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en Epidémiologie Nutritionnelle

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# International comparative experimental study : objective understanding of front-of-package nutrition labels in 12 countries

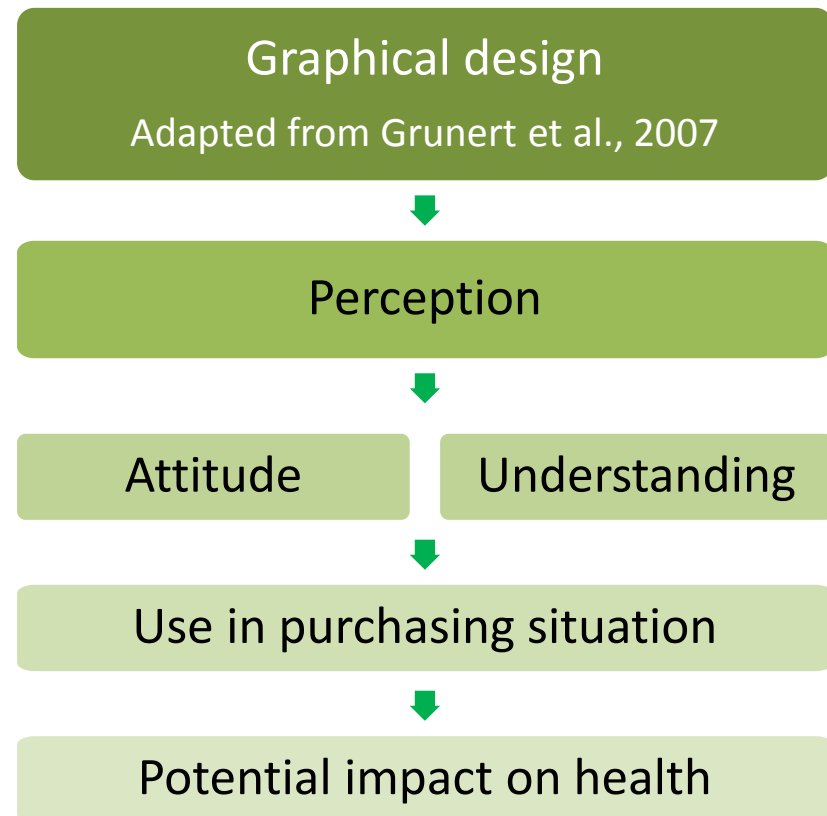
Dr. Chantal JULIA, MD, PhD

On behalf of a scientific consortium

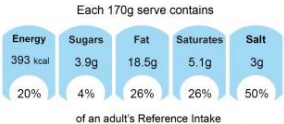

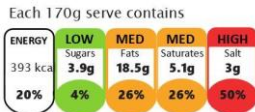


- Equipe de Recherche en Epidémiologie Nutritionnelle (EREN), Université Paris 13, Bobigny, France
- Curtin University, Curtin, Australia

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- Funders did not have any involvement in study design, data collection, statistical analyses, interpretation of the results or presentation of the results
- The scientists in the consortium report no conflicts of interests

- **Front of Pack labels** (FOPL) = efficient tool to increase consumers' awareness of foods nutritional quality and encouraging healthier choices
- Influence of the label format on its effectiveness
- **Understanding** = one of the key step of the FoPL use
  - ➔ Objective understanding: defined as the consumer's capacity to interpret the information conveyed by the FoPL as intended by its designers
- Influence of the label format on the consumers' objective understanding of the labels



- Various types of FoPLs implemented in the world

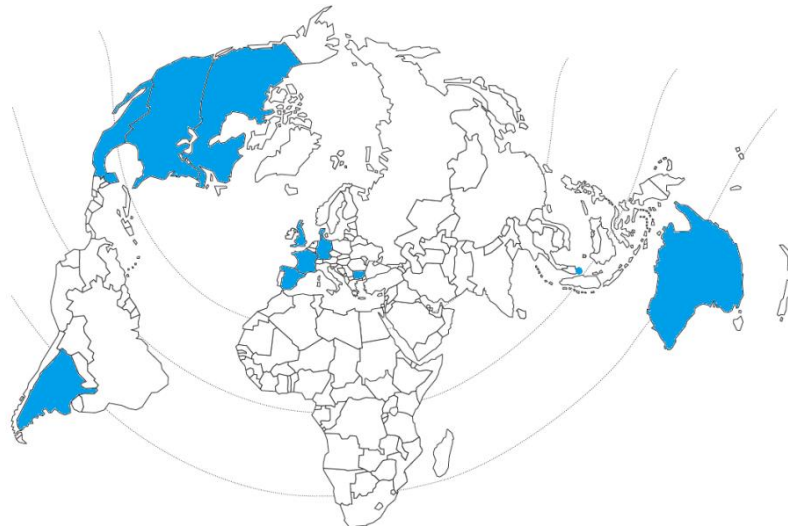
Nutrient-Specific	Summary
<p>Numeric - informative (e.g. Reference Intakes)</p> 	<p>Scale-based graded (e.g. Nutri-Score, Health Star Rating system)</p> 
<p>Colour-coded (e.g. Multiple Traffic Lights)</p> 	<p>Endorsement schemes (e.g. Choices, Green Keyhole)</p> 
<p>Warnings (e.g. Warning symbol)</p> 	

- **Intepretive** FoPLs (using colours, texts, symbols) more effective than informative labels
- Growing number of studies comparing the effectiveness of various FoPLs but **few labels included** and **recent models understudied**
- Different social and cultural backgrounds → Differences in consumers’ responses to FOPLs suggested

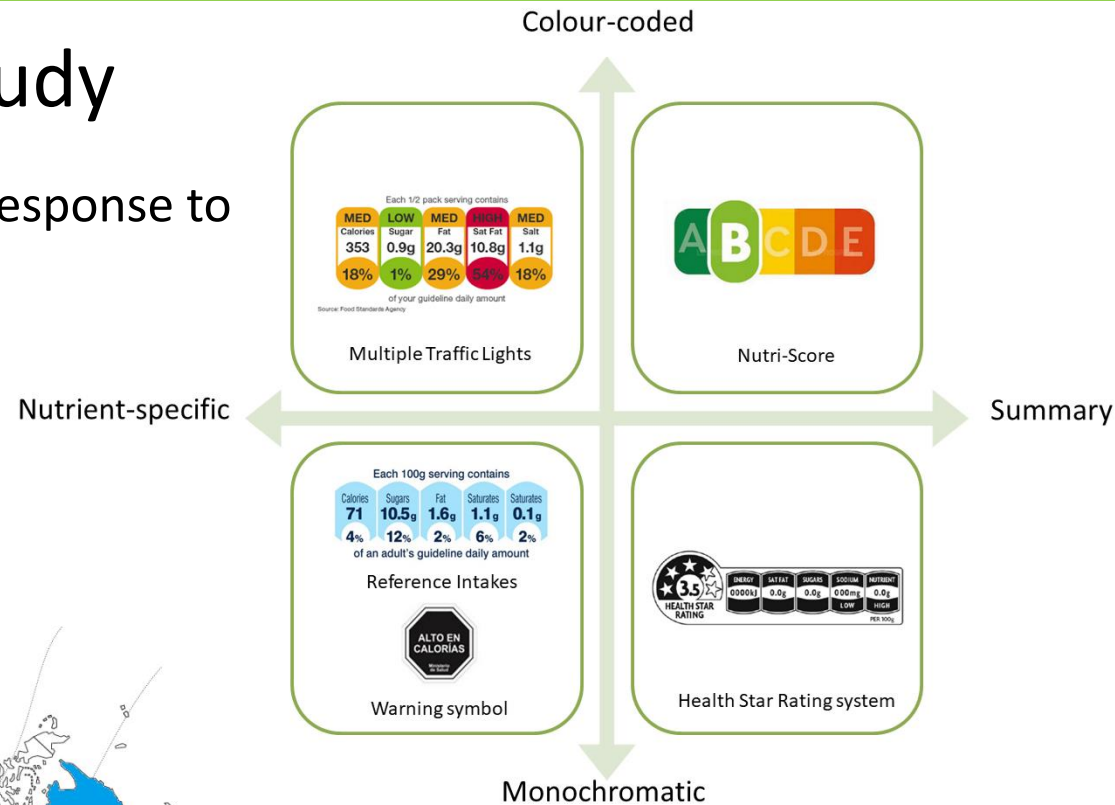
**Very few studies studies comparing different FoPLs across diverse cultural contexts**

# Objectives of the study

- Assessment of consumers' response to five FoPLs currently in use in the world
  - Objective Understanding**
  - Attitudes
  - Effect on food choice



- International comparison across 12 countries: Argentina, Australia, Bulgaria, Canada, Denmark, France, Germany, Mexico, Singapore, Spain, United Kingdom, United States



- Participants

- 12,015 adults recruited in twelve countries (~1000/country) using an international web panel provider
- Quota sampling on:
  - ✓ Sex: 1/1 ratio
  - ✓ Age: 1/3 in 18-30 years, 31-50 years and over 51 years
  - ✓ Socioeconomic status: 1/3 in high, medium, low income households
- Regular consumers of the food categories tested

- Design and stimuli

- 3 food categories (pizzas, cakes, cereals) with high variability in nutritional quality within the category and consumed in all 12 countries



- Within each food category: 3 products with distinct nutritional profiles (lower, intermediate, and higher nutritional quality)
- Creation of mock packages

- Procedure

Ranking task without any FoPL (3 food categories successively)

1



1 - highest nutritional quality  
2 - medium nutritional quality  
3 - lowest nutritional quality

1 - highest nutritional quality  
2 - medium nutritional quality  
3 - lowest nutritional quality

1 - highest nutritional quality  
2 - medium nutritional quality  
3 - lowest nutritional quality



Randomisation in one of the 5 FoPLs groups

Ranking task with one of the 5 FoPLs (3 food categories successively)

2



1 - highest nutritional quality  
2 - medium nutritional quality  
3 - lowest nutritional quality

1 - highest nutritional quality  
2 - medium nutritional quality  
3 - lowest nutritional quality

1 - highest nutritional quality  
2 - medium nutritional quality  
3 - lowest nutritional quality

- Descriptive analyses

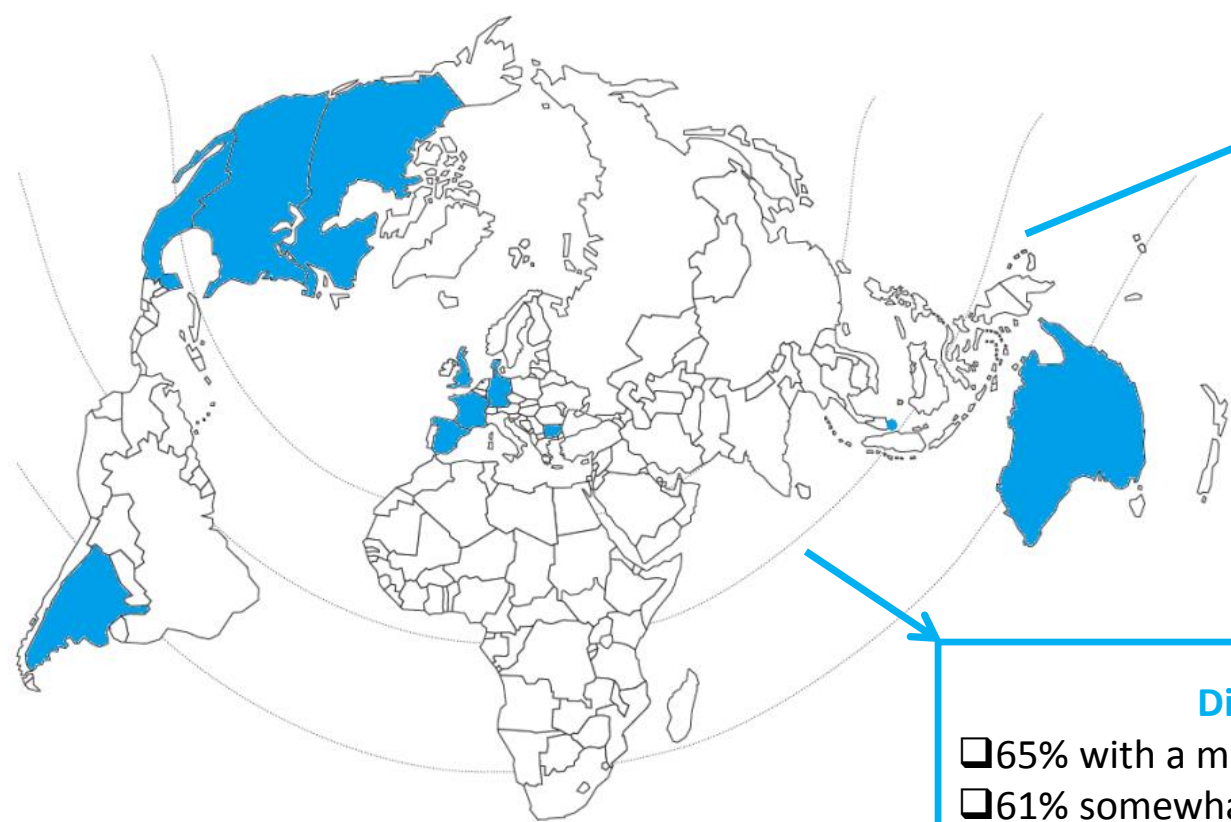
- Number of correct answers in no label and FoPL conditions by food category
- Change** in number of correct answers: % of change compared to no label

- Multivariate analyses

- Outcome : **objective understanding** assessed by comparing the ranking task results of participants between the no label and FoPL conditions
  - ➔ final score between -3 (deterioration of participant's ability between no FoPL and FoPL tasks) and +3 (improvement of participant's ability)
- Association with **FoPLs**
  - ✓ Overall sample
  - ✓ By country



- Overall description of the population sample



**Sociodemographic**

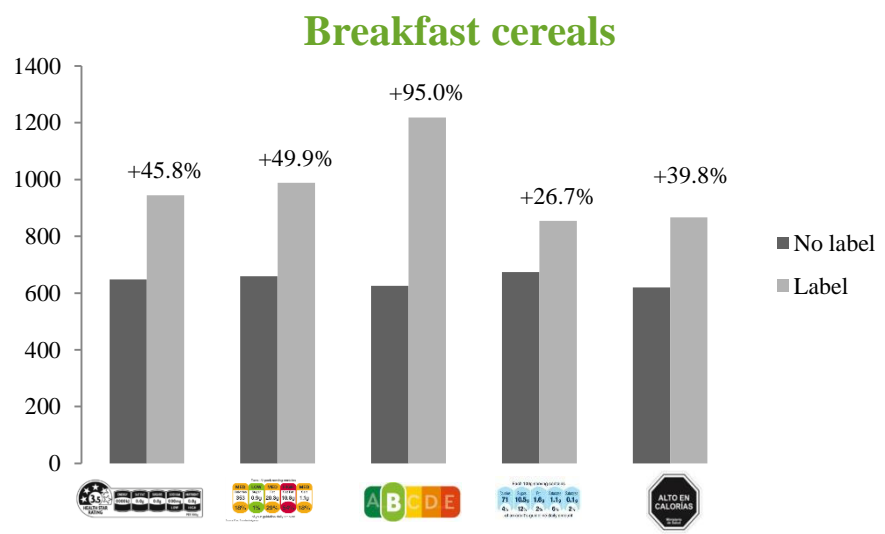
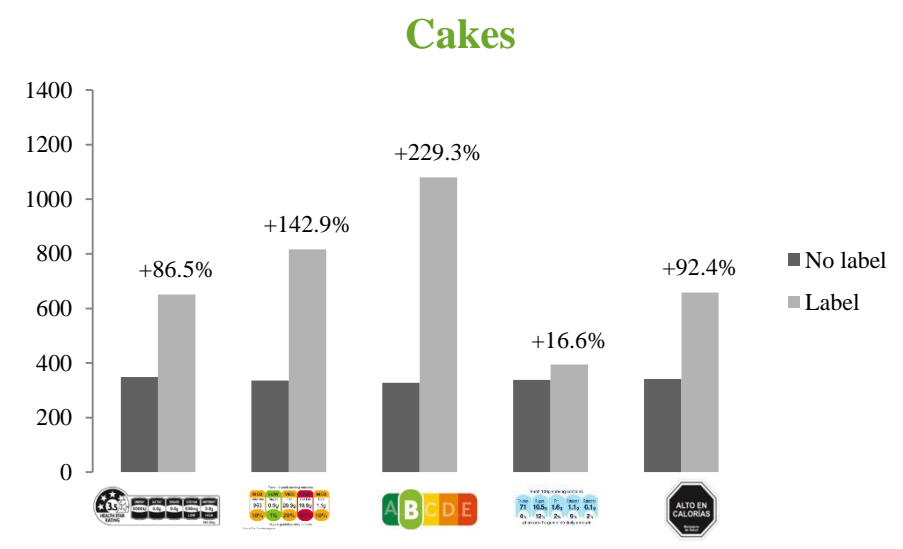
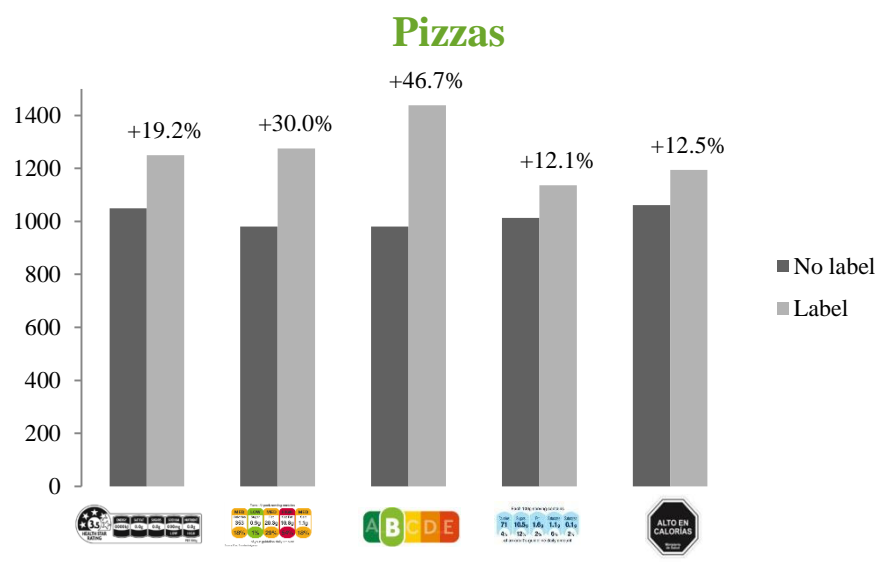
- ❑ 50% men
- ❑ 33% over 50y
- ❑ 34% with a University undergraduate degree

**Diet – grocery shopping**

- ❑ 65% with a mostly healthy diet
- ❑ 61% somewhat knowledgeable about nutrition
- ❑ 74% responsible for the grocery shopping
- ❑ 62% recalled seeing the FoPL during the survey

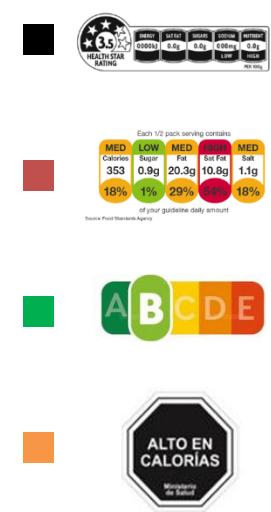
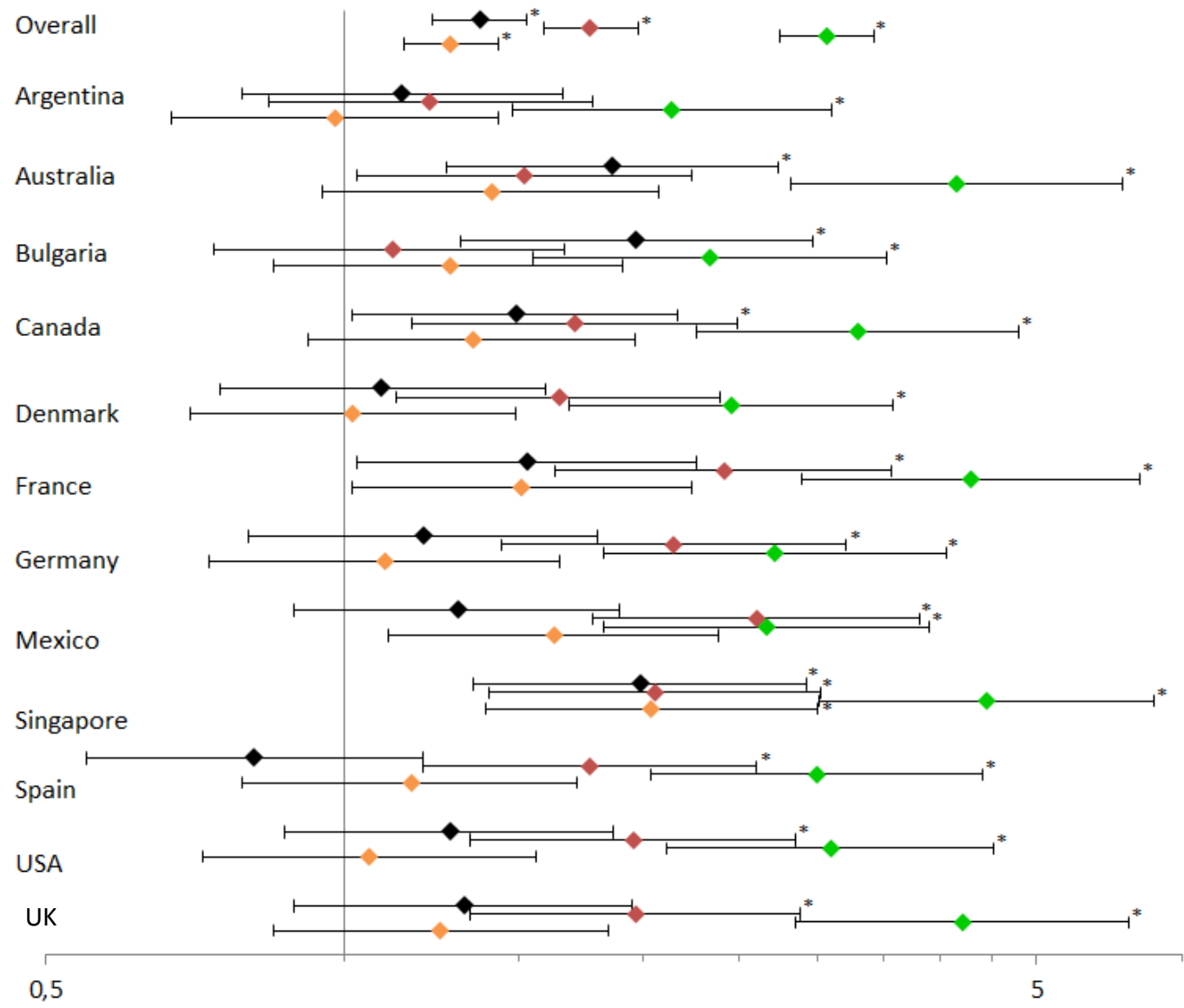
- Similar trends across countries

- All FoPLs improved the number of correct answers compared to no label



- Heterogeneous results depending on the FoPL:
  - 1 – Nutri-Score
  - 2 – Multiple Traffic Lights
  - 3 – Health Star Rating system
  - 4 – Warning symbol
  - 5 – Reference Intakes

- Results of the associations between FoPLs and the ability of correctly rank products



Odd Ratios and 95% confidence intervals of the association between FOP labels and improvement of ranking ability compared to RIs  
 \* Significant associations after multiple testing correction

**Nutri-Score** is the FoPL associated with the highest improvement in participants' ability to correctly rank nutritional quality of products, followed by the MTL, the HSR and the Warning symbol.

- Similar trends in all 12 countries
- Similar trends by food category
- No interaction with level of income: high understanding of Nutri-Score irrespective of the level of household income
- In sensitivity analyses on participants recalling having seen the FoPL during the survey : Nutri-Score performed best followed by the Warning symbol

### **1 – Interpretive vs. informative labels**

**Higher understanding** of FoPLs providing **guidance to consumers** (colours, symbols, etc) than labels providing only numeric informations such as the RIs label

### **2 – Colour-coded vs. monochromatic labels**

**Higher understanding** of FoPLs featuring a **colour-coding**, using in particular the **green-red** polychromatic scale, than monochromatic labels

### **3 – Summary vs. Nutrient-specific labels**

**Higher understanding** of FoPLs using a **summary indicator** of the overall nutritional quality of the food

### **4 – Similar patterns across countries**

**Higher understanding** of labels with the two key features (**summary and colour-coded**, such as Nutri-Score) in **all countries** included in the study, even in countries where another FoPL is already implemented (UK, Australia).

These graphical assets appear to **outweigh the effect of potential familiarity** of consumers with a FoPL.

- Perspectives of this international comparative experimental study

- The comparison of these 5 FoPLs on food choices



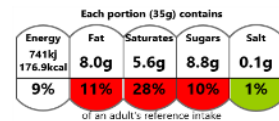
Although most respondents did not change their choice of food with the addition of a FoPL, a sizeable minority shifted towards a healthier product, especially when the Nutri-score or MTL was used.

- Other perspectives

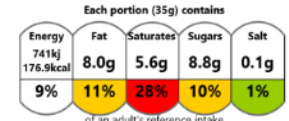
- Experimental comparison of the Nutri-Score with other FoPLs formats on portion size selection



Nutri-Score



Multiple Traffic Lights



Evolved Nutrition Label



The Nutri-Score is the most effective FoPL to decrease the portion size selected by participants for less healthy products.



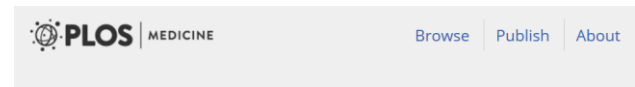
Article  
**Impact of Front-of-Pack Nutrition Labels on Portion Size Selection: An Experimental Study in a French Cohort**

Manon Egnell <sup>1,\*</sup>, Emmanuelle Kesse-Guyot <sup>1</sup>, Pilar Galan <sup>1</sup>, Mathilde Touvier <sup>1</sup>, Mike Rayner <sup>2</sup>, Jo Jewell <sup>3</sup>, João Breda <sup>3,\*</sup>, Serge Hercberg <sup>1,5</sup> and Chantal Julia <sup>1,5</sup>

- Validation of the underlying algorithm of the Nutri-Score in the EPIC cohort of 471,495 adults



The consumption of food products with a higher FSAm-NPS score (lower nutritional quality) is associated with an increased risk of cancer.



OPEN ACCESS PEER-REVIEWED  
RESEARCH ARTICLE  
Nutritional quality of food as represented by the FSAm-NPS nutrient profiling system underlying the Nutri-Score label and cancer risk in Europe: Results from the EPIC prospective cohort study  
Mélanie Deschasaux , Inge Huybrechts, Neil Murphy, Chantal Julia, Serge Hercberg, Bernard Strour, Emmanuelle Kesse-Guyot, Paule Latino-Martel, Carine Biessy, Corinne Casagrande, Mazda Jenab, Heather Ward, Elisabete Weiderpass, [...] Mathilde Touvier [ view all ]



Article

# Objective Understanding of Front-of-Package Nutrition Labels: An International Comparative Experimental Study across 12 Countries

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## • References

1. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: a systematic review. *Public Health Nutr.* févr 2005;8:21-8.
2. Hawley KL, Roberto CA, Bragg MA, Liu PJ, Schwartz MB, Brownell KD. The science on front-of-package food labels. *Public Health Nutr.* mars 2013;16:430-9.
3. Hersey JC, Wohlgenant KC, Arsenault JE, Kosa KM, Muth MK. Effects of front-of-package and shelf nutrition labeling systems on consumers. *NutrRev.* janv 2013;71:1-14.
4. Grunert Klaus G, Wills Josephine M. A review of European research on consumer response to nutrition information on food labels. *J Public Health.* oct 2007;15:385-99.
5. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: a systematic review. *Public Health Nutr.* août 2011;14:1496-506.
6. Borgmeier I, Westenhoefer J. Impact of different food label formats on healthiness evaluation and food choice of consumers: a randomized-controlled study. *BMC Public Health.* 12 juin 2009;9:184-.
7. Ducrot P, Mejean C, Julia C, Kesse-Guyot E, Touvier M, Fezeu L, et al. Effectiveness of Front-Of-Pack Nutrition Labels in French Adults: Results from the NutriNet-Sante Cohort Study. *PLoS One.* 2015;10:e0140898-.
8. Ducrot P, Mejean C, Julia C, Kesse-Guyot E, Touvier M, Fezeu LK, et al. Objective Understanding of Front-of-Package Nutrition Labels among Nutritionally At-Risk Individuals. *Nutrients.* 24 août 2015;7:7106-25.
9. Gorski Findling MT, Werth PM, Musicus AA, Bragg MA, Graham DJ, Elbel B, et al. Comparing five front-of-pack nutrition labels' influence on consumers' perceptions and purchase intentions. *Prev Med.* janv 2018;106:114-21.
10. Julia C, Peneau S, Buscail C, Gonzalez R, Touvier M, Hercberg S, et al. Perception of different formats of front-of-pack nutrition labels according to sociodemographic, lifestyle and dietary factors in a French population: cross-sectional study among the NutriNet-Sante cohort participants. *BMJ Open.* 15 juin 2017;7:e016108-.
11. McLean R, Hoek J, Hedderley D. Effects of alternative label formats on choice of high- and low-sodium products in a New Zealand population sample. *Public Health Nutr.* mai 2012;15(5):783-91.
12. Mejean C, Macouillard P, Peneau S, Hercberg S, Castetbon K. Consumer acceptability and understanding of front-of-pack nutrition labels. *J Hum Nutr Diet.* oct 2013;26:494-503.
13. Mejean C, Macouillard P, Peneau S, Hercberg S, Castetbon K. Perception of front-of-pack labels according to social characteristics, nutritional knowledge and food purchasing habits. *Public Health Nutr.* mars 2013;16:392-402.
14. Roseman MG, Joung H-W, Littlejohn EI. Attitude and Behavior Factors Associated with Front-of-Package Label Use with Label Users Making Accurate Product Nutrition Assessments. *J Acad Nutr Diet.* 30 nov 2017;
15. Talati Z, Norman R, Pettigrew S, Neal B, Kelly B, Dixon H, et al. The impact of interpretive and reductive front-of-pack labels on food choice and willingness to pay. *Int J Behav Nutr Phys Act.* 19 déc 2017;14(1):171.
16. Maubach N, Hoek J, Mather D. Interpretive front-of-pack nutrition labels. Comparing competing recommendations. *Appetite.* 1 nov 2014;82:67-77.
17. Feunekes GI, Gortemaker IA, Willems AA, Lion R, van den Kommer M. Front-of-pack nutrition labelling: testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. *Appetite.* janv 2008;50:57-70.
18. Grunert KG, Fernandez-Celemin L, Wills JM, Storcksdieck Genannt BS, Nureeva L. Use and understanding of nutrition information on food labels in six European countries. *ZGesundhWiss.* juin 2010;18:261-77.