluation plans or a lack of actual policy evaluation. In France, evaluation of the Nutri-Score system was planned for three years from the implementation decree in July 2016, with the first evaluation study planned for September 2018. This will be conducted by the Observatory of Nutritional Food Quality, a public observatory financed through public funds. In Israel, evaluation of the red warning label is planned in cooperation with academia, including a consumer survey by the Nielsen Company. In Croatia, the Healthy Living Guarantee Mark is part of the broader Healthy Living programme, which is formally evaluated by the Croatian Government (62). Products displaying the Healthy Living Guarantee Mark are analysed for compliance with the label nutrient profiling. Most FOPL policies do have provisions in place for periodic monitoring of nutrient criteria; for example, criteria for the Keyhole logo have been reviewed five times since its introduction in 1989.


### 2.5.1 Process evaluation for policy implementation

In this context of FOPL policy, process evaluation includes:

- **reach**, the FOPL penetration in the marketplace;
- **fidelity**, the compliance with regulations outlining stipulations for label use; and
- **satisfaction**, of consumers with the label.

#### Reach, penetration into the marketplace

Most process evaluation data were available on market penetration and indicated variable uptake of voluntary labelling policies by food manufacturers and retailers. As would be expected, penetration of FOPL increases over time following the introduction of policies.



Evaluation evidence highlighted the low penetration of endorsement logos in the marketplace, which may reflect poor uptake for voluntary policies or possibly the small number of products that comply with nutritional standards. This means that consumers have no FOPL to guide their decisions for the majority of products in countries with endorsement logos (23,26).

The Keyhole logo is used in Denmark, Iceland, Lithuania, Norway and Sweden but only the Lithuanian Government holds a central registry of Keyhole-labelled products. In April 2018, 192 Keyhole products were listed in the Lithuanian registry, an increase from nine approved products in 2014 (90). In the other three countries, estimates on the number of Keyhole-labelled products are calculated through cooperation with the food industry. In the 12 months following the implementation of the Keyhole logo in Norway in 2009, it was estimated that at least 500–600 products displayed the logo. This increased to approximately 2000 products by 2015. In Denmark, in the 12 months following the introduction in 2009, at least 500 products bore the logo. This increased to at least 1677 products in 2015, approximately 60% of which were core foods (91). A 2009 study by the Swedish National Food Agency indicated that 20% of foods advertised through direct marketing were Keyhole-labelled products, and estimates from 2010 were for 2500 products. There are no more recent data. While data on the absolute numbers of packaged foods with the Keyhole label for sale in Lithuania and the Scandinavian countries are not available, evidence indicates that sales of frozen foods, snack foods and sugary drinks have increased in these countries since the late 1990s (92). Processed packaged foods dominate the food supply in high-income countries and their prevalence has rapidly increased in middle-income countries. Consequently, the number of Keyhole-labelled products is likely only a small proportion of the total available packaged foods in most of these countries.

Data on the reach of the Choices logo is available for the Netherlands and Poland. In the Netherlands in 2011, 100 food manufacturing, retail and food service companies were part of the Choices Programme, which represented approximately 80% of the food service market (56). As part of the EU-funded project on the role of health-related claims and symbols in consumer behaviour (CLYMBOL) (93), an early phase in 2013 examined labelling of products across five European countries. Three stores were selected for each country and approximately 400 pre-packaged foods were sampled. In the Netherlands, it found that 12% of foods carried the Choices logo (94). In Poland in 2010, the Choices logo was placed on around 110 food products supplied by eight food companies (95).

Based on an audit of nutrition and health claims conducted in 2011 across four grocery stores in Ljubljana, the capital of Slovenia, 127 of 6341 products sampled (2%) displayed the Protective Food logo (96). The CLYMBOL audit in 2013 across three grocery stores in Slovenia identified that eight of 416 sampled foods (2%) displayed an endorsement logo (94).

In France, three large retailers and three manufacturers agreed to adopt FOPL across all their products when the decree for Nutri-Score as the official FOPL was signed in October 2017 (32). By July 2018, more than 70 manufacturers and retailers had committed to the label (89).

In the United Kingdom, internal analysis by the Department of Health and Social Care showed that businesses that had adopted the voluntary FOPL scheme accounted for two thirds of the market for pre-packed foods and drinks in 2016 (97).


### Fidelity, compliance with regulations

Information on FOPL fidelity is available for the Keyhole logo in Norway and Sweden. In Norway in 2009, soon after the introduction of the logo, the Norwegian Food Safety Authority investigated the appropriate use of Keyhole criteria by the food industry. Their findings indicated that 32 of the 35 products surveyed complied with the criteria. In Sweden in 2011, an investigation of the application of the Keyhole logo was undertaken by the National Food Agency (98). Seven municipalities participated in the project, in which a total of 65 food products were examined. Few errors were found in the application of the logo design, but some foods displaying the logo did not meet the eligibility criteria.

### Satisfaction of consumers with the label

In Iceland, process evaluation of the Keyhole logo has also involved surveys of consumer satisfaction with the label. An initial consumer survey was carried out in 2012 with a follow-up survey in 2015 to identify any change in consumer awareness, use and trust in the label following its implementation in 2013 (99). In 2015, almost all respondents were familiar with (90%) and trusted (93%) the Keyhole logo. However, only 13% believed the Icelandic Government was responsible for the logo, compared with 33% who incorrectly believed it was the food industry (99).

Similarly, a survey of Swedish consumers in 2008–2009 found that one quarter were uncertain about who was responsible for the implementation of the Keyhole logo and one third believed it to be the food industry (100). A later consumer survey in



2014 conducted for the Swedish National Food Agency with over 1000 participants identified that consumer perceptions of the logo were generally positive (101). Most (82%) believed the existence of the Keyhole to be good; 65% said the Keyhole was a food label they thought they could trust, and 56% said the logo made it easier to choose healthier foods.

In Norway, nationally representative consumer surveys have been conducted on behalf of the Norwegian Directorate of Health on six occasions since 2011. Awareness of the Keyhole logo increased from 20% in 2008 to 84% in 2009 as a result of an information campaign carried out on television, in newspapers and on the Internet (30,100). In 2011–2012, consumer awareness was reported to have reached 98% (102). Across all surveys, approximately half of respondents said they had high trust in the logo. Data from the most recent survey in 2017 found that two thirds of consumers believed the Keyhole was a good labelling system. In a further study, Roos and Rysst (103) reported positive attitudes towards the Keyhole from non-Western immigrant women in Norway prior to its implementation. At the time, unprompted awareness and understanding of the logo were very low; however, once they were told the meaning of the Keyhole, participants demonstrated positive perceptions and intentions to use the logo.

A study by Lahti-Koski et al. (83) explored the use and awareness of the Finnish Heart Symbol over a nine-year period, using data from the Health Behaviour and Health among the Finnish Adult Population survey from 2001 to 2009. During the first four years of the Heart Symbol implementation (2000 to 2004), reported awareness and use of the label was highest among those in the highest education group. Over time, more consumers with lower levels of education reported using the label, such that there was no difference in awareness and use of the label by consumers with higher and lower education status in 2005–2009.

Measurement of consumer satisfaction with the Choices logo has also been undertaken with Dutch consumers, including through an online questionnaire sent to adult consumers at four months (1032 respondents) and one year (1127 respondents) after the introduction of the logo (104). Seven focus groups (41 consumers) were also conducted at the one-year assessment. Measures included logo familiarity, reported use, perceived need for the logo and perceived credibility. Self-reported familiarity with the logo had significantly increased at the one-year follow-up but the perceived need for the logo had significantly decreased. Perceived credibility was lower among men than women. Focus groups revealed that the credibility of the logo was impaired as participants perceived that the logo was

only used on more expensive processed food brands and that it was developed by the food industry for its own benefits (104).

## 2.5.2 Impact evaluation

The effectiveness of FOPL in contributing to improvements in population health is related to the extent that this labelling is noticed, understood and applied during food selection (and possibly consumption) by consumers. Fig. 1 provides a graphical representation of the outcome hierarchy from the introduction of FOPL through to health gains.

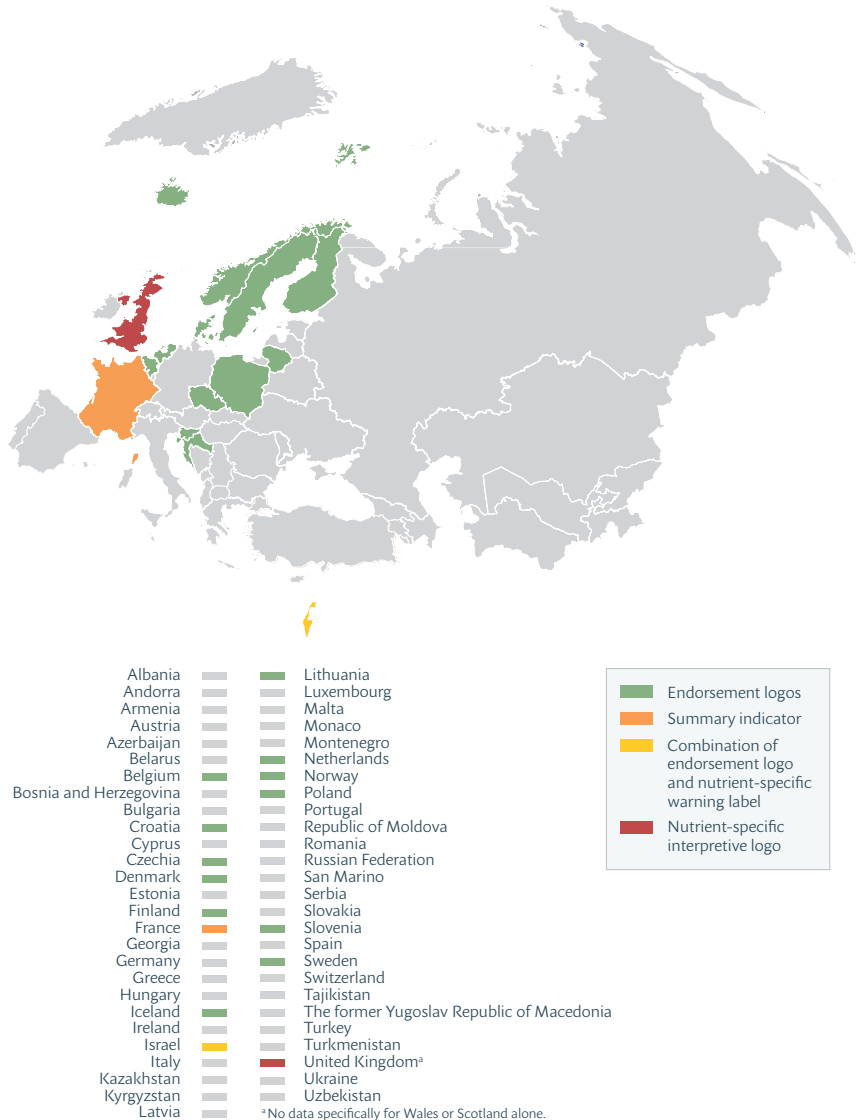
### Use and understanding

Most of the available published studies have been limited to assessing consumers' use and understanding of FOPL systems; as these mostly used self-reports, they are likely to have inflated estimates (14,108). For example, an in-store observation in 2009 of Swedish shoppers found that use of the Keyhole logo was very low, with only 1% of shoppers using health claims (including the Keyhole logo) as a source of nutrient information when selecting a product (114). This compared with 44% of Norwegian consumers reporting that they always or usually used the Keyhole logo (114). Research evidence indicated that FOPL is more likely to be used and understood by consumers than nutrient declarations and that the use of interpretational aides (e.g. interpretive wording, meaningful colours and symbols) consistently was found to increase label understanding (22–24,109,110). Systems that presented only numerical information on the contribution that a serving of a food made to the daily RI for a reference adult were found to be more poorly understood (22,23). In 2002, a study found that consumers tended to use nutrient labels to make comparisons *within* a group of products (112) but one in 2008 found that consumers in Germany, Italy, the Netherlands and the United Kingdom used labels to compare products *across* food groups (113).

Understanding of FOPL is also likely to improve with familiarity, regardless of the FOPL system used. For example, in the United Kingdom where %GDA (now %RI) labelling has been in use since at least 2005, consumers have one of the best understandings of such information across the WHO European Region (115,116). In other countries, the %GDA system has been found to be poorly understood compared with systems that provide an evaluative judgement or interpretation of the nutritional content or quality of a food. This is particularly the case for people in more socially disadvantaged groups (22,23). At least nine studies have examined British consumers' understanding of FOPL systems that include colour coding and/or %RI information (13,50,115–121). Three of these studies compared



Fig. 1. Framework for FOPL outcomes.



Source: based on several publications (24,105–107).

the performance of traffic light colour systems with %RI (116,117,121) and generally found little difference in participants' ability to identify healthier foods using any of the labels. However, understanding of %RI was found to decline with lower socioeconomic status and age (115).


Over time, consumer understanding of the meaning of the Keyhole logo has mostly also improved in Nordic countries (122–124,126). Self-reported understanding is generally higher than objectively measured understanding (125). Evidence suggests that a substantial proportion of consumers (up to almost 50%) misunderstand the meaning of the Keyhole logo entirely, perceiving it to relate to non-health-related product properties, such as environmental sustainability (101,122,124,126). A 2015 consumer survey by the Norwegian Directorate of Health also found that 15% of participants thought Keyhole-labelled products were healthy in general, rather than just healthier than comparative products (36).

Consumer surveys with Dutch participants undertaken by academics and the food industry have found the Choices logo to be effective in supporting consumers for identifying the relative healthfulness of products within the same category (120,127) but the label was less useful for comparing product healthfulness across food categories (127).

In France, randomized controlled trials (60,128) and cross-sectional surveys (129) with large study samples (13 578 to 38 604) consistently found that the Nutri-Score performed best in assisting participants to comprehend the healthfulness of products, compared with the Green Tick and the multiple traffic light systems.

### Impact on food choice

There was some evidence that the consumers most influenced by FOPL were those who were already health conscious to purchase healthier foods (130). Studies based on consumer self-report data generally found that a substantial minority of consumers intended to purchase foods that displayed an endorsement logo (95,131). A survey in the United Kingdom examined how consumers apply traffic light colours in making food choice decisions (118). Participants were asked to choose which of two labels represented a healthier choice. Participants tended to make choices based on negative evaluative judgements (number of red indicators on a label) rather than positive judgements (presence of green indicators). This is supported by other studies indicating that the colour red reduces impulsivity towards unhealthy foods (132).



There is evidence that consumers' understanding of healthy choices is affected by how the nutrient's contribution is expressed, for example, on a weight/volume basis or on a portion basis, where the latter may lead consumers to overestimate the healthfulness and amount to consume of products (50,51).

### 2.5.3 Outcome evaluation

Outcome indicators include impact on purchasing choices by consumers, nutrition (healthfulness of food choices), health outcomes (dietary intake) and reformulation of products.

#### Purchasing choices

Less information is available on the effect of FOPL on actual food purchases. Some studies in countries with endorsement logos indicate that consumers express a preference to purchase products carrying a healthy product logo (24,133–136) while others finding no significant differences between products with and without the logo (137–140). Importantly, one study from Denmark found that consumer self-reported preference for purchasing Keyhole-labelled products was correlated with their actual purchase of labelled products in four of the six food categories assessed (133).

Consumer surveys in Nordic countries have identified wide variations in the proportion of consumers who report that they always or often purchase Keyhole-labelled foods: from 10% in Denmark (144) to 83% in Norway (36). This variation may reflect the different penetration of the label in the marketplace at the time the surveys were undertaken. Self-reported use of endorsement logos when making product purchases also varies across product categories and by consumer group. One study assessing purchases of foods displaying the Choices logo found that purchase of labelled foods was associated with consumers' perceived importance of product information and their health-conscious behaviours: consumers most influenced were those who already wanted to purchase healthier foods (130).

Following the introduction of the Choices logo and Keyhole logo in the Netherlands and Denmark, respectively, analyses of household scanner data indicated that consumers paid more for products that displayed the endorsement logo than for similar products that did not carry the logo (145). This finding indicates the potential value that consumers place on endorsement logos, but also the price premium that food manufacturers apply to labelled foods.

## Nutrition: healthfulness of food choices

Only three FOPL systems provided an indicator of unhealthfulness: Nutri-Score, the Israeli red warning label and the United Kingdom's colour coding and %RI system. Improvements in the nutritional composition of purchased foods were identified in experimental scenarios in France, with the French Nutri-Score system having a significantly greater effect than RIs or multiple traffic light systems (141–143). However, a study in 2007 of a multiple traffic light system for ready meals and sandwiches in one British food retailer concluded that there was no association between changes in product sales and the healthfulness of the products (140). This study was of short duration (four weeks) and occurred relatively early in the time frame of use of FOPL systems. Anecdotal evidence from retailers in the United Kingdom suggest that the introduction of colour-coded %RI by the retailer Sainsbury's led to increased sales of some healthier products and decreased sales of comparable but less nutritionally favourable products (24). However, no details were reported by the retailer and the study did not control for other factors.

## Dietary intake and health outcomes

The primary objective of nutrition labelling is to support consumers to identify more healthy products and then use this to make healthy food purchases and thus improve dietary intakes and, over time, health outcomes.

Twelve studies were identified that assessed the impact of FOPL systems on dietary intake (91,123,126,146–155). Nine of these studies (91,146–153) used data simulation or modelling to predict the impact of replacing usually consumed foods with similar foods with more favourable nutritional profiles based on FOPL nutrient profiling. These studies consistently predicted better dietary intakes under replacement scenarios (including Choices logo, Keyhole logo and Nutri-Score) but only provided a hypothetical estimate of consumer behaviour and did not take account of actual consumer use of labels or other food purchase heuristics. The three studies that assessed the impact of FOPL on actual dietary intakes, including the Keyhole logo and the United Kingdom's colour-coded %RI system, found these to have minimal impacts on energy and nutrient intakes (123,126,154), but with some improvements in fat or fibre intakes observed for some population groups. Few studies were found linking FOPL to health outcomes. Five studies based on the same French population cohort study found prospective associations between lower dietary quality, as reflected by higher the consumption of products with poorer nutrient profiling scores, and increased weight gain (74), metabolic syndrome (75), cardiovascular risk (76), overall cancer risk (77) and breast cancer risk (78).



## Reformulation of products

Labelling can stimulate product reformulation as manufacturers may seek to achieve competitive advantage or to avoid having to make unfavourable disclosures (155). Such reformulations can lead to positive dietary changes across the population, even in the absence of conscious decision-making processes by consumers. Four studies were found that assessed the impact of FOPL on food product reformulation (34,147,156,157). Again, two of these applied data simulation to predict the effect of labelling on product composition. Reformulation of products to meet the Choices logo criteria was found to lead to healthier product composition (149), while small reformulations were found to result in more favourable ratings using the Nutri-Score system (34). Results from this latter study suggest that the nutrient cut-off points were set at a level that would stimulate feasible reformulations. Other studies surveyed food industry representatives to assess the extent to which FOPL criteria (Choices logo and Keyhole) influenced product development and reformulation and reported that food companies had applied nutrient criteria for the logos as part of their product development (156,157).

The CLYMBOL project examined 10 European countries between 2012 and 2016 to determine how nutrition and health-related claims and symbols, including endorsement logos, can affect consumer understanding, purchase and consumption patterns (93). Its findings will be a valuable resource when published.

## 3. DISCUSSION


### 3.1 Strengths and limitations of this review

This review presents the first published synthesis and review of the processes for FOPL policy development and implementation undertaken for the WHO European Region. Such information is not typically the subject of academic publications and, consequently, much of the evidence was retrieved through an extensive search of the grey literature. The peer-reviewed literature was descriptively presented and not formally appraised for quality. The grey literature was considered in relation to the authority of the source, date of publication, objectivity and significance to the topic (4). The methodology used strengthened the comprehensiveness and validity of the data in terms of providing a better overview of the policy development processes in countries than the peer-reviewed literature alone could provide. Multiple databases of countries with FOPL policies were accessed to identify all countries with relevant labelling policies. The extracted data were then verified by competent authorities in each country.

A further limitation of the review was that the review team contained only English speakers, which may have hindered the identification and interpretation of grey literature. Google Translate was used to interpret non-English language information and so errors in interpretation are possible. As only publically available information was extracted, it is possible that some information was missed. For example, the lack of available information on countries' evaluation provisions for FOPL may be a result of either a lack of action in this area or a lack of publically available information on evaluation commitments.

As no restrictions were made in terms of study design when choosing papers for inclusion, findings of studies should be interpreted cautiously. For example, many of the studies were based on consumer self-report of label use and understanding, and purchase intentions. Care was taken to indicate instances where such data were self-reported. These studies may be prone to misreporting and social desirability biases.

The evidence on FOPL performance presented in this report is limited to studies that assessed FOPL systems identified as being implemented in the 15 European countries with FOPL policies. It, therefore, does not take in evidence from other countries worldwide on FOPL. However, the key findings presented in this report



on the effectiveness of FOPL systems on consumer and reformulation outcomes are broadly aligned with other published reviews. These similarly identified most information on more proximal outcomes of label implementation, including label understanding, and relatively less or no information on dietary and health outcomes (14,19).

## 3.2 Ensuring FOPL systems work for consumers

The FOPL systems identified in this report vary according to three major attributes, including the extent that they may:

- provide information on individual nutrients or summary information on the product overall;
- identify only products that achieve a set standard/threshold or apply across all products; or
- provide evaluative judgements about only product healthfulness or relative/absolute unhealthfulness.

Those systems that apply across all products and that provide an indicator of product unhealthfulness are likely to be most supportive for consumers. Most of the Member States of the WHO European Region with FOPL policies have implemented endorsement logos under voluntary arrangements. However, these do not give any information about relative unhealthfulness of products and the absence of a logo is ambiguous (could mean failure to make the threshold criteria or simply a lack of participation in the system). Consumer research identified that purchase decisions were based more on negative evaluative judgements than on positive judgements (118). These negative judgements reduced impulsivity towards less healthful foods (132). Inclusion of direct indicators of product unhealthfulness reduced the potential for overinterpreting the healthfulness of labelled products. Evidence on consumer responses to other types of nutrition labelling, including nutrient declarations and nutrition and health claims, indicated that labels showing high levels of positive nutrients increased product purchases (135), while claims about positive nutrients increase the consumption of labelled foods (136). Taken together, the evidence highlights the importance of negative evaluative judgements for accurate interpretation of nutrition labels.

### 3.3 Policy considerations

Based on the evidence synthesized in this report, a number of considerations can be identified for the adoption or review of FOPL policies at the national or regional level:

- establish a consistent FOPL system to aid consumer use and understanding of the label;
- utilize a system of interpretive FOPL that can provide evaluative judgements about product unhealthfulness, which appears to be a more effective way to support consumers to choose nutritionally favourable products – it may also highlight better-for-you choices, thus providing both positive and negative evaluative judgements;
- consider that endorsement logos alone may encourage consumers to overestimate the healthfulness of products and may engender a price premium, which may have implications for low socioeconomic groups;
- choose to have government-led FOPL policy development rather than a commercially based system as consumers perceive the latter as less credible;
- develop the scope of FOPL policies based on stakeholder engagement and formative research to ensure that the right policy is chosen for the population;
- explore ways to overcome issues with uptake of the FOPL system in the marketplace, including through mandatory implementation;
- support implementation through the development of guidance documents for industry to facilitate label adoption, and public education initiatives to stimulate consumer demand for the label and improve awareness and understanding; and
- create a formal and comprehensive FOPL policy monitoring and evaluation programme to assess implementation and impact (e.g. outcomes such as knowledge, attitudes and behaviour; purchasing and consumption changes; reformulation; and potential health effects).





## 4. CONCLUSIONS

The introduction of interpretive FOPL is recognized as a policy priority for promoting healthy diets by both the WHO Regional Office for Europe and national governments. Other policies that improve economic and physical access to healthy foods, and increase the desirability of healthy choices or reduce the normalization of unhealthy choices, will augment the uptake of FOPL by consumers. A government-endorsed interpretive FOPL policy exists in 15 Member States of the WHO European Region. Most of these have been implemented under voluntary arrangements, with variable penetration into the marketplace. Policy development that is led by government and based on formative research, and that engages stakeholders and the public, is most likely to lead to acceptable, credible and effective policies. Consumers have a reasonable understanding of interpretive FOPL systems and this understanding improves with label familiarity and consistency within the marketplace. An FOPL system that is applied across all products and can provide both positive and negative evaluative judgements is better able to support consumers in making food selections. Consequently, FOPL implementation is best supported by policy provisions that encourage widespread uptake of the system and allow for formal evaluation of both implementation and impact (e.g. outcomes such as knowledge, attitudes and behaviour; purchasing and consumption changes; reformulation and potential health effects).

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## ANNEX 1. SEARCH STRATEGY

### Databases and websites

Searches were performed in March–May 2018 and included peer-reviewed literature identified through academic databases, including Scopus and Ovid Medline, and grey literature identified through Google browser and databases including OpenGrey and the WHO/Food and Agriculture Organization of the United Nations Global Individual Food Consumption Data Tool (1).

Articles included those published from 1 January 1980 through to 31 March 2018 based on studies undertaken in the WHO European Region. Evidence was limited to the Region to specifically capture and describe local evidence of relevance for policy-makers.

Countries with existing policies on FOPL were identified from the WHO Global Nutrition Policy Survey database and the WHO Country Capacity Survey database, which contained data for the WHO European Region in 2016–2017. The World Cancer Research Fund's online repository of global food policies (NOURISHING database) was scanned for FOPL policies from any missing country. For each identified country, webpages of the ministries/departments of health, food standards agencies, departments of agriculture and parliament (legislation repositories) were searched. In addition, the European Commission database of notifications of country regulations was examined. The INFORMAS (International Network for Food and Obesity/Non-communicable diseases Research, Monitoring and Action Support) network was contacted to identify any information on public sector policies related to food labelling in the WHO European Region (2). This network is involved in rating the level of implementation of government policies on food environments, including food labelling, against international best practice.

### Study selection

The review identified available evidence on FOPL policy development and implementation from the WHO European Region. Evidence from countries outside the Region was only considered where this explicitly informed the development of European systems, for example the evidence from Chile, which was highlighted as part of formative evaluation of FOPL options in Israel. Evaluation evidence was included that assessed the development and implementation of FOPL systems across countries and the performance of single FOPL systems in isolation.

Using the PICO model (problem, intervention, comparison and outcome (3)), comparisons were made of:

- FOPL system characteristics, including format, content and nutrient profiling method;
- policy development processes, including timelines, agenda setting, consultation processes and evidence used to inform system development;
- policy frameworks, including timelines for implementation and/or review plus any legislative provisions; and
- evaluation provisions for policy and/or system and outcomes in meeting consumer and reformulation objectives.

A major focus of the report was on FOPL policy development processes, and grey literature sources were extensively used and considered in relation to the authority of the source, date of publication, objectivity and significance to the topic (4).

### **Step 1. Identification of countries in the WHO European Region with existing policies on interpretive FOPL**

Countries in the WHO European Region with interpretative FOPL policies were identified from the databases outlined above.

### **Step 2. Retrieval of information on FOPL policies**

A standard template was developed to aid data extraction for each identified country, with sections on

- characteristics of the FOPL system
- policy development process
- policy framework
- provisions for evaluation
- particular gaps in information.

For peer-reviewed literature, the search terms were (food OR beverage OR nutrition OR nutrient OR diet OR calories) AND (label\* OR front-of-pack\*).

For grey literature, search terms were (food label OR nutrition label) AND (Europe OR [specific country] OR [name of relevant in-country system]). Information available in languages other than English was entered into Google Translate for reporting.

For government webpages, search terms included food label OR nutrition label OR [name of relevant in-country system].



Retrieved articles were screened for inclusion by one reviewer (Bridget Kelly) and assessed for relevance using the following inclusion and exclusion criteria. No restriction was made for study design.

**Inclusion criteria** were:

- empirical studies from a specific country on the impact of the FOPL system on consumer search or use, consumer understanding (distinction made between self-reported and objectively tested), food choice/purchase intention, food purchase, dietary intakes, health outcomes, food product reformulation, label implementation or compliance with labelling regulations;
- published papers (e.g. editorials and commentaries) that described regulatory arrangements for FOPL in the Region, including information on the process for development or policy specifications; and
- non-interpretive FOPL systems if these were referred to in evaluation studies comparing system performance against other interpretive systems that had been introduced in European countries.

**Exclusion criteria** were:

- back-of-pack nutrition labelling;
- text-based nutrition and health claims (e.g. 99% fat free, contains calcium for healthy bones);
- non-nutrition labelling (e.g. ingredient lists, allergen labels);
- baby and infant formula and complementary foods labels;
- labelling on menu boards/cards, on-shelf or on foods served cafeteria style;
- claims in food advertisements; and
- where support for food label reading was given as part of a broader intervention programme.

### Step 3. Validation of completeness and accuracy of data capture

Data extraction from both academic and grey literature was performed by one of four researchers and the extracted information was then cross-checked with in-country representatives from either the organizations providing responses to the Global Nutrition Policy Review survey or the national competent authorities for the labelling policy to ensure data completeness and accuracy.

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## ANNEX 2. GLOSSARY

**Core/basic and non-core/non-basic foods.** Core and basic are interchangeable terms used to refer to products that are recommended to be consumed as part of a healthy diet in most national nutrition guidelines, such as fruit and vegetables; beans and legumes; grains and cereals; lean meat, fish, poultry, eggs and substitutes; dairy products; and fats and oils. Non-core and non-basic are interchangeable terms used to refer to products that are considered to contain relatively high amounts of added fat, sugar and/or sodium and are not considered necessary for a healthy diet. FOPL schemes may divide foods according to these categories and apply different criteria to different types of food. For the purposes of this publication, the terms core and non-core are used throughout, unless when the scheme being described uses different terminology.

**Guideline Daily Amount.** The approximate daily amount of calories, fat, saturated fat, total sugars and sodium/salt for healthy adults and children to maintain a healthy diet (values for a product are given as %GDA). This is not an interpretive system.

**Interpretive and non-interpretive labelling systems.** Interpretive labelling systems provide evaluative judgement about nutritional quality of foods and do this using interpretational aids, such as symbols, colours or words. Generally, they aim to minimize numerical information and focus on providing at-a-glance guidance on the relative healthfulness of a product. Non-interpretive labelling systems provide a summary of nutrient information from nutrient declarations but provide little advice or evaluative judgement on the nutritional value of the food to assist with purchasing decisions. Although labelling systems have been grouped in other ways, including nondirective, semidirective and directive systems, the distinctions according to more or less judgement/evaluation are similar, and for the purposes of this report the terms interpretive and non-interpretive are used.

**Reference amount.** The quantity of a food or beverage for which the nutrition information on the label relates. Reference amounts may be expressed per 100g or 100ml, per serving or in relation to the energy contribution of nutrients (e.g. percentage of energy from saturated fat).

**Reference Intake.** A daily value for a nutrient based on an average adult with an estimated daily energy requirement of 8400kJ/2000kcal.

**Threshold amount or cut-off points.** Interpretative FOPL systems apply threshold amounts or cut-off points in order for foods to be classified according to their nutritional composition. For most types of system, these cut-off points relate to individual nutrients and are either graded (e.g. high, medium and low in a given nutrient) or binary (e.g. meets the standard/threshold or does not meet the standard/threshold for a given nutrient). For summary indicator systems, thresholds are established for the overall nutritional quality of products. Threshold amounts or cut-off points are usually based on nutrition guidelines for populations, including national dietary guidelines and RI values for nutrients, and also align with other health-related food policy (e.g. criteria for health claims) or authoritative recommendations.

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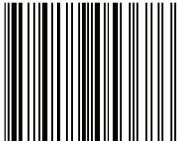
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