



## Short Communication

# Do nutritional warnings encourage healthier choices on food ordering websites? An exploratory experimental study in Uruguay

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### Abstract

**Objective:** To evaluate if the inclusion of nutritional warnings in food ordering websites can discourage consumers from purchasing foods with excessive content of nutrients associated with non-communicable diseases (NCD).

**Design:** Participants were randomly assigned to one of the two experimental conditions: control ( $n$  225) or nutritional warnings ( $n$  222). Nutritional warnings corresponded to separate black octagonal signs containing the word 'Excess' followed by the corresponding nutrient: total fat, saturated fat, sugars and sodium. Participants were asked to purchase a lunch for themselves using a simulated food ordering website.

**Setting:** Online study in Uruguay.

**Participants:** Convenience sample of 447 Uruguayan participants, recruited using social media.

**Results:** In the control condition, 76 % of the participants selected a dish or a beverage with excessive content of at least one nutrient in the simulated food ordering website. When nutritional warnings were included, this percentage significantly decreased to 62 % ( $P = 0.002$ ). In addition, nutritional warnings caused a significant reduction in the percentage of participants who selected dishes with excessive content of total fat: 50 % *v.* 62 % ( $P = 0.012$ ).

**Conclusions:** Results from the present work provide preliminary evidence that the inclusion of nutritional warnings in food ordering websites could discourage consumers from selecting dishes and beverages with excessive content of nutrients associated with NCD.

**Keywords**  
Menu labelling  
Nutrition labelling  
Front-of-package  
Public policy  
Behavior change

Nutritional warnings are a front-of-package nutrition labelling scheme that is gaining increased interest among policy-makers, particularly in the region of the Americas<sup>(1,2)</sup>. They consist of text-based logos that highlight products with excessive amounts of nutrients associated with non-communicable diseases (NCD)<sup>(2)</sup>. Nutritional warnings make negative aspects of the nutritional composition of products more salient in consumers' mind, encouraging them to re-assess their food purchase decisions<sup>(3,4)</sup>. A growing body of evidence shows that nutritional warnings are efficient at discouraging consumption of products with excessive content of nutrients associated with NCD<sup>(3–7)</sup>.

To date, the implementation of nutritional warnings has been mostly restricted to packaged foods<sup>(2,4–8)</sup>. However, their extension to food establishments selling unpackaged foods deserves further attention given the growing contribution of prepared meals and meals consumed outside the home to the overall diet<sup>(9,10)</sup>. Compared to home-made meals, consumption of meals prepared away from home has been associated with a higher intake of total calories, total fat, saturated fat, trans-fatty acids, and sodium, and a lower intake of fruit, vegetables and fibre<sup>(11)</sup>. In recent years, food delivery services have risen worldwide as consumers increasingly

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order food online through websites or apps<sup>(12,13)</sup>. This trend is expected to be exacerbated in the context of the social distancing measures implemented to contain the outbreak of COVID-19<sup>(14)</sup>.

The implementation of nutritional information to unpackaged foods has received increasing attention worldwide to encourage healthier food choices<sup>(9)</sup>. However, it has been mainly focused on calorie labelling on restaurant menus, which has been reported to have a limited effect on consumer behaviour<sup>(15–18)</sup>. Considering that simple and visible summaries of the nutritional quality of foods have been shown to be more impactful than numeric information<sup>(2,7)</sup>, the implementation of nutritional warnings in food retail establishments selling unpackaged foods deserves further consideration. Based on research conducted with packaged foods<sup>(4–7)</sup>, it could be hypothesised that nutritional warnings could potentially discourage selection of foods and beverages with excessive content of nutrients associated with NCD. In this sense, the limitation of nutritional warnings to pre-packaged foods has been a concern during the public consultation held before the implementation of this public policy in Chile and Uruguay<sup>(19,20)</sup>. The Chilean government identified the extension of nutritional warnings to retail food establishments as a relevant topic for the medium-term policy agenda<sup>(19)</sup>.

In this context, the aim of the present work was to evaluate if the inclusion of nutritional warnings in food ordering websites can discourage consumers from purchasing foods with excessive content of nutrients associated with NCD.

## Methods

### Participants

A total of 447 participants were recruited using an advertisement on Facebook and Instagram targeted at Uruguayan adult users between 12 June and 27 June 2020. The advertisement included the following text ‘Click on the link, choose a lunch as you do in a food ordering website, and enter a raffle for a gift card’, accompanied by an image containing a cellphone and food delivery motorcycle. The advertisement was delivered to 149 050 social media users, randomly selected by Facebook software, from which 1640 clicked on the advertisement and 447 completed the shopping task. All the participants who completed the task used food ordering websites, at least occasionally. Participants (64% female) were aged between 18 and 71 years ( $M = 39.9$ ,  $SD = 14.5$ ) and were diverse in terms of their educational level (Table 1). The study was approved by the ethics committee of the School of Chemistry of Universidad de la República (Uruguay).

### Stimuli

The study was conducted using a website that simulated an online food ordering website. A total of 224 dishes and beverages were included. Dishes and beverages were grouped

**Table 1** Sociodemographic characteristics of the participants ( $n = 447$ )

Characteristic	Percentage of participants (%)
Gender	
Feminine	64
Masculine	36
Age (years)	
18–29	27
30–45	34
46–60	27
61–71	11
Educational level	
Primary school	5
Secondary school	59
Technical education	14
University degree	15
Postgraduate studies	7
Number of people living in the household	
1	15
2	27
3	32
4	16
5 or more	10
Responsibility for food purchasing in the household	
Once or more times per week	79
A few times per month	11
Occasionally	10

into 31 categories: Beverages (mineral water – still and sparkling, flavoured water – regular and sugar-free versions, soft drinks – regular and sugar-free versions), Coffee, Calzone, Meat, *Chivito* (a typical Uruguayan meat sandwich), Arabic, Chinese, Indian, *Empanadas* (baked or fried mould of pastry filled with a variety of ingredients), Salads, *Revuelto gramajo* (typical dish composed of French fries, scrambled egg, ham and other ingredients), Burgers, Ice cream, Juices and Smoothies, *Labmacun* (thin piece of dough topped with minced meat, minced vegetables and herbs), *Milanesas* (slice of meat with breading, typically fried), Hot dogs, French fries, *Parrilla* (grilled meats), Pasta, Fish and seafood, Appetizers, Pizza, Poke (cubes of fish served in a bowl along with rice, dressing, vegetables and seasonings), Chicken, Desserts, Sandwiches, Sushi, Pies, *Tortilla* (omelette made with eggs and potatoes), and Wraps. The categories were selected based on the options available on the most popular Uruguayan food ordering website. Within each category, 3–18 options were selected, based on the recommended dishes and beverages available in the food ordering website. Dishes and beverages were presented on the website using a written description of the dish or beverage, a picture and the price. A screen capture of the website is shown in the Appendix. Prices were selected based on the information available in the most popular Uruguayan food ordering website. Only beverages included brand information (shown in the product name and the picture).

Two experimental conditions were considered: (i) a control condition with no nutritional information and (ii) the Uruguayan nutritional warning system. This system



uses separate black stop signs, containing the word 'Excess' followed by the corresponding nutrient, to highlight products with excessive content of total fat, saturated fat, sugars and sodium. According to the Uruguayan regulation, nutritional warnings were included on dishes and beverages added with fat, sugar and/or salt if their content exceeded pre-established limits, based on a flexibilisation of the nutrient profile model of the Pan American Health Organization<sup>(21)</sup>. From all the available options, 50 % contained excessive content of total fat, 61 % excessive content of saturated fat, 10 % excessive content of sodium and 14 % excessive content of sugars. Nutritional warnings were included next to the picture of the dish or beverage, as exemplified in the Appendix.

### **Experimental procedure**

Participants were randomly assigned to one of the two experimental conditions: control ( $n = 225$ ) or nutritional warnings ( $n = 222$ ). Randomisation was automatically generated by the software and was blinded to the researchers during the study. No significant differences between the groups were found in their gender, age, educational status, household composition and responsibility for food purchasing (all  $P$ -values higher than 0.23).

First, participants provided informed consent using an online form. They completed a series of sociodemographic questions and indicated their frequency of use of food ordering websites to confirm eligibility criteria. Participants were also asked to indicate their willingness to participate in a raffle for a voucher worth 70 US dollars by clicking on the corresponding option and providing their contact details. Then, they were given the following instructions: '*The study consists of making a purchase of a lunch for yourself, as if you were using a food ordering website*'. They were explained that products were grouped into categories and that they could go through the products included in each category by making a mouse click on the category name. They were asked to select all the products they would buy by clicking on the 'Add' button of each product. Once they had finished their purchase, they were instructed to click on the shopping cart symbol at the top of the website to review the purchase and submit their response.

### **Data analysis**

The primary outcome of the study was the percentage of participants who selected a dish or beverage with excessive content of any nutrient (total fat, saturated fat, sodium and sugars). The secondary outcomes were the percentage of participants who selected a dish or beverage with excessive content of each separate nutrient (total fat, saturated fat, sodium and sugars). The minimum number of participants to be included in the study was calculated *a priori*. A minimum of 342 participants (171 per group) was needed to detect a significant difference of 15 % in the percentage of participants who selected dishes or beverages with nutritional warnings, from 71 % in the control condition. This

last percentage was estimated based on the percentage of the dishes and beverages in the food ordering website which featured warnings, whereas the 15 % change was estimated based on results from a previous study with packaged products<sup>(5)</sup>.

A set of binary variables were created to identify whether a participant selected a dish or beverage with excessive content of any nutrient and excessive content of total fat, saturated fat, sodium and sugars (1: participant selected a dish or beverage with excessive content of the target nutrient and 0: participant did not select a dish or beverage with excessive content of the target nutrient). The percentage of participants who selected dishes or beverages with excessive content of total fat, saturated fat, sodium and sugars were calculated. A generalised linear model was used to evaluate the effect of the experimental condition on the likelihood of participants' selecting a product with excessive content of each of the four nutrients. A logit link function and a 5 % significance level were considered. Hypotheses and analytic plan were not publicly registered prior to data collection.

### **Results**

Participants selected dishes and beverages within an average of 2.6 categories. Fifty-six per cent of the participants selected at least one beverage (24 % selected mineral water, 26 % flavoured water, 15 % soft drinks and 10 % juices or smoothies), whereas 44 % selected a dessert. The most frequently selected dishes corresponded to the categories: Meat (selected by 20 % of the participants), Salads (17%), Pies (9%), Sandwiches and Bocattas (8%), *Chivito* (8%), Empanadas (7%), and *Milanesas* (7%) (data not shown).

In the control condition, 76 % of the participants selected a dish or a beverage with excessive content of at least one nutrient in the simulated food ordering website. When nutritional warnings were included, this percentage significantly decreased to 62 % ( $P = 0.002$ ). As shown in Table 2, when data were analysed at the level of individual nutrients, it can be concluded that nutritional warnings caused a significant reduction in the percentage of participants who selected dishes with excessive content of total fat: 50 % *v.* 62 % ( $P = 0.012$ ). In addition, a marginal reduction in the percentage of participants who selected dishes or beverages with excessive content of saturated fat ( $P = 0.079$ ) and sugars ( $P = 0.074$ ) was observed (Table 2).

### **Discussion**

Although nutritional warnings have been compulsorily implemented on packaged foods in several countries worldwide, their application to unpackaged foods has not gained much attention yet<sup>(1,2,19,20)</sup>. The only application of this policy to food establishments is restricted to the inclusion of sodium warnings on the menus of chain

**Table 2** Percentage of participants who selected a dish or beverage with excessive content of nutrients for participants in the control group (without nutritional information) and the nutritional warnings group

Type of dish or beverage	Experimental condition		P-value
	Control (n 225)	Nutritional warnings (n 222)	
Excessive content of at least one nutrient (total fat, saturated fat, sodium and sugar)	<b>76 %</b>	<b>62 %</b>	<b>0.002</b>
Excessive content of total fat	<b>62 %</b>	<b>50 %</b>	<b>0.012</b>
Excessive content of saturated fat	52 %	44 %	0.079
Excessive content of sodium	28 %	23 %	0.227
Excessive content of sugars	47 %	39 %	0.074

Percentages highlighted in bold are significantly different between the two experimental conditions according to the generalised linear model.

restaurants in New York<sup>(22)</sup>. However, empirical evidence of the efficacy of warnings to discourage selection of dishes with excessive content of nutrients associated with NCD is still limited<sup>(23–25)</sup>. In this context, the present work intended to contribute to the literature by assessing the effect of including nutritional warnings on food ordering websites.

Results showed that the inclusion of nutritional warnings in a simulated food ordering website led to a reduction in the percentage of participants who selected dishes or beverages with excessive content of at least one nutrient associated with NCD. Warnings discouraged participants from selecting dishes with excessive content of total fat and beverages with excessive content of sugars. These results are in agreement with empirical evidence on the impact of the inclusion of nutritional warnings on packaged foods in experimental studies<sup>(5,6)</sup>, as well as after their compulsorily implementation in Chile and Uruguay<sup>(4,7)</sup>.

The inclusion of nutritional warnings did not significantly modify the percentage of participants choosing meals with excessive sodium content. One of the possible explanations for this result is that dishes with excessive content of sodium only accounted for 10 % of all the available options. Similar results have been reported by Byrd *et al.* when assessing the impact of sodium warnings on restaurant menus<sup>(23)</sup>. According to these authors, the inclusion of sodium warnings on restaurant menus was associated with meal selections with lower sodium content only for participants that regarded foods with lower sodium content and healthy foods as healthy<sup>(23)</sup>. Similarly, Burton *et al.* reported that provision of numeric information about sodium content only influenced the choice of consumers with heart disease risk<sup>(24)</sup>. However, another recent study reported that the inclusion of red octagonal sodium warnings on restaurant menus led to a significant reduction in the average sodium content of the selected items<sup>(25)</sup>.

Further research is needed to explore the variables that mediate the effect of warnings on consumers' food choices in food ordering websites and other establishments selling unpackaged foods.

### Limitations of the study

To the authors' knowledge, the present study is the first to explore the influence of nutritional warnings on consumer food choices in food ordering websites. Despite its novelty, the study is not free of limitations.

First of all, the hypotheses and analytic plan were not publicly registered prior to data collection. Secondly, the study involved hypothetical choices as participants did not consume the selected items nor paid for them. In addition, although the simulated food ordering website included a wide range of dishes and beverages, no information about food retail establishments was provided. Further research should be conducted to evaluate the influence of nutritional warnings on real purchase behaviour in food ordering websites and other establishments selling unpackaged foods.

A relatively small sample of participants recruited using social media was considered, which may be the cause of some of the marginal effects reported in the present work. In addition, the small sample size did not enable to evaluate the effect of nutritional warnings on specific segments of the population (e.g. age groups). In this sense, the effect of nutritional warnings on participants with NCD deserves special attention<sup>(24)</sup>.

Finally, results were not analysed considering specific categories of dishes and beverages. Research on packaged products suggests that nutritional warnings are expected to be more efficient in food categories wrongfully regarded as healthy compared to categories that are clearly perceived as unhealthy (e.g. French fries)<sup>(3,4,26)</sup>. Future studies should look at category effects to provide an in-depth understanding of how nutritional warnings influence consumer choices of unpackaged foods and prepared meals.

### Conclusions

Results from the present work provide preliminary evidence that the inclusion of nutritional warnings in food ordering websites has the potential to discourage consumers from selecting dishes and beverages with excessive content of nutrients associated with NCD. Further research is needed to confirm and extend the findings of the present work to other food establishments selling unpackaged foods and support their implementation.

### Supplementary material

For supplementary material accompanying this paper visit <https://doi.org/10.1017/S1368980021001026>



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