Review of current labelling regulations and practices for food and beverage targeting children and adolescents in Latin America countries (Mexico, Chile, Costa Rica and Argentina) and recommendations for facilitating consumer information

Instituto Nacional de Salud Pública

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Contents

Abbreviations

NCDs *Noncommunicable diseases*
LA *Latin America*
FOP *Front-of-package*
GDA *Guideline Daily Amounts*
MeSH *Medical Subject Headings*
INFORMAS *International Network for Food and Obesity / NCDs Research, Monitoring and Action Support*
GI *Glycaemic Index*
BMI *Body Mass Index*
MTL *Multi-Traffic Light*
WHO *World Health Organization*
PAHO *Pan American Health Organization*
NGOs *Non-governmental Organizations*

Abstract

In response to the rising rates of obesity and diet-related noncommunicable diseases (NCDs), policies have emerged that focus on improving the diets of populations using strategies such as food labelling. The aim of food labels is to influence consumers to make healthier decisions regarding their food choices.

Aims of the present study include: 1) To review current food labelling regulations and voluntary practices on products targeted to children and adolescents in Latin America (LA); 2) Identify key labelling models in packaged food targeted to children and adolescents in four Latin countries: Mexico, Chile, Costa Rica and Argentina; 3) To test the usage, perception and preference of such systems with a sample of parents; and 4) To provide specific recommendations.

A narrative and systematic review was carried out to describe the current food labelling regulations and the impact of these regulations on parents and child behaviour. For each selected country we explored the currently regulated or voluntary front-of-package (FOP) food labelling systems used and identified labelling components on products targeted to children or adolescents. Then, a close ended questionnaire was used to collect data on the usage, perception and preference of the FOP food labelling. Finally, we provided specific recommendations addressed to the main stakeholders in the region.

Specific regulatory and monitoring food labelling frameworks have been implemented in different LA countries in recent years in response to the alarming obesity rates in the region. However, the prevalence of FOP food labelling components (specifically nutrition claims) is widespread across LA, and there is a lack of studies evaluating any impact or effect in the region. Overall, FOP nutrition labelling is a promising means to influence packaged food choices towards healthier alternatives and improve the diets of a growing worldwide population who are overweight and obese. Findings suggested that it is important to regulate in a harmonized way all of the FOP food labelling components based on evidence and encourage a single and consistent system, especially on products targeted to children and adolescents. However, further research needs to be carefully outlined to avoid conflicts of interest and to standardize a system, based on recommended nutrition profiles, as well to improve informed decisions particularly in vulnerable populations.

Background

Over the past decades a dramatic shift has occurred in the way the entire global population eats, drinks, and moves. New access to food technologies (e.g., packaged foods, modern supermarkets, food marketing) and increased consumption of processed foods are changing diets globally. This has contributed to a rising overweight and obesity prevalence[1].

Urbanization is a major driving force in the high global overweight and obesity prevalence. According to the International Obesity Task Force, overweight and obesity prevalence rates vary between regions and countries with rates >30% in Latin America[2]. Children and women are the most vulnerable population groups to the health risks related to obesity[3,4].

In response to the rising rates of obesity and diet-related noncommunicable diseases (NCDs), policies have emerged that focus on improving the diets of populations using strategies such as nutrition and food labelling[5,6]. Nutrition food labels appear on products to provide consumers with information regarding the nutrient content and declarations of health benefits packaged foods products may have. The aim of nutrient food labels is to influence consumers to make healthier decisions regarding their food choices[7,8].

FOP food labelling has been identified by nutrition researchers around the world as a relevant intervention that can contribute to healthier diets [5,9,10]. This is of particular importance in low and middle-income countries where 80% of the deaths due to NCDs occur[11,12], and especially in the Americas region where there is the highest obesity prevalence in the world[13] and little or no progress has been documented in decreasing the trends of NCDs risk factors[14]. This strategy has been demonstrated to be effective at informing consumers to make healthier choices including those who are nutritionally at risk[15,16]. However, evidence of healthier choices using a particular FOP food labelling system is still inconclusive, especially on products addressed to children and adolescents[17–21].

The Codex Alimentarius Commission (Codex) defines food labelling as "any written, printed or graphic matter that is present on the label, accompanies the food, or is displayed near the food, including that for the purpose of promoting its sale or disposal[22]."

To date most information on food labels is voluntary, presented by food manufacturers or retailers and mainly with marketing purposes. Yet in many countries, some information on food labels is mandatory, such as a list of ingredients, nutrition information, country of origin and disclosure of particular ingredients that may present health risks. In some countries, there are either voluntary or mandatory health-related labels on foods, such as nutrition and health claims, logos or summary front-of-pack labelling[5].

Around the world, different FOP food labelling systems are already available on food products. The Guideline Daily Amounts (GDAs), developed by a food industry consortium is one of the most prevalent systems. However, evidence has shown this format to be misleading even among highly educated adults[23–25]. Other FOP nutrition labelling systems, such as "traffic light" systems have not been able to demonstrate an association with consumers' purchases of healthier foods in all populations[8,20,26]. Within LA countries there are a number of promising FOP food labelling systems. The potential contribution of each of these systems to healthier consumer food choices needs to be evaluated to identify

which systems may be more effective than others in order to help parents identify the nutrition quality and make healthy choices regarding the packaged foods they purchase that are being marketed to their children. Our research will contribute to the promotion of food reformulation and regulation by Latin American governments, especially among products targeted to children and adolescents.

Aim and objectives

Our aims include: 1) To review current food labelling regulations and voluntary practices on products targeted to children and adolescents in four LA countries: Mexico, Chile, Costa Rica and Argentina; 2) Identify key labelling models in packaged food targeted to children and adolescents in the selected countries; 3) To test the usage, perception and preference of such systems with a sample of parents; and 4) To provide specific recommendations on which of all the nutrition labels identified (regulated or voluntary) are more useful and easily understood by consumers (parents of children and adolescents) when selecting foods.

Objectives

1. To map current food labelling regulations and voluntary actions in LA countries, with a particular focus on food and beverage products targeted to children and adolescents.

2. To perform a literature review of existing qualitative and quantitative studies on the impact and use of food and nutrition labelling on consumers selection of foods.

3. To identify key models of labelling and categorize the types of FOP label components available on food products targeted to children and adolescents in Mexico, Argentina, Chile and Costa Rica.

4. To design and conduct a survey to describe and test the usage, perception and preference of FOP labelling in terms of legibility, clarity and nutrition information among parents of children and adolescents with a special focus on products targeted to children and adolescents in Mexico, Argentina, Chile and Costa Rica.

5. To propose recommendations to improve labelling of food and beverage products targeting children and adolescents in LA countries.

a) Narrative and Systematic literature review

Methods

A narrative review was conducted for current food labelling mandatory actions in Latin American countries. The report includes primary research reporting current policy actions (statutory or self-regulatory) in Latin America intended to regulate food and beverage labelling with particular emphasis on those targeted to children and adolescents as well as government official documents and news, and articles in digital media (internet and websites) about current food labelling regulations in Latin America countries. The search was carried out through Google and Meltwater Database.

A systematic review was carried out to identify and develop a comprehensive appraisal of the available body of evidence on the impact of different FOP nutrition labelling systems on consumers' practices, food sales, reformulation and health outcomes.

A systematic search was conducted on scientific and grey literature databases to identify existing qualitative and quantitative studies on labelling and its impact on parents' and children's food selection and consumption in the region.

Search strategy

The search was focused globally with a special focus on LA countries regarding interventions and current statutory and self-regulatory actions related to food labelling. The purpose of this review was to describe what changes, if any, food and nutrition labels have had on the behaviors of parents and children (buying, eating or perception of food labelling).

Appropriate Medical Subject Headings (MeSH) terms and subject headings were entered for the search on different databases, including PubMed/Medline and EBSCO.

Table 1. MESH Terms

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Exp Food Labelling/ Exp Food Packing (label or sign or symbol* or ticker)	(food or nutritio*) AND (label or sign or symbol* or ticker) Exp Food Labelling/ Exp Food Packing/	Health Behaviour/ IMC/ Body weight/ Nutrient intake/ (behaviour* or behaviour* or consum* or intake* or purchase* or buy* or eat* or select* or intake* or intentions* or attitude*)	Exp Public Policy/ Exp Nutrition Policy (public policy or nutrition policy or intervention) (regulation or plan* or strategy* or proposed action approach* or program* or system* or poli* or government policies) Exp Intervention	Health Impact assessment/ (effectiveness or impact)	Exp Latin America/ (Latin America or south America or central America)

Grey literature and digital media outputs such as news, articles, and reports, were searched using Meltwater Database with the terms "food/beverage, labelling/food claims, policy actions/regulations".

The search included documents published from January 2010 up to and including December 2015.

Criteria

Studies were included in the review if they met any of the following criteria:
- Primary research reporting current policy actions (statutory or self-regulatory) intended to regulate food and beverage labelling, with particular emphasis on those targeted to children and adolescents.

- Relevant outcome measures resulting from these actions including food labelling perception, food selection, food consumption, eating behavior, nutrient intake, and health outcomes.

- Studies with before/after measures, experimental and quasi-experimental designs, or comparisons.

- Official government documents.

- News and articles in digital media (websites) about current food labelling regulations.

- Peer-reviewed literature.

Both qualitative and quantitative studies were included since both kinds of studies are relevant to the objectives of the review.

Data extraction

After the relevant documents were identified, an evaluation on relevance, validity and scope was completed to evaluate the quality and usefulness of the literature for further analysis.

Data extraction included information on: the year, study country, study design, study sample, current policy action or measure employed to regulate food and beverage labelling, inclusion of outcome measures and use of statistical tests.

Table 2. Data Base Search Strategy

1. Exp Food Labelling/ Exp Food Packaging (label OR sign OR symbol* OR ticker)
2. (Food OR nutrition*) AND (label OR sign OR symbol* OR ticker)/ Exp Food Labelling / Exp Food Packaging
3. Health Behaviour* / BMI / Nutrient intake / (behaviour* OR consum* OR intake* OR purchase* OR buy* OR eat* OR select* OR intake* OR intentions* OR attitude*)
4. Exp Public Policy/ Exp Nutrition Policy (public policy OR intervention OR regulation OR strateg* OR proposed action approach OR program* OR government policies) / Exp Intervention
5. Health Impact assessment / (effectiveness OR impact)

Results

FOP food labelling is considered an informational tool which assists consumers in considering nutritional content of packaged foods, in their purchase decisions, and consequently in making informed choices for healthier options thus improving their diets[27]. To date, food manufacturers and retailers voluntarily provided information on the food labels, with non-standardized formats, and it is mainly used as a promotional tool with marketing purposes.

Different FOP nutrition labelling systems have already been introduced in many countries, see Table 3.
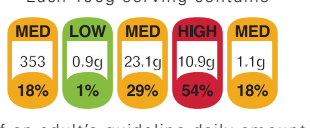
The Guideline Daily Amounts (GDA's), developed by a food industry consortium, is one of the most prevalent FOP nutrition labelling system used voluntarily around the globe. However, research has shown the GDA labelling system is misleading even in highly educated adults[23–25].

Other FOP nutrition labelling systems, such as the so-called "traffic light", and summary systems as the Choices International logo and the American Heart Association Tick have been implemented as well[27].

Specific regulatory and monitoring frameworks for food labelling have been implemented in different LA countries in recent years in response to the alarming obesity rates in the region, see Supplemental Material, Figure S1. Ecuador, Chile, and Mexico, for instance, have recently passed laws to promote FOP in packaged foods, see table 4. However, evidence on the evaluation and monitoring of these strategies has not been collected. Most of LA countries have voluntarily applied practices favoring manufactures of processed foods. Some others are using systems that are encouraged and developed by food industries with higher daily standards intakes compared to the recommendations set by the World Health Organization (WHO).

Currently, different types of FOP food label components concerning to nutrition and health claims, promotional characters, and premium
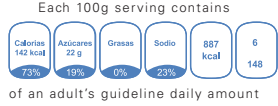
Table 3. Currently Nutrition Labelling Systems

Front-of-Package Nutrition Labelling	Example
Claims	Products that use "free," "low," "light," "reduced," "less," and "high"
Nutrient specific systems	
Guideline Daily Amounts (GDA) -Single or/and monochrome (M-GDA)	Each 100g serving contains — Calorias 142 kcal 73%, Azúcares 22 g 19%, Grasas 0%, Sodio 23%, 887 kcal, 6 148 — of an adult's guideline daily amount
Colour-coded GDA (CC-GDA) or Multi-Traffic Light GDA (MTL-GDA)	Each 100g serving contains — MED 353 18%, LOW 0.9g 1%, MED 23.1g 29%, HIGH 10.9g 54%, MED 1.1g 18% — of an adult's guideline daily amount
Traffic light (TL) -Simple or multiple	LOW Fat, LOW Sat Fat, HIGH Sugar, MED Salt
Warning labels	ALTO EN AZÚCARES, ALTO EN GRASAS SATURADAS, ALTO EN SODIO, ALTO EN CALORIAS
Summary indicator systems	
Choices International logo	
American Heart Association (AHA) Tick or Heart-Check	
Emolabelling	
Star Rating	

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offers, which food manufactures are using as marketing strategies, are not mandatorily regulated[28].

Additionally, the Latin American region has specific characteristics that need to be considered when implementing any strategy regarding food labelling, such as mathematical and reading skills, educational level, and the current health status of the population.

Table 4. Countries With Mandatory Food Labelling Policies

Countries With Mandatory Food Labelling Policies	Countries Applying Voluntary Food Labelling Guidelines
In Mexico, the Guideline Daily Amounts (GDA) system has been established as mandatory in all foods and beverages since July 2015. Simultaneously, the Ministry of Health established a voluntary logo to indicate if a product is healthier than similar products of its kind , according to a particular set of nutrition criteria[29]. Ecuador, has adopted the nutrition traffic light system (TL) in the FOP of processed foods since November 2015[30]. The nutrition criteria of this system is based on evidence. Chile, approved a food labelling regulation in 2012, which consists on an octagonal logo with the expression: "High in" sugars, saturated fats, sodium and calories for those foods that exceed an established nutritional limit[31]. The nutrition criteria of this system is based on evidence.	CODEX ALIMENTARIUS: Argentina, Bolivia, Colombia, Dominican Republic, Ecuador, Peru. SIECA (Secretariat of the Central American Economic Integration): Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama. MERCOSUR (Southern Common Market): Argentina, Bolivia, Brazil, Paraguay, Uruguay, Venezuela.

There are harmonized food labelling guidelines in the Latin American region that emphasize the different definitions of food claims, such as the Codex Alimentarius[32], the Secretariat of the Central American Economic Integration (SIECA)[33], and the Southern Common Market (Mercosur)[34].

However, components of the guidelines, such as the amount and type of FOP label components, are not mandatory and still not regulated. Specifically, one of the main drawbacks is that it is not necessary to declare added sugars. Additionally, guidelines mainly have economic and trade goals that do not align with the goals of the public health community.

There is a number of promising FOP food labelling systems in Latin America, such as the Chilean and Ecuadorian systems based on scientific evidence, the potential contribution of each of these systems to public health in these countries need to be evaluated.

In the systematic review, 612 publications were identified and 42 studies were included. FOP nutrition labels have a consistent impact on consumer choice of healthy foods, intent to purchase and food reformulation. The system with favorable results in terms of healthy food choices and perception of healthfulness was the Multi-Traffic Light (MTL) labelling system, and the summary system demonstrated the greatest impact on food reformulation. However, studies conducted in real life scenarios and those performed in a modeled environment did not compare different FOP labelling systems, whereas experimental studies did. There is a lack of studies evaluating any impact or effect of multiple FOP nutrition labelling systems, especially in low and middle-income countries.

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Conclusions

FOP nutrition labelling is a promising means to influence packaged food choices towards healthier choices, alternatives and improve the diets of a growing worldwide population who are overweight or obese. However, there are multiple labelling formats currently in use, which can cause confusion, especially as some of the systems are extremely complex.

FOP nutrition labelling systems that have proven effective in improving consumers' choices are those that are simple, consistent, coloured, do not require mathematical skills, and take little time to interpret. The new warning labels that have been implemented in Chile as well as the new TL system in Ecuador include many of the effective characteristics and present an opportunity for further research to evaluate their effectiveness.

Further research needs to be carefully outlined to avoid conflicts of interest, should focus on health outcomes and food reformulation impacts among the various FOP nutrition labelling systems, and ought to be conducted in real-life scenarios. It is also important to validate these labelling systems in the context of the particular population in which they are going to be implemented. The overarching goal of subsequent research should be to achieve a clear and standardized system based on a proper nutrition profile such as the new PAHO nutrient profile model following the examples of Chile and Ecuador. Finally, research efforts focused on food labelling offer an opportunity to advance nutritional knowledge and improve public health, particularly in vulnerable populations.

b) Review of the current nutrition labels and categorization

Methods

To categorize the types of food and nutrition labels available on food products targeted to children within the four selected LA countries. Information on labels of more than 10,000 products has been collected in Mexico. In collaboration with the InterAmerican Heart Foundation in Argentina, who had previously participated in a project involving photos of food products, 600 photos of prepackaged food were randomly selected for inclusion. Groups from the Graduate Program in Human Nutrition from Costa Rica University and the Nutrition and Public Health department of the Bío-Bío Universtity at Chile took 600 randomized photos in each of their respective countries, trying to have diversity between and within brands and type of products.

For each selected country, we explored the currently regulated or voluntary FOP label components used and identified labelling models on products targeted to children or adolescents which are specifically associated with increasing diet-related NCDs (sweet and savory snacks, breakfast cereals, sweetened beverages, fast food, milk and dairy sweetened products), including all products mentioned in Table 5.

Data sample

Data collection was performed by taking a randomized sample of photos of the front of food packages from the selected categories of food products at various food retail outlets in each country. The sample included 600 products per country, 100 per food group category.

Table 5. Definition of the Food Categories Included in the Sampling for the Identification of FOP Labelling Systems.

Categories	Included	Not included
1. Sweet snacks	Chocolate and sugar confectionery, energy and cereal bars, sweet toppings and desserts, cakes, sweet biscuits and pastries; other sweet bakery wares, and dry mixes for making such.	Salty bread products
2. Savory snacks	Savory snacks Popcorn and maize corn; seeds; nuts and mixed nuts; savory biscuits and pretzels; other snacks made from rice, maize, dough or potato	
3. Breakfast cereals	Oatmeal; cornflakes; chocolate and sweet breakfast cereals; mueslis	
4. Sweetened beverages	Juices, cola, lemonade, orangeade, other soft drinks, sweetened beverages, flavored waters	Cream and alcoholic beverages
5. Fast food	Ready-made and convenience foods and composite dishes; pizzas; lasagna and other pasta dishes with sauces; quiches; ready meals; ready-made sandwiches or burgers; filled pastas; soups and stews (packaged or tinned)	
6. Milk and dairy products	All sweetened milks, yogurt, fermented milk, substitutes of yogurt, yogurt products containing additional products (such as fruit; seeds)	Unsweetened milks.

*Categories adapted from the World Health Organization, Europe nutrient profile model. 2015.

Data collection

The information collected, included the following information from the package:

- Summarized nutrition information on FOP labelling systems (e.g. % guideline daily amounts (GDAs), traffic lights, health star ratings or other FOP labelling systems).
- Logos and claims of nutrition characteristics of products.
- Other non-health-related information (e.g. origin, brand name) and presence or absence of promotional characters and/or premiums.
- Promotional characters, when the FOP included a printed cartoon or company character, an amateur or famous sportsperson, a celebrity or a movie character
- Premium offers, referred to promotions such as game or app downloads, contests, special prices, limited edition, gifts or collectables.

After collecting the data, the information was categorized to an existing taxonomy to identify specific labelling models and classify health-related food labels, exemplified in *figure 1* [5]. This categorization was done in Mexico including photos form the other countries, see Supplemental Material, Figures S2-S5. This taxonomy provided a standardized way to synthesize the information for the analysis, making it comparable between countries. To minimize coding errors, a coding system has been developed where the different variables that will be considered for analysis are mentioned.

Figure 1. INFORMAS Taxonomy for the classification of health-related food labelling components in a standardized way across countries and over time.
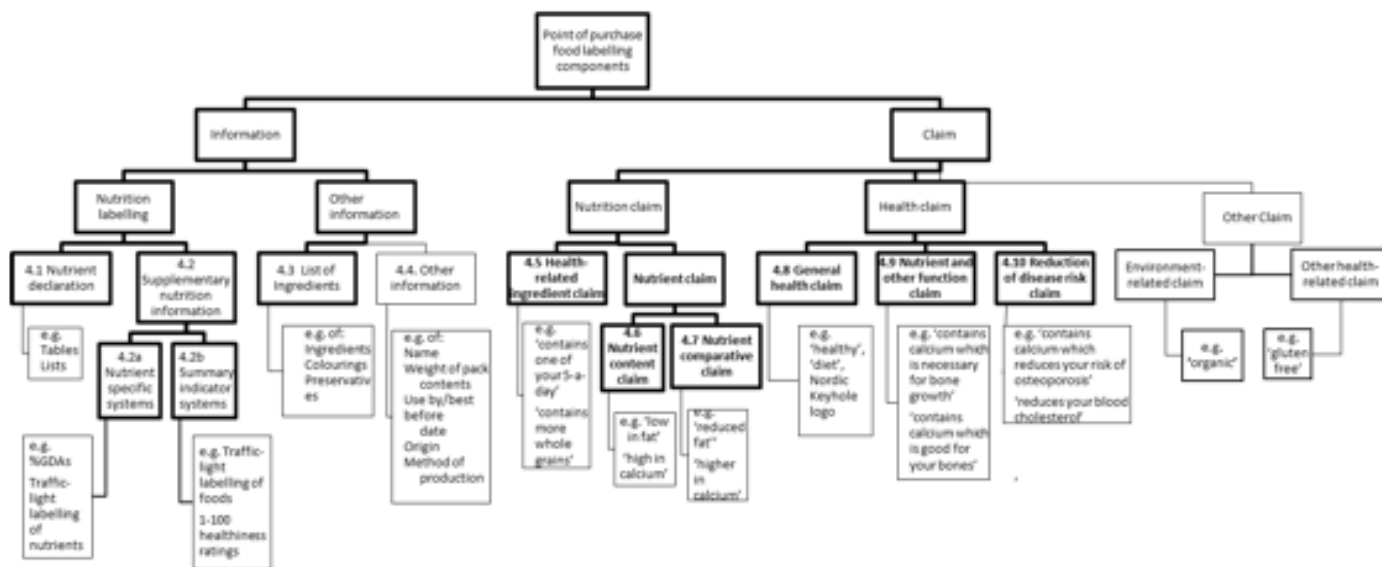
Rayner M, Wood A, Lawrence M, et al. Monitoring the health-related labelling of foods and non-alcoholic beverages in retail settings. Obes Rev 2013; **14 Suppl 1**: 70-81.

Inter-rater reliability

Agreement among coders was standardized. To minimize coding errors, the persons performing the coding understood the classification system, the differences between the types and formats of claims and promotional characters. Variations in the coding and variability in interpretation of data were the main sources of error. To assess inter-rater reliability, two persons coded the same food product categories to compare the differences in coding. The assessment of inter-rater reliability was done for a subsample of food products. The κ statistic was of 0.926, with a significant correlation (p<0.05).

Statistical analysis

Descriptive analysis of the proportion of different types of FOP labelling systems present on the selected food products from each country were presented using percentages. Also, tests of significance were used to assess whether labelling systems are different between products within categories.

Chi-Square tests were used to assess if the number of claims on products varied within a category and/or between countries. A p<0.05 was considered statistically significant. Multiple testing was adjusted.

Results

A total of 1,973 foods and drinks were included in the analysis: México (n=600), Argentina (n=445), Chile (n=515) and Costa Rica (n=413). Almost half of them displayed at least one claim, and a third of them, the GDA nutrition system. Overall, 21% of food products carried a promotional character and only 2% a premium offer. Nutrition claims were the most common in all four countries, and milk and dairy as well as breakfast cereals were the categories that displayed the majority of FOP labelling components.

Results are discussed by FOP food labelling components, country and food category. Percentage of FOP labelling components by food category are shown in Figure 2 and by country in Table 6. Costa Rica was the country with the highest quantity of nutrition claims, while Chile had more percentage of products displaying the GDA system and Mexico promotional characters.

Table 6. FOP food labelling components by countries.

Country	FOP labelling component	No. of packaged foods showing FOP labelling component	% of food products with the FOP labelling component 95% CIs*)
All countries N= 1,973 foods	Nutrition claim	772	39.1% (37 – 41.3)
	Health claim	32	1.6% (1.1 – 2.2)
	Other claim	331	16.8% (15.1 – 18.4)
	GDA	643	32.6% (30.5 – 34.6)
	Promotional character	412	20.9% (19.1 – 22.7)
	Premium offer	45	2.3% (1.6 – 2.9)
Mexico N= 600 foods	Nutrition claim	260	43.3% (39.4 – 47.3)
	Health claim	17	2.8% (1.5 – 4.2)
	Other claim	173	28.8% (25.2 – 32.5)
	GDA	197	32.8% (29.1 – 36.6)
	Promotional character	145	24.2% (20.7 – 27.6)
	Premium offer	12	2% (0.9 – 3.1)
Argentina N= 445 foods	Nutrition claim	140	31.5% (27.1 – 35.8)
	Health claim	0	0%
	Other claim	33	7.4% (5 – 9.8)
	GDA	114	25.6% (21.5 – 29.7)
	Promotional character	65	14.6% (11.3 – 17.9)
	Premium offer	16	3.6% (1.9 – 5.3)
Chile N= 515 foods	Nutrition claim	153	29.7% (25.7 – 33.7)
	Health claim	1	0.2% (0 – 0.6)
	Other claim	31	6% (4 – 8.1)
	GDA	193	37.5% (33.3 – 41.7)
	Promotional character	110	21.3% (17.8 – 24.9)
	Premium offer	10	1.9% (0.7 – 3.1)
Costa Rica N= 413 foods	Nutrition claim	219	53% (48.2 – 57.8)
	Health claim	14	3.4% (1.6 – 5.1)
	Other claim	94	22.8% (18.7 – 26.8)
	GDA	139	33.6% (29.1 – 38.2)
	Promotional character	92	22.3% (18.2 – 26.3)
	Premium offer	7	1.7% (0.4 – 2.9)

CIs = Confidence Intervals

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The percentage of FOP food labelling components by country and by category varies widely across Latin American countries (Mexico, Argentina, Chile and Costa Rica), see Figure 2, 3 and Graph 1.

In Costa Rica 79% of the Breakfast cereals displayed a nutrition claim, 77% in Mexico, 63% in Chile and 57% in Argentina. Similar results were found on Milk and Dairy products, 79% in Costa Rica, 75% in Chile, 64% Mexico and 33% Argentina. Usually the claims were presented in a verbal format, which uses words, statements and phrases to communicate a special content of the products. This study also demonstrate that the persuasive technique most used among the different food and beverage products was promotional characters (cartoons, celebrities, famous sports persons, among others).

Figure 2. Percentage of FOP labelling components by fofod category and by country. 2014-2015.

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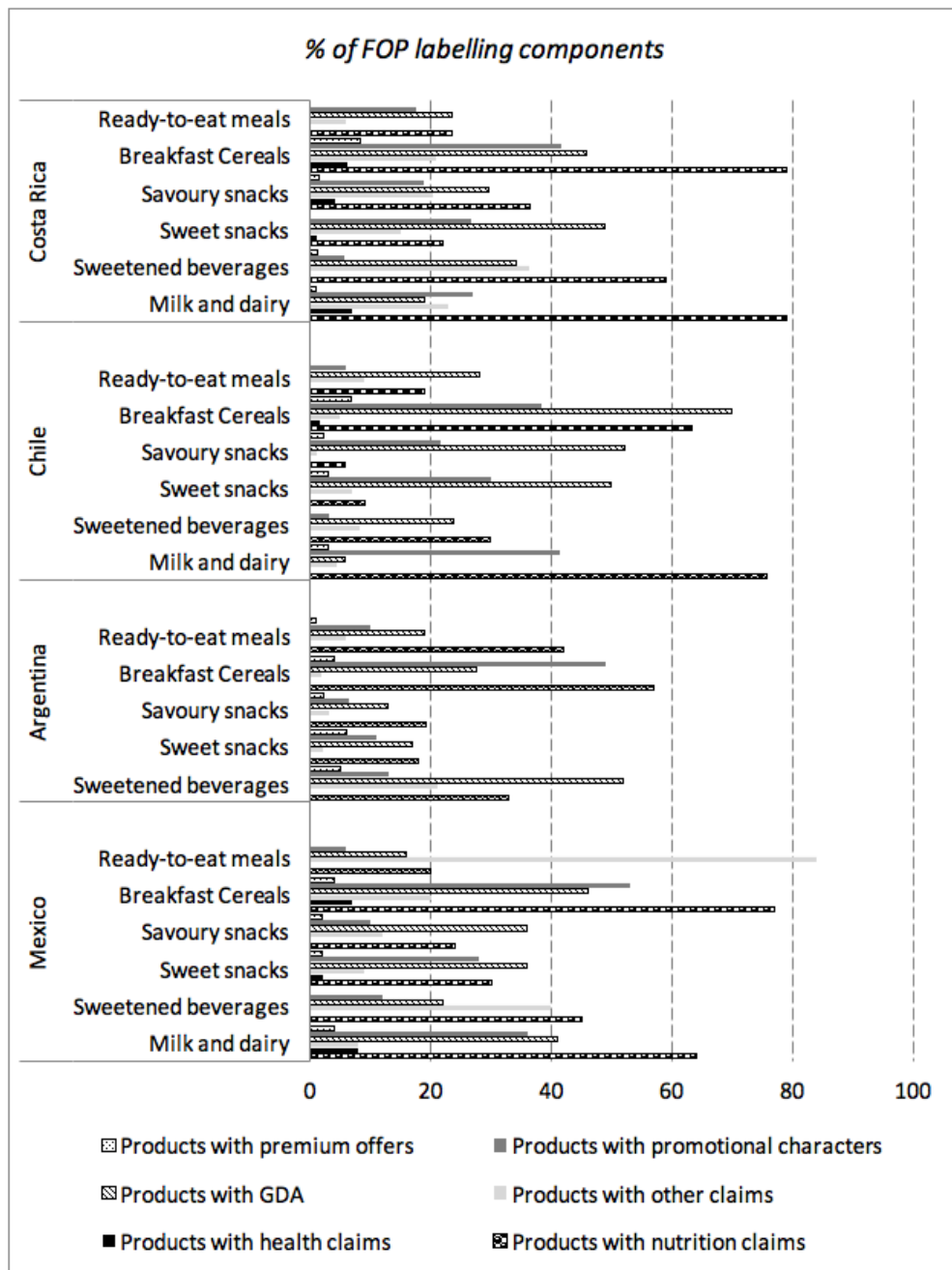
Figure 3. Format of claims by food category and by countries.

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targeting children and adolescents in Latin America countries
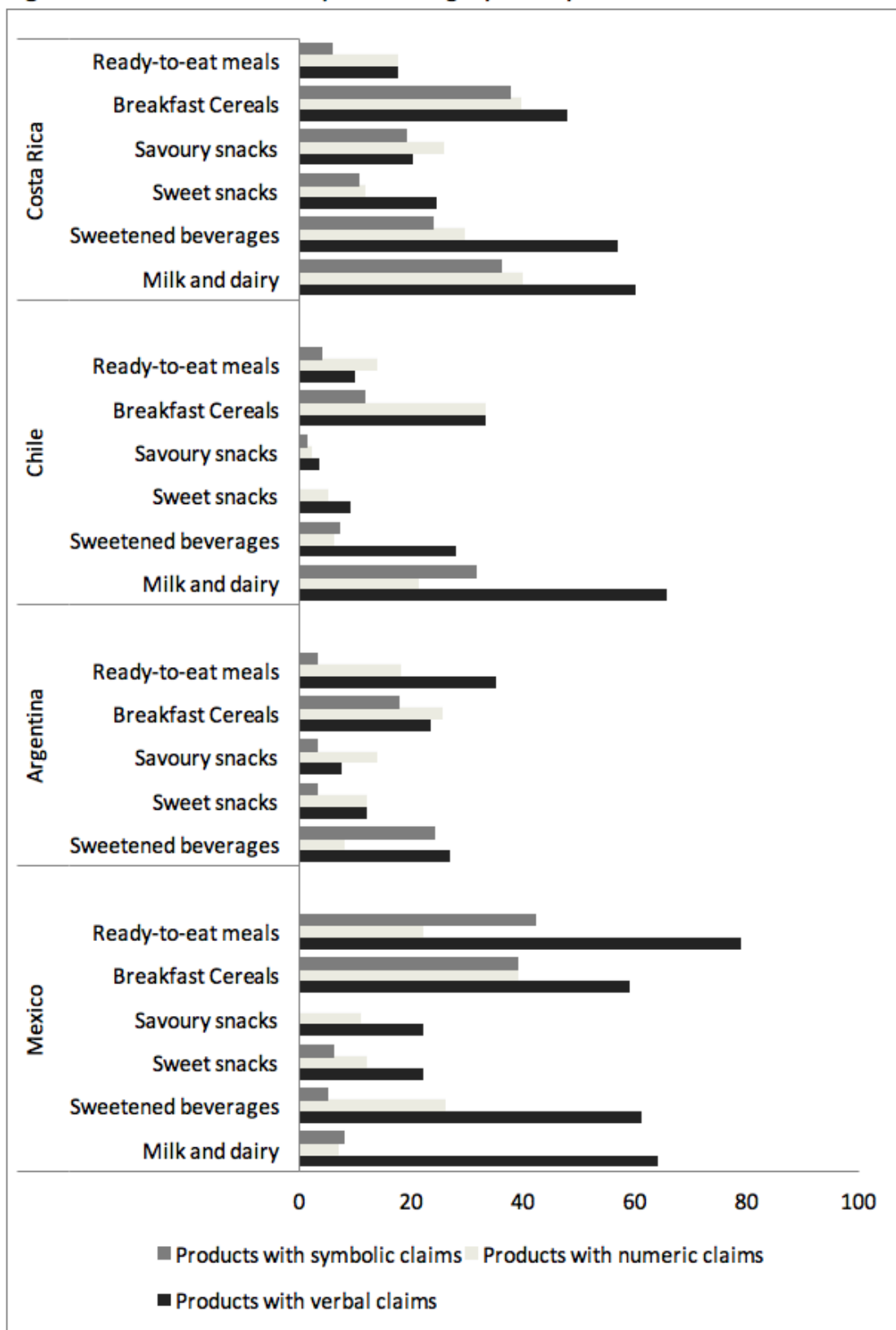
Graph 1. Percentage of FOP labelling Components by Food Category Across all Countries. Mexico, Argentina, Chile, Costa Rica. 2014-2015.
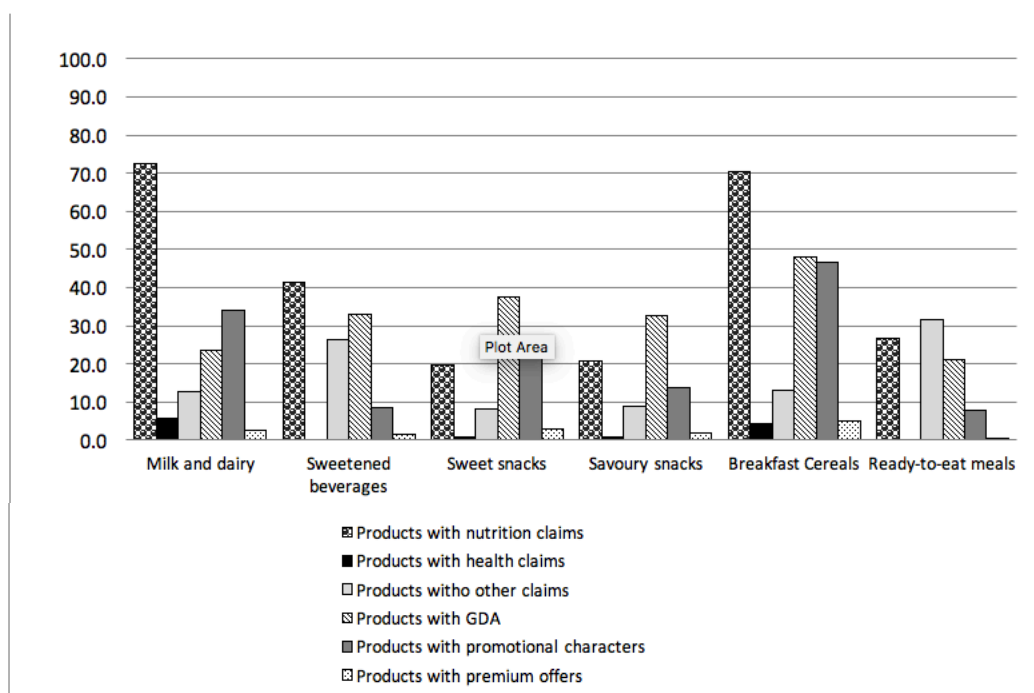
Note: A single product could carry more than one of the FOP *food labelling components, so it could be part of several bars in graphic.*

*Other claims: claims that are not specifically related to nutrient but are related to other factors such as environment, allergies or food safety.

The numbers of nutrition claims per product and by country are shown in *Table 7*.

Almost half (45.9%) of the nutrition claims were about vitamins and/or minerals, one quarter (26.5%) referred to the fat content of a food, 10.1% to calories, 8.5% to the sugar content and 4% to sodium. Nutrition claims referring to nutrients and ingredients across food categories are shown in table 8.

Table 7. Claims per food products by countries.

	Mean number of any claim	Highest number of any claims in a single product	Mean number of nutrition claims	Highest number of nutrition claims in a single product
All countries	0.9±0.03	9	0.7±0.02	6
Mexico	1.3 ±1.4	9	0.8 ±1.1	6
Argentina	0.5 ±0.9	5	0.5 ±0.8	5
Chile	1.3 ±1.5	7	1 ±1.3	6
Costa Rica	0.6 ±1.1	6	0.5 ±1	5
p value	<0.001		<0.001	

*Note: Per food product carrying a claim
*Median test adjusted by Bonferroni's multiple contrast tests
*n= 1,973

Table 8. Nutrition Claims referring to nutrients and ingredients across food categories in Mexico, Argentina, Chile and Costa Rica.

Food categories	Vitamins and minerals n(%)	Fat n(%)	Calories n(%)	Sugar n(%)	Sodium n(%)
Milk and dairy products	116 (39.2)	51 (20.5)	9(13.8)	20(36.4)	0
Sweetened beverages	65 (21.9)	5 (2)	33(50.8)	20(36.4)	6 (23.1)
Sweet snacks	9 (3.1)	37 (14.9)	12(18.5)	9(16.3)	1 (3.8)
Savoury snacks	11 (3.7)	58 (23.3)	2(3.1)	0	9 (34.6)
Breakfast cereals	92(31)	32 (12.8)	8 (12.3)	6(10.9)	10 (38.5)
Ready-to-eat meals	3 (1.1)	66(26.5)	1 (1.5)	0	0
Total nutrient or ingredient claims	296	249	65	55	26

*n= 1,973
*Similar patterns were found across countries

Conclusions

This cross-sectional study provides an overview of the types of FOP labels available on packaged foods in four Latin American countries. The prevalence of FOP food labelling components in the LA countries market is widespread and varied across countries. Nutrition claims seems to be the primary labelling component to which Latin American consumers are exposed.

Our results showed that almost half of the products analysed displayed at least one type of claim and of those, half showed 2 or more claims. Approximately one third of foods sampled in this study carried a nutrition claim or a nutrition specific system (GDA). Breakfast cereals and milk and dairy food categories were the ones with the highest percentage of nutrition information and promotional characters on food labels (claims and GDA), 70% and 73%, respectively. Additionally, claims were more often depicted in a verbal format.

We found a large percentage of label components on the selected food products across countries. The excessive amount of components displayed on food and beverage products seems to be used to drive consumer's interest, which can confuse consumers and mislead their choices.

Claims were the most common FOP label component found on all the products showing that they are the main source of information about the quality of the product for consumers. The large quantity of claims on foods and beverages that this study identified suggests that this type of label component does not fully reflect public health priorities.

The evidence presented in this study is useful for monitoring, evaluating and creating advocacy tools to promote public policies within and across LA countries and strengthen the NCD prevention agenda.

c) FOP label usage, perception and preference among parents

Methods

A close-ended questionnaire was used to collect data on the usage, perception and preference of the FOP nutrition labels that exist on the selected food products. This close-ended questionnaire was adapted from a previous questionnaire used and validated in Mexico[25], which was designed based on the theory-planned behavior and a literature review of international data collection for similar aims. The objective of this questionnaire was to evaluate consumers' motives when buying foods as well as the mediators that drive such food choices, including nutrient characteristics, the healthiness of the products, and the use, perception and understanding of the information provided. The questionnaire was validated at two levels, the first with researchers having knowledge on the topic and the second by a sub sample of the target population in each country (supplemental material figure S6.). Each country's team adapted the questionnaire with the appropriate language and labels used in each country and piloted it. Two people with the same level of knowledge on the subject and bachelor degrees went to the selected elementary schools to distribute the questionnaires. Informed consent was obtained for each survey participant by explaining the study to each parent and confirming their understanding via signature of the document prior to dissemination of the questionnaire.

The questionnaire was given to a sample of parents of children in elementary schools. The questionnaires were delivered to each parent at the school and they were given time to self-respond. The survey took an average of 10 minutes to complete.

Study sample of consumers

The number of applied questionnaires in each country was determined by the power to observe 12 percentile points between countries (284 questionnaires by country), adjusting the sample by 5% to compensate for any lack of information and / or loss of questionnaires, the final sample of questionnaires by country was 300.

A two-stage sampling strategy was applied. First, to estimate the total number of parents in each elementary school we stratified schools by sectors (public and private), and the proportion of student attendance to public and private elementary schools in each country was considered. In order to have a proxy of a representative sample, we defined the third part of the sample (100 parents)) as a minimum sample size in a specific sector. The following table presents further details:

Table 9. Sample of Parents

Country	Proportion of student's attendance to elementary schools according to private and public sector, by country.			Number of parents according to the proportion of students attendance to elementary school according to private and public sector			Number of parents, adjusting the sample by the established minimum (one third of the sample)		
	Public (%)	Private (%)	Total (%)	Public (n)	Private (n)	Total (n)	Public (n)	Private (n)	Total (n)
Mexico	93.4	6.6	100	280	20	100	200	100	300
Chile	44.2	55.8	100	133	167	100	133	167	300
Argentina	69.3	30.7	100	208	92	100	200	100	300
Costa Rica	92.1	7.9	100	276	24	100	200	100	300

*SITEAL, information according to the expenditure surveys of households in each country, 2013.

For the second stage of sampling, a convenience sample of elementary schools was selected in each country for each sector. City suburbs were used to select the schools. We included lay (non-religious) elementary schools that had at least 200 students. Schools were excluded if they were comprised of only male or female students, the principals' permission to distribute the questionnaires could not be obtained, or if the school was participating in another research project.

To apply the questionnaire a convenience sample was undertaken by the interviewers. Parents with at least one child enroled in the selected elementary schools were included, and those parents employed as health professionals or working in the food industry were excluded from the sample.

Data collection

Prior to data collection an oral informed consent was approved by the National Institute of Public Health of Mexico, the University of Chile's Institute of Nutrition and Food Technology (INTA) the University of Costa Rica and the InterAmerican Heart Foundation Argentina (FIC). Consent was read to and obtained from each participant before conducting the questionnaire.

Statistical analysis

Each survey question was assessed within and between countries. Within each country, chi-squared test were used to determine if statistically significant differences in response vary by parental characteristics: sex, age group, number of children and adolescents in the household, occupational status and education level achieved. Descriptive analysis consisting of the frequency and percentage of the perception and usage of the FOP labels by the parental respondents was done by t-test and median differences test. To assess the associated factors with the FOP usage, regression models were performed. Statistical significance was defined by $p < 0.05$.

Results

Overall, the participants (parents of elementary school children) around the countries had significant differences in their characteristics, except in the number of children living with them and members of the family with special diet, see table 10. Most of the respondents were females on mid-thirties and the primary shopper in their household. Most of the Mexico and Costa Rica respondents had children in public schools, while in Chile and Costa Rica in private schools.
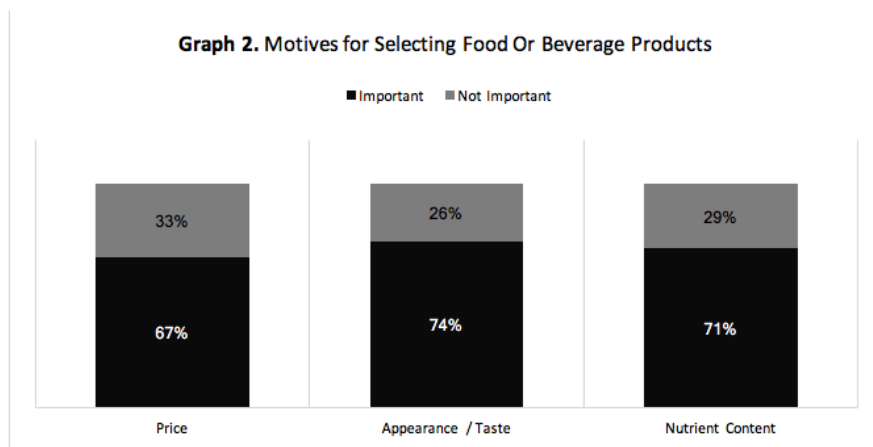
Table 10. Participant Characteristics by Country		Mexico	Chile	Costa Rica	Argentina	p
School	Public	62.5%	45.1%	69.9%	33.3%	<0.001
	Private	37.5%	54.9%	30.1%	66.7%	
Gender	Males	15.9%	26.5%	15.9%	28.6%	<0.001
	Females	84.1%	73.5%	84.1%	71.4%	
Average Age		36.2	38.7	38.1	38.0	<0.001
BMI	Average	26.5	25.6	0*	22.9	<0.001
	BMI < 25	38.1%	40.7%		78.8%	
	BMI 25-30	40.3%	48.3%		18.2%	
	BMI > 30	21.6%	11.0%		3.0%	
Primary shopper	Yes	88.57%	94.29%	0*	87.88%	<0.001
	No	11.43%	5.71%		12.12%	
Maximum level of education	Low	22.54%	14.74%	55.02%	19.70%	<0.001
	Medium	47.94%	43.59%	20.88%	63.64%	
	High	29.52%	41.67%	24.10%	16.67%	
Number of children	One	28.9%	30.1%	29.2%	34.8%	0.136
	Two	43.5%	49.7%	43.2%	45.4%	
	More than two	27.6%	20.2%	27.6%	19.7%	
Special diet	No	80.6%	77.8%	80.9%	81.8%	0.174
	Yes	20.4%	22.2%	19.1%	18.2%	

*Missing data, participants filled weight and height of their children.
*n=977 participants

The respondents ranked how important each of the following motives were for selecting a food or beverage product: the ease of preparation; the need to consider a special diet; the familiarity to the product's brand; the price; the appearance or taste of the product; the promotion or deal; and the low or high nutrient content. The most important motives for an individual to select a food or beverage product were the product's price, taste or appearance, and the nutrient content of the product, sees *Graph 2*. The price of the food or beverage product was important 67% of the time. The decisions to select a product based on appearance or taste was important 74% of the time. The nutrient content in a food or beverage was important 71% of the time. Same patterns were found in all four countries.

Graph 2. Motives for Selecting Food Or Beverage Products

■ Important ■ Not Important

	Price	Appearance / Taste	Nutrient Content
Not Important	33%	26%	29%
Important	67%	74%	71%

*n=977 participants

Usage

At the moment of buying a product for their children, more than 40% of the participants reported that they frequently or always examined the nutrient content of the sugar, fat, and calorie count. Small differences were found among countries, see *graph 3*. Furthermore, the products that were most reviewed by the participants were dairy products (74.3%), cereals (71.8%), and sweetened beverages (68.1%). It was determined that the use of the nutritional content of food and beverages products was associated with different factors such as: level of education, type of diet, primary shopper and BMI.

Graph 3. Use frequence of the nutritent content displayed on food an beverage products

	Mexico	Chile	Costa Rica	Argentina
Not use	49	33	30	60
Use	51	67	70	40

■ Use ■ Not use
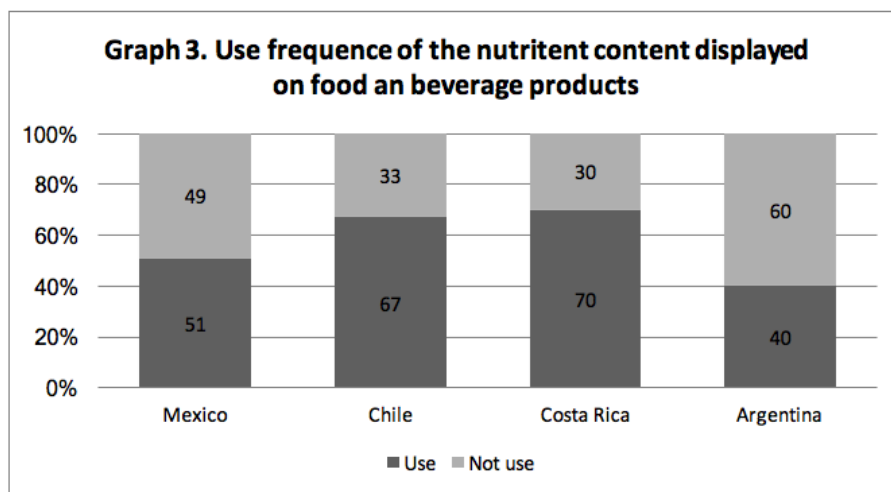
*n=977 participants

Perception

Parents with children in elementary school were asked questions about their perceptions by statements of each of the different components of the front-of-package food and beverage labels, see Graph 4. The same statements were made for each of the three components. The majority of the parents considered the claims as publicity for the product. However, 68% trusted the claims. Furthermore, three fourths of the participants reported the GDA helped select healthier products. But when the participants were asked to evaluate

the ease of understanding the nutritional value system between the claims, GDA, and nutrient logo, the GDA was found to be the most confusing.

Graph 4. Perception of Different Components of the Front-of-package Food and Beverage Labels
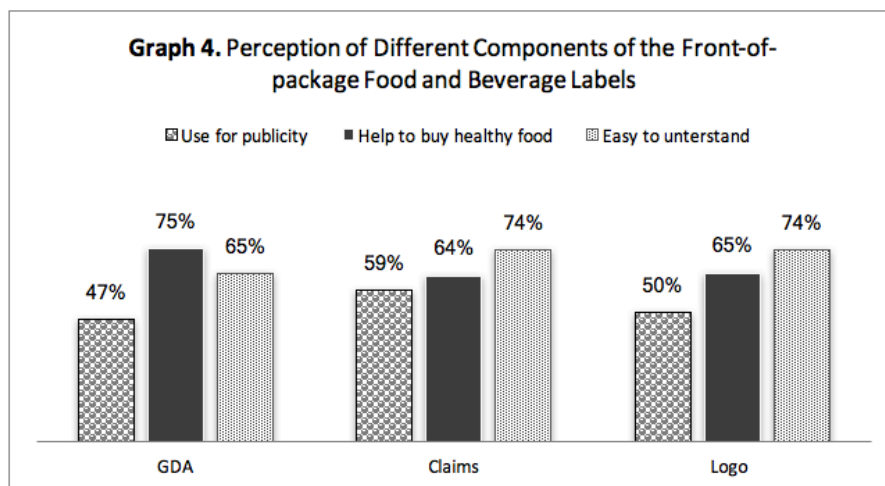
Answers were given for each statement and component of the FOP food and beverage labels

Preference

The participants answered a question about their preferred front-of-package diagram design(s) for identifying healthy food and beverage products, see Table 11. There were significant statistical differences between the education levels and the preferred front-of-package diagram designs, see Graph 5 and 6. The participants with the lowest education, (completion of elementary school) selected the traffic light, which is utilized in Ecuador, as the most useful, and the octagon signs, which is utilized in Chile, as the next useful. There were more preference to the traffic light and octagons in public schools, while the majority of the preference in private schools was to the GDA colour coded.

Table 11. Preference of Labelling Type by Country				
	Mexico	Chile	Costa Rica	Argentina
GDA	16.49%	15.37%	17.15%	12.05%
Logo	14.64%	3.21%	7.57%	9.64%
Traffic Light	27.01%	30.28%	22.27%	43.37%
Octagons	13.40%	16.74%	19.82%	4.82%
Claims	5.57%	8.26%	20.71%	3.61%
GDA Traffic Light	22.89%	26.15%	12.47%	26.51%

*Each FOP label were evaluated separately *n=957 participants*

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Graph 5. Preference of FOP systems among Latin American Population with the lowest level of education
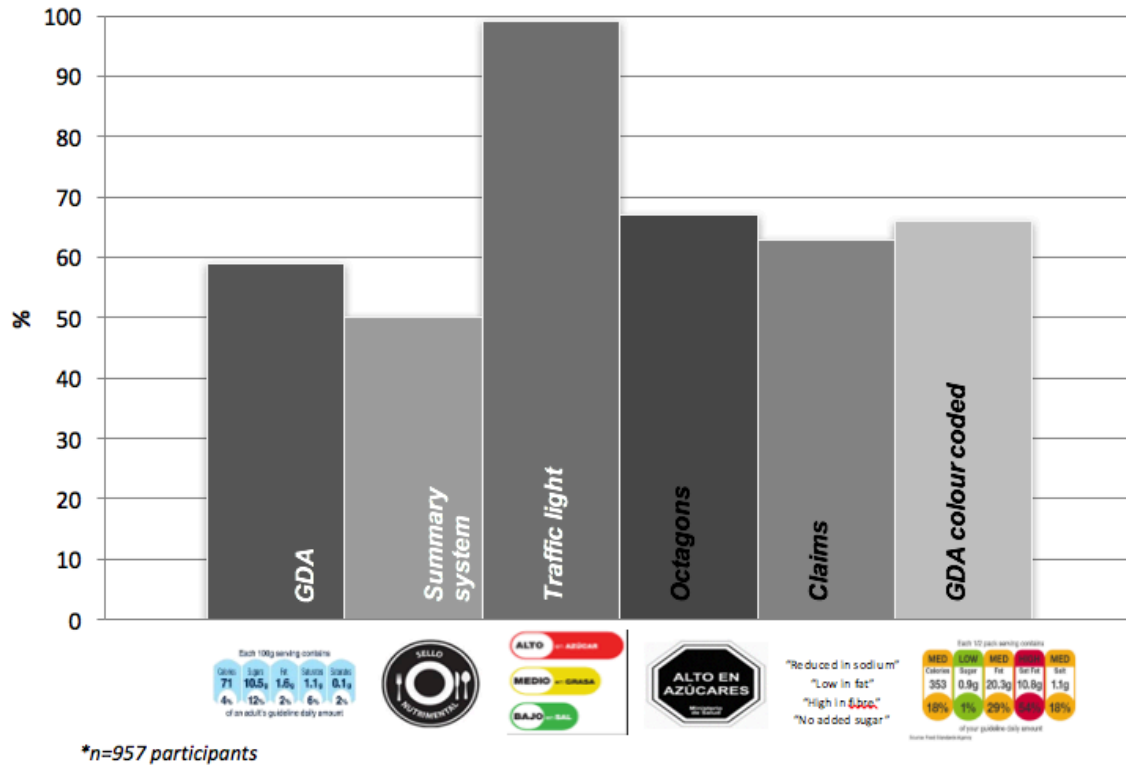
*n=957 participants

After the participant's selection of their preferred FOP system, they were asked why they chose that system. Most of them (46%) explained their selection because of the use of the system (ease of use, easy to compare, easy to understand, simple and short time to interpret), see graph 6. The preference to the traffic light, the octagons, summary system and claims were mostly related to the use, while the selection of the GDA systems (monochrome or colour coded) was often explained by the content in addition to the familiarity with the system. Reasons varied by country, see graph 7.

Graph 6. Reason of labelling systems preference

Familiarity 23%

Ease of usage 46%

Content 31%

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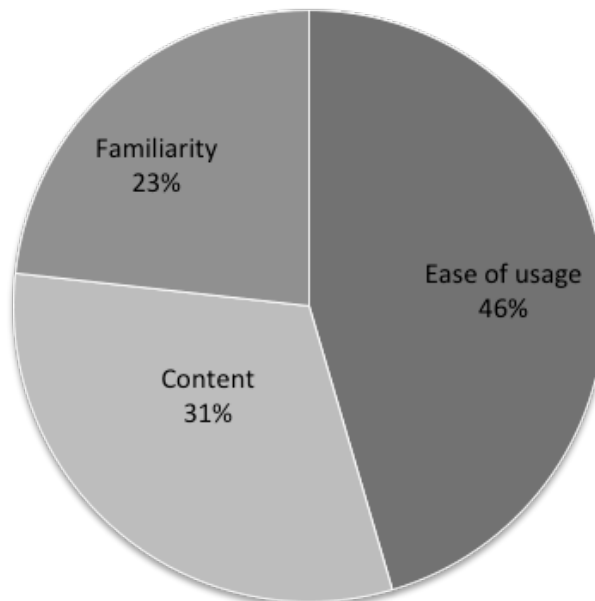
Graph 7. Reason of labelling systems preference by country
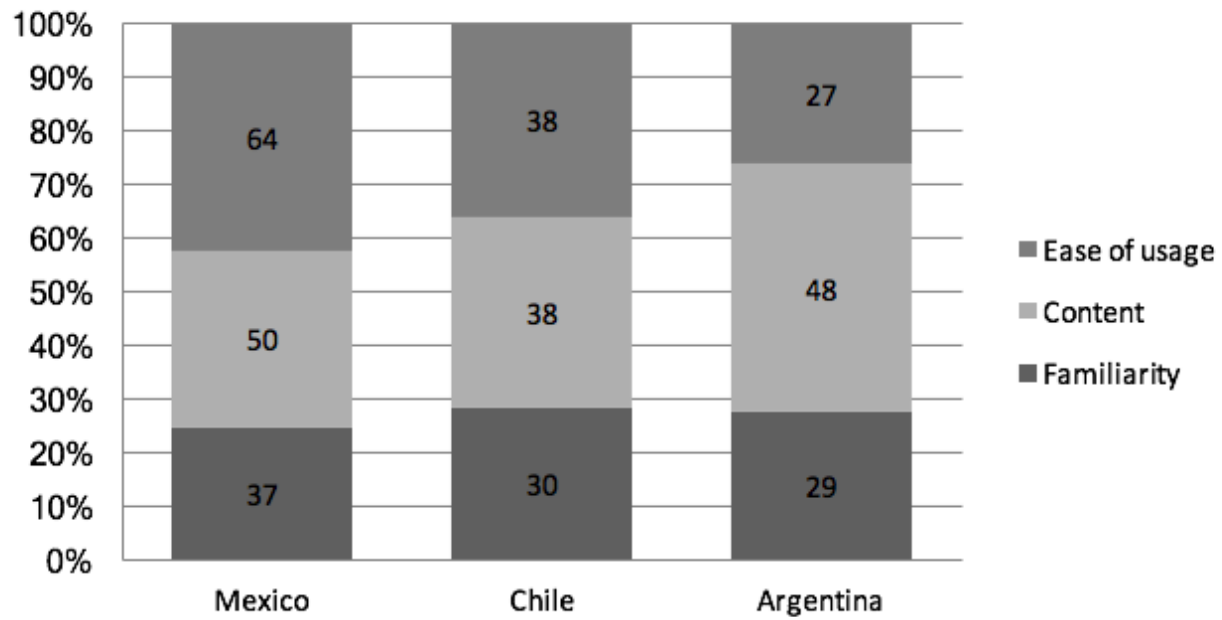
Costa Rica's information was removed from this analysis because some information was illegible or was missing data; Participants were able to explain their selection with as many reasons as they wanted.

Conclusions

Parents do use FOP information when buying foods for their children. They take into consideration many aspects of the food and beverage products, such as: product's price, taste or appearance, and the nutrient content of the product. The majority of participants focused on sugar, fat, and calories from the FOP.

A FOP label system should be addressed to all the population, including the most vulnerable people (low socio-economic status, educational level, rural areas, among others) to increase the potential impact of this strategy.

In LA, parents look for systems to compare products which are easy to understand, with simple systems and that don't take a long time to interpret. It seems that Ecuador's (traffic lights) and Chile's (warning octagons) current labelling systems on food and beverages products carry these characteristics. Even though the traffic light and the octagons were not available in every country, preference for them were considerably high. The results suggest that both of the systems could be useful for the LA population to help healthy choices and their purchase which can influence their dietary intake.

d) Write-up of policy recommendations

Methods

Based on all study objectives and results, summary of the information collected and main findings were written by the team and adapted to provide specific recommendations and actions for food labelling strategies and their potential to promote healthier choices to different stake holders.

Recommendations and actions were discussed and suggested by a scientific expert team committee on the topic from the four countries involved in the study. Next, the proposed recommendations were presented to the different offices of UNICEF involved in the study and suggestions, recommendations were received and included in the final version.

Policy Recommendations

Table 12. Recommendations and actions to the main stakeholders

Actions	Recommendations
What? **Implement and regulate labels on packaged food**	-Lead efforts regarding Front-of-Package food labelling towards consumers with low educational levels and low literacy in nutrition for a greater public health impact. -To promote the implementation of a FOP nutrition labelling systems simple, consistent, coloured, do not require mathematical skills, and take little time to interpret.
How? **Regulating all label components**	-Regulate all the label components on packaged food including any type of nutrition systems, claims, promotional characters, and premium offers.
Based on evidence	-Design an evidence-based FOP food labelling regulation that includes the content total of added sugars, salt, fat and energy as these are the most relevant nutrients related to public health issues according to WHO and PAHO(35,36).
Harmonized, simple, single, and consistent	-Promote and encourage regional and harmonized regulations. -To use the PAHO nutrient criteria for their FOP labelling regulations in the region.
Supported by educational campaigns	-Implement a single and consistent FOP nutrition labelling system supported by scientific authorities and health organizations, following the examples of Ecuador and Chile. -Develop a permanent education campaigns to improve understanding and use by consumers of the selected FOP nutrition system.
Who? **_Stakeholders_**	All the involved should declare publicly their interests, including previous and current work and their financial source to avoid conflict of interest.
⮑ Academia	-ACADEMIA should generate evidence and identify which FOP nutrition labelling systems may be more effective in helping consumers make healthier choices.
⮑ Government	-GOVERNMENT should lead and promote implementation and regulation of the label components, as well to guarantee transparency during the implementation process. The evidence has shown that the GDA system is complicate to understand and is not being useful to make healthier choices in the population.
⮑ Food industry	-FOOD & BEVERAGE INDUSTRIES must implement the food labelling regulation in their products, complying with the set criteria and providing information to monitor food reformulation periodically. The food and beverage industry should not be part of the criteria setting for food labelling or the design of the regulatory framework.
⮑ Civil Society and NGOs	-CIVIL SOCIETY can contribute by providing information on the use and understanding of the FOP food labelling systems. They are encouraged to promote FOP food labelling regulation and advocate for regulatory measures on the policy agenda.

Limitations of the study

While this is the first study in Latin American countries on the topic, using the same methods to guarantee comparability between countries, several limitations have been observed:

- We only assessed six different food and beverages categories, while parents and their children are exposed to many more products.

- A random selection of the products was used to analyze their FOP, which is not representative of all food categories.

- Sometimes the quality of images was not clear enough to allow coding of all the components, this can skew the final results.

- A convenience sample of schools and parents was used to apply the questionnaire to the parents in the four countries.

- The number of participants included in the study, by country, does not have the power to be considered a representative sample of the whole LA region.

- The data collection between parents and within countries had small differences. Some of the parents were asked to fill the questionnaire on their own, while others participants were questioned by an interviewer.

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Glossary

Front-of-package (FOP) nutrition labelling systems: Schemes that use nutrient criteria to indicate that a product has certain nutrition characteristics.

Nutrient specific systems: Displays the amount per serving of select nutrients from the Nutrient Facts on the front-of-package label or uses symbols based on specific criteria.

Summary indicator systems: Health and graded logos or symbols that provide summary information about the nutrient content of a product, such as healthiness ratings or tick marks.

Guideline Daily Amounts (GDA): GDAs are nutrient intake levels that most people are guided to consume daily for a healthy diet. They provide a voluntary benchmark against which the contribution from specific nutrients per portion of a food product can be assessed.

Nutrition labelling: All nutrition information presented on the FOP foods.

Label components: All items presented on the FOP foods such as nutrition systems, claims, promotional characters and premium offers.

Claim: A stated or implied nutrition, health or related claim that can be communicated through all mediums including statements, symbols, vignettes, print or electronic media, or other forms of communication and or advertising.

Health claims: Any representation that states, suggests, or implies that a relationship exists between a food or a constituent of that food and health. (CAC/GL 23-1997)

Nutrition claims: Any representation which states suggests or implies that a food has particular nutrition properties including but not limited to the energy value and to the content of protein, fat and carbohydrates, as well as the content of vitamins and minerals.

Health-related ingredient claim: Any representation which states, suggests or implies that a food has particular nutrition properties not related to its energy value or to the content of protein, fat and carbohydrates, vitamins and minerals but related to the content of an ingredient.

Nutrient content claim: A nutrition claim that describes the level of a nutrient contained in a food (CAC/GL 23-1997).

Nutrient comparative claim: A [nutrition] claim that compares the nutrient levels and/or energy value of two or more foods. (CAC/GL 23-1997)

General Health claim: A health claim concerning the general beneficial effects of the consumption of foods or their constituents on health.

Nutrient and other function claim: Nutrient function claim – a health claim that describes the physiological role of the nutrient in growth, development and functions of the body. (CAC/GL 23-1997) [Although Codex classifies nutrient function claims as nutrition claims it seems more logical to classify them as health claims]. Other function claim – health claims concerning specific beneficial effects of the consumption of foods or their constituents, in the context of the total diet on normal functions or biological activities of the body. Such claims relate to a positive contribution to health or to the improvement of a function or to modifying or preserving health. (CAC/GL 23-1997)

Reduction of disease risk claim: Health 'claims relating the consumption of a food or food constituent, in the context of the total diet, to the reduced risk of developing a disease or health-related condition. (CAC/GL 23-1997).

Added sugars: Sugars or other ingredients added during processing or packaging that functionally substitute for sugars.

Promotional characters: Sales promotion technique that features and traits the individual nature of some person or thing, such as a printed cartoon or company character, an amateur or famous sportsperson, a celebrity or a movie character.

Premium offers: Technique used to increase sales of a product, referred to promotions such as game or app downloads contests, special prices, limited edition, gifts or collectables.

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