

Innovation in Nutrition Labeling: Consumer Perceptions of the Usefulness of Front of Pack Labeling Schemes

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Abstract

The managerial responsibilities and resources required to implement the methods of nutrition labeling of foods lie with the whole food system. The use of back-of-pack (BOP) nutrition labeling in the form of the nutrition declaration is widespread in commercial practice, and in the EU it is even mandatory for most products. Detailed numerical information on the nutrient content of the product makes it difficult for consumers to understand. Through a quantitative exploratory research, this paper focuses on the descriptive analysis of different voluntary front of pack (FOP) labeling schemes, assessing their impact on consumers' perception of the nutritional quality of products and determining their usefulness in terms of understanding the declared nutritional information. We are interested in increasing the usefulness of these systems in the context of a low level of consumer understanding of nutritional information (especially BOP), as indicated by the results obtained. This will facilitate the process of selecting more nutritionally balanced products to meet the need for education and healthy lifestyles. We start from the premise that the harmonization of front of pack labeling schemes, which tend to take the form of graded indicators, could be considered a necessary and useful innovative solution in the process of selecting and comparing food products on the market according to their declared nutritional profile. A single, voluntary, interpretative traffic light system, as the EU proposes, would harmonize the nutritional labeling of foods, as a condition for putting social policy on consumer nutrition education into practice, but also for facilitating the reformulation and promotion of healthier foods, beyond the controversies over the discrimination of some of them.

Keywords

FOP labeling schemes, FOP usefulness, nutrition labeling innovation, consumer perception, FOP harmonization.

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Introduction

The need for regulation of nutrition labeling is a matter of public interest, involving national, regional and international bodies. According to European regulations, the mandatory nutrition declaration on the back-of-pack (BOP) can be complemented by a voluntary nutrition labeling scheme, which is a voluntary repetition of its main elements in the principal field of vision on the front of the packaging. In this way, consumers are helped to quickly notice essential nutritional information when purchasing food. Front-of-pack (FOP) nutrition labeling schemes may also use other forms of expression and/or presentation, e.g. colors, symbols or graphics, in addition to the nutrition declaration, which generally contains words and/or numbers (EC, 2020a).

The variety of nutrition labels has led to many obstacles in consumers' understanding and analysis of them. These difficulties are due to a number of reasons including lack of knowledge or information related to

nutrition or too little time allotted to the purchasing process. In May 2020, the European Commission produced a final report on the use of additional forms of expression and presentation of the nutrition declaration, including their impact on the internal market and the opportunity for further harmonization of these forms of expression and presentation (EC, 2020a).

Labeling schemes can measure the nutritional value of a product based on compliance with a nutritional standard, either by meeting a threshold or a criterion, influencing consumer perception (Prada et al., 2021). In the specific European context, FOP nutrition labels are gaining increasing interest, a growing number of countries are implementing these labeling schemes and discussions on the harmonization of labeling at European level are ongoing (Egnell et al., 2021).

Recent research shows that FOP nutrition labels, such as the Nutri-Score, can be used to improve food choices, but at the same time can be used as an incentive to improve food products through reformulation (Ter Borg et al., 2021).

Other research (Bollinger et al., 2022) points out that FOP nutrition labeling schemes have a weak influence on the purchase of healthier foods, but educational campaigns can increase the usefulness of these types of product labels if there is a lack of consumer awareness and/or understanding of labels.

These are arguments for the relevance and timeliness of the present research on the perception of the usefulness of FOP labeling schemes from the perspective of consumers lacking the nutritional knowledge of a specialist in this field. But is this type of indicator a solution to the equation: nutrition education + consumption decision = healthy diet?

1. Literature review: EU - towards a single voluntary nutrition labeling scheme

According to EU regulations (European Parliament, 2011) most food products must be accompanied by a nutrition declaration, usually placed on the back of the packaging, as a part of the mandatory food label claims. It is allowed to repeat, on a voluntary basis, on the front of the package (FOP) the information provided in the nutrition declaration, either the energy value or the energy value and the amounts of fat, saturated fatty acids, sugars and salt. FOP nutrition labeling schemes emphasize the information provided in the nutrition declaration and provide information on the nutritional value/nutritional profile of foods, using symbols, colors and/or letters. (EC, 2020a) Interest of public authorities in FOP nutrition labeling has grown significantly in recent years due to the alarming increase in the number of people suffering from obesity and the significant incidence of diet-related diseases in most EU Member States. Therefore, FOP labeling is increasingly seen as a tool to support strategies preventing diet-related health problems (Farrand, 2021).

By definition, all FOP evaluative labeling schemes, whether "nutrient-specific" or based on "summary indicators", are intuitive tools (Muzzioli et al., 2022), based on nutritional profiling models, which involve classifying foods by chemical composition and based on well-defined criteria; these may include simple nutrient thresholds, and the system assigns colors -green, yellow, red- or algorithms that result in a summary score. At EU level, the trend in recent years has been to introduce and promote a single European FOP nutrition labeling system, studies showing that Nutri-Score has proved easy to understand and to take into consideration. Consumers are increasingly concerned about their health (GFK, 2020) by making careful food choices. According to GFK (2020) almost 60% of consumers in Europe read the ingredients of the food and drink they buy and half of them are aware of the Nutri-Score labeling system.

It is acknowledged that Nutri-Score acts as a food grading criterion and is an argument for manufacturers in reformulating the nutritional quality of existing and new products in the food supply; its adoption by large companies indicates market engagement out of a desire to remain relevant. Research provides new insights into the positive effect of Nutri-Score, i.e., decreasing purchases of processed products and increasing proportions of unprocessed and un-packaged foods, in line with public health recommendations (Egnell et al., 2021). The advantages of Nutri-Score are also recognized as a possible tool to reduce calorie intake, trans fat, salt and sugar in consumption, simplifying consumer choice (National Institute of Public Health, 2016) in order to adopt a more balanced diet, although Medina-Molina and Pérez-González (2021) consider that different interpretative ways of nutrition labeling such as Nutri-Score do not moderate the relationship between perceived health and purchase intention. Sarda et al. (2020) obtained useful results demonstrating positive developments in awareness and use of this type of label, although the authors would have expected a higher proportion to report improved eating behavior, and the overall impact on the selection of healthier eating patterns has not yet been demonstrated (Savoie et al., 2013).

Nutrition labeling schemes clearly have the potential to empower consumers to make healthy purchases. However, the nature of the schemes is often confusing and nutritionists complain of potential misinterpretations among consumers, with information being general rather than objective (Sijm, 2021).

2. Operational implications in the innovation of nutrition labeling systems - research methodology

2.1. Normative, cognitive and pragmatic approaches to nutrition labeling schemes

The analysis of the usefulness of nutrition labeling schemes must take into account societal values, resources involved, feasibility and acceptability by stakeholders, equity and consumer rights, as well as socio-cultural acceptability (WHO, 2021). Integrated approaches are more effective when they respect different individuals and cultures, thus making tailored assessments, interventions and changes possible (Trovato, 2012).

While initially, additional ways of nutrition labeling emerged in the form of a single symbol, such as the "Heart Guide" symbol for heart-friendly foods (Tarabella and Voinea, 2013) or the "Keyhole" symbol drawing attention to healthy food, they have advanced and various schemes have been set up. To date, various front-of-pack labeling schemes have been developed and used around the world, including simplified versions (Table no. 1).

Table no. 1. Major differences in technical documentation

Taxonomy presented in the scientific literature				FOB labeling schemes	Developer	States	
Nutrient-specific labels	Numerical	Non-directive character	Reductive/non-interpretive	“Guideline Daily Amounts” (GDA)		Private	EU
				NutrInform Battery		Public	IT
	Color coded	Semi-directive character	Evaluative/interpretive	“Traffic light” (TL)		Public	EU
	Mixed: numerical and color coded	Semi-directive character	Evaluative/interpretive	„Multiple Traffic Light” (MTL)		Public	EU and the UK
				Other traffic light type labels		Private	Various states in EU (Portugal, Spain)
Summary labels	Logos with a positive message (promotional)	With a directive character	Evaluative/interpretive	Keyhole		Public	Sweden, Denmark, Lithuania
				Heart Guide		Public NGO	Finland, Slovenia, Croatia
	Healthy choice				Private	Czechia, Poland, gradually eliminated in the Netherlands	
	Nutri-score				Public	France, Belgium, Spain, Germany, the Netherlands, Luxembourg	
	Health Star Rating				Public	Australia, New Zealand	

Source: adapted from EC, 2020

FOP nutrition labeling schemes can be classified into two broad categories:

- "nutrient-specific" systems that provide nutritional information on specific nutrients, which can be divided into "numerical" – GDA, "color-coded" - TL and "numerical and color-coded" - MTL;

- "summary indicator systems" that provide a synthetic assessment of the nutritional value and "healthiness" of the product in general (Savoie et al., 2013), which can be divided into "positive" indicators (promotional acronyms) applicable only to foods that meet certain nutritional criteria (Keyhole, Heart Guide) and "graded" indicators that provide general, graded information on the nutritional quality of foods, applicable to all foods (Julia and Hercberg, 2017), such as Nutri-Score or Health Star Rating.

They can also be classified according to other criteria:

- depending on the level of "directiveness" of the scheme, i.e. the extent to which the label provides a direct indication of the nutritional benefits of the product for the consumer (non-directive - TL, semi-directive - MTL or directive - Keyhole, Heart Guide, Nutri-Score or Health Star Rating) (Hodgkins et al., 2012);

- depending on the mode of representation (numerical - GDA, color-coded - TL, numerical and color-coded - MTL, positive message logos - Keyhole, Heart Guide, graded indicators - Nutri-Score or Health Star Rating);

- depending on the interpretative nature of the labeling systems ("reductive"/non-interpretive TL or "evaluative"/interpretive- the others) (Newman, Howlett and Burton, 2014).

FOP nutrition labeling schemes can bring order to the sometimes rather chaotic and confusing consumer behavior, giving consumers the confidence that, based on the information provided, they have the right attitude, they make the right food choice, by making their own informed decisions.

2.2. The usefulness of FOP labeling schemes from a consumer perspective

Based on the normative, cognitive and pragmatic approach to FOP nutrition labeling schemes, we conducted an exploratory research to identify consumer perceptions of the usefulness of FOP, with the following objectives:

- identifying the determinant factor in the decision to consume a food product and determining the level of understanding of the BOP nutrition label and the level of consumer nutrition education;

- identifying the level of awareness and use of voluntary nutrition labeling schemes FOP and deciding the main nutrition information of interest to the purchaser;

- deciding the most suggestive model of voluntary FOP nutrition labeling schemes and determining the need for harmonization and improvement of nutrition labeling from a consumer perspective.

Questionnaires were used as a tool for data collection and the sources of information used to achieve the goal were external and primary, obtained directly from consumers and intended for research purposes. The sample size is 145 respondents, randomly selected and grouped according to five criteria: gender, age, education level, background and monthly income, resulting in the following profile of respondents: female respondents predominate (63%), aged between 18 and 25 years (57%), with higher education (72%), living in urban areas (77%) and having a monthly income between 1500 lei and 3000 lei (45%).

In the present research, the following assumptions were made:

H 1a: Respondents are aware of the nutrition-food-health relationship;

H 1b: The determinant factor in food choice is psycho-sensory value;

H 2: Most consumers want to be informed about the nutritional profile of the food they buy, but the level of understanding of the information on the BOP nutrition label is still low;

H 3: Respondents do not have a high level of nutrition education, so action is needed to improve consumer nutrition education;

H 4: Voluntary BOP nutrition labeling schemes are known, useful and improve consumers' perception of the nutritional profile of the food;

H 5: Nutri-Score labeling scheme is considered the most suggestive FOP model.

H 6: Consumers consider it necessary to find innovative solutions to harmonize FOP nutrition labeling schemes at EU level and increase their usefulness.

We note that although most respondents (87%) are aware of the influence of food on health, they still choose to consume food based on its psycho-sensory value (78%). Most consumers thus make subjective choices about food consumption, although they are well informed and aware, they forgo adopting a balanced diet for the hedonistic value of food. Consistent with the results, hypotheses H1a and H1b are validated.

The analysis of the data shows that the majority of consumers feel the need to be informed about the nutritional profile of foods, which is confirmed by the high number of respondents who read the nutrition label when purchasing food but find the information not easy to understand (68%). Thus, according to the results presented above hypothesis H 2 is validated.

In order to identify the level of nutrition education of consumers, a scale from one to five was used and the sample average is 2.42, which shows that respondents have an average level of nutrition education, which is also underlined by the fact that 53% of consumers do not know the harmful effect of hydrogenated (trans) fats on the body's health. These results lead to the validation of the following hypothesis H 3. Therefore, the level of understanding of the information is directly proportional to their level of nutrition education, but inversely proportional to consumers' perception of the usefulness of the data on the label.

Most respondents (86%) recognize FOP nutrition labeling schemes and find them useful. In terms of establishing the usefulness of FOP nutrition labeling schemes among consumers, the results show that almost all respondents (97%) consider them to be a source of information about the nutritional profile of the food product. Most respondents are interested in energy value (42%), then carbohydrate content (35%), followed by fat (24%), protein (14%) and salt (10%). This also validates hypothesis H 4.

The Multiple Traffic Light (MTL) system is considered the most suggestive FOP labeling model, being preferred by 44% of respondents, followed by the Nutri-Score model (32%), Guideline Daily Amounts (15%) and Traffic Light (9%). These results can be justified by the advantages of the MTL system, i.e. the color coding of nutrients and the labeling of the degree of coverage of daily requirements; the lack of transparency of the information makes the Nutri-Score and Traffic Light systems not considered suggestive. Consistent with the results presented above hypothesis H5 is invalidated.

A high percentage of respondents (70%) consider it necessary to find innovative solutions to increase the usefulness of FOP nutrition labeling schemes, from a normative, pragmatic and cognitive point of view, so hypothesis H6 is validated.

3. Discussions and proposals on increasing the usefulness of FOP systems

Colour-coded food labeling FOP is effective in improving consumers' understanding of the nutritional quality of food, according to studies. The combination of a color-coded format with a scaled indicator seems to improve consumers' objective understanding of what they are eating (Egnell et al., 2018; Storcksdieck Genannt Bonsmann, 2020).

The graded indicator labeling scheme has sparked controversy among EU experts (European Parliament, 2017) because it penalizes the traditional system of labeling geographical indications and disadvantages higher quality food products, such as those from the Mediterranean diet. Other criticism relates to the provision of misleading and incomplete information preventing consumers from making informed choices about the nutritional content of foods or the authenticity of foods. However, we believe that such an indicator is an easy, effective, but not sufficient solution for adequate nutrition education.

Among the innovative solutions to increase the usefulness of FOP nutrition labeling systems:

- the increase of the visibility of the label on small packages (attaching an accordion-type label with a closure system allowing the consumer to access the nutritional information of the food, as an extension of the nutritional labeling);
- the inclusion on the nutrition label of additional information on substances harmful to health, for example on the content of trans-fatty acids, although European legislation limits their content in food to 2 grams per 100 g of fat (EC, 2019), to increase consumer awareness of the negative effects of these substances;
- the use of a QR code on product packaging as an additional information tool, but also as a marketing tool that can enrich the shopping experience. Thus, an intervention function could be attached to the communication function (Radu, 2019) because the manufacturer/retailer can add nutritional information

related to different categories of consumers according to age, gender and physical activity, origin of ingredients or healthy food pairing.

- development of mobile applications: the possibility of determining its nutritional value by means of easy-to-use applications that can draw up a nutritional profile in a short space of time requires the creation of a database containing nutritional declarations for as many products as possible. Such applications, by merging functions, could thus provide a link between food guides, supply, nutrition labels and healthy foods, but attention must be paid to improving the automation and integration of applications, to allow diversification of recipes, calculation of the energy value and nutrient content of the product, and reporting to individual needs.

Thus, nutrition labeling can be a means of personalizing the offer and educating consumers.

Conclusions

In recent decades, food labeling has undergone a major development in terms of production methods and the graphic qualities of the label, as well as a permanent enrichment of its information content. The visual appeal and nutritional informativeness of nutrition labels play a decisive role in consumers' purchase intentions (Brewer and Sebby, 2021), and consumers love visuals.

The research highlights the implications of nutrition label innovation in improving consumer perceptions of the usefulness of FOP labeling schemes. The theoretical and practical operational aspects of innovation in this area require consideration of contextual factors and a normative, cognitive and pragmatic approach to nutrition labeling schemes. The results obtained align with the findings of other studies reviewed in the literature and demonstrate that FOPs are familiar, useful and improve the perception of the nutritional profile of food.

The usefulness of FOP nutrition labeling schemes lies in their adaptation to consumer needs, consumer values and stakeholder acceptability, given the determinants of the social-cultural environment. Social marketing is successfully used to promote better nutrition, based on the premise that people consider the perceived benefits of alternative eating behaviors against the costs determined in economic terms: monetary expenditure, psychological costs, time, energy. Voluntary FOP nutrition labeling schemes feasibly adapted to nutrition interventions, even tailored to individual needs, can facilitate healthy food choices through their informative, educational and promotional role.

In the future, the aim is to create a sustainable labeling framework that harmonizes the nutritional aspects of food products in synergy with other relevant initiatives: climate, environmental, social, ways to harmonize voluntary environmental claims (EC, 2020b). EU countries adopt different approaches as part of their health promotion strategies, which take the form of action on healthy lifestyles and healthy eating.

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