

A study is 21 times more likely to find unfavourable results about the nutrition label Nutri-Score if the authors declare a conflict of interest or the study is funded by the food industry

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Diseases related to unhealthy diets were responsible for 11 million deaths worldwide in 2017.¹ Non-communicable diseases, such as type 2 diabetes, cardiovascular diseases and cancer, are responsible for 80% of the disease burden in European Union countries. They are the leading cause of avoidable premature deaths and have become a major burden for health systems.^{1–2} Dietary factors have long been recognised as one of the leading risk factors of these chronic diseases^{1–5} and key policy levers for public health as they represent modifiable determinants that could be addressed through primary prevention interventions.³ This is why worldwide government-led strategies and policies have introduced interventions aiming at improving diets in the population. Among the different possible interventions, front-of-pack nutrition labels (FoPNLs) have received growing attention of public health authorities by delivering simple at-a-glance nutritional information allowing consumers to easily compare nutritional quality across food products.

The Nutri-Score is a summary-graded colour-coded FoPNL aiming to inform consumers, in a simple and understandable way, about the overall nutritional value of food products. That way it helps them make better-informed and healthier choices at the point of purchase. It also encourages manufacturers to improve the nutritional quality of their products.⁴ It uses a five-colour scale (from dark green to dark orange) associated with letters, from A (the best) to E (the worst).

Scientists, health professionals, learned societies, expert committees and public health authorities consider that the Nutri-Score relies on very strong scientific evidence, both in how the score is developed and in the demonstration of its effectiveness and usefulness in terms of

SUMMARY BOX

- ⇒ Many scientists and health professionals consider that scientific evidence that supports front-of-pack nutrition labelling, such as 'Nutri-Score', becomes mandatory in Europe to help consumers make healthier choices at the point of purchase.
- ⇒ Politicians and political parties, food manufacturers and some agricultural sectors are opposed to nutrition labelling such as 'Nutri-Score' as they claim that scientific studies insufficiently support making it into a policy.
- ⇒ The findings of 83% of studies published in peer-reviewed journals support nutrition labelling such as 'Nutri-Score'.
- ⇒ The probability for an article to show results that are not favourable to nutrition labelling such as 'Nutri-Score' is 21 times higher if the authors declare a conflict of interest or if the study is funded by the food industry.

public health.^{5,6} Given the evidence these experts consider that Nutri-Score should become mandatory in Europe. On the other hand, Nutri-Score is the subject of much criticism and numerous attacks by food manufacturers and some agricultural sectors. Some of this criticism is also relayed by politicians and political parties. These detractors claim that scientific studies are insufficient to support the use of Nutri-Score. Since this nutrition labelling was first used in 2014, numerous scientific studies have been published in peer-reviewed scientific journals investigating the validity of its underlying nutrient profile model and graphic design. A review of the literature (see online supplemental appendix) found a total of 149 scientific articles on Nutri-Score (or its initial version, the five-colour FoPNL or 5C label) have been published in peer-reviewed journals between January 2013 and September 2022.

Of these, 15 articles focused on the description of some food characteristics and/or evaluation of its implementation, including the evolution of its adoption by the food manufacturers and the role of industry lobbying. Of the 134 articles (110 original articles and 24 general reviews) investigating the effectiveness of the Nutri-Score using various criteria (validation of the underlying nutrient profile model or graphic design), 111 (83%) have conclusions favourable to the Nutri-Score. These articles, for example, demonstrated the relevance of the underlying algorithm,⁷ a better performance than other existing nutrition labels in terms of perception/attractiveness,⁸ an impact on food selection and on the nutritional quality of food purchases.⁹

Only 23 of the 134 articles (17%) on the effectiveness of the labelling model had results not favourable to the Nutri-Score. These 23 articles did not demonstrate its effectiveness, or showed less favourable effects than other labels,¹⁰ or suggested that its algorithm be improved.¹¹

Of the 111 studies considered favourable to the Nutri-Score, only 2 included declarations of a conflict of interest or indicated that the authors had received funding from the food industry (1.8%). Conversely, 9 of the 23 studies presenting results which are not favourable (39.1%) included a conflict of interest by the authors or that the study had received funding from the food industry. Among these nine studies, six^{11–16} are narrative reviews or papers not presenting any original research. These especially aim to sow doubts about the validity of the algorithm underlying the computation of Nutri-Score and/or on those demonstrating its efficiency in terms of objective understanding, food choice and impact on the nutritional quality of food purchases.

This can be seen, for example, in two recently narrative reviews funded by the food industry that resulted in negative findings on Nutri-Score, questioning the positive conclusions of the authors of the original scientific works.^{12–14} Three private structures were involved in the funding (or conflicts of interest of authors) of studies not favourable to Nutri-Score: the Dutch Dairy Association, Federalimentare (the Italian Federation of the Food Industry) and the Italian Nutrition Foundation (supported by 18 Italian food manufacturers). The impact of such private support to research specifically aims to prevent Nutri-Score from being adopted in 2023 as the single mandatory FoPNL in Europe as part of the Farm to Fork Strategy of the European Commission.

The probability for an article to show results that are not favourable to nutrition labelling such as ‘Nutri-Score’ is 21 times higher if the authors declared a conflict of interest or if the study was funded by the food industry. This finding of unfavorable results to Nutri-score in papers declaring a conflict of interest or that are funded by the food industry persists and is seven times higher even if all studies where the academic research team that developed Nutri-Score (without any conflict of interest) are excluded (38 articles published by the academic research team and 35 articles published in

collaboration between the team and other academic research teams).

These results about the role of financial conflicts of interest on the results of studies on Nutri-Score confirm the links between funding for studies and their results, the so-called funding bias, already described in several publications.^{12–17–22} A study²⁰ analysing articles published in 2018 in 10 nutrition and dietetics journals found that more than half (55%) of the articles for which the food industry provided funding had results aligned to the interests of the food industry, compared with only 9.7% of the articles published without food industry support.

This review shows that industry-funded research focuses on narrative reviews aimed at casting doubt on the relevance of findings of previous scientific papers whose results are favourable to Nutri-Score. Taking into account conflicts of interest and industrial funding appears to be an important indicator when assessing the relevance and the performance of a public health tool such as FoPNL Nutri-Score. Such focus on funding sources and conflicts of interest can help shed light on the various strategies used by the food production and processing industry and other economic actors to discredit tools or policies that are deemed a threat to the economic interests of these actors.²³ The food industry is only one of many private sector groups trying to influence policy and practice.

Addressing this issue requires on the one hand strong government support for independent scientific research. On the other hand, policymakers need to be made aware and held accountable if and when conflicts of interest arise in decision-making processes.

Accountability can be promoted by academia and civil society through research, publications and debates of these issues in the public domain including in scientific journals. Scientific journals also play a key role in guaranteeing that conflicts of interests are disclosed. Finally, it is important to guarantee maximum transparency on funding from private sources so that certain private sector interests do not take precedence over science.

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REFERENCES

- 1 Afshin A, Sur PJ, Fay KA, *et al*. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the global burden of disease study 2017. *The Lancet* 2019;393:1958–72.
- 2 European Commission. Public health-non-communicable diseases – overview. n.d. Available: [https://health.ec.europa.eu/non-communicable-diseases/overview_en#:~:text=Non%2Dcommunicable%20diseases%20\(NCDs\),causes%20of%20avoidable%20premature%20deaths](https://health.ec.europa.eu/non-communicable-diseases/overview_en#:~:text=Non%2Dcommunicable%20diseases%20(NCDs),causes%20of%20avoidable%20premature%20deaths)
- 3 Murray CJL, Aravkin AY, Zheng P, *et al*. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. *Lancet* 2020;396:1223–49.
- 4 Julia C, Hercberg S. Development of a new front-of-pack nutrition label in France: the five-colour nutri-score. *Public Health Panor* 2017;3:712–25.
- 5 Hercberg S, Touvier M, Salas-salvado J and group of European scientists supporting the implementation of nutri-score in Europe. *Int J Vitam Nutr Res* 2022;92:147–57.
- 6 International Agency for Research on Cancer (IARC/WHO). The nutri-score: a science-based front-of-pack nutrition label helping consumers make healthier food choices. n.d. Available: https://www.iarc.who.int/wpcontent/uploads/2021/09/IARC_Evidence_Summary_Brief_2.pdf
- 7 Gómez-Donoso C, Martínez-González MÁ, Perez-Cornago A, *et al*. Association between the nutrient profile system underpinning the nutri-score front-of-pack nutrition label and mortality in the sun project: a prospective cohort study. *Clin Nutr* 2021;40:1085–94.
- 8 Talati Z, Egnell M, Hercberg S, *et al*. Consumers' perceptions of five front-of-package nutrition labels: an experimental study across 12 countries. *Nutrients* 2019;11:1934.
- 9 van den Akker K, Bartelet D, Brouwer L, *et al*. The impact of the nutri-score on food choice: a choice experiment in a Dutch supermarket. *Appetite* 2022;168:S0195-6663(21)00571-7.
- 10 Packer J, Russell SJ, Ridout D, *et al*. Assessing the effectiveness of front of pack labels: findings from an online randomised-controlled experiment in a representative British sample. *Nutrients* 2021;13:900.
- 11 Kissock KR, Vieux F, Mathias KC, *et al*. Correction to: aligning nutrient profiling with dietary guidelines: modifying the nutri-score algorithm to include whole grains. *Eur J Nutr* 2022;61:555.
- 12 van der Bend DLM, van Eijsden M, van Roost MHI, *et al*. The nutri-score algorithm: evaluation of its validation process. *Front Nutr* 2022;9:974003.
- 13 Mazzù MF, Baccelloni A, Finistauri P. Uncovering the effect of European policy-making initiatives in addressing nutrition-related issues: a systematic literature review and bibliometric analysis on front-of-pack labels. *Nutrients* 2022;14:3423.
- 14 Peters S, Verhagen H. An evaluation of the nutri-score system along the Reasoning for scientific substantiation of health claims in the EU-A narrative review. *Foods* 2022;11:2426.
- 15 Donini LM, Berry EM, Folkvord F, *et al*. Front-of-pack labels: Directive versus informative approaches. *Nutrition* 2023;105:S0899-9007(22)00274-X.
- 16 Muzzioli L, Penzavecchia C, Donini LM, *et al*. Are front-of-pack labels a health policy tool? *Nutrients* 2022;14:771.
- 17 Lesser LI, Ebbeling CB, Goozner M, *et al*. Relationship between funding source and conclusion among nutrition-related scientific articles. *PLoS Med* 2007;4:e5.
- 18 Chartres N, Fabbri A, Bero LA. Association of industry sponsorship with outcomes of nutrition studies: a systematic review and meta-analysis. *JAMA Intern Med* 2016;176:1769–77.
- 19 Nestle M. Corporate funding of food and nutrition research: science or marketing? *JAMA Intern Med* 2016;176:13–4.
- 20 Lesser LI. Reducing potential bias in industry-funded nutrition research. *Am J Clin Nutr* 2009;90:699–700.
- 21 Massougbojji J, Le Bodo Y, Fratu R, *et al*. Reviews examining sugar-sweetened beverages and body weight: correlates of their quality and conclusions. *Am J Clin Nutr* 2014;99:1096–104.
- 22 Sacks G, Riesenbergs D, Mialon M, *et al*. The characteristics and extent of food industry involvement in peer-reviewed research articles from 10 leading nutrition-related journals in 2018. *PLoS ONE* 2020;15:e0243144.
- 23 Nestle M. Conflicts of interest in the regulation of food safety: a threat to scientific integrity. *JAMA Intern Med* 2013;173:2036–8.