

## Review Article

# In Search of Superiority: Exploring the Effectiveness Gap of Front-of-Pack Nutritional Labels. An Assessment of Consumer's Decision-Making Process Toward Healthier Food Choices

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### Abstract

In recent years, increasing attention has been paid to issues on overweight and obesity. This is due to the combined effect of the focus of policymakers, aimed at solving a problem that is currently severely affecting public health in multiple countries, and a rising stream of academic research, directed at identifying the best tools to help customers make healthier food choices within a balanced and varied diet.

In this respect, the use of Front-of-Pack Labels (FOPLs) on pre-packaged foods and their impact on consumer decision making have been investigated from multiple angles, with the hope of identifying a FOPL that could be considered undoubtedly superior to all others, and thus worth being standardized through the intervention of supra-national regulatory bodies.

Despite utilizing similar theoretical frameworks, two major streams of evidence emerge, depending on the underlying view on how a consumer should be supported (more guided vs. more informed) and the subsequent measurements of objective vs. subjective understanding. While on objective understanding, Summary Labels appear to be more effective, on subjective understanding, Nutrient-Specific ones are more supportive to consumers, when taking an

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informed food decision. Further research should be developed to arrive at a new unified theory and a clear view on which FOPL could best support consumers in their decision-making toward healthier food choices.

**Keywords:** Front-of-pack labels; Liking; Nutrition; Objective understanding; Overweight; Subjective understanding

### Introduction

According to the World Health Organization [1], improper dietary habits, as an excessive consumption of processed foods, and more specifically of sugar, salt and fats can lead to the development of serious non-communicable diseases, such as obesity, diabetes and Cardiovascular Disease (CVD). Obesity in the first place is a worryingly soaring problem: in the next four years it will likely increase in at least 44 countries [2] and, by 2030, 51% of the world's population is forecasted to be obese [3]. In addition, studies show that overweighted children will be approximately 70 million by 2025 [4]. Furthermore, the spread of the Covid-19 pandemic and the consequent restrictive measures have proven to be worsening towards the serious situation regarding obesity and other metabolic-related diseases [5]. According to the WHO, obesity can be prevented and reduced through measures at the individual, social and governmental level [1]. Therefore, an effective intervention of governments, public institutions and international bodies is required, in order to encourage consumers to make healthier food choices. Some measures have already been introduced, especially in the area of food labelling, such as the now-mandatory, in many countries, Nutrient Facts Panel Labels, generally placed on the back of the pack which have already demonstrated their effectiveness in generating healthier eating habits in consumers [6].

A new measure to facilitate the reduction of obesity and prevent other diseases caused by unbalanced nutrition is the recent establishment of the so-called Front-Of-Pack labels (FOP labels or FOPLs), i.e., the labels found on the front of the pack of pre-packaged foods. At a global level, FOP labels are considered an effective tool for addressing the progressive global diffusion of obesity and diet-related diseases [1]. At the European level, the EU decided to introduce a new regulation [7], in order to allow Member States, to develop, on a voluntary basis, FOPL guidelines and stimulate a debate about the effectiveness of the different systems in use [8], in order to make it compulsory, in the future, after a careful evaluation of all proposed labels [9]. In the lack of a widely accepted FOP nutritional scheme understandable by EU consumers, Member States started to develop their own schemes, adapted to their own consumers' preferences, and compliant with certain nutritional criteria, as long as the information displayed is not misleading about the actual healthfulness of the product [4]. Previous studies show that it is important to tailor a label design to specific populations, as cultural or epidemiological factors may determine the label's effectiveness [10]. A variety of labels have been designed around the world, which are currently under testing or already adopted, but in Europe the debate on the most effective FOPL

is still ongoing and there is no actual agreement on how a FOPL should be designed. In Europe the first Member State to introduce such a label in the late 1980s was Sweden through the adoption of the Keyhole Logo [11].

According to the most recent EU taxonomy on FOPLs, there are two main label categories: Nutrient-Specific Labels and Summary Labels [9]. The former, which provide fairly detailed information about certain nutrients (fat, saturates, sugars, salt and energy value), are themselves divided into “Numerical” and “Colour-Coded”. “Numerical” labels are non-interpretive labels, providing numerical information about the content of the nutrients and the energy value, as a percentage of the Reference Daily Intake [9]. An example of “Numerical” labels is the newly introduced NutrInform Battery, adopted in Italy, with the addition of a battery symbol to indicate how much that amount of food contributes to the Reference Intake of energy and nutrients. “Colour-Coded” labels, in addition to numerical information, use colors to classify nutrients as “low” (green), “medium” (amber) or “high” (red) [9]. An example of a “Colour-Coded” label is the Multiple Traffic Light, introduced by United Kingdom which combines colour-coding and reference intake percentages. The latter provide a synthetic assessment of the product's overall nutritional healthfulness using both symbols and colours. These are further clustered into “Endorsement Logos” and “Graded Indicators”. “Endorsement Logos” labels provide the appreciation of a product's nutritional information through a positive logo applied to foods that comply with specific nutritional criteria [9]. An example of an “Endorsement Logo” label is the above-mentioned Keyhole which Sweden introduced in 1989, a green symbol that identifies healthier food choices. “Graded Indicators” labels display information on nutritional values, through a graded indicator, using both colours and letters [9]. The most representative example is the Nutri-Score, one of the most studied labels in Europe, proposed by France and subsequently adopted by Belgium, Germany, and Luxembourg.

### **Theoretical frameworks, measures and evidences from extant literature**

In order to test the different FOP labels and examine their effectiveness in informing consumers about the nutritional values of the foods they buy, several authors have utilized the theoretical framework proposed by Grunert and Wills [12], which includes the following phases: exposure, perception, understanding and liking, and finally use. Specifically, it analyzes different types of understanding, the subjective and the objective [13-15]. The former reflects the meanings consumers derive from the label's perceived information and the extent to which consumers think they comprehended the communication effectively. The latter, on the other hand, represents whether the meaning the consumer has attributed to the FOPL is consistent with the meaning the sender of the FOPL intended to communicate [12].

This approach is grounded in consumer decision-making and attitude formation and change, two fundamental streams of research, that can be applied to the understanding of the effects of nutritional information on consumers. The first, relates to the process behind consumers' product choice, when there are multiple viable options, analyzing how these choices are influenced by the information available. The second, concerns how consumers process

and synthesize the information available in order to determine its relevance. The model predicts that only labels to which consumers are exposed to can have an effect. The likelihood of exposure increases if consumers actively search for the label. Exposure then leads to subsequent behavior only if the information is actually perceived. Perception can be conscious or subconscious, although conscious perception can still have stronger effects. In turn, perception leads to understanding, which is the meaning the consumer attaches to what he or she has perceived. Finally, information can be used to make choices [12]. Another effect present in the framework is connected to the liking of the label. This may come from the fact that consumers like the label, for example, because they find it simple and useful, or because they like the symbols and colors used. However, liking does not necessarily have to be related to understanding, but it can still impact the use of the label [12].

### **Overview of alternative avenues**

Several studies demonstrated that FOP labels improve consumer awareness and understanding of nutritional information, with differences between age, social class, and cultures [16]. They also facilitate healthier choices for consumers [17], where consumer choice is made easier by Nutrient-Specific FOP than by Summary Labels. In addition, it shows that consumers prefer labels that feature both text and color and that they find labels that feature only numerical data more difficult to understand.

Recently, academic research has focused on understanding whether any FOPL continuously performs better to achieve the goals set by WHO, thus helping policymakers to take fact-based and solid decisions in recommending its implementation across multiple countries.

The typical framing of those studies compares the effectiveness of different FOP labels on a set of pre-defined parameters, derived from validated extant research, to understand whether the measured items/constructs are consistently showing a statistically significance, in terms of positive mean differences, of one label vs. all others. Approaches have been then replicated in multiple countries in the hope of finding consistent evidences that can later shape policy decisions.

A relevant stream of those studies is connected to the abovementioned Grunert & Wills theoretical framework. Subsequent analysis often took one of two different avenues (subjective vs. objective), intrinsically underlying different views of the customer (more guided vs. a more empowered).

The first stream, focusing on the comparison among FOPLs on objective understanding produced a set of evidence in favor of the higher effectiveness of Summary Labels [13,14,18], with the use of color, considered essential in catching the attention of consumers [13-15,17,19]. However, because these labels are simple and provide less information than Nutrient-Specific labels, consumers might trust them less [15], on the other hand they are easier to decode, as the sender's message actually coincides with the message comprehended by the consumer. Recent studies [20], keep confirming that the largest effects are associated with the Nutri-Score label, while respondents assigned the Multiple-Traffic-Lights highest scores in terms of the information contained in the label.

A second stream of research, utilizing the same conceptual framework, has mainly focused on subjective understanding with results often showing alternative patterns of superiority among FOPLs. Consumers can determine nutritional values better when the Nutrient-Specific System is used, while they can more easily estimate the healthiness of a product when the Summary System is used [17]. Nutrient-Specific labels also seem to show a better result when the subjective understanding of consumers is observed, since they likely provide consumers with more complete and specific information, which allows them to use it according to the use they have to make of it. Some limitations are connected with the use of this type of label when processing-time is limited [17] and rapid-decision making is required [21]. A more recent series of studies have been carried out to benchmark the performance of Nutrient-Specific Labels vs. Summary Labels, in line with the EU 2020 taxonomy, exploring subjective understanding and liking of the consumers. A first introductory study [22], showed, in a real-life setting, and in two subsequent periods of time distanced by 4 weeks, that Italian consumers prefer richer and more informative types of labels, such as the NutrInform Battery, in terms of subjective understanding and liking, when compared to a summary label, specifically the Nutri-Score. A subsequent cross-country experimental study [23], confirmed that those results in terms of subjective understanding are reliable, stable and valid across multiple countries (France, Germany, Greece, Italy, Portugal, Romania and Spain). Preliminary evidence from two new studies, yet to be published, highlight the consistency and stability of the above results also in Slovenia and Poland. Specifically in Poland, in addition to confirming the overall findings that NutrInform Battery has a higher performance on subjective understanding when compared to Nutri-Score, it also neutralized the effects of education and income on the dependent variables. In synthesis, NutrInform Battery demonstrated that it can help consumers of different countries in better understanding information, while also showing a more limited impact of socio-cultural differences.

## Discussion and Conclusion

The study by Talati et al. [24], shows that regardless of how labels are perceived in different countries, one desire shared by all respondents is that these labels be made compulsory. It is important to choose one single mandatory label harmonized at European level, so that food producers who choose to use FOP labels are not at disadvantage compared to those who decide not to use it.

The debate on which FOP label should be adopted as a standard system is then still open and the recent European Strategy "Farm to Fork", which aims to make food systems healthy, environmentally friendly and fair, stresses the need for harmonization among FOPLs by 2022 [25]. Previous studies show that what is measured influences the output, demonstrating that an "absolute" superiority of one label over the others on all dimensions does not currently exist. The consequence is that different labels have different results in different countries and depending on what is measured. The necessary pre-condition for achieving the desired institutional outcome of reducing overweight and obesity and supporting changes in consumer eating habits without reasonable doubt through the use of a single FOPL is apparently not yet solved. As previously illustrated, Summary labels, such as Nutri-Score tend to be more popular in studies looking at impact on objective understanding, while more informative, Nutrient-Specific labels, such as the recently introduced

NutrInform Battery, are better perceived when analyzing subjective understanding. In other words, results of comparing different labels might change, depending on what is measured (e.g., subjective vs. objective understanding).

Thus, in order to answer the question: "Which is the most effective FOP label in obtaining the desired result?" it is first necessary to clarify which underlying approach toward the end-customers is taken (guided customers vs. empowered customers) and then analyze outcomes of previous research.

Potential ways to overcome this situation would include extending the current research as a basis for a more thorough and independent debate, either a) clarifying upfront what would be the "view" on European Customers, i.e., customers that need support and guidance vs. customers that are willing to build their nutritional knowledge to form their best personalized diet, b) collecting additional benchmarking data to include the impact of portion and frequency of intake in the performance results of the labels on current measures, moving from a deterministic to a risk-based approach, c) enlarging the spectrum of potential alternatives, d) reducing the uncertainty by developing different theoretical models that go beyond the dichotomy of subjective understanding and objective understanding. A further stream should also be linked to the upcoming research avenues on consumers' trust in labels. Furthermore, the overall trust might depend on the characteristics of the task (i.e. consequential tasks vs. objective tasks) and the past exposure of the consumer to other elements, such as algorithms. However, in consequential tasks (i.e. when diagnosing or treating a disease), consumers might trust less when potential outcomes derive from misleading or inaccurate predictions [26].

Existing streams of research have made a significant step forward toward the comprehension of the dynamics of FOPL. The overall debate, for the benefit of end-customers, will however likely require additional research to arrive at an undisputed superiority of one FOPL over the others to support the achievement of the desired institutional goal of reducing the increasing global trend of growth in the number of individuals who are overweight and obese.

## References

1. WHO (2020) Obesity and overweight. World Health Organization, Geneva, Switzerland.
2. Pineda E, Sanchez-Romero LM, Brown M, Jaccard A, Jewell J, et al. (2018) Forecasting future trends in obesity across Europe: The value of improving surveillance. *Obes Facts* 11: 360-371.
3. Finkelstein EA, Khavjou OA, Thompson H, Trogdon JG, Pan L, et al. (2012) Obesity and severe obesity forecasts through 2030. *Am J Prev Med* 42: 563-570.
4. Derén K, Dembiński Ł, Wyszynska J, Mazur A, Weghuber D, et al. (2021) Front-of-pack nutrition labelling: A position statement of the European academy of paediatrics and the European childhood obesity group. *Ann Nutr Metab* 25: 1-6.
5. Clemmensen C, Petersen MB, Sorensen TIA (2020) Will the COVID-19 pandemic worsen the obesity epidemic? *Nat Rev Endocrinol* 216: 469-470.
6. Barreiro-Hurle J, Gracia A, De-Magistris T (2010) Does nutrition information on food products lead to healthier food choices? *Food Policy* 35: 221-229.
7. First population estimates EU population in 2020: Almost 448 million More deaths than births.

8. van der Bend DLM, Lissner L (2019) Differences and similarities between front-of-pack nutrition labels in Europe: A comparison of functional and visual aspects. *Nutrients* 11: 626.
9. European Commission (2020) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions a Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system.
10. Vargas-Meza L, Jáuregui A, Pacheco-Miranda S, Contreras-Manzano A, Barquera S (2019) Front-of-pack nutritional labels: Understanding by low- and middle-income Mexican consumers. *Plos One* 14: 225268.
11. Kanter R, Vanderlee L, Vandevijvere S (2018) Front-of-pack- age nutrition labelling policy: Global progress and future directions. *Public Health Nutr* 21: 1399-1408.
12. Grunert KG, Wills JM (2007) A review of European research on consumer response to nutrition information on food labels. *J Public Health* 15: 385-399.
13. Ducrot P, Méjean C, Julia C, Kesse-Guyot E, Touvier M, et al. (2015) Objective understanding of front-of-package nutrition labels among nutritionally at-risk individuals. *Nutrients* 7: 7106-7125.
14. Egnell M, Talati Z, Hercberg S, Pettigrew S, Julia C (2018) Objective understanding of front-of- package nutrition labels: An international comparative experimental study across 12 countries. *Nutrients* 10: 1542.
15. Talati Z, Egnell M, Hercberg S, Julia C, Pettigrew S (2019) Consumers' perceptions of five front- of-package nutrition labels: An experimental study across 12 countries. *Nutrients* 11:1934.
16. Grunert KG, Fernandez-Celemin L, Wills JM, Bonsmann SSG, Nureeva L (2010) Use and understanding of nutrition information on food labels in six European countries. *Z Gesundh Wiss* 18: 261-277.
17. Hersey JC, Wohlgenant KC, Arsenault JE, Kosa KM, Muth MK (2013) Effects of front-of-package and shelf nutrition labeling systems on consumers. *Nutr Rev* 71: 1-14.
18. Egnell M, Ducrot P, Touvier M, Allès B, Hercberg S, et al. (2018) Objective understanding of nutri-score front-of-package nutrition label according to individual characteristics of subjects: Comparisons with other format labels. *PLos One* 13: 0202095.
19. Aschemann-Witzel J, Grunert KG, van Trijp HC, Bialkova S, Raats MM, et al. (2013) Effects of nutrition label format and product assortment on the healthfulness of food choice. *Appetite* 71: 63-74.
20. Packer J, Russell SJ, Ridout D, Hope S, Conolly A, et al. (2021) Assessing the effectiveness of front of pack labels: Findings from an online randomised-controlled experiment in a representative British sample. *Nutrients* 13: 900.
21. De la Cruz-Gongora V, Torres P, Contreras-Manzano A, de la Mota AJ, Mundo-Rosas V, et al. (2017) Undersatnding and acceptability by Hispanic consumers of four front-of-pack food labels. *Int J Behav Nutr Phys Act* 14: 28.
22. Mazzù M, Romani S, Gambicorti A (2020) Effects on consumers' subjective understanding of a new front-of-pack nutritional label: A study on Italian consumers. *Int J Food Sci Nutr* 72: 357-366.
23. Mazzù M, Romani S, Baccelloni A, Gambicorti A (2021) A cross-country experimental study on consumers' subjective understanding and liking on front-of-pack nutrition labels. *Int J Food Sci Nutr* 3: 1-15.
24. Talati Z, Norman R, Pettigrew S, Neal B, Kelly B, et al. (2017) The impact of interpretive and reductive front-of-pack labels on food choice and willingness to pay. *International Journal of Behavioral Nutrition and Physical Activity* 14: 171.
25. European Parliament and the Council (2020) Report from the commission to the European Parliament and the council regarding the use of additional forms of expression and presentation of the nutrition declaration.
26. Castelo N, Bos M, Lehmann D (2018) Consumers' Trust in Algorithms. *ACR North American Advances*, USA.



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