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New technical requirements for nutrition labeling in packaged foods: overview of reviews

Novos requisitos técnicos para rotulagem nutricional nos alimentos embalados: *overview* de revisões

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ABSTRACT

Introduction: Personal food preferences, purchasing decisions and eating behaviors are shaped by price, marketing, availability and accessibility, which are influenced by health policies and regulations. The National Health Surveillance Agency in Brazil (Anvisa) published in 2009 a public consultation on the proposal for a Normative Instruction that establishes the technical requirements for declaring nutrition labeling in packaged foods. However, the path through which a legislative proposal is implemented is permeated by several possibilities, being subject to disputes by interest groups, such as consumers and food companies. **Objective:** to carry out a comparison between the new technical requirements for declaring nutrition labeling in packaged foods with the literature on the standardization of food labels and the effects on the influence on the population's food choices. **Method:** An overview of systematic reviews was conducted to carry out a comparative study between the scientific evidence and the new technical requirements for declaring nutrition labeling proposed by Anvisa. **Results:** Of the 99 studies identified, six systematic reviews, published from 2011 to 2018, were included. The reviews reported positive results in the presentation of nutritional information on food labels, especially when dealing with healthy choices by consumers. Based on this outcome, Anvisa's regulation follows international labeling standards so that consumers can have more information, which favors the promotion of healthy food choices. **Conclusions:** The Public Consultation on nutritional labeling of foods is based on the interventions studied and on the current evidence, which ensures reliability for decision-making by the Ministry of Health and Anvisa.

KEYWORDS: Food Labeling; Obesity; Overview

RESUMO

Introdução: As preferências alimentares pessoais, as decisões de compra e os comportamentos alimentares são moldados pelo preço, *marketing*, disponibilidade e acessibilidade, os quais são influenciados por políticas e regulamentações sanitárias. A Agência Nacional de Vigilância Sanitária (Anvisa) publicou em 2009 uma consulta pública da proposta de Instrução Normativa que estabelece os requisitos técnicos para declaração da rotulagem nutricional nos alimentos embalados. No entanto, o percurso pelo qual uma proposta de legislação passa a ser implementada é permeado por diversas possibilidades, estando sujeita a disputas por parte de grupos de interesse, como consumidores e empresas alimentícias. **Objetivo:** Realizar uma comparação entre os novos requisitos técnicos para declaração da rotulagem nutricional nos alimentos embalados com a literatura sobre a padronização de rotulagens de alimentos e os efeitos sobre a influência nas escolhas alimentares da população. **Método:** Foi conduzida um *overview* de revisões sistemáticas para realização de um estudo comparativo entre as evidências científicas e os novos requisitos técnicos para declaração da rotulagem nutricional propostos pela Anvisa. **Resultados:** Dos 99 estudos identificados, foram incluídas seis revisões sistemáticas, publicadas de 2011 a 2018. As revisões reportaram resultados positivos na apresentação

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de informações nutricionais nos rótulos dos alimentos, principalmente se tratando de escolhas saudáveis por parte dos consumidores. Baseados nesse desfecho, a regulação da Anvisa segue os padrões de rotulagem internacionais para que assim os consumidores possam ter mais informações, o que favorece a promoção de escolhas alimentares saudáveis. **Conclusões:** As consultas públicas sobre rotulagem nutricional de alimentos estão fundamentadas nas intervenções estudadas e nas evidências atuais, o que assegura confiabilidade para a tomada de decisão do Ministério da Saúde e da Anvisa.

PALAVRAS-CHAVE: Rotulagem de Alimentos; Obesidade; *Overview*

INTRODUCTION

Personal food preferences, purchasing decisions, and food behaviors are shaped by price, marketing, availability, and accessibility, which are influenced by health policies and regulations at the national level[1,2].

Studies show that the way of life of modern societies involves the increasing consumption of ultra-processed foods, which are energetically dense and rich in sugars, fats, and salt, to the detriment of *in natura* or minimally processed foods, such as fruits, vegetables, vegetables, cereals, nuts, among others[3]. The prevalence of obesity among children and adults doubled in 73 countries between 1980 and 2015, according to the findings of a large survey on the effects of overweight and obesity carried out in 195 countries[4]. In 2015, it was estimated that 107.7 million children and 603.7 million adults were obese in the world, with an overall prevalence of obesity of 5.0% among children and 12.0% among adults. A total of 39% of deaths and 37% of disability-adjusted life years were related to high body mass index (BMI)[4].

Such growth has been attributed to several biopsychosocial processes, in which, in addition to aspects related to the individual and their choices, the food environment assumes a strategic place in the analysis of the problem and in the proposals for interventions[5].

Currently, regulatory actions that promote healthier eating environments are among the measures considered effective for protecting health and preventing obesity. On the other hand, such resolutions oppose the interests of the private sector[4,6,7].

In Brazil, the National Food and Nutrition Policy since 1999 has included health promotion actions with control of canteens in schools and other regulatory guidelines. In 2011, this policy brought initiatives for the implementation of adequate and healthy eating, with the strategy of creating favorable environments for health in which individuals and communities could be encouraged to exercise a health-promoting eating and nutritional behavior[8,9].

Thus, the role of governments in ensuring that food environments are as healthy as possible and in encouraging better food choices by citizens is highlighted, with the purpose of promoting health and well-being[10].

In 2017, during the 294th Ordinary Meeting, the Plenary of the National Health Council (CNS) approved three recommendations related to the regulatory agenda of food and nutrition, for different agencies of the federal administration, with the objective of inhibiting the consumption of foods considered harmful to the health of the population: i) for the Brazilian National Health Surveillance Agency (Anvisa), to adopt frontal food labeling; ii) for the Ministry of Finance, to increase the taxation of soft drinks and sugary drinks; iii) for the Ministry of Education, draft legislation that provides for the distribution, supply, marketing, advertising, and commercial promotion of ultra-processed foods, preparations, and beverages in public and private schools[11].

Regarding frontal labeling, it is a strategy that aims to provide consumers with a clearer view of the composition and characteristics of the food[12]. Anvisa classifies this strategy into four distinct models: i) interpretive ones, which carry labels, or a ranking system that indicates how healthy the food is; ii) the semi-interpretative, which proposes to clearly indicate the amounts of sugars, saturated fats and sodium through nutritional traffic light alerts; iii) the non-interpretative, which brings a specific set of nutrients in a non-standard way; and iv) the hybrid models, which are a mixture of the previous models[13].

Given the different forms of existing presentation and the need to standardize the presentation of nutritional labels, in 2019, Anvisa published a public consultation of the proposed normative instruction that establishes the technical requirements for the declaration of nutritional labeling on packaged foods[14,15]. This new regulation aims to standardize food labeling in order to strengthen health promotion and prevention of chronic non-communicable diseases (NCDs)[14,15].

However, the path through which a proposed legislation starts to be implemented is long and permeated by several possibilities, being subject to disputes by interest groups, such as consumers and food companies[16].

This overview aimed to make a comparison between the new technical requirements for the declaration of nutritional labeling on packaged foods with what is available from the literature on the standardization of food labeling and the effects on the influence on the population's food choices.

METHOD

This is an overview that prioritized systematic literature reviews to carry out a comparative study between scientific evidence and new technical requirements for the declaration of nutritional labeling on packaged foods proposed by Anvisa.

A search was carried out for systematic reviews with or without meta-analysis, which analyzed policy actions for food nutrition labeling with effects on obesity prevention and influence on food choices.

The study question was structured from the anachronistic PICOT[17,18], in which the general population was the reference, the intervention was the actions and labeling standards, the outcomes were the promotion of healthy eating and the influence on food choices, and the type of study prioritized were systematic reviews or meta-analysis.

The first searches were performed in May 2017 and updated in January 2020. Five electronic databases were used: Virtual Health Library repositories, Embase, MEDLINE via PubMed, Scopus, and *Web of Science*.

For the search strategy, the following terms were used: *"food labeling", "nutritional status", "product labeling", "obesity", and "systematic review"*. The terms were adapted according to the specificities of each database and in all of them the systematic review filter was used. To remove duplicates and organize the identified studies, the Mendeley reference manager was used[19].

Inclusion and exclusion criteria were predefined for the search and selection of studies. Only systematic reviews were included, with or without a meta-analysis, which analyzed labeling policy actions with the purpose of preventing obesity and/or influencing it in food choice. Systematic reviews were considered regardless of the age and gender of the population studied. There was no year and language filter.

Exclusion criteria were narrative literature reviews, academic essays, policy reviews, and articles that addressed labeling from an industry perspective or as an influence on children or on food safety. Full texts that did not meet the inclusion criteria defined *a priori* were excluded.

The following information was collected in the identified reviews: objective, countries, number of studies included, the main findings, and the authors' recommendations. The tool *Assessment of Multiple Systematic Reviews* II (AMSTAR 2) was used to evaluate the quality of selected systematic reviews[20]. The instrument assesses quality through the adequacy of the methods used in the review[20]. In total there are 16 requirements that can be answered with "yes", "partially yes", or "no" and evaluate: i) elaboration of the structured question; ii) prior construction of a research protocol; iii) selection of study designs for inclusion in the review; iv) comprehensive literature search; v) selection of studies by peers; vi) data extraction by pairs; vii) justification for exclusions and list of excluded studies; viii) detailed description of the included studies; ix) assessment of the risk of bias; x) statement of funding sources; xi) appropriate methods for statistical combination; xii) impact of the risk of bias of the meta-analysis; xiii) risk of bias when interpreting and discussing the results; xiv) explanation about the heterogeneity of the studies; xv) publication bias; xvi) declaration of conflict of interest[20].

The analysis focused on the narrative description of the labeling standards presented in the selected reviews and the effects reported by the authors, comparing them with the technical requirements described in Public Consultation No. 707, of September 13, 2019[14], and in Public Consultation No. 708, of September 13, 2019[15], available on Anvisa's website.

RESULTS

Literature review

A total of 99 studies were selected in the five databases used and, from the removal of repeated research, 92 studies were selected. After reading the titles and abstracts, 15 were selected to read the full texts based on predefined inclusion and exclusion criteria. Of these, five did not bring the outcomes of interest, two were not systematic reviews, one was a protocol, and one was an expanded congress abstract. At the end, a total of six systematic reviews were included (Figure).

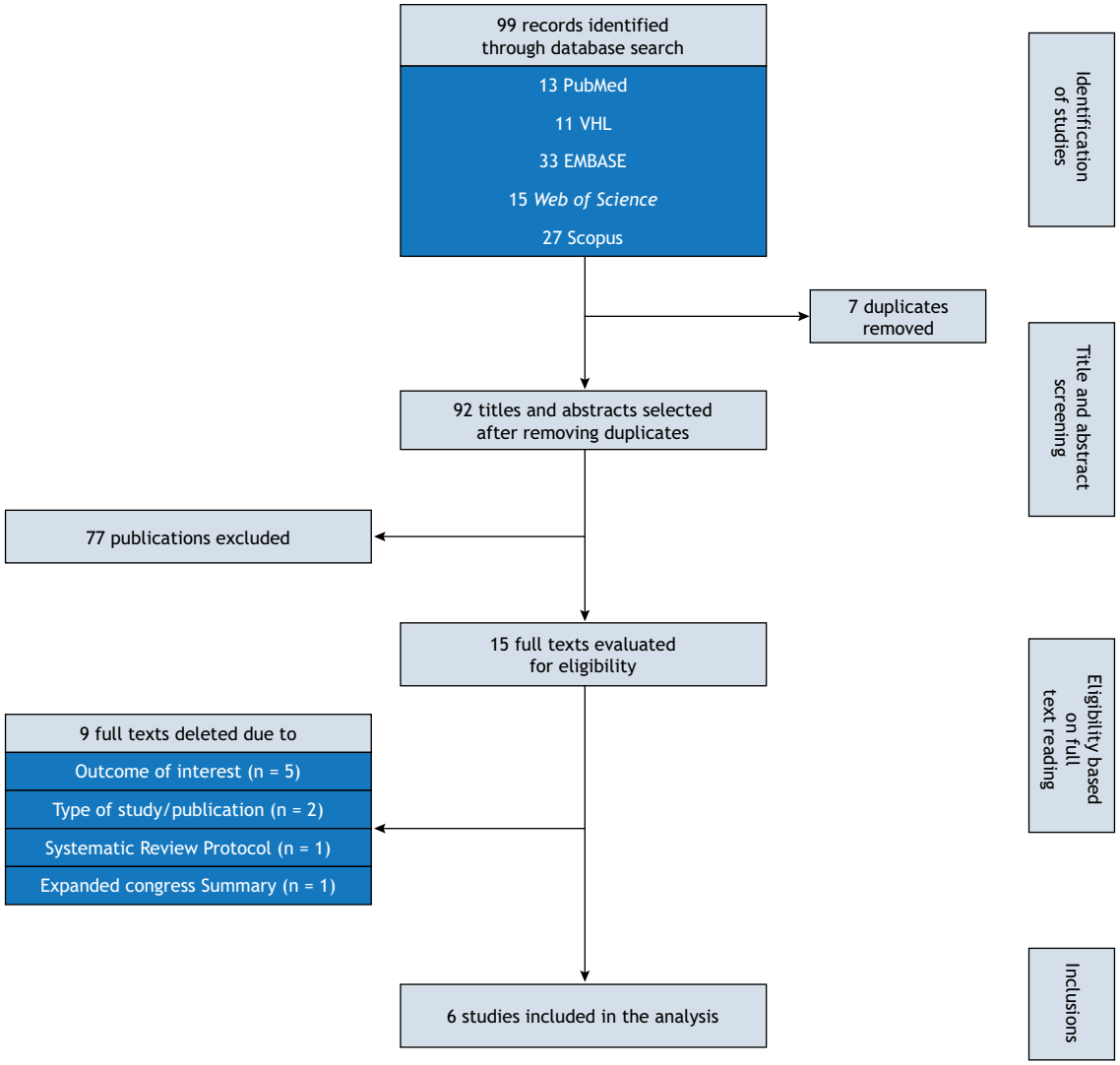
Chart 1 shows the main characteristics of the included studies. The selected systematic reviews were published between 2011 and 2018, with a predominance of studies included in high-income countries. Two studies were evaluated with moderate quality[21,22] and four with low quality[23,24,25,26] according to the criteria of the AMSTAR 2 tool.

One of the reviews showed that the labeling theme is in full force in high-income countries, with two of the three articles published in the last five years[21]. Sebastián-Ponce et al.[23] showed the positive effect of food labeling on final consumption. They also highlighted the long-term effect of the studied interventions, with follow-up and monitoring of these interventions being important. It is interesting to note the variety of places investigated in the studies, such as: high school, university, military food service, cafeterias, *fast foods*, and schools[23].

The review by Huang et al.[21] pointed to the limited impact of a voluntary food labeling code, launched in 2007 in China, which encouraged manufacturers to display information about the nutritional content and properties of food, using a standard nutrition declaration. Although reporting of some nutrients has increased, the code has shown limited ability to change the practices of the food and beverage industries. The authors highlighted, however, that widespread compliance is likely to be achieved only with the implementation of an enforcement process with significant sanctions for non-compliance. In addition, they suggested that an interpretive food labeling system on the front of the package provides better support to consumers and is an important factor to be considered by regulators in China[21].

The systematic review by Bucher et al.[22] identified in the included studies that the form of presentation and terminology used on the labels of packaged products are not attractive and, often, they make it difficult for consumers to interpret, either because of the font size or lack of information on proportions.

The study prepared by Freudenberg et al.[26] conducted a survey of the literature in the United States of America (USA) on policies



Source: Elaborated by the authors, 2020.

Figure. Search, selection, and inclusion of studies for analysis flowchart.

related to food to prevent obesity and diabetes among adults. It was found that the formulation of policies and the improvement of the strictness of the labeling norms tend to bring better results in the prevention of obesity, as they can influence consumers to reduce the consumption of energy products with few nutrients[26].

Bucher et al.[22], Sisnowski, Street e Merlin[24], and Cecchini e Warin[25] had positive results and emphasized that the nutritional information contained on the labels however, they highlighted that studies on this theme are still scarce to state exactly. On the other hand, the study by Sisnowski, Street, and Merlin[24] identified that the information contained in the labels may have divergences with the actual nutritional values of the products.

Anvisa Public Consultation

In order to standardize the form of presentation of nutritional information on packaged products, Anvisa launched Public Consultations No. 707/2019, and No. 708/2019, on the new regulation for nutritional labeling[14,15]. Anvisa's public consultation applies to packaged foods in the absence of consumers, including beverages, ingredients, food additives, and technology adjuvants, including those intended exclusively for industrial processing or food services[14,15].

Are outside the scope of public consultations: alcoholic beverages, spices, natural mineral waters and other bottled waters for human consumption, as well as vinegars, salt, coffee, mate, tea and other herbs without the addition of other ingredients. Foods prepared and packaged in restaurants and commercial establishments, such as desserts, mousse, pudding and fruit salad, are also not under the scope of nutritional labeling. The list includes fractioned products at retail points of sale such as: cheese, salami, ham, in addition to fruits, vegetables, and meat *in natura*, refrigerated and frozen. However, the agency reports that exceptions will be discussed in the ongoing regulatory process[14,15].

Chart 1. Characteristics of systematic reviews included in the study.

Author	Objective of the study	Country of included studies	Number of SR studies	Main findings	Recommendations	AMSTAR 2
Sebastián-Ponce et al.[23]	Knowing how it has acted through labeling in the prevention of obesity.	13 USA 1 Netherlands	14	Labeling had a positive effect on the final consumption of the food, which was not observed in *fast food* restaurants. Sensory attributes were more effective than label recommendations. The follow-up of the process confirmed the long-term impact of the studied interventions.	Have not been made.	Low
Huang et al.[21]	Quantify the prevalence of nutrition labels and completeness of nutrient claims on prepackaged foods in China and explore the impact of the 2007 code.	China	15	Most prepackaged foods had a nutrition label that was not compatible with current Chinese nutrition labeling standards. The voluntary code launched in 2007 had a limited impact on nutrition labeling.	It is suggested that the serial surveys will allow the government to track the continued success of the labeling program, as well as contribute to providing nutrition information to make healthier food choices over the next decade.	Moderate
Sisnowski, Street, and Merlin[24]	Investigate the effect of "real world" policies targeting different aspects of the food environment that shape individual and collective nutrition.	1 Australia	36 (only 1 addressed labeling)	Only 7% of 350 product samples matched the exact nutrition information provided on the label in a laboratory test. However, as interpretive labeling approaches are increasingly considered, they raise the questions: to what extent nutrition labeling can be applied beyond adherence to design and presentation rules and what constitutes an acceptable margin for consumer information.	Have not been made.	Low
Cecchini and Warin[25]	Evaluate the effectiveness of food labeling schemes, increasing healthier product selection and reducing calorie intake/choice. The secondary objective is to determine whether the format of food labels influences choices and consumption.	2 United Kingdom 2 USA 2 Australia 1 Canada 1 France 1 Germany	9	Food labeling can play a significant role in facilitating consumers to select healthier food products. Food labeling schemes would have a statistically significant effect on guiding consumers' choice of healthier products. Interpretive nutrition labels, such as traffic light schemes, can be more effective than other approaches. Food labels can also help consumers choose/consume lower calorie foods, but the available evidence is currently too limited to produce statistically significant results.	Have not been made.	Low
Bucher et al. [22]	Investigate how information from food packaging influences food consumption.	3 USA 1 Australia	5	There is disagreement regarding the inconsistent use of terminology on the labels, which reinforces the need to provide information on portion sizes that can be interpreted according to dietary guidelines. However, some labeling formats described in the studies included in the review suggest that there is a possibility of positively influencing the consumption of food and beverages by consumers. Double-column back-pack labels, which provide nutritional information per serving and per package, can result in lower consumption of discretionary foods, as well as increasing the reported number of servings per package.	Have not been made.	Moderate
Freudenberg et al.[26]	Summarize literature on recent efforts in the United States to change food-related policies to prevent obesity and diabetes among adults.	27 USA	27	All included studies that evaluated the labeling of packaged foods had positive results.	Have not been made.	Low

SR: systematic review; USA: United States of America.
Source: Elaborated by the authors, 2020.

Among the determinations of the resolution is the obligation of the nutritional information table on packaged food labels. The frontal nutritional labeling is also mandatory for foods whose amount of added sugars, saturated fats, or sodium is equal to or greater than the predefined limits[14,15].

Anvisa Public Consultation and comparison with literature findings

The main characteristics presented in the systematic reviews were related to the labeling elements described in the Anvisa public consultation (Chart 2).

Compared to the requirements set out in the public consultation on labeling, most of the included studies found positive results in the food labeling guidelines, especially regarding healthy choices by consumers[21,22,24,26]. Only one study listed mandatory nutritional information[21].

Frontal and/or easy-to-view labeling was addressed by four[21,23,25,] of the six included studies. In three of these studies, the importance of identifying certain components, such as sugars and *trans* and saturated fats, was highlighted, since this highlighted information can help in the choice of food consumption. In addition, one of the studies found no relationship between labeling and food consumption[22].

As for the form of presentation of the nutritional table, it was investigated by only one study<[23], which highlighted that the components of the nutritional table must be explained in a clear and legible way. This is important not only to influence food choice, but also to reach all types of consumers[27].

DISCUSSION

The scarcity of information on actions aimed at food labeling reinforces that this is an expanding field for policy formulation. Most studies are from high-income countries, with only two Brazilian publications included in the reviews selected in this study[23,28].

The results found in the reviews showed that Anvisa's proposal follows international labeling standards, so that consumers are more aware of healthy food choices.

Among the barriers identified in the reviews for the implementation of nutritional labeling are the reliability of the information contained in the label[31] and the need to invest in government monitoring capacity[23].

One of the reviews on labeling pointed out a Brazilian study that shows the lack of reliability in the information on food labels aimed at children and adolescents. It is recognized that attempts to reach an "informed consumer", who make healthier choices, have not been demonstrably successful and, therefore, in order to help the consumer, the Obesity Weight Group was created, endorsed by the *International Association for the Study of Obesity*, which investigates consumer behavior and search of new approaches to promote healthy alternatives[23].

Chart 2. Public consultation by the Brazilian National Health Surveillance Agency and information found in the literature.

Anvisa Public Consultation		Sebastián-Ponce et al.[23]	Huang et al.[21]	Sisnowski, Street, and Merlin[24]	Cecchini and Warin[25]	Bucher et al.[22]	Freudenberg et al.[26]
Main mandatory nutritional information	• Energetic values; • Carbohydrates; • Total sugars; • Added sugars; • Proteins; • Total fats; • Saturated fats; • Trans fats; • Dietary fiber; • Sodium.	NR	• Value; • Energetic; • Protein; • Fat; • Carbohydrate; • Sodium.	In addition to listing nutritional information, laboratory tests, and inspection are important to verify the values displayed on the packages.	NR	The author explores the importance of energetic values being described. Results of the included studies suggest that when described, they influence consumption.	A detailed description of the nutritional composition of foods helps to choose healthier options.
Front and easy-to-view labeling of mandatory items	Mandatory for packaged foods that have a high content of added sugars, saturated fats, and/or sodium. The front labeling must contain letters larger than those used in the nutrition table.	It highlights that easy-to-view labels are important for consumers to make decisions at the time of purchase.	Evidence highlights the importance of identifying the amount of saturated fat, *trans* fat, and sugars on labeling.	NR	Authors report that front labeling facilitates interpretation and helps consumers choose food.	Labels with larger sizes did not influence consumption.	NR
Form of presentation of the nutritional table	Readable tables in easy-to-view locations; black letters and white background; be located on a single surface.	Readable and easy-to-understand presentation is important to reach all types of consumers.	NR	NR	NR	NR	NR

Source: Elaborated by the authors, 2020.
NR: not reported.

According to the reviews, a frontal interpretive food labeling system is suggested, to better guide consumer choices[21]. Front labeling, however, has been adopted with different approaches by countries. Stamps with black warning polygons were implemented in Chile with relative success, and later in Uruguay and Peru[1,29]. In Brazil, there is a recurrent use of semi-interpretative nutritional labeling models as traffic lights and alerts, however, Anvisa is in the process of analyzing the contributions of Public Consultations No. 707 /2019 and No. 708/2019 and the technical subsidies from these must decide the necessary changes[30,31,32].

According to the analysis of the United Nations Children's Fund (Unicef)[17], the use of a simple front labeling, consistent with clear criteria for regulating all packaging components, is recommended. According to this body, labeling must be developed and based on scientific evidence without conflicts of interest, accompanied by an educational campaign to ensure its sustainability[17].

The World Health Organization emphasizes that, in order to protect the implementation of public health policies for the prevention and control of CNCDs against the interference of conflicts of interest, comprehensive legislation and the application of national laws and regulations are needed.[33]. As the Food Guide for the Brazilian Population points out, the removal of obstacles to an adequate and healthy diet will often require public policies and State regulatory actions that make the environment more conducive to the adoption of recommendations[34]. This knowledge, therefore, proves to be of great importance to support and guide the decision-making process of policies to fight obesity in the country.

This work has methodological limitations, such as: the lack of systematic review on the effects of food labeling policy actions and the limited quality of the studies identified according to criteria established by the AMSTAR 2 tool. Initiatives in this area are often reported in reports from international organizations and, possibly, searches for documents not commercially disseminated, works not controlled by scientific editors - such as congress proceedings, theses and dissertations - and the identification of electronic databases that concentrate evidence-informed policy research could allow the identification of other studies.

CONCLUSIONS

The results show that public consultations on food labeling are based on available evidence, which ensures confidence in decision making about the studied interventions and current evidence.

Monitoring is proposed to deepen the long-term effects of food labeling changes on obesity patterns and promotion of healthy choices on the behavior of the Brazilian population. Such monitoring could be carried out in conjunction with the Ministry of Health's strategy for chronic diseases, such as approaches to surveillance of risk factors and protection for Chronic Diseases by Telephone Survey (Vigitel)[35].

The involvement of civil society and the regulatory sector can support the monitoring of the impacts of public consultations to address issues related to food and nutrition aimed at the food environment.

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Author's Contributions

Pereira ACES, Elias FTS – Conception, planning (study design), acquisition, analysis, data interpretation, and writing of the work. Gonçalves MR, Pereira ACPS – Acquisition, analysis, data interpretation, and writing of the work. All authors approved the final version of the work.

Conflict of Interests

The authors inform that there is no potential conflict of interest with peers and institutions, politicians, or financial in this study.