

Nutritional quality, child-oriented marketing and health/nutrition claims on sweet biscuit, breakfast cereal and dairy-based dessert packs in Argentina

Calidad nutricional, mercadotecnia orientada a la infancia y propaganda sobre salud/nutrición en galletas dulces, cereales para el desayuno y embalajes de postres lácteos en Argentina

Qualidade nutricional, marketing concentrado no público infantil e alegações nutricionais e de saúde nas embalagens de biscoitos, cereais matinais e sobremesas lácteas na Argentina

Lorena Allemandi ¹
Luciana Castronuovo ¹
Maria Victoria Tiscornia ¹
Patricia Gutkowski ¹
Julieta Gijena ²
Celeste Nessier ²

doi: 10.1590/0102-311X00196619

Abstract

As children are particularly vulnerable to marketing, this study analyzes marketing techniques and health/nutrition claims in food packaging and evaluates the nutritional quality in three food categories: sweet biscuits, breakfast cereals and dairy-based desserts. This descriptive study analyzed marketing techniques and claims included in food packaging (n = 301) in one of the largest retailers in Argentina. Trained researchers coded data following an adapted version of the INFORMAS protocol to account for local food packaging regulations. Nutritional quality was assessed using both Pan American Health Organization Nutrient Profile (PAHO NPM) and the WHO Regional Office for Europe Nutrient Profile (WHO Euro NPM) models. Under the PAHO model, 87% (n = 262) of the product sample presented excess content of at least one nutrient ("less healthy" products), and 91% (n = 273) should not be marketed to children according to the WHO Euro model. Almost 40% of less healthy food products displayed nutrition claims on their package. Characters or celebrity endorsements, which are particularly attractive to children, featured in 32% of less healthy products, being more frequent in less healthy food products than in healthier ones. Results indicate that packaging for food products with low nutritional value often includes powerful marketing elements in Argentina, which renders young children very vulnerable to obesogenic influence. Moreover, the real nutritional value of the products analyzed were often at odds with the health claims shown on its package. Food labeling policies must be improved in Argentina to guarantee people's health protection against deceptive advertising.

Food Publicity; Industrialized Foods; Pediatric Obesity; Food Labeling

Correspondence

L. Allemandi
Arevalo 2364 1º A, Ciudad Buenos Aires – 1425, Argentina.
lorena.allemandi@ficargentina.org

¹ Fundación InterAmericana del Corazón Argentina, Buenos Aires, Argentina.

² Facultad de Ciencias de la Salud, Universidad Católica de Santa Fe, Santa Fe, Argentina.



Introduction

The World Health Organization (WHO) estimates that 41 million children were overweight or obese in 2016 ¹, making childhood overweight and obesity one of the most pressing public health issues today. Latin America has the highest prevalence in the world: 20 to 25% of children and adolescents are overweight or obese ². In Argentina, the most recent *National Nutrition and Health Survey* (ENNyS 2018) indicates that the prevalence of overweight and obesity among children under 5 years old was 10.6% and 3%. Excess weight was observed in 41.1% of the children and teenagers of 5 to 17 years of age: 20.7% were overweight and 20.4% were obese ³.

Marketing of unhealthy foods and its influence on children's food choices is one of the main drivers of the increase in overweight and obesity ^{4,5,6,7,8,9}. Children are particularly vulnerable to marketing strategies because they lack the capacity "to process advertising in a conscious and critical way" ¹⁰. Research suggests that, up to the age of ^{10,11,12}, children are not fully able to identify the persuasive intent behind advertising techniques ¹⁰. Front-of-pack marketing techniques such as endorsement by licensed characters ¹¹ or sports celebrities ¹² and branding ^{13,14} have been proven to influence taste perception and food preferences among children. Consumers are more likely to have positive associations and purchase food products whose packaging features health or nutrition claims ^{15,16}. Health claims such as "reduced fat content" or "low sugar" become a powerful tool to influence consumer choices.

The *Argentinean Codex Alimentarius* (ACA) regulates the content and form of food labeling in the country ¹⁷. Ingredient lists and nutritional information panels are mandatory labeling elements, while optional labeling includes supplementary nutritional information, such as nutrition or health claims, which must comply with the mandatory label components. However, there are no rules regarding using nutrition and health claims and marketing techniques in the packaging of products with high content of critical nutrients (either sodium, sugar, fats and/or saturated fats) following a specific nutrient profile model. The only Latin American country that has regulations in place to restrict marketing techniques and health and nutrition claims on food packaging according to the nutrient value of food products is Chile ¹⁸.

Most research on food packaging marketing has been conducted in Europe, North America and Australia; little comparable research has been published in Latin America, except for Guatemala, Uruguay and Brazil ^{11,19,20,21,22,23}. Recent work has evaluated TV advertising of ultra-processed food products and their nutritional quality in Argentina ²⁴, but with no available information on marketing techniques in food packaging. Developing effective, evidence-based public policy to tackle the childhood obesity epidemic depends heavily on generating such evidence locally.

This study was conducted as part of a broader research initiative to promote effective regulation of food packaging and protect children's health. We analyzed marketing techniques and health and nutrition claims in food packages and evaluated the nutritional quality in sweet biscuits, breakfast cereals and dairy-based desserts – three ultra-processed food categories prevalent in Argentinean dietary and advertising patterns. According to the 2012-2013 *National Survey of Household Expenditure*, sweet biscuits accounted for nearly 33% of mean monthly expenditure on food and beverages. Moreover, Argentina registered the highest per capita consumption of sweet biscuits in the world in 2018 ²⁵. Many breakfast cereals are ultra-processed, high sugar, and high sodium products, that reduce the nutritional quality of children's breakfast, while contributing greatly to increase their daily sugar intake ²⁶. Evidence suggests that breakfast cereals advertised to children have higher sugar content than those targeting a general audience ²⁷. Dairy-based desserts are the most frequently advertised food products in Argentinean children's TV ²⁴ – they include ready-to-eat, flavored dairy products that usually contain sugar or synthetic sweetener, and other ingredients and additives (e.g., modified food starch, modified corn starch, flavorings and food colors).

Methods

This is a cross-sectional, descriptive study of marketing techniques using sweet biscuits, breakfast cereals and dessert packages as the unit of analysis. The sample comprised all the products available in a specific retail store during the data collection period (June 2016). This supermarket was chosen because it was one of the largest retailers in Argentina, based on Euromonitor data ²⁵.

Two trained field-workers photographed all sides of the product packages (all brands and presentations) included in the three selected categories (n = 301), with consent from the store management. A few products were purchased to facilitate coding as workers were unable to obtain clear photographs of the labels in-store. The images were uploaded to an online database (<http://lfstatistics.ddns.net/ENC/DBFIC0001/index.php>) for further processing.

We adapted the data collection instrument from the International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support (INFORMAS) protocol, which has been developed to evaluate food environments and assist in designing policies to improve them ²⁸. The adaptation consisted of translating to Spanish and incorporating variables relevant under ACA terms. The instrument was designed to gather information regarding mandatory and optional labelling and marketing techniques, as detailed in Tables 1 and 2. Mandatory labelling variables included the presence of an ingredient list and nutrition information panel, as regulated by the ACA ¹⁷; variables were constructed to evaluate compliance with these instructions. Optional labelling elements included the *Guideline Daily Amounts* system (GDA), endorsement by health or nutrition organizations and nutritional and health claims (Box 1). Marketing techniques of interest included using brand and licensed characters, celebrity endorsements, child images, event sponsorship, "limited edition" claims, premiums (collectibles, prizes), games, messages related to price/promotions, sports references, and contests (Box 1).

Table 1

Use of mandatory labeling, optional labeling and marketing techniques on breakfast cereals, sweet biscuits and dairy-based desserts in Argentina, as % of the total sample and per food category.

	Total		Food category					
	% of total	n	Breakfast cereals		Sweet biscuits		Dairy-based desserts	
			% of total	n	% of total	n	% of total	n
Total	100	301	14	42	69	209	17	50
Mandatory labeling								
Mandatory label element								
Ingredient list	100	300	98	41	100	209	100	50
Nutritional information panel	100	301	100	42	100	209	100	50
Optional labeling								
Optional label element								
GDA system	20	59	7	3	27	56	0	0
Endorsement logo	2	6	10	4	0	1	2	1
Health claims	9	26	55	23	1	2	2	1
Nutrition claims	40	119	71	30	31	64	50	25
Marketing techniques								
Marketing elements								
Characters	32	95	29	12	25	52	62	31
Gifts	9	28	0	0	13	27	2	1
Collectible container	6	18	0	0	0	0	36	18
Games	5	14	17	7	3	7	0	0

GDA: *Guideline Daily Amounts*.

Table 2

Nutritional quality classification of total product sample and food category subsamples in Argentina using the Pan American Health Organization Nutrient Profile (PAHO NPM) and the WHO Regional Office for Europe Nutrient Profile (WHO Euro NPM) models.

	Total (n = 301)		Breakfast cereals (n = 42)		Sweet biscuits (n = 209)		Dairy-based desserts (n = 50)	
	% of total	n	% of category	n	% of category	n	% of category	n
PAHO NPM								
Nutritional quality								
Healthy	13	39	52	22	6	13	8	4
Less healthy	87	262	48	20	94	196	92	46
WHO Euro NPM								
Nutritional quality								
Healthy	9	28	67	28	27	56	0	0
Less healthy	91	273	33	14	0	0	0	0

Box 1

Definitions and examples of nutrition and health claims on food product packages.

Type	Definition	Subtype	Examples
Nutrition	Message that suggests specific nutritional properties	The product contains a specific "healthy" ingredient	"Contains chia and sunflower seeds" "Made with whole wheat"
		The product does not contain a specific "unhealthy" ingredient	"No artificial preservatives"
		The product contains a specific nutrient/nutrient quantity	"With zinc" "50% of the recommended daily fiber intake"
		The product does not contain a specific nutrient (except messages related to food intolerance such as gluten or lactose)	"0% cholesterol" "Sugar free" "No trans fat"
		The product has a specific energy density	"Low calories" "90 kcal per serving"
		The product contains more/less of certain nutrient or is more/less energy-dense than another product	"Reduced sodium" "Light", "Diet" "25% more fiber"
		Health	Message that suggests an association between health and the product or one of its components
The product reduces the risk of physical illness (all messages that mention "heart" or "cardiovascular" are included)	"With calcium, to prevent osteoporosis" "For a healthy heart" "Reduces cholesterol"		
The product increases health/wellness	"For a healthier lifestyle" "Stronger bones" "More energy for an active lifestyle"		
The product has a specific nutrient/ingredient with a made-up name	"Nutrimilk", "Provitalis"		

Nutritional quality was evaluated using the Pan American Health Organization Nutrient Profile (PAHO NPM) ²⁹ and the WHO Regional Office for Europe Nutrient Profile (WHO Euro NPM) models ³⁰. They establish maximum threshold contents for different nutrients to differentiate between food products “*that are more likely to be part of a healthy diet from those that are less likely (notably those foods that may contribute to excess consumption of energy, saturated fats, trans fats, sugar or salt)*” ³⁰ (p. 2). Both nutrient profiles aim to provide a tool to facilitate the design and implementation of policies selectively targeting less healthy foods. WHO Euro NPM was explicitly formulated to support restrictions in marketing of less healthy foods targeting children ³⁰; in turn, PAHO NPM has a broader policy scope ²⁹. Both NPM are used here to increase comparability with previous and future studies.

PAHO NPM sets across-the-board thresholds for all processed food products, including limits for sugar (amount of energy from sugars $\geq 10\%$ of the total energy), salt (ratio between the amount of sodium (mg) and the total amount of energy (kcal) $\geq 1:114$), saturated fats (amount of energy from saturated fats $\geq 10\%$ of the total amount of energy), trans fats (the amount of energy from trans fats $\geq 1\%$ of the total amount of energy) and total fat (the amount of energy from total fats $\geq 30\%$ of the total energy) ²⁹.

Regarding WHO Euro NPM, the thresholds are applied by food category and certain categories are considered a priori as unhealthy foods, regardless of their nutrient content, meaning that no specific nutrient threshold is available. Such is the case of sweet biscuits and desserts categories which are classified as unhealthy and thus should not be allowed to be marketed to children. Breakfast cereals have maximum nutrient thresholds of $> 10\text{g}$ of total fat, $> 15\text{g}$ of sugar, $> 640\text{mg}$ of sodium and $> 1\text{g}$ of trans fat/100g of total fat. These amounts are normalized to 100g of ready-to-eat food product ³⁰.

Products were classified as “less healthy” when one or more nutrients exceeded the threshold value in a given product. Regarding WHO Euro NPM, all products included in the sweet biscuits and dessert categories were considered as less healthy foods, regardless of their nutrient content.

Two trained research assistants coded this information to identify compliance with ACA mandatory labeling, marketing techniques, nutrition/health claims and nutritional quality of the product. A pilot study was conducted on a sub-sample of 23 products, to analyze reliability and improve the coding instrument; inter-rater agreement was measured using Cohen’s kappa and percentage of agreement. This sample size was calculated assuming a 90% agreement rate (95% confidence interval – 95%CI; 10% error). The 23 products were selected by systematic sampling; the total sample was ordered by coder and product category and subdivided in periodic intervals of 13 products.

All variables analyzed were categorical; results are presented as percentages of the total sample. Main outcomes include percentages of products that displayed a complete ingredient list, that informed nutritional content in compliance with the ACA, as well as percentages of “healthy” and “less healthy” products making specific nutritional/health claims or displaying particular marketing techniques.

Fisher’s exact test was applied to evaluate differences among sub-groups, such as differential use of nutrition/health claims and marketing techniques between healthy and less healthy foods; p-values under 0.05 were considered statistically significant. Statistical analyses were conducted using R 3.6.1. software (<http://www.r-project.org>).

After completing the database, we tested the inter-rater reliability on a subsample of 23 products assuming a 90% agreement rate (95%CI; 10% error), following the same systematic sampling method used in the pilot study. All coded variables presented high ($k \geq 0.61 < 0.8$) to very high ($k \geq 0.81-0.99$) inter-coder agreement.

Results

Of the total sample of 301 products included in the study, 69% were sweet biscuits, 17% were dairy-based desserts (from here onwards, “desserts”) and 14% were breakfast cereals. Except for one breakfast cereal that had no ingredient list, all product packages displayed the mandatory nutritional information (Box 2).

Box 2

Definitions and examples of marketing techniques included on food product packages.

Type	Subtype	Definition
Characters	Company-owned/brand character	Images of real or imaginary characters, objects or foods with humanoid features designed to promote a product or brand.
	Licensed characters and tie-ins	Images of characters not owned by the company but used via a license purchase.
	Sports celebrity/team	Images of famous athletes or sports team.
	Celebrities (non-sport)	Images of any nationally or internationally famous person – actors, musicians, models, etc.
	Image of a child/teenager	Photograph of real people under 18 years old (not celebrities).
Messages	Sport reference	Images of characters, adults or children, famous or not, playing a sport; mentions of sporting events; images of elements associated to sport, such as tennis rackets, soccer shoes, basketball hoops, etc.
	Charity	Calls to donation drives or mentions of charitable organizations.
	Sponsorship of events (other than sports)	Mention of a non-sporting event, e.g. concerts, festivals.
Premiums	Limited edition	Expresses the availability of a particular product for a specific, often short, period of time.
	Gifts	Includes a free item with the purchase of the product.
	Collectible packs	Variability in the pack (e.g. diverse characters, colors, etc.) making it a collectible item. The package has value on its own.
	Games	Packaging includes recreational activities (puzzles, board games, etc.).
	Game and app downloads	Provides a medium to download or access online games or apps.
	Contests	Provides access to contests and prizes but needs further action by the consumer; examples include scanning QR codes, entering information into an online database, trading bottle caps for promotional items, etc.
	Price/special offers	Price-related promotions, such as 2x1 offers, “extra 10% for free”, discount coupons for future purchases. Includes messages that underscore product affordability.
Others	Sensorial appeal	Products whose shape, flavor, texture, color, etc., are appealing to children, and are not “natural” qualities of the food product itself. Examples include cereals in the shape of colored rings, candy that colors your teeth or fizzes, “glow in the dark” products, fantasy flavors, animal-shaped cookies, etc.

Results on optional labeling elements related to health and nutrition are shown in Table 3. Four breakfast cereals, one sweet biscuit and one dessert presented institutional endorsement logos, representing 2% of the total sample. A 20% of the total sample included the GDA system label: none of the dessert products showed the GDA label, while 27% of sweet biscuits and 7% of breakfast cereals did. Of the total product sample, 40% displayed nutrition claims, including most breakfast cereals and half of the desserts sub-sample. Less frequent in the total sample, health claims (9%) appeared mostly in breakfast cereals.

The analysis of marketing techniques focused on the display of characters and premium offers (prizes, collectibles and games) (Table 1). Messages (e.g., charity and sponsorship of non-sports events) and sensorial appeal features were absent from the sample, so results are not reported for these categories. Approximately one-third of the total sample display characters in their packages, but these percentages vary among the three product categories, presenting a higher frequency in desserts. Only dessert products offered collectible containers, representing 6% of the total sample and 36% of the desserts category. Gifts were included in 9% of the total sample, mainly in sweet biscuits, while games accounted for 5% of the total sample (Table 1).

Regarding nutritional quality, most of the sample was classified as less healthy products: 87%, following the PAHO NPM, and 91% by WHO Euro NPM standards (Table 2). Among the less healthy products according to the PAHO NPM, 2% included a health organization endorsement logo and 37% made nutrition claims. Characters were displayed in 32% of these products, while 16% offered premiums or collectible containers. Nutrition and health claims were more frequent among the healthier product subsample; the GDA system, characters, and premiums were more frequent among the less healthy products (statistically significant differences; $p < 0.05$) (Table 3).

Among the products classified as less healthy under the WHO NPM standards, 1% included a health organization endorsement logo and 36% made nutrition claims. Of these products, 33% portrayed licensed characters and 17% offered premiums or collectible containers. Nutrition and health claims were more frequent among the healthier product subsample (statistically significant differences; $p < 0.05$). We found no significant differences in the use of other optional labeling elements and marketing techniques between the healthier and less healthy food groups (Table 3).

Discussion

This was the first study conducted in Argentina that analyzed marketing strategies and nutrition and health claims in food packaging. Approximately 90% of the products in the total sample were classified as less healthy by both WHO Euro and PAHO NPM standards and should not be marketed to children. These results are consistent with previous research in Argentina ²⁴, indicating that the vast majority of food products advertised on TV are processed or ultra-processed foods with low nutritional value. Our results also show that the packages of these products often include powerful marketing elements. Brand/licensed characters or celebrity endorsements, which have been found to exert a powerful influence over child food choices ^{11,12,19,21,22,31,32,33}, feature in 32% of less healthy products. Brand and licensed characters/celebrity endorsement display and premiums such as prizes

Table 3

Use of optional labeling and marketing techniques on sweet biscuits, breakfast cereals and dairy-based desserts packages in Argentina according to nutritional quality categories.

	Total n	PAHO NPM				WHO Euro NPM			
		Healthy (n = 39)		Less healthy (n = 262)		Healthy (n = 28)		Less healthy (n = 273)	
		% of NPM category	n	% of NPM category	n	% of NPM category	n	% of NPM category	n
Optional labeling									
Optional label element									
GDA system	59	10	4	21 *	55	11	3	21	56
Endorsement logo	6	0	0	2	6	7	2	1	4
Health claims	26	41	16	4 *	10	57	16	4 *	10
Nutrition claims	119	56	22	37 *	97	71	20	36 *	99
Marketing techniques									
Marketing element									
Characters	95	23	29	32 *	86	21	6	33	89
Gifts	28	0	0	10 *	28	0	0	10	28
Collectible container	18	2	1	6 *	17	0	0	7	18
Games	14	5	2	5	12	7	2	4	12

GDA: *Guideline Daily Amounts*; PAHO NPM: Pan American Health Organization Nutrient Profile; WHO Euro NPM: WHO Regional Office for Europe Nutrient Profile.

* Statistically significant difference between “healthy” and “less healthy”; $p < 0.01$.

and collectible containers were more frequent among the less healthy food products than among products with no nutrient excess as per PAHO NPM standards.

Our study also suggests that the food labeling policy currently in force in Argentina is insufficient to protect the health of the population. ACA stipulates that supplementary nutritional information (claims) “must not be presented in such a way that leads to incorrect interpretations or are deceptive to consumers; may promote overconsumption of certain foods; or may suggest that the food product is nutritionally complete”¹⁷. Despite this regulation, nutritional claims appear in almost 40% of less healthy food product packages, exposing consumers to food products whose real nutritional value is at odds with that claimed on the product package. Nutrition/health claims have also been found to influence children’s perception of products as healthy³⁴. We found endorsement by health organizations in a small subset of the sample, but all of these products were deemed less healthy foods under PAHO NPM. A study described a similar scenario for sweetened drinks in Guatemala, where most of the beverages endorsed by health organizations were classified as less healthy. Conflict of interest is in fact a concern when dealing with partnerships between the food industry and health organizations³⁵; if this type of collaboration cannot be avoided, organizations should consider using at least one of the nutrient models presented here to identify healthier products worthy of endorsement and, ideally, refuse to endorse products that fail to achieve the standards set by the model.

We also lack a regulatory framework concerning deceptive marketing of food products with low nutritional quality, especially among children and young adults. The WHO Euro NPM and the PAHO NPM provide the basis to develop such a framework in Argentina, since they enable a simple, straightforward and evidence-based system for identifying less healthy food products whose marketing should be restricted. But the only policy in place related to unhealthy food advertising is included in the *National Law of Food Disorders* that stipulates that any form of advertising of foods with high energy density and low essential nutrients must include the disclaimer “*Excessive consumption is harmful to health*”³⁶. However, there are no criteria established by law to identify the food products whose advertisements or front-of-pack marketing elements should include the disclaimer.

This situation approaches a double regulatory void in Argentina, as in most Latin American countries: there are no objective tools in place to measure the overall healthiness of food products, and there are no policies in force to restrict marketing of less healthy foods. This reality underscores the need to strengthen food labeling regulations to ensure that consumers receive clear and accurate nutritional information to make healthier food choices. Labeling policies must change to incorporate the perspective of non-communicable chronic disease prevention. As party to both PAHO and WHO, Argentina should follow their guidelines to reduce childhood overweight and obesity, including the implementation of adequate labeling and restrictions to the marketing of less healthy food products^{37,38}.

The serious public health issue imposed by growing rates of childhood overweight and obesity today is no longer a subject of debate; what is still under discussion is what governments can do to tackle the obesity epidemic and protect the right to health of both children and the adult population. Our results underscore the need for straight-forward, effective regulations on using claims and marketing techniques on less healthy food packages, especially those targeting children. Packaging, however, is only one of the many media for food marketing; comprehensive legislation to reduce overall exposure to marketing of less healthy foods should also include specific regulations for TV, social media, and point of sale advertising. The recommendations put forth by PAHO and WHO to tackle childhood obesity^{37,38} provide a good starting point for Argentina to develop its own regulatory framework.

Ours is the first analysis of optional labeling and child-oriented marketing in processed food packages in Argentina, conducted using an international protocol. This will allow both to inform decision makers and influence policy making for public health objectives, and to compare the local situation with other countries and establish a baseline to track future progress. The study dealt with resource and time constraints, but its main limitation concerns the inclusion of only three food categories. More research is needed to examine whether our results extend to other frequent advertised food groups, such as chips, cookies, crackers or sugar-sweetened beverages.

Data was collected from only one supermarket in the city of Santa Fe, Argentina. Although this store belongs to one of the largest retailers nationwide, the products included in the analysis do

not represent all products sold in the country, thus preventing us from capturing the full extent of product packaging claims. Lastly, a significant deficiency of the study arises from the regulations currently in force in the country: sugar content is not a mandatory label element in Argentina, so this critical ingredient was disregarded in the analysis. As such, the nutritional value of some products could be overestimated, although about 90% of the products were found to be less healthy, even with this caveat.

Contributors

L. Allemandi contributed in the research design, data collection and data entry process, interpretation of results, and writing of the manuscript. L. Castronuovo and M. V. Tiscornia contributed in the elaboration of the data collection instrument and coding manual, training of coders, supervision of data collection, interpretation of results and revision of the manuscript. P. Gutkowski contributed in the elaboration of the data collection instrument and coding manual. J. Gijena and C. Nessler contributed in the data collection process and revision of the manuscript.

Additional informations

ORCID: Lorena Allemandi (0000-0002-6562-2033); Luciana Castronuovo (0000-0002-1883-6741); Maria Victoria Tiscornia (0000-0002-5029-7506); Patricia Gutkowski (0000-0002-3861-1785); Julieta Gijena (0000-0001-9689-0391); Celeste Nessler (0000-0002-8586-2069).

Acknowledgments

The authors thank the FIC Argentina volunteers who collaborated with data entry, and Agustina Mozzoni, Juan Carballo and Slavenska Zec from FUNDEPS and Belen Rios from FIC Argentina for their legal contribution and participation in the broader research project of which this study was part of. We also thank Malena Pirola for her assistance in writing the paper and all FIC Argentina's staff for their ongoing support. Finally, we thank the anonymous reviewer whose comments allowed us to improve on the original manuscript.

References

1. World Health Organization. Facts and figures on childhood obesity. 2015. <https://www.who.int/end-childhood-obesity/facts/en/> (accessed on 05/Oct/2019).
2. Pan American Health Organization. Obesity prevention. 2016. https://www.paho.org/hq/index.php?option=com_content&view=article&id=11506:obesity-prevention-home&Itemid=41655&lang=en (accessed on 05/Oct/2019).
3. Secretaría de Gobierno de Salud de la Nación. 2º Encuesta Nacional de Nutrición y Salud 2018. http://www.msal.gob.ar/images/stories/bes/graficos/0000001565cnt-ennys2_resumen-ejecutivo-2019.pdf (accessed on 05/Oct/2019).
4. Wiecha JL, Peterson KE, Ludwig DS, Kim J, Sobol A, Gortmaker SL. When children eat what they watch: impact of television viewing on dietary intake in youth. *Arch Pediatr Adolesc Med* 2006; 160:436-42.
5. Zimmerman FJ, Bell JF. Associations of television content type and obesity in children. *Am J Public Health* 2010; 100:334-40.
6. Utter J, Scragg R, Schaaf D. Associations between television viewing and consumption of commonly advertised foods among New Zealand children and young adolescents. *Public Health Nutr* 2006; 9:606-12.
7. Magnus A, Haby M, Carter R, Swinburn B. The cost-effectiveness of removing television advertising of high-fat and/or high-sugar food and beverages to Australian children. *Int J Obes* 2009; 33:1094-102.
8. Hastings G, Stead M, McDermott L, Forsyth A, MacKintosh AM, Rayner M, et al. Review of research on the effects of food promotion to children. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.134.1856&rep=rep1&type=pdf> (accessed on 05/Oct/2019).
9. Cairns G, Angus K, Hastings G, Caraher M. Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite* 2013; 62:209-15.
10. Rozendaal E, Buijzen M, Valkenburg P. Children's understanding of advertisers' persuasive tactics. *Int J Advert* 2011; 30:329-50.

11. Letona P, Chacon V, Roberto C, Barnoya J. Effects of licensed characters on children's taste and snack preferences in Guatemala, a low/middle income country. *Int J Obes (Lond)* 2014; 38:1466-9.
12. Dixon H, Scully M, Niven P, Kelly B, Chapman K, Donovan R, et al. Effects of nutrient content claims, sports celebrity endorsements and premium offers on pre-adolescent children's food preferences: experimental research. *Pediatr Obes* 2014; 9:e47-57.
13. Elliott CD, Carruthers Den Hoed R, Conlon MJ. Food branding and young children's taste preferences: a reassessment. *Can J Public Health* 2013; 104:e364-8.
14. Robinson TN, Borzekowski DL, Matheson DM, Kraemer HC. Effects of fast food branding on young children's taste preferences. *Arch Pediatr Adolesc Med* 2007; 161:792-7.
15. Hawkes C. Nutrition labels and health claims: the global regulatory environment. Geneva: World Health Organization; 2004.
16. Andrews JC, Burton S, Netemeyer RG. Are some comparative nutrition claims misleading? The role of nutrition knowledge, ad claim type and disclosure conditions. *J Advert* 2000; 29:29-42.
17. Código Alimentario Argentino. Capítulo V: normas para la rotulación y publicidad de los alimentos. 2005. http://www.anmat.gov.ar/alimentos/codigoa/Capitulo_V.pdf (accessed on 05/Oct/2019).
18. Corvalan C, Reyes M, Garmendia M, Uauy R. Structural responses to the obesity and non-communicable diseases epidemic: the Chilean Law of Food Labeling and Advertising. *Obes Rev* 2013; 14:79-87.
19. Ares G, Arrúa A, Antúnez L, Vidal L, Machín L, Martínez J, et al. Influence of label design on children's perception of two snack foods: comparison of rating and choice-based conjoint analysis. *Food Qual Prefer* 2016; 53:1-8.
20. Giménez A, Saldamando L, Curutchet MR, Ares G. Package design and nutritional profile of foods targeted at children in supermarkets in Montevideo, Uruguay. *Cad Saúde Pública* 2017; 33:e00032116.
21. Perry A, Chacon V, Barnoya J. Health claims and product endorsements on child-oriented beverages in Guatemala. *Public Health Nutr* 2018; 21:627-31.
22. Chacon V, Letona P, Barnoya J. Child-oriented marketing techniques in snack food packages in Guatemala. *BMC Public Health* 2013; 13:967.
23. Ferreira JSG, Silva Y, de Moraes OMG, Tancredi RP. Marketing de alimentos industrializados destinados ao público infantil na perspectiva da rotulagem. *Vigil Sanit Debate* 2015; 3:75-84.
24. Allemandi L, Castronuovo L, Tiscornia MV, Ponce M, Schoj V. Food advertising on Argentinean television: are ultra-processed foods in the lead? *Public Health Nutr* 2017; 21:238-46.
25. Euromonitor International. Sweet biscuits, snack bars and fruit snacks in Argentina. <https://www.euromonitor.com/sweet-biscuits-snack-bars-and-fruit-snacks-in-argentina/report> (accessed on 05/Oct/2019).
26. Harris JL, Schwartz MB, Ustjanauskas A, Ohri-Vachaspati P, Brownell KD. Effects of serving high-sugar cereals on children's breakfast-eating behavior. *Pediatrics* 2011; 127:71-6.
27. Schwartz MB, Vartanian LR, Wharton CM, Brownell KD. Examining the nutritional quality of breakfast cereals marketed to children. *J Am Diet Assoc* 2008; 108:702-5.
28. Swinburn B, Sacks G, Vandevijvere S, Kumanyika S, Lobstein T, Neal B, et al. INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support): overview and key principles. *Obes Rev* 2013; 14 Suppl 1:1-12.
29. Pan American Health Organization. Nutrient profile model. Washington DC: Pan American Health Organization; 2016.
30. WHO Regional Office for Europe. Nutrient profile model. Copenhagen: World Health Organization; 2015.
31. Ogle AD, Graham DJ, Lucas-Thompson RG, Roberto CA. Influence of cartoon media characters on children's attention to and preference for food and beverage products. *J Acad Nutr Diet* 2017; 117:265-70.
32. Roberto CA, Baik J, Harris JL, Brownell KD. Influence of licensed characters on children's taste and snack preferences. *Pediatrics* 2010; 126:88-93.
33. Kraak VI, Story M. Influence of food companies' brand mascots and entertainment companies' cartoon media characters on children's diet and health: a systematic review and research needs. *Obes Rev* 2015; 16:107-26.
34. Soldavini J, Crawford P, Ritchie LD. Nutrition claims influence health perceptions and taste preferences in fourth- and fifth-grade children. *J Nutr Educ Behav* 2012; 44:624-7.
35. Nestle M. Corporate funding of food and nutrition research: science or marketing? *JAMA Intern Med* 2016; 176:13-4.
36. Presidencia de la Nación, Ministerio de Justicia y Derechos Humanos. National Act Ley 26.396. Declárase de interés nacional la prevención y control de trastornos alimentarios. <http://servicios.infoleg.gob.ar/infolegInternet/anexos/140000-144999/144033/norma.htm> (accessed on 05/Oct/2019).
37. Pan American Health Organization. Plan of action for the prevention of obesity in children and adolescents. Washington DC: Pan American Health Organization; 2015.
38. World Health Organization. Report of the commission on ending childhood obesity. Geneva: World Health Organization; 2016.

Resumen

Los niños son particularmente vulnerables a la mercadotecnia; este estudio analiza las técnicas de mercadotecnia y la propaganda sobre salud/nutrición en los paquetes de comida, además de evaluar la calidad nutricional en tres categorías de comida: galletas dulces, cereales para el desayuno y postres lácteos. Este estudio descriptivo analizó las técnicas de mercadotecnia y propaganda incluida en los embalajes de galletas dulces, cereales para el desayuno y postres (n = 301) en uno de los distribuidores más grandes de Argentina. Investigadores cualificados codificaron los datos siguiendo una versión adaptada del protocolo INFORMAS, con el fin de evaluar la regulación respecto a los embalajes de comida local. La calidad nutricional fue evaluada usando tanto los modelos del Perfil Nutricional de la Organización Panamericana de la Salud (OPS NPM) y Organización Mundial de la Salud (OMS Euro NPM). Un 87% (n = 262) de la muestra del producto presentó un exceso de contenido de al menos un nutriente (productos “menos saludables”), según el OPS NPM, y un 91% (n = 273) de la muestra no debería haber sido etiquetada para niños, según el OMS Euro NPM. Casi un 40% de los productos menos saludables contaban con propaganda nutricional en sus embalajes. Personajes infantiles o el respaldo de famosos, que son particularmente atractivos para los niños, fueron destacados en un 32% de los productos menos sanos, y fueron más frecuentes entre los productos menos sanos que entre los más saludables. Los resultados indican que los embalajes de productos alimenticios con un valor nutricional bajo, a menudo incluyen elementos poderosos de mercadotecnia en Argentina, lo que provoca que los niños más jóvenes sean más vulnerables a la influencia obesogénica. Asimismo, el valor real nutricional de los productos analizados estuvo a menudo en conflicto con la propaganda sobre los beneficios para la salud mostrados en su embalaje. Las políticas de etiquetado deberían mejorar en Argentina para garantizar la protección a la salud de toda la población frente a la publicidad engañosa.

Publicidad de Alimentos; Alimentos Industrializados; Obesidad Pediátrica; Etiquetado de Alimentos

Resumo

As crianças são particularmente vulneráveis ao marketing. O estudo analisa as técnicas publicitárias e alegações nutricionais e de saúde nas embalagens de alimentos e avalia a qualidade nutricional de três categorias de alimentos: biscoitos, cereais matinais e sobremesas lácteas. O estudo descritivo analisou as técnicas de marketing e as alegações impressas nas embalagens de biscoitos, cereais matinais e sobremesas lácteas (n = 301) em uma das maiores cadeias de varejo da Argentina. Pesquisadores treinados codificaram os dados de acordo com uma versão adaptada do protocolo INFORMAS para levar em conta a regulamentação argentina de rotulagem de alimentos. A qualidade nutricional foi avaliada com os modelos de Perfil de Nutrientes da Organização Pan-Americana da Saúde (OPAS NPM) e da Organização Mundial da Saúde (OMS Euro NPM). Ao todo, 87% (n = 262) das amostras dos produtos apresentavam um conteúdo excessivo de pelo menos um ingrediente (os produtos “menos saudáveis”) de acordo com o OPAS NPM, enquanto 91% (n = 273) dos produtos não deveriam ser promovidos para crianças, de acordo com o OMS Euro NPM. Quase 40% dos produtos alimentícios menos saudáveis mostravam alegações nutricionais nas embalagens. Personagens conhecidos pelo público infantil, além do endosso de celebridades, que são particularmente atraentes para as crianças, foram destacados em 32% dos produtos menos saudáveis, e eram mais frequentes nos produtos menos saudáveis do que nos mais saudáveis. Os resultados indicam que as embalagens dos produtos alimentícios com menor valor nutritivo muitas vezes fazem uso de elementos poderosos de marketing na Argentina, deixando as crianças altamente vulneráveis à influência obesogênica. Muitas vezes o verdadeiro valor nutritivo dos produtos analisados não estava de acordo com as alegações de saúde nas embalagens. As políticas de rotulagem de alimentos devem ser melhoradas na Argentina para garantir a proteção da saúde da população inteira contra a publicidade enganosa.

Publicidade de Alimentos; Alimentos Industrializados; Obesidade Pediátrica; Rotulagem de Alimentos

Submitted on 08/Oct/2019

Final version resubmitted on 20/Jan/2020

Approved on 04/Feb/2020