

# Extended Abstract

# Influence of different models of front-of-pack nutrition labeling on the Argentinian consumer acceptability: Case of crackers

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# Abstract

Prevalence of overweight, obesity and noncommunicable diseases continue to increase in Argentina and in the world. The massive consumption of ultra-processed foods rich in sugars, fats and sodium constitute one of the main factors in the development of these pathologies. In several countries, different front labeling models have been developed with simplified nutritional information on food product packages in order to mitigate this situation, guiding the consumer towards the choice of healthy foods. The objective of this study was to evaluate the impact of three different types of front-of-pack nutrition labels: warning stamps, nutritional traffic lights and nutri-score, on the crackers acceptability in Argentinian consumers. An acceptability test with two version of crackers ("traditional" and "free or reduced" nutrient) was carried out in four stage with 400 consumers. The first one was carried out without labels. In the subsequent three ones the different front labels were presented along with the samples to be analyzed in order to quantify the difference in acceptability in the presence or absence of the labels. The results showed that all FOP nutritional labeling positively influenced the choice of the healthiest crackers. When analyzing the responses by sociodemographic segments, it was observed that the warning stamps had a greater impact, mainly in women. These results indicate that the implementation of front-of-pack nutrition labeling model in Argentina could contribute positively to healthy food choices.

#### Introduction

Increased production of processed food, rapid urbanization and change in lifestyles has led to changes in eating habits. Convenience, practicality, pleasure and speed have become factors that define what to buy, what to eat and where to eat.

In Argentina, the dietary pattern has changed in the last two decades, highlighting the increase in the consumption of foods high in sugar, saturated fat and sodium, typical of ultra-processed products and decrease in the intake of foods with no or minimal processing such as fruits, vegetables, milk, lean meats, legumes and cereal flours

According to the new report of the Pan American Health Organization, in Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela the sales of ultra-processed foods and beverages grew by 8.3% from 2009 to 2014 and continued increasing towards 2020. These changes are significantly associated with an increase in the average body mass index of the general population, which, combined with the decrease in energy expenditure, induces a sedentary lifestyle. All these generate an environment conducive to the development of overweight and obesity that produce a public health problem of great magnitude, both globally and nationally.

Overweight and obesity are strongly linked to the development of chronic non-communicable diseases (NCDs), which are the cause of death for millions of people in the world. In Argentina, obesity and NCDs rates related to it continue to rise. In 2018, The Argentinean National Survey of Risk Factors revealed that 36,2% of Argentinian were overweight and the 25.4% were obese (61,6% of the total population). These pathologies can be prevented by transforming the current obesogenic environment into opportunities to promote greater consumption of nutritious foods.

In Argentina, food labeling is regulated through the Argentine Food Code (CAA) which, in 2006, implemented the nutritional labeling of packaged foods on a mandatory basis in order to provide consumers with more information about the properties of said products. However, the provisions of the code are of sanitary, hygienic, bromatological and commercial identification content; therefore, they do not include a NCDs prevention perspective and do not help to consumer in order to make conscious decisions about their diet to improve their health.

The present work proposes to study different models of front-of-pack nutrition labeling in order to evaluate their influence on the food acceptability and define which would represent the best strategy around the choice of healthy products for prevention of the health.

#### Methods:

Two versions of crackers were selected: the "traditional" and "free or reduced" nutrients. For each one, their acceptability: measured from a verbal hedonic scale of 9 degrees of freedom anchored at the extremes "Like Extremely " and "Dislike Extremely" with a midpoint located at "Neither Like nor Dislike"; was evaluated through a full factorial "2x4" experimental design arranged as follows:

Stage 1	Stage 2	Stage 3	Stage 4	ntot
(n=100)	(n=100)	(n=100)	(n=100)	
TCWI	TCTL	TCOT	TCNS	400
RCWI	RCTL	RCOT	RCNS	

#### Table 1 Experimental design

Where: TCWI is traditional cracker without nutritional information; RCWI is nutrient "free or reduced" cracker without nutritional information; TCTL is traditional cracker whit traffic light FOP nutrition labeling; RCTL is nutrient "free or reduced" cracker whit traffic light FOP nutrition labeling; TCOT is traditional cracker whit octagonal stamps FOP nutrition labeling; RCOT is nutrient "free or reduced" cracker whit octagonal stamps FOP nutrition labeling; TCNS is traditional crackers whit nutri-score FOP nutrition labeling, and RCNS is nutrient "free or reduced" cracker whit nutriscore FOP nutrition labeling.

One-way analysis of variance (ANOVA) was conducted on all results using Minitab 16 software (Minitab Inc., State College, PA, USA). When differences were significant (P < 0.05), the means were compared using Tukey's test

### **Results and discussions**

The study was segmented by gender (male - female), age (between 18 and 40 years - between 41 and 65 years) and by educational level (basic studies - higher studies). 53.7% of the sample corresponded to subjects between 20 and 40 years old, 54.5% were women and 56.6% had higher education.

In stage 1, the traditional cracker was significantly more acceptable (p < 0.05) than "free or reduced" nutrients. This fact has been reported by some authors and is related whit palatability or hedonic value of foods (sensation of pleasure that is experienced when a specific food is ingested). Certain food ingredients such as salt, sugar and fats exert a powerful effect on palatability, which explains the human preference for sweet, salty and fatty foods. Taste is the main motive in food choices and health and weight management are seen by most people as lower priorities (Renner et al., 2012). However, in stage 2, 3 and 4, when consumers retested both samples with the front-of-pack nutrition labeling, the acceptability differences changed significantly as can be seen in Table 1.

Sample	Aceptability (Δ)	
Without POF Nutrition	2,17 ± 1,85A	
Labeling		
Nutri-Score	1,49 ± 1,82B	
Nutritional Traffic	1,36 ± 1,52B	
Lights		
Warning Stamps type	1,16 ± 1,51B	
Octagon		
p-value	0,0001	

Different superscript letters for a same column indicate significant differences (p<0,05)

Table 2 Evolution of the acceptability difference  $(\Box)$  between the samples without

FOP nutritional labeling and the samples with FOP nutritional labeling

Table 2 shows a decrease in the acceptability  $(\Delta)$  in the presence of the three types of FOP nutritional labeling compared to the samples without FOP nutritional labeling. This reduction may be due to an increase in the acceptability of the healthier cracker, a decrease in the acceptability of the less healthy cracker, or both effects simultaneously. However, between the three types of labels no significant difference was observed. This suggests that the three labels would equally influence the acceptability change. These results are consistent with other studies, where FOP nutritional labeling was found to positively influence healthy food choices. For example, an experimental and comparative work, carried out in twelve countries (including Argentine), evaluated the ability of consumers to understand five types of front labeling. It was found that all the models studied improved the number of correct answers regarding the nutritional quality of foods compared to the nolabel situation Likewise, a study carried out later in Argentina showed similar results. These authors concluded that front-of-pack nutritional labels are efficient tools to increase consumer awareness of the nutritional quality of foods and promote healthier choices

#### Table 3

Evolution of the acceptability difference  $(\Box)$ between the samples without FOP nutritional labeling and the samples with FOP nutritional labeling in the segmented groups There are some factors related to the individual such as gender, age and educational level, among others, that could influence the effectiveness of the FOP nutritional labeling intervention. In Table 3 it can be observed that, for the female gender, all types of labeling have a significantly positive impact on the variation of the acceptability of the samples, being the stamps warning (octagon) the most representative followed by nutri-score and traffic light, respectively; who did not present differences significant between them. Regarding the male gender, a decrease in the acceptability ( $\Delta$ ) is observed in the three cases

in the presence of labels. However, analyzing the segmented data, it can be seen that only the traffic light and octagon models present a significantly positive difference in acceptability. A large number of studies have described notable differences in food choices between men and women. For example, women would attach greater importance to healthy food choices, which could be related to motivation for weight control and, consequently, would take leads them to make modifications in eating behavior Research on front labeling reported that women were more likely to read labels that provided nutritional information compared to men (Savoie et al., 2013).

For its part, in young adults (20 to 40 years), frontal octagon type labeling was the only one that had a significantly positive incidence. The same can be seen among adults from 41 to 65 years for the octagon and traffic light type frontal labels, where both models influenced in the same way.

Finally, among the subjects who completed basic and higher studies, the values in the table show that warning stamps (octagon) and traffic light positively influence the acceptability variation. On the other hand, in the group with higher education, no significant differences were observed between the four stages.

#### Conclusions

Results of present work show that, in absence of FOP nutritional labeling, traditional crackers were significantly (p<0.05) higher accepted. However, in the presence of the different type of FOP nutritional labeling, this acceptability difference between both samples decreased with respect to stage 1 and the differences disappeared (p <0.05).

All those labeled had an equal influence (p <0.05) in improving the acceptability of the healthy cracker compared to the traditional one. Nevertheless, the model of warning stamps or octagons had greatest influence on acceptability women and was the only one that had an impact on young adults.

These results suggest that the implementation of a front-of-pack nutritional labeling model can positively contribute in the choice of healthy foods to improve the health conditions of the Argentinean population.

#### Keywords

Front-of-pack nutrition labeling; acceptability; Argentinian consumers; healthy feeding

#### References

 Ramírez A, Pascual M, González M et al.
 2017. Elección Alimentaria. Universidad FASTA. Mar del Plata. Argentina.

2. Díaz AA, Veliz PM, Rivas-Mariño G. et al. Etiquetado de alimentos en Ecuador: implementación, resultados y acciones pendientes. Revista Panamericana de Salud Pública. (2017): 41-54.

3. Mozzoni A. La no inclusión del etiquetado frontal en la normativa del codex alimentarius: un posible obstáculo para una regulación nacional más protectoria del derecho a la salud. Revista Administración Pública y Sociedad 2016; (2): 94-110.

4. Britos S. Perfiles Nutricionales. Definiciones y estado de situación del tema en Argentina. Dieta 2017; 35(160): 8-15

5. World Organization of Health. 2020. Nota descriptiva: Obesidad y Sobrepeso. https://www.who.int/es/news-room/fact-

sheets/detail/obesity-and-overweight

6. Galán P, Egnell M, Britos S. et al. Evaluación de la comprensión objetiva de 5 modelos de etiquetado frontal de alimentos en consumidores argentinos: resultados de un estudio comparativo. Dieta 2019; 37(166): 20-30.

7. Allemandi L, Tiscornia M, Castronuovo V, et al. Etiquetado frontal de productos alimenticios en Argentina. Salud Colectiva 2018; 14(3): 645-648.

8. Llopart E, Bonacci J, Mosquera C et al. Evaluación de la cantidad y calidad nutricional de alfajores dietéticos de bajo valor glucídico disponibles en el mercado de la ciudad de Rosario, Argentina. Revista Española de Nutrición Humana y Dietética 2017; 18(2): 58-63.

9. Hernández Ruiz de Eguilaz M, Martínez de Morentin Aldabe M, Almirón-Roig E. et al. Influencia multisensorial sobre la conducta alimentaria: ingesta hedónica. Endocrinología, Diabetes y Nutrición 2018; 65(2): 114-125.

10. Renner B, Sproesser G, Strohbach S. et al. Why we eat what we eat. The Eating

Motivation Survey (TEMS). Appetite 2012; 59: 117–128.

11. Egnell M, Talati Z, Hercberg S. et al. Objective Understanding of Front-of-Package Nutrition Labels: An International Comparative Experimental Study across 12 Countries. Nutrients 2018; 10(10): 1542.

12. Santos-Antonio G, Bravo-Rebatta F, Valverde-Delgado P. et al. Efectos del etiquetado nutricional frontal de alimentos y bebidas: Sinopsis de revisiones sistemáticas. Revista Panamericana de Salud Pública 2019; 43.

13. Westenhoefer J. Age and gender dependent profile of food choice. Forum of Nutrition 2005; (57): 44-51.

14. Savoie N, Barlow K, Harvey K. et al. Consumer Perceptions of Front-of-package Labelling Systems and Healthiness of Foods. Canadian Journal of Public Health 2013; 104(5): 359-363.