

Estimated effects of the implementation of the Mexican Warning Labels regulation on the use of health and nutrition claims on packaged foods

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Abstract

Background The use of health and nutrition claims on front-of-pack labels has a potential effect on consumers' food choices; therefore, many countries established regulations to avoid misperceptions. This study describes the use of nutrition and health claims on the front-of-pack of food products in retail stores in Mexico and analyze the potential effects of the new front-of-pack labelling regulation on the use of these claims.

Methods This is a cross-sectional study in which nutrition and health claims, nutrition information panels, and the list of ingredients of all foods and beverages available in the main retail stores in Mexico City were collected. The products were grouped by level of processing according to the NOVA food system classification. Claims were classified into different types using the internationally harmonized INFORMAS taxonomy. The potential effect of the implementation of the warning label regulations on the use of nutrition and health claims was estimated by food group and by thresholds of energy and critical nutrients according to the new regulation.

Results Of 17,264 products, 33.8% displayed nutrition claims and 3.4% health claims. In total 80.8% of all products on the Mexican market were classified as "less healthy"; 48.2% of products had excess calories, 44.6% had excess sodium, and 40.7% excess free sugars according to the new regulation. The new regulation would prevent 39.4% of products with claims from displaying health and nutrition claims ($p < 0.001$); the largest reduction is observed for ultra-processed foods (51.1%, $p < 0.001$). The regulation thresholds that contribute the most of the reduction in the use of claims were calories (OR 0.62, $p < 0.001$) and non-sugar sweeteners (OR 0.54, $p < 0.001$).

Conclusions The new Mexican front-of-pack labelling regulation will prevent most of less healthy processed and ultra-processed foods from displaying HNC and will potentially increase the effectiveness of the warning labels for consumers.

Background

Non-communicable diseases (NCDs) contribute to more than half of the global burden of disease and unhealthy diets are one of the main risk factors [1]. In 2017, it was estimated that 11 million deaths worldwide (22% of all deaths among adults), mainly those caused by NCDs, such as cardiovascular disease, cancers and type 2 diabetes, were attributable to unhealthy diets [2]. According to the last Mexican National Health and Nutrition Survey (ENSANUT), between 2012 and 2018 there was an increase in the prevalence of overweight and obesity in children (34.8% to 35.6%), adolescents (34.9% to 38.4%) and adults (71.3% to 75.2%) [3]. The proportion of adults with type 2 diabetes also increased from 6.4 million (9.2%) in 2012 to 8.6 million (10.3%) in 2018 [3]. Diabetes is the main cause of disability and the third cause of mortality in Mexico [4].

The main dietary components associated with increased risk for NCDs are a high intake of sodium, added sugars, and saturated fats, which are commonly found in ultra-processed foods and beverages [5].

According to the NOVA food classification, ultra-processed foods are ingredient formulations, mainly for industrial use, that result from a series of industrial processes; some examples are carbonated drinks, breakfast cereals, and instant soups[6]. In the Mexican population, added sugars and saturated fats contribute 12.5% and 11.2% (respectively) to the total energy intake [7]. At the same time, the intake of those nutrients of concern rises with increased consumption of ultra-processed foods and beverages [7]. The World Health Organization (WHO) recommends that the intake of both added sugars as well as saturated fats should be less than 10% of the total calories in the average daily diet to prevent NCDs [5].

Improved nutrition labelling is one of the strategies that the WHO and the Pan American Health Organization (PAHO), recommends for the prevention of NCDs, with the main aim to support consumers to make healthier food choices [8]. Nutrition labelling on the back-of-pack is often ignored by consumers or can be confusing for consumers, who prefer shorter and simpler messages on the front-of-pack [9,10]. Front-of-pack labelling (FOPL) has been shown to help consumers make healthier food choices [11,12]. The most commonly used schemes to date include warning labels, traffic lights, the Nutri-score, and the Health Star Ratings.

Health claims (“any presentation that states, suggests or implies a relationship between a food or a constituent of that food and health”) and nutrition claims (“any presentation that states, suggests or implies that a food has particular nutritional properties, including but not limited to the energy value and to the content of protein, fat and carbohydrates, as well the content of vitamins and minerals”) are also ways of presenting health-related product information to consumers [13]. However, such claims constitute a form of advertising on packaging that can influence purchases, preferences, and consumption[14,15]. Packaging with health and nutrition claims (HNC) can generate “health halos” making products look healthier regardless of their nutritional quality[16]. This can mislead consumers, who may misinterpret the nutritional quality of products with HNC [9,17,18].

There are several studies that have investigated the prevalence of HNC on packaged foods in countries such as New Zealand (50%)[19], United Kingdom (32%)[20], Ireland (47.3%)[21], and Brazil (50.5%)[22]. These studies have shown that products displaying HNC generally have a more favorable nutritional profile compared to those without HNC, although these differences were not always significant. Moreover, for some food categories it has been observed that less healthy food products carry HNC more frequently than healthier foods [19]. In order to prevent less healthy foods carrying HNC through public policies, it is important to monitor health-related labelling on food products. Therefore, the International Network of Food and Obesity, NCDs Research, Monitoring and Action Support (INFORMAS) developed specific protocols for monitoring different types of HNC on food products, using a common taxonomy and harmonized methodology across countries [13,23].

Some regions and countries in the world such as Australia and New Zealand have incorporated specific regulations for the use of HNC on food products, including a series of nutritional criteria that must be met to declare their properties[24]. However nutrient profile models designed to prevent unhealthy food products from carrying claims only apply to health claims, not to nutrition claims which are generally

most frequent [24]. In March 2020, the existing Mexican FOPL system “Guideline Daily Amounts (GDA)”, which has been shown to be very confusing for consumers[25,26], was replaced by a warning label system. This label system will be mandatory and includes warnings for calories, added sugar, saturated fat, trans fat and sodium[27]. This regulation will come into effect in October 2020 and the thresholds for energy and the nutrients of concern will become progressively stricter during three stages over five years.

Unlike other countries which implemented warning labels to date such as Chile, Peru and Uruguay, the system includes statements about certain additives not recommended for children, such as non-sugar sweeteners (artificial or natural non-caloric sweeteners or caloric sweeteners like polyols) and caffeine. In addition, the nutrient profile used by the Mexican regulation is based on the PAHO Nutrient Profile Model, which is more restrictive than the nutrient profile model used by Chile, Peru and Uruguay as it classifies all ultra-processed food products as less healthy [28]. Food products with at least one of the warning labels or warning legends must not display HNC on the front-of-pack.

A regulation with the same specifications and thresholds for energy and nutrients of concern has not been implemented before in other countries, so its performance is unknown.

The objectives of this study were to comprehensively assess the use of NHC on the front-of-pack of foods and beverage products on the Mexican market and to analyze the potential effects of the new regulation on the use of NHC on industrialized food products.

Methods

This is a cross-sectional study in which we analyzed the use of NHC on the front-of-package of foods and beverages available in supermarkets in Mexico City during the period of January to March 2017. The selection of outlets was carried out randomly and included the biggest supermarket chains in Mexico (such as the Walmart group, La Comer, Soriana, and Chedraui) and other types of establishments. The selection of establishments was made according to the urban Basic Geostatistics Areas (AGEB by its acronym in Spanish; it is a geographical area delimited by streets, avenues, walkways, or any other feature whose land use is mainly living, industrial, or commercial usage and its population is greater than 2,500 inhabitants). The selection of AGEBS was determined according to the level of marginalization defined by the National Institute of Statistics and Geography (low, middle, and high) and population density (>20,000 inhabitants). The selection of establishments in each AGEBS was carried out randomly and proportionate-to-size.

Data were collected from 136 establishments of different types: supermarkets (n=52), price club (n=8, a type of supermarket where membership is required, and which generally offers products contained in multi-packages for consumers and other establishments), wineries (n=32), convenience stores (n=20), mini supermarkets (n=17) and other types of establishments (n=7). The selected establishments included supermarket chains with more than 70% of the market share in Mexico [29].

To collect data, nutrition undergraduate students were trained by researchers from the National Institute of Public Health (INSP). Photographs were taken of each side of the package with a smartphone. When a product had a singular shape (cylinder, sphere or bag), the fieldworkers captured all relevant information.

It was ensured that the name of the product, the front of the package (including HNC), the type of package, GDA labelling, bar code, list of ingredients, nutrient facts table, and price were captured. The fieldworkers walked through all the aisles of the establishments to capture all products available (except those that were repeated in different stores). For each visit to a particular establishment, a checklist was generated with the registered products; if a product had already been registered in another establishment, the product was excluded. Bar codes were used to identify duplicate products. Each field worker collected information on the same category of products from all included establishments. Before taking photographs, we consulted the legal representatives of each supermarket chain and /or the manager in charge for authorization.

Relevant information on food and beverage packages (as detailed below) was captured in RedCaP by 8 research assistants who were previously trained and exported in electronic spreadsheets.

Health and nutrition claims

All claims that appeared on front-of-package were registered and classified according to the protocols and taxonomy of INFORMAS (Table 1) [13,23]. The classification included three categories and their subcategories (see Additional file 1): 1) nutrition claims (health-related ingredient claim, nutrient content claim and nutrient comparative), 2) health claims (general health claim, nutrient and other function claim and reduction of disease risk claim) and 3) Other claims (i.e. organic, gluten free). The format of each claim was also recorded as verbal, numerical or symbolic. Products containing combinations of numerical and verbal format were registered as numerical.

Food groups

Food and beverages were grouped according to their degree of processing according to the NOVA classification system as unprocessed or minimally processed foods (such as fresh fruits or vegetables, whole grain cereals, plain milk, and seeds with no added ingredients), processed culinary ingredients (such as salt, sugar or oil), processed foods (such as canned fruits and vegetables, salted seeds or meat with salt for preservation), and ultra-processed foods (such as carbonated beverages, ready to eat foods like pizza or hamburgers, pastries and instant sauces) [30]. The classification was made using the information available in the nutrition information panel and list of ingredients such as sugars, sodium, fat and added sweeteners, and other ingredients such as emulsifiers, preservatives, binders, humectants, stabilizers, brighteners, colorants, and flavorings.

Nutritional quality

Nutritional quality of the food products was calculated using the nutrient profile criteria of the Mexican FOPL regulation. Energy information was reported in calories, saturated fats, trans fats and free sugars

(such as sugar, sucrose, fructose, corn syrup, honey) in grams per 100 g/mL, sodium in milligrams per 100g/mL, and use of non-sugar sweeteners reported in the list of ingredients. For products that require preparation for consumption, the reconstituted content was considered. This nutrient profile is applicable to products containing added sugar, sodium or fat (n=14,191), so unprocessed or minimally processed foods and processed culinary ingredients were automatically classified without excess of nutrients of concern (healthier). To establish the cut-off points, the calories per gram were calculated for free sugars (4 kcal), saturated fats (9 kcal) and trans fats (9 kcal). The following criteria were applied: Excess of: a) calories: ≥ 275 kcal per 100g for foods, ≥ 70 kcal per 100 mL for beverages or ≥ 8 kcal per 100 mL from free sugars for beverages; b) free sugars: $\geq 10\%$ of total energy from free sugars; c) saturated fat: $\geq 10\%$ of total energy from saturated fat; d) trans fat: $\geq 1\%$ of total energy from trans fat; e) sodium: ≥ 1 mg of sodium per 1 kcal or ≥ 300 mg per 100g, ≥ 45 mg per 100 mL for non-caloric beverages; and, use of non-sugar sweeteners: reported in list of ingredients. For products without disaggregated content of free sugars on the package, we calculated free sugars according to the algorithms proposed by the PAHO nutrient profile model [31].

Scenarios for the use of health and nutrition claims

Two scenarios were applied to show the differences in the use of HNC before and after the implementation of the regulations.

The first scenario (current scenario) analyzes the use of HNC on packaged food products in Mexico in 2017. The second scenario (regulatory scenario) was established following the specifications of the third and final stage of the new FOPL regulation in Mexico. The regulation requires that products with warning labels (excessive in calories, free sugars, saturated fats, trans fats and sodium) or warning legends (contains non-sugar sweeteners or added caffeine) must not [27]: a) use health claims or b) use nutrition claims, and c) display nutrition claims in the front of package.

For this scenario and according to the Mexican FOPL regulation, the following types of claims are considered to be included in the regulation: nutrient content claim, nutrient comparative claim, nutrient and other function claim and reduction of disease risk claim. Consequently, these types of claims were covered in the analyses for the second scenario (Table 5 and Table 6). For health-related ingredient claims and general health claims (as per the INFORMAS taxonomy), the Mexican regulations do not apply.

We used the nutrient profile criteria of the Mexican FOPL regulation to determine which products are still permitted to display HNC.

Statistical analysis

The analyses were performed using the statistical package STATA version 14. To verify the objectivity in the classification of claims, we performed a reliability test between two raters (Table 2). A random sample of products that contained claims (n=436) was taken and claims were classified according to the content

and format by the two raters. The proportions of claims classified by category and subcategories were compared. The consistency in the reliability tests was determined using the Kappa Coefficient, values above 0.8 indicate very good consistency. The variables included in the analysis correspond to the categorical type, so they were presented as frequencies and percentages. The use of HNC was presented by food group, claims type (Table 4) and nutrient profile (Figure 1 and Table 5). Chi-square tests were used to determine differences in the proportion of products with HNC between the current scenario and the regulatory scenario (Table 5 and Table 6). Two logistic regression models were fitted to determine the Odds Ratio (OR) of using HNC in the current scenario and the regulatory scenario. Both models were adjusted for the components of the Mexican FOPL regulation and we report the results for each threshold of the nutrient profile separately. The analysis that included the regulatory scenario only considered products with claims ($n = 8,746$). For all tests, the value $P < 0.05$ was considered as statistically significant.

Results

In general, there were no significant differences between both raters in the proportion of each type of claim classified by food category and subcategory ($P > 0.05$). There was good agreement between raters for classification by categories and subcategories of claims ($K > 0.8$) (Table 2).

Photographs of 18,558 unique products were collected. Products contained in multi-packages ($n = 533$) and with inconsistencies in nutritional information ($n = 761$) were excluded (for example, differences of more than 15% between reported and calculated calorie content, portion size, and sum of nutrients and units of nutrients). In total 17,264 food and beverage packages available in retail stores in Mexico were included, of which, 72% were classified as ultra-processed foods, 10.4% as unprocessed or minimally processed foods, 9.9% as processed foods, and 7.4% as processed culinary ingredients. When evaluating the nutritional quality of all included products, 48.2% of food products were excessive in calories, 44.6% were excessive in sodium and 40.7% were excessive in free sugars according to the thresholds of the Mexican FOP regulation. For processed foods, 69.2% were excessive in sodium and 41.4% were excessive in calories; most of the ultra-processed foods were excessive in calories (61.0%) and free sugars (53.4%) (Table 3).

More than half of all products (50.7%) displayed claims on the front-of-pack. Nutrition claims were the most frequent type of claims (33.8%), mainly nutrient content claims (27%). According to the format of claims, symbolic claims were the most frequently used (33.9%). Table 4 shows the proportion of products with claims by food group. The category of unprocessed or minimally processed foods had the highest proportion of products with claims, mainly plain milk (97.4%), juices and fruit drinks (77.1%) and purees of fruits, vegetables and cereals (76.4%). More than half of the ultra-processed food products displayed at least one claim (51.6%); claims were found most frequently for baby food (92.2%), breakfast cereals (82.2%), yogurt and milk-based beverages (67.5%). Among products with claims, nutrition claims were common for unprocessed or minimally processed (72%) and ultra-processed foods (69.9%).

In the current scenario, 68.4% (95% CI 67.4 – 69.3) of all products and 71.0% (95% CI 69.8 – 72.1) of ultra-processed foods displayed HNC on the front-of package (Table 5). This proportion is highest for beverages with non-sugar sweeteners (96.7%, 95% CI 95.0 – 98.0) and baby food (93.0%, 95% CI 88.6 – 96.1). In the regulatory scenario, the proportion of all products that would display HNC is significantly lower (39.4%, $P < 0.001$, 95% CI 38.1 – 40.8) compared to the current scenario. The differences were statistically significant for all food and beverages categories. The largest reduction in the use of HNC was observed for ultra-processed foods, where the regulatory scenario would prevent 51.1% ($P < 0.001$, 95% CI 49.5 – 52.5) of these products from displaying HNC. Within the category of ultra-processed products, the highest reduction in use of HNC was observed in beverages with non-sugar sweeteners (85.9%, $P < 0.001$, 95% CI 82.3 – 88.7).

In Table 6, we compared the proportion of products with HNC between the current scenario and the regulatory scenario according to the thresholds for energy and nutrients of concern as per the Mexican regulations. In the current scenario, 94.9% of the products containing non-sugar sweeteners displayed HNC on the FOP. According to other thresholds, 65.5% of products excessive in saturated fats, 69.4% of products excessive in free sugars and 70.1% of those excessive in calories displayed HNC. Products that were excessive in calories were 1.40 ($P < 0.001$, 95% CI 1.25 – 1.56) times more likely to display HNC compared to those products that were not excessive in calories in the current scenario (versus 0.6 times more likely in the regulatory scenario). The Odds Ratio was highest for comparing products that contained non-sugar sweeteners versus those did not contain such sweeteners (OR 11.67, $P < 0.001$, 95% CI 9.14 – 14.88). In the current scenario, products that were excessive in saturated fat (OR 0.83, $P < 0.01$, 95% CI 0.75 – 0.93) and sodium (OR 0.59, $P < 0.001$, 95% CI 0.53 – 0.65) were less likely to display HNC compared to those products that were not excessive in these thresholds. In the regulatory scenario, we observed a significantly lower proportion of products with HNC for each threshold, mainly for products containing non-sugar sweeteners (18.6% $P < 0.05$, 95% CI 16.7 – 20.7) and those excessive in sodium (14.3% $P < 0.05$, 95% CI 13.2 – 15.4). In the regulatory scenario, the odds for displaying HNC were lower compared to the current scenario for each threshold.

Discussion

Of the 17,264 products on the Mexican market in 2017, 72% were ultra-processed, 33.8% displayed nutrition claims and 3.4% displayed health claims. About 45% of products had excess sodium and 40% had excess free sugars according to the thresholds of the new regulations. The new regulation would prevent about 40% of total products and 50% of ultra-processed food products with claims on the market in 2017 from displaying health and nutrition claims when the final thresholds come into place.

The use of HNC on food products in Mexico is consistent with what has been found in other parts of the world, for example, in the UK, 32% [20] of package products carry HNC and 29% in other regions of Europe [32]. HNC are relevant to public health due to the implications derived from their use. HNC provide information that may be of interest to consumers [18], especially those motivated or interested to improve their own health [33].

However, HNC can be used for other purposes such as product marketing[16,34]; HNC can improve the appearance of products, consumers may perceive products with HNC as healthier even if they are not. Products displaying HNC can modify dietary choices and purchase requests of consumers.

According to previous studies, foods and beverages with HNC are 75% more likely to be chosen compared to those without these claims (regardless of nutritional quality)[18]. In addition, improving food labeling and HNC regulation are recognized as public health interventions that can improve the food environment and have positive effects on nutrition-related outcomes[35]. Several countries have regulations for the use of HNC on food products, however, these regulations generally do not include nutrient profiling systems and thus it is still common to find HNC displayed on less healthy foods and beverages or ultra-processed products [36]. According to our results, the new Mexican FOPL regulation could improve consumers dietary choices, as most of less healthy foods and beverages will be prevented from displaying HNC. Consequently, this could also improve the effectiveness of the actual warning labels on the FOP on consumers purchases and diets.

The nutrient profile proposed in the Mexican regulation is based on the PAHO nutrient profile model; this establishes that unprocessed foods are excluded from the nutrient profile evaluation as they are considered healthier products, although there are some exceptions (for Mexico, the consumption of juices and whole fat milk is not recommended [37]). The PAHO nutrient profile model applies to processed and ultra-processed food products. This study showed that a large proportion of ultra-processed food products exceed the thresholds for calories, free sugars, and sodium, so they could be considered as less healthy. In Mexico, the contribution of these products is 30% of the population's total dietary calories, and the consumption of free sugars, saturated fats, and sodium is higher among groups with the greatest intake of ultra-processed foods [7,38]. In addition, it means that the implementation of the Mexican warning label regulations will reduce the use of HNC mostly on these types of products.

According to a study conducted in the Mexican population, 22% reported using the information of HNC on packaging to select their food and beverages at the point of sale. Until now, there was no strict regulation for the use of HNC in Mexico, so they could be displayed on the packaging regardless of nutritional quality[26]. The regulatory scenario has shown that HNC will be reduced in most less healthy (ultra-processed) food products, so consumers will be able to make better-informed choices.

In the regulatory scenario, it is proposed that minimally processed or unprocessed foods may continue displaying HNC. This could be an advantage over processed and ultra-processed food products, there would be no difference in the proportion of minimally processed foods with HNC between the current scenario and the regulatory scenario. However, as previously mentioned, there are groups of foods not recommended by the Mexican food-based dietary guidelines such as fruit juice, which may still display HNC after the implementation of the regulation [37].

To our knowledge, this is the first FOP regulation internationally that includes a restriction on HNC as part of the regulation. In addition, it is also the first FOP regulation to include the use of non-sugar sweeteners as a threshold. There is not enough evidence to describe the long-term effects of the consumption of non-

sugar sweeteners, the recommendations suggest not excluding possible negative effects[39]. However, the use of non-sugar sweeteners is different between countries. A study in 2015 that analyzed the prevalence of non-sugar sweeteners across four countries (Australia, Mexico, New Zealand and the United States) reported that Mexico is the country with the highest proportion of products with non-sugar sweeteners (11% of all products)[40]. In our study, we found that products with non-sugar sweeteners generally displayed HNC related to the content of calories or sugar (attributed by the absence or reduction). A threshold related to non-sugar sweeteners will likely also prevent unnecessary unhealthy reformulations. In Chile, after the implementation of warning labels, the added sugar content in sugary drinks decreased, but the use of non-sugar sweeteners in these drinks increased[41]. They may display HNC but not warning labels, which could lead to a misperception about nutritional quality.

The Mexican FOPL regulation is based on the evidence and recommendations available for the development of FOPL [16,18,42–44]. The main modifications include the incorporation of a warning labelling system, the regulation of advertising directed at children and the specifications to display HNC. However, this regulation has some limitations for HNC, for example, it does not cover a health-related ingredient claims and general health claims, which are considered claims by the INFORMAS, which could increase the use of these after regulation. In addition, health claims are restricted on the whole package while nutrition claims not related to excess thresholds can be displayed on the back of packaging. On the other hand, in Mexico there was an interest to regulate the use of health endorsements, a particular type of health claim in which different non-governmental health associations recommend or endorse the consumption of food and beverages for certain groups (for example, "Recommended by the Mexican Association of Pediatrics"). A study conducted in Mexico reported that more than 60% of foods and beverages with health endorsements were classified as less healthy and endorsements were frequently found in sweetened beverages and sweet snacks, most of the organizations that endorsed these products were professionals and independents groups of diabetes and nutrition associated with the food industry[45].

The results of this study provide an approximation to what could be observed after the implementation of the regulation. We also describe the current prevalence of products that show HNC, so they could be used as a baseline measure for future evaluations of this regulation.

Conclusion

The new Mexican front-of-pack labelling regulation is the first in the world to include restrictions on health and nutrition claims (HNC) on FOPL and this study estimated that the new regulation would prevent most less healthy processed and ultra-processed foods from displaying HNC, in particular those containing non-sugar sweeteners. This is important as a reduction on HNC on less healthy products may improve the effectiveness of the warning labels for consumers.

List Of Abbreviations

NCDs: non-communicable diseases

HNC: health and nutrition claims

FOPL: front-of-pack labelling

PAHO: Pan American Health Organization

INFORMAS: International Network of Food and Obesity/non-communicable diseases Research, Monitoring and Action Support

Declarations

Ethics approval

This study was approved by the Research, Ethics and Biosafety Committees of the Mexican National Institute of Public Health (approved number: 1530). This study does not report or involve the use of any animal or human data.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and analyzed during the current study are not publicly available. Data are however available upon reasonable request and with permission of the corresponding author.

Competing interest

The authors declare that they have no competing interests.

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Authors' contributions

The original idea was provided by LTM. LTM wrote the research protocol. LTM, SB and team collected the information. CCC, SV and LTM wrote the manuscript of this study. CCC analyzed and interpreted the results. All authors read and approved the final version of the manuscript.

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Description Of Supplementary Files

File name

Additional file 1

File format

Additional file 1.docx

Title of data

Additional file 1. Definitions and taxonomy of claims

Description of data

This document contains the specifications, definitions, examples and taxonomy for the classification of claims, based on the protocols of the International Network for Food and Obesity / non-communicable Diseases Research, Monitoring and Action Support

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Tables

Table 1. Examples of different types of health and nutrition claims according to the INFORMAS taxonomy [13]

Claim	Types of claims	Examples
	Health-related ingredient claim	“Contains 25% orange juice”
Nutrition claim	Nutrient content claim	“Low calories” “Contains calcium”
	Nutrient comparative claim	“Light” “Sweetened with stevia”
Health claim	General health claim	“Low glycemic index” “Healthy”
	Nutrient and other function claim	“Ca for strong bones” “Magnesium for growth”
	Reduction of disease risk claim	“Pediatric association” “Prevents cavities”
Other claim	Other claim	“Organic” “Non-GMO”

INFORMAS: International Network for Food and Obesity/non-communicable Diseases Research, Monitoring and Action Support

Table 2. Inter-rater reliability for the classification of claims according to the INFORMAS taxonomy (n=436)

	Rater 1		Rater 2		P-Value	K
	n	%	n	%		
Health-related ingredient claim	60	13.8	61	14.0	0.992	0.8744
Nutrient content claim	158	36.2	159	36.5	0.955	0.9314
Nutrient comparative claim	40	9.2	44	10.1	0.889	0.9039
General health claim	21	4.8	20	4.6	0.975	0.8775
Nutrient and other function claim	4	0.9	3	0.7	-	-
Reduction of disease risk claim	11	2.5	12	2.8	-	-
Environmental	245	56.2	247	56.7	0.911	0.9656
Other	163	37.4	165	37.8	0.940	0.9494
Numerical	78	17.9	99	22.7	0.433	0.8163
Verbal	211	48.4	216	49.5	0.820	0.8258
Symbolic	335	76.8	329	75.5	0.694	0.8743

P-value for difference between two proportions. K Cohen's Kappa Coefficient

Table 3. Proportion of label components, claims and nutrient profile (n=17,264), the Mexican food supply, 2017

	Total		Unprocessed or minimally processed foods (n=1,794)		Processed culinary ingredients (n=1,279)		Processed foods (n=1,705)		Ultra-processed foods (n=12,486)	
	n	%	n	%	n	%	n	%	n	%
Mexican FOPL nutrient profile										
Meet nutrient profile	3,403	19.7	1,794	100	1,279	100	88	5.2	242	1.9
Excessive in one or more nutrients of concern or energy	13,861	80.3	0	0	0	0	1,617	94.8	12,244	98.1
Excessive in calories	8,327	48.2	0	0	0	0	706	41.4	7,621	61.0
Excessive in free sugars	7,020	40.7	0	0	0	0	351	20.6	6,669	53.4
Excessive in sodium	7,699	44.6	0	0	0	0	1,18	69.2	6,519	52.2
Excessive in saturated fats	6,054	36.1	0	0	0	0	518	32.4	5,536	45.8
Excessive in trans fats	156	2.1	0	0	0	0	17	4.1	139	3.7
Containing non-sugar sweeteners	2,176	12.6	0	0	0	0	0	0	2,176	17.4
Label Components										
List of ingredients	16,745	97.0	1,472	82.1	1,181	92.3	1,659	97.4	12,433	99.6
Nutrient declarations	17,242	99.8	1,793	99.9	1,279	100	1,705	100	12,465	99.8
Supplementary nutrition information										
GDA	13,598	78.8	1,215	67.7	882	69	1,359	79.7	10,142	81.2
<i>Sello Nutrimental</i>	18	0.1	3	0.2	6	0.5	2	0.1	7	0.1
Use of claims										
Yes	8,746	50.7	1,036	57.8	598	46.8	673	39.5	6,439	51.6
No	8,518	49.3	758	42.2	681	53.2	1,032	60.5	6,047	48.4
Nutrition claim										
Health-related ingredient claim	1,614	9.4	209	11.7	124	9.7	59	3.5	1,222	9.8
Nutrient content claim	4,667	27.0	660	36.8	184	14.4	247	14.5	3,576	28.6
Nutrient comparative claim	998	5.8	45	2.5	61	4.8	27	1.6	865	6.9
Health claims										
General health claim	306	1.8	60	3.3	68	5.3	12	0.7	166	1.3
Nutrient and other function claim	145	0.8	4	0.2	7	0.6	6	0.4	128	1.0
Reduction of disease risk claim	214	1.2	12	0.7	14	1.1	4	0.2	184	1.5
Other claim										
	5,190	30.1	616	34.3	476	37.2	553	32.4	3,545	28.4

GDA, Guide Daily Amount. *Sello Nutrimental* is a type of voluntary labelling to indicate that food and beverages are healthy. Proportion of products that exceed the content of nutrients of concern, contain the components of the label and use claims.

Table 4. Proportion of packaged food products with claims according to the NOVA food groups

	n	Use of Claims (%)	Nutrition claims (%)	Health Claims (%)	Other claims (%)
Total	17,264	50.7	66.8	7.1	59.3
Unprocessed or minimally processed foods	1,794	57.8	72.0	7.1	59.5
Milk	113	97.4	100	10.9	36.4
Cereals	218	46.8	66.7	8.8	75.5
Fruits and vegetables	277	54.5	37.1	17.2	76.8
Legumes	87	9.2	62.5	0	37.5
Coffee and tea	135	62.2	57.1	7.1	71.4
Eggs, read meat and seafood	90	50.0	40.0	4.4	91.1
Water	109	51.4	85.7	14.3	30.4
Juices and fruit drinks	166	77.1	85.9	0.8	71.9
Nuts and seeds	126	61.9	74.4	3.9	73.1
Pastas	401	54.6	81.3	3.2	34.3
Puree of fruits, vegetables and cereals	72	76.4	85.5	0	69.1
Processed culinary ingredients	1,279	46.8	49.5	13.4	79.6
Oils and fats	336	45.5	62.8	17.7	62.8
Dressings	315	51.8	34.4	13.5	92.0
Condiments	183	27.9	52.9	5.9	76.5
Sweeteners	445	51.9	50.7	12.1	82.7
Processed foods	1,705	39.5	44.4	3.3	82.2
Fruits and vegetables (canned)	526	39.5	13.5	2.9	94.7
Meat and seafood	298	41.3	69.9	3.3	75.6
Sweet snacks	152	28.3	46.5	9.3	69.8
Salty snacks	348	35.6	65.3	1.6	71.0
Bread and other cereals	152	56.6	66.3	7.0	76.7
Cheeses	128	29.7	47.4	0	76.3
Other ^A	101	50.5	17.7	0	98.0
Ultra-processed foods	12,486	51.6	69.9	6.9	55.1
Yogurt and milk-based beverages	935	67.5	91.6	10.9	34.4
Ultra-processed meat	649	67.3	29.5	3.9	98.4
Breakfast cereals	555	82.2	83.8	11.0	48.7
Seafood	208	36.1	81.3	9.3	50.7
Beverages with non-sugar sweeteners ^B	948	67.5	96.6	8.8	19.2
Sugar-Sweetened beverages ^C	775	54.1	74.0	10.0	49.2
Sweet snacks ^D	3,956	44.2	67.7	3.0	57.7
Salty snacks	912	35.8	58.6	2.8	70.6
Packaged bread and tortilla	215	65.6	75.2	8.5	46.1
Cheeses	360	31.9	64.4	7.0	52.2
Ready to eat	409	40.3	37.0	3.0	87.9
Baby food	218	92.2	88.1	13.9	39.8
Soups pastas and creams	326	60.4	50.8	1.0	71.6
Other ^E	2,020	43.9	59.4	9.4	65.2

The percentages for nutrition claims, health claims and other claims represent a proportion in products with claims. ^A Includes canned beans and prepared salads, ^B includes beverages sweetened with artificial or natural non-caloric sweeteners or polyols, ^C Includes nectars, fruit drinks with added sugar, energy drinks,

sport drinks and powder to prepare beverages, ^D Includes candies, sweets, desserts and bakery, ^E Includes prepared flour bakery, prepared cereals, non-sugar sweeteners and ultra-processed culinary ingredients (margarine, seasonings for meat)

**le 5. Difference between current scenario and regulatory scenario for use of health and nutrition claims
8,746)**

	n	Proportion of products with health and nutrition claims				Difference	
		Current scenario		Regulatory scenario		%	95% CI
		%	95% CI	%	95% CI	%	95% CI
ducts with claims	8,746	68.4	[67.4, 69.3]	28	[27.1, 29.0]	39.4***	[38.1, 40.8]
sed and ultra-processed	7,112	68.6	[67.3, 69.9]	19.1	[17.0, 21.2]	49.5***	[47.1, 51.2]
sed foods	673	46.2	[42.4, 50.1]	11.0	[8.7, 13.6]	35.2***	[30.8, 39.7]
its and vegetables (canned)	208	14.4	[9.9, 19.9]	9.6	[6.0, 14.5]	4.8***	[0.1, 11.0]
it and seafood	123	72.4	[63.6, 80.0]	7.3	[3.4, 13.4]	65.0***	[55.9, 74.2]
et snacks	43	51.2	[35.5, 66.7]	2.3	[0.1, 12.3]	48.8***	[33.2, 64.4]
y snacks	124	66.9	[57.9, 75.1]	8.9	[4.5, 15.3]	58.1***	[48.4, 67.7]
ad and other cereals	86	69.8	[58.9, 79.2]	25.6	[16.8, 36.1]	44.2***	[30.8, 57.6]
eses	38	47.4	[31.0, 64.2]	23.7	[11.4, 40.2]	23.7*	[0.3, 44.5]
er ^A	51	17.7	[8.4, 30.9]	3.9	[0.5, 13.5]	13.7*	[0.2, 25.5]
rocessed foods	6,439	71.0	[69.8, 72.1]	19.9	[19.0, 20.9]	51.1***	[49.5, 52.5]
urt and milk-based erages	631	92.6	[90.2, 94.5]	26.3	[22.9, 29.9]	66.2***	[62.2, 70.2]
a-processed meat	437	31.1	[26.8, 35.7]	5.3	[3.4, 7.8]	25.9***	[21.4, 30.7]
akfast cereals	456	85.8	[82.2, 88.8]	47.8	[43.1, 52.5]	37.9***	[32.3, 43.5]
food	75	89.3	[80.1, 95.3]	9.3	[3.8, 18.3]	80.0***	[70.4, 89.6]
erages with non-sugar eteners ^B	640	96.7	[95.0, 98.0]	10.8	[8.5, 13.4]	85.9***	[83.2, 88.7]
ar-Sweetened beverages ^C	419	75.2	[70.8, 79.2]	19.6	[15.9, 23.7]	55.6***	[50.0, 61.2]
et snacks ^D	1,750	68.0	[65.8, 70.2]	20.3	[18.5, 22.3]	47.7***	[44.8, 50.5]
y snacks	326	58.9	[53.3, 64.3]	6.8	[4.3, 10.0]	52.1***	[46.2, 58.1]
kaged bread and tortilla	141	75.2	[67.2, 82.1]	31.9	[24.3, 40.3]	43.3***	[32.8, 53.8]
eses	115	66.1	[56.7, 74.7]	27.8	[19.9, 37.0]	38.3***	[26.3, 50.2]
dy to eat	165	38.8	[31.3, 46.7]	15.8	[10.6, 22.2]	23.0***	[13.7, 32.3]
y food	201	93.0	[88.6, 96.1]	36.3	[29.7, 43.4]	56.7***	[49.2, 64.2]

ps pastas and creams	197	51.3	[44.1, 58.4]	14.2	[9.7, 19.9]	37.1***	[28.5, 45.6]
er ^E	886	61.1	[57.8, 64.3]	15.5	[13.1, 18.0]	45.9***	[41.6, 49.6]

cludes products with claims. The proportion of products with health and nutrition claims in the regulatory scenario was estimated according to the nutrient profile thresholds of the new Mexican food labelling regulation (third stage). The regulatory scenario does not affect the proportion of products with health and nutrition claims of processed or minimally processed foods and culinary ingredients. Chi-squared test, the proportion values were significantly different between current scenario and regulatory scenario: *($P < 0.05$), **($P < 0.01$), ***($P < 0.001$)

Table 6. Difference in scenarios for the use of health and nutrition claims on less healthy products

	n	Proportion of products with health and nutrition claims				Odds Ratio for the use of health and nutrition claims			
		Current scenario		Regulatory scenario		Current scenario		Regulatory scenario	
		%	95% CI	%	95% CI	OR	95% CI	OR	95% CI
Excessive in calories	3,957	70.1	[68.7, 71.5]	20.6*	[19.3, 21.9]	1.40***	[1.25, 1.56]	0.62***	[0.56, 0.71]
Excessive in free sugars	3,392	69.4	[67.8, 70.9]	22.5*	[21.1, 23.9]	0.96	[0.86, 1.08]	0.69***	[0.61, 0.78]
Excessive in saturated fats	2,658	65.5	[63.7, 67.3]	19.4*	[17.9, 21.0]	0.83**	[0.75, 0.93]	0.62***	[0.55, 0.70]
Excessive in trans fats	42	64.3	[48.0, 78.4]	23.8*	[12.1, 39.5]	1.08	[0.57, 2.10]	1.21	[0.57, 2.51]
Excessive in sodium	3,938	63.6	[62.0, 65.1]	14.3*	[13.2, 15.4]	0.59***	[0.53, 0.65]	0.24***	[0.22, 0.27]
Containing non-sugar sweeteners	1,484	94.9	[93.6, 95.9]	18.6*	[16.7, 20.7]	11.67***	[9.14, 14.88]	0.54***	[0.46, 0.62]

Only includes products with claims. The proportion of products with health and nutrition claims in the regulatory scenario was estimated according to the nutrient profile thresholds of the new Mexican food labelling regulation (third stage). Proportion and Odds Ratio (OR) for products with health and nutrition claims according to the current scenario and regulatory scenario. For proportions, *($P < 0.05$) indicates statistical significant different from current scenario. For Odds Ratio, ***($P < 0.001$) indicates statistical significance.

Figures

Figure 1

Figure 1 is not available

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