Approach to food processing in the main messages of food-based dietary guidelines: A qualitative analysis

Abordagem sobre o processamento de alimentos nas mensagens principais de guias alimentares mundiais: uma análise qualitativa

Cintia Cassia Tonieto Gris[1] [ID], Suellen Secchi Martinelli[1] [ID], Rafaela Karen Fabri[2] [ID], Suzi Barletto Cavalli[1] [ID]

[1] Universidade Federal de Santa Catarina, Centro de Ciências da Saúde, Programa de Pós-Graduação em Nutrição. Florianópolis, SC, Brasil. Correspondence to: CCT GRIS. E-mail: <cctgris@gmail.com>.

[2] Universidade do Estado do Rio de Janeiro, Instituto de Nutrição. Rio de Janeiro, RJ, Brasil.

ABSTRACT

Objective

Analyze the content of the main messages of the world food guides, identifying the approach regarding the food processing level.

Methods

This qualitative exploratory study was conducted through documentary research based on analyzing the main messages of 96 consumption guides selected from the database provided by the Food and Agriculture Organization of the United Nations. The unit of analysis consisted of segments of the main messages whose content was scrutinized using the document analysis technique. Recommendations that referred to food processing were identified after repeated readings. Data were extracted according to the developed protocol, including terms used, consumption guidance, scope of approach, and complementary information (definition, justification, exemplification, and advice on the recommended consumption amount).

Results

We identified 21 Food Guides (21.88%) with recommendations related to the food processing level in their main messages, primarily published after 2012 (76.19%). The analyzed guides used terms "highly processed", "ultra-processed", "processed", "minimally processed", and "non-processed". Guidelines regarding limiting consumption were primarily used by the guides, and few specified the related food. The messages did not define the terms used. When identified, the justifications were of a nutritional or health nature.

Conclusion

We observed a lack of agreement and standardization concerning the terms used, the guidelines for consumption, and the scope of the identified recommendations, with little or no additional information to explain or justify the approach adopted regarding the food processing level.

Keywords: Diet, food, and nutrition. Diet, healthy. Industrialized foods. Recommended dietary allowances.

RESUMO

Objetivo

Analisar o conteúdo das mensagens principais dos guias alimentares mundiais identificando a abordagem quanto ao nível de processamento dos alimentos.

Métodos

Estudo exploratório qualitativo, realizado por meio de pesquisa documental, com base na análise das mensagens principais de 96 guias alimentares selecionadas no banco de dados disponibilizado pela Food and Agriculture Organization of the United Nations. A unidade de análise consistiu em segmentos das mensagens principais cujo conteúdo foi analisado através da técnica de análise documental. Após repetidas leituras foram identificadas as recomendações que faziam referência ao processamento dos alimentos. Os dados foram extraídos segundo protocolo desenvolvido, contemplando: termos utilizados; orientação de consumo; abrangência da abordagem; presença de informações complementares (definição; justificativa; exemplificação; e orientação sobre quantidade recomendada de consumo).

Resultados

Constatou-se que 21 guias alimentares (21,88%) faziam recomendações relacionadas ao nível de processamento do alimento em suas mensagens principais, a maioria (76,19%) publicado após 2012. Os guias analisados utilizaram os termos: altamente processado, ultraprocessado, processado, minimamente processado e não processado. Orientações referentes à limitação de consumo foram as mais utilizadas pelos guias e poucos especificavam o alimento relacionado. As mensagens não apresentavam definição para os termos utilizados. Quando presentes, as justificativas eram de cunho nutricional ou de saúde.

Conclusão

Foi observada falta de consenso e padronização no que se refere aos termos utilizados, às orientações de consumo e à abrangência das recomendações apresentadas, além de pouca ou nenhuma informação complementar capaz de explicar ou justificar a abordagem realizada em relação ao nível de processamento dos alimentos.

Palavras-chave: Alimentos, dieta e nutrição. Dieta saudável. Alimentos industrializados. Recomendações nutricionais.

INTRODUCTION

Food processing can be defined as a combination of methods or procedures that aim to achieve changes in raw materials [1]. Historically, it has allowed developing foods that are safe from a microbiological, nutritious, and sensorially-acceptable viewpoint [2], emerging to make foods edible, safe, and transportable and enabling their preservation and storage [3].

A major socioeconomic transition characterized the Industrial Revolution during the 18th and 19th centuries. It was an essential milestone in the food processing historical trajectory [4]. The emergence of techniques such as pasteurization and sterilization allowed preserving food for much longer [5]. In the 20th century, social, economic, and political changes, increasing urbanization, and marketing strategies adopted by industries motivated the desire for practical and convenient foods, escalating the industry's processing level and innovating and developing ready-to-eat foods [5-7]. However, changes made in the formulations of processed foods originated hyper-palatable, nutritionally unbalanced, sugar-rich, salt-rich, and fat-rich foods [8,9], driven by aggressive marketing strategies [10,11] that derive from an environmentally, economically, and socially unsustainable system [12,13].

The growing consumption of processed foods at a higher level has been considered one of the main aggravating factors of malnutrition (undernutrition and obesity) and climate change [14]. As a way of bringing to light the debate on the food processing level and alleviating the malnutrition pandemic, documents guiding public policies and pointed out as an essential strategy for assuring

people's health and nutrition, such as food guides, have incorporated recommendations regarding the consumption of processed foods [15]. Food guides can promote improvements in people's health through guidance on appropriate, healthy, and scientific food choices, provide subsidies for nutritionists and other health professionals in developing food and nutrition education actions [16], boost better production and food supply, improve social and economic development [17,18], and play an essential role as inducers of public policies to promote healthy eating [15].

In 1996, the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) published the document "Preparation and use of food-based dietary guidelines/report of a joint FAO/WHO consultation" to encourage countries to create their dietary guidelines [19]. Subsequently, many countries started to develop food guides according to the dietary and lifestyle characteristics of their populations [16] to translate a vast and incomplete evidence base on the relationships between food, dietary patterns, and health into specific, culturally appropriate recommendations likely to be put into practice [20]. Global food guides have been studied from different perspectives [16,20,21]. We seek to analyze, for example, how these documents incorporate the dimension of sustainability [18,22-25] and how they address specific food groups [26,27]. However, so far, analyses have yet to be found on the approach to the food processing level in food guides from different countries.

Considering the need for shared efforts to revert the global picture of malnutrition, the importance of food guides for public health, and the participation of processed foods in people's diets [14,28-30], this article aimed to analyze the content of the main messages of the world food guides identifying the approach to the food processing level.

METHODS

Exploratory, qualitative study conducted through documental exploratory research – a procedure that adopts methods and techniques for apprehending, understanding, and analyzing documents of the most varied types [31-33]. The analyzed documents were food guides aimed at healthy adult individuals from different countries, and the main messages in these guides were the unit of analysis. The methodology for selecting food guides and extracting messages followed that proposed by Fabri et al. [18]. Therefore, first identifying the country of publication, the document's title, the year of publication, and the main messages for further analysis.

The authors called "main messages" the guidelines ("recommendations") of the guides made available by FAO on its website and not the entire content of the food guide, thus allowing the analysis of a more significant number of documents since these messages were standardized in the English language [18].

Food guides were selected from the database provided by the Food and Agriculture Organization of the United Nations (FAO) [34]. The Organization has a repository containing a collection of food guides in which full documents and their graphic representations are available (when the country has this type of visual information, for example, food pyramid), both in the language of the country of origin, besides the main messages identified in the guides [18].

The main messages were usually short sentences such as "Include whole fruits and fresh vegetables in each of your meals to improve your digestion and prevent heart disease" (Colombian Dietary Guidelines); "Eat more fruits and vegetables, at least 5 to 7 servings a day" (Ireland Food Guide) [34]. The guidelines found in guides targeting children or population groups with special

nutritional needs, such as pregnant women, nursing mothers, and older adults, or even guides aimed at the population with specific diseases were not analyzed [18].

The first author collected data regarding the guide messages from July and August 2021. Information from food guides from 95 countries was analyzed – the total number of countries with food guides deposited on the FAO website in that period. We should underscore that countries send information about their food guides to FAO after being invited by the Organization, which does not mean that other countries (not analyzed) do not have food guides.

The unit of analysis consisted of segments of the main messages whose content was qualitatively analyzed using the document analysis technique. This technique is understood as processing the content to present it differently from the original, facilitating its consultation and referencing, conveniently redrafting it, and representing this information in another way through transformation procedures [35]. Much more than locating, identifying, organizing, and evaluating texts, document analysis effectively contextualizes facts, situations, and moments, introducing new perspectives while respecting the original content of documents [36].

The steps presented by Moreira [36] were employed for operationalizing the document analysis: verification and organization of the material and critical analysis of the material, including the characterization and description of the documents and data processing through decoding, interpretation, and inference.

Intense and repetitive readings were conducted to verify and organize the material, and an attempt was made to identify recommendations that referred to processed foods (regardless of the processing level). The identified messages were extracted to a spreadsheet organized in the Microsoft Excel program, retrieving the country of origin to proceed to the next stage of critical analysis.

A data extraction protocol regarding the approach to food processing in the main messages of the guides was developed for critical analysis by the first author based on previous readings and discussed until consensus was reached among the authors.

The data extraction protocol contained the information: country of publication, document title, and year of publication. The following data were extracted for analyzing the main messages: 1) terms used to refer to foods with some processing level; 2) consumption orientation (eat less, avoid, and moderate); 3) scope of the approach (foods in general or specific foods) and; 4) additional information: 4.a) definition (explanation of the term used); 4.b) justification (explanation or reason for reducing or increasing consumption); 4.c) exemplification (quote examples of food) and 4.d) guidance on the recommended amount of consumption (information on the amount expressed in any format, such as portion or grammage). Data were extracted by the first author and revised by the other authors.

To analyze the results, we counted the documents that included recommendations about processed foods and grouped them by place of publication, considering the stratification by continent proposed by the FAO, and by year, considering the last issue's publication date [34]. Following the developed protocol, data were organized in spreadsheets, presenting simple absolute and relative frequencies.

RESULTS

The main messages of 96 food guides from 95 countries were analyzed (Belgium has a Flemish Region Guide and a French Region Guide). The place with the highest percentage of analyzed guides

is Europe (35.42%), followed by Latin America and the Caribbean (30.21%). We found that 61.46% (59/96) of the analyzed food guides were published after 2012, showing that most countries have structured or updated their dietary guidelines in the last ten years. Twenty-one food guides (21.88%) made recommendations related to the food processing level in their main messages. Of these, 76.19% (16/21) were published after 2012, evidencing that the concern related to the food processing level has increased in the last decade. Table 1 presents the total number of guides analyzed and the number of guides that address the food processing level in the main messages stratified by year and place of publication.

Table 1 – Characterization of the food guides analyzed and food processing level recommendations. (n=96).

Guides' Characterization	Total		Include processing-level recommendations	
	n	%	n	%
Year of publication				
Before 2005	10	10.42	0	0.00
2006–2011	27	28.13	5	23.81
2012–2017	46	47.92	10	47.62
2018-2021	13	13.54	6	28.57
Total	96	100.00	21	100.00
Place of publication				
Europe	34	35.42	8	38.10
Latin America and the Caribbean	29	30.21	8	38.10
Asia and Pacific	18	18.75	2	9.52
Africa	7	7.29	2	9.52
North America	2	2.08	1	4.76
Middle East	6	6.25	0	0.00
Total	96	100.00	21	100.00

Chart 1 presents data extracted from food guides that mentioned food processing in their main messages. The terms "highly processed" and "ultra-processed" accompanied by the words "food(s)" or "product(s)" were identified in the main messages of 12 guides (57.14%). The term "processed" was accompanied by the words "food(s)", "product(s)", or "meats" and was found in the messages of 11 guides (52.38%). Terms referring to lack of or a lower level of processing, such as "minimally processed" or "non-processed", were used by two countries (9.52%). No other terms related to the food processing level were identified. Consumption guidance also varied between the guides analyzed (Chart 1). Guidelines referring to "limitation" or "moderation" prevailed and were found in the main messages of ten guides (47.62%). The guidelines "eat/use less", "reduce", and "decrease" were found in messages from 7 guides (33.33%), and the orientation "avoid" was found in messages from 3 guides (14.29%) and was always linked to the terms "highly processed food(s)" or "ultra-processed food(s)". Consumption incentive guidelines were related to the words "minimally processed foods" and "non-processed [starchy] foods" and appeared in the main messages of two food guides (9.52%). Specifically, no consumption guidelines were found in the main messages of the Benin food guide, only a mention comparing traditional and processed foods - "traditional foods are generally better for health than highly processed products". Regarding the scope of the approach, most guides (n=12; 57.14%) were limited to addressing foods with different processing levels in general, without specifications.

Chart 1 – Characterization of information on foods with different processing levels in the main messages of the 21 Food Guides, 2022. (n=21).

Country	Year of the last issue	Terms adopted	Consumption guidance	Coverage	Justification	Exemplification	Guidance on consumption amount
Romania	2006	Highly processed foods	Eat with moderation	Highly processed sugar-rich foods			
Austria	2010	Processed foods	Should be consumed with moderation	Processed fat-sugar-and-salt-rich foods	X	X	X
Saint Kitts and Nevis	2010	Processed foods	Use less processed foods	Processed foods in general			
Slovenia	2011	Processed and preserved foods*	Limit intake	Processed and preserved foods, in general			
India	2011	Processed foods	Reduce use	Processed fat-sugar-and-salt-rich foods			
El Salvador	2012	Highly processed products	Avoid	Highly processed products, in general			
Cyprus	2013	Highly processed products	Limit intake	Highly processed foods in general	X		
Brazil	2014	Minimally processed food; processed foods; ultra-processed foods	Make natural or minimally processed foods the basis of your diet; Limit the consumption of processed foods; avoid the consumption of ultra-processed foods	Foods in general			
Colombia	2014	Processed meat	Reduce the consumption	Processed meat	X		
Former Yugoslav Republic of Macedonia	2014	Highly processed foods	Limit the consumption	Highly processed foods in general			
Afghanistan	2015	Highly processed foods	Eat less	Highly processed foods in general			
Benin	2015	Highly processed products		Processed foods in general	X		
Jamaica	2015	Processed foods	Reduce the intake	Processed foods in general			
Kenya	2017	Non-processed food	Include	Non-processed starchy foods			
Belgium	2017	Ultra-processed products	Choose as little as possible	Ultra-processed foods in general			
France	2019	Ultra-processed foods; processed meat	Limit the consumption	Ultra-processed foods, in general, and processed meat			X (for processed meat)
Poland	2019	Processed foods; Processed meat	Consume less and replace	Processed foods, in general, and processed meat		X	
Ecuador	2020	Ultra-processed foods	Avoid the consumption		X		
Panama	2019	Processed products	Limit the consumption	Processed sodium-rich products		X	
Peru	2019	Processed foods; ultra-processed foods	Reduce the consumption of processed foods; avoid ultra-processed foods	Processed and ultra-processed foods in general	X		
Canada	2019	Highly processed foods	Limit	Highly processed foods in general			X

Note: Due to the numerous possibilities of interpretation, the term "preserved" was not counted as a "new term" related to the level of food processing.

The availability and detail of complementary information to the approaches on the food processing level are shown in Table 2. The main messages did not define the terms used (highly processed or ultra-processed), and only three guides (14.29%) presented examples. When available, the justification for the guidelines on the consumption of foods with different processing levels was exclusively nutritional or health-related. Guidelines on the recommended amount of consumption were found in the main messages of three food guides (14.29%).

Table 2 – Complementary information in the main messages of food guides that address the food processing level and examples extracted from the guides, 2022. (n=21).

Complementary Information	n (%)	Examples
Definition	0	-
Justification	6/21 (28.57)	Austria: "Some processed foods [such as sweets, pastries, fast food products, snacks and soft drinks) are high in fat, sugar, and salt and are less desirable nutritionally." Benin: "Traditional foods are generally better for your health than highly processed products." Cyprus: "Limit your intake of highly processed foods because they contribute significantly to the consumption of calories, fat, and salt in our diet." Colombia: To maintain normal blood pressure, reduce the consumption of salt and foods high in sodium, like processed meats, canned foods, and packaged products. Ecuador: "Let's protect our health: avoid consuming ultraprocessed foods, fast food, and sugar-sweetened beverages." Peru: "Reduce the consumption of processed foods to protect your health"
Exemplification	3/21 (14.29)	Austria: "Some processed foods (such as sweets, pastries, fast food products, snacks and soft drinks) are high in fat, sugar and salt and are less desirable nutritionally." Poland: "processed food products (such as fast food, salty snacks, biscuits, bars) high in salt, sugars and fats" Panama: "Limit your intake of processed products high in sodium, such as artificial sauces and seasonings, dry soups, cans, and jars."
Recommended consumption amount	3/21 (14.29)	Austria: "They (processed foods) should be consumed sparingly – a maximum of one small serving a day." France: "The consumption of processed meat, to 150 g per week" Canada: "Limit highly processed foods. If you choose these foods, eat them less often and in small amounts"

DISCUSSION

This study identified how the approach to food processing has been conducted in the main messages of food guides from 95 countries on the FAO website [34]. Only 21.9% of the 96 guides analyzed contained some mention of the food processing level in the main messages, and most (76.2%) have been published from 2012 onwards. The term "processed", and its variants (highly processed and ultra-processed) prevailed in the evaluated messages. However, no definition was observed in any of them. Complementary information such as justification, exemplification, and quantity for consumption were absent.

Our findings show that guidelines related to the food processing level are rarely found in the main messages of food guides. They were more frequent in guides published from 2012 onwards. This is likely due to more studies associating food consumption with high processing levels to the persistent malnutrition setting [14,37] and higher incidence of noncommunicable diseases (NCDs) and cardiovascular diseases worldwide [8,30,38-40].

Moreover, discussions about the classification of foods based on the processing level started to permeate with greater intensity in the scientific community in the last decade. In 2009, a study that aimed to describe the contribution of highly processed foods in the diet of European population groups participating in the European Prospective Investigation into Cancer and Nutrition study defined and reclassified industrially processed foods and ingredients into three main categories (highly processed foods; moderately processed foods; non-processed foods), also establishing a fourth group for foods with unknown processing [41]. Also, in 2009, Brazilian researchers proposed a classification that divided foods into three groups based on the extent and purpose of processing

[42,43]. This classification has been improved over the years, now comprising four distinct groups (non-processed and minimally processed foods; processed culinary ingredients; processed foods; ultra-processed foods) [44] and today includes technical reports and guidelines from United Nations organizations, recognized as the NOVA classification [45,46].

More recently, in the United States of America, researchers proposed four categories (non-processed and minimally processed; basic processed; moderately processed; highly processed) with subdivisions to classify foods based on the extent to which food was altered from its natural state by industrial food processing and the purpose of the processes used [47].

At least seven food classifications considering processing levels have already been described in the literature [48], and the different terminologies used by the scientific community reflect the terms used in food guides. Our study observed a need for more consensus and standardization among countries concerning the terms used, the guidelines for consumption, and the scope of the approach. We understand that food guides differences are related to the specificities of each country, such as the geographic environment, culture and traditions, ethnicity, and other sociocultural conditions [16]. However, when we consider that malnutrition, in all its forms, is a global issue lacking coordinated concerted efforts from different bodies [14,37] and that globalization has escalated the sale and consumption of foods and products with similar characteristics everywhere in the world, a single approach in recommendations about the food processing level seems to be strategic [49].

There needs to be explanations and additional information in the main messages that address the food processing level to ensure people's understanding of the subject. Studies that aimed to verify consumers' understanding of the classification of foods by processing level highlighted the complexity of the subject, and foods were wrongly classified as ultra-processed [50-53]. Even if complementary information can be found in the complete documents (data not analyzed in this study), a significant portion of the population is likely to become aware of the content conveyed in the main messages of the food guides only.

Analyses already performed on the content of food guides concluded that, regardless of the country, dietary recommendations are essentially similar [16,18,54], which is mainly because specific guidelines for promoting healthy eating patterns are consensus in the scientific community and society, such as regularly consuming fruits and vegetables and drinking water [16,21]. The negligible and non-consensual approach to consuming foods with different processing levels shown in this study may reflect how recent and incipient this topic is in the scientific community, for public policymakers, and society as a whole [55,56].

Criticisms and considerations regarding the processing level have been presented to food classifications [57,58]. Some are considered too broad and too rigid and, when compared, include different classification criteria [48,55,59,60]. We believe the difficulties of consumers in categorizing foods, the lack of culinary skills and knowledge to plan meals, and the scarce resources (time, money) may hinder the adoption and success of these classifications in the practical scope [53,60] and, consequently, compromise the expected improvement in food consumption.

Another concern in this article is that the basis of food classification systems regarding the processing level disregards the production system that gives rise to food or ingredients. A fruit jam produced with organic ingredients has higher quality than one made with ingredients from conventional agriculture dependent on external inputs, such as chemical fertilizers and pesticides [61]. However, considering consumption guidelines based on food classification systems from the processing level, both consumption will be approached from the same perspective.

Whereas recommendations for the adoption of healthy diets need to consider food comprehensiveness, the several combinations, dietary patterns, and factors associated with their consumption, and the individual's relationship with food, the environment, and society [18,62], studies with more comprehensive approaches that seek to establish criteria for the quality of processed foods, including the dimensions of healthiness, safety, and sustainability, can be a first step towards uniting and improving classifications. Also, establishing these criteria can help consumers identify processed foods with safe, healthy, and sustainable quality through certifications and seals conveyed in nutritional labeling.

When interpreting the results, we should consider that the FAO displays on its website the main messages of the food guides sent by each country to the organization, which does not mean that other countries do not have recommendations. We did not analyze all the documents, and the results may not express the complex discussions in the complete record. Considering that the principal messages analyzed were extracted from the FAO website, we can infer the risk of outdated information and mistranslation since the messages were presented in English and could differ from the source language. However, having studied the main messages of food guides from 95 countries, this article presents a comprehensive analysis of the content of the main messages of world food guides directed at the food processing level, and this is the first analysis focusing on the approach to food processing levels.

CONCLUSION

Most of the world's food guides – many recently updated – do not address the food processing level in their main messages. When this approach occurs, food guides do not agree with each other in using terminologies and implementing guidelines, and few main messages present complementary information to help readers understand the presented recommendations.

Using approaches without the necessary depth in the principal messages of dietary guidelines can lead to a misunderstanding and bring unintended negative consequences to people's food choices. We suggest the realization of in-depth studies dedicated to the compression and improvement of classification systems based on the formulations, the level, purpose, impact of the processing, and the production system (origin) of ingredients and foods to unify information and strategies to improve the global picture of malnutrition and climate change.

REFERENCES

1   Fellows P. Food Processing Technology - Principles and Practice. 2nd ed. England: Woodhead Publishing Limited; 2000.

2.   Boekel MV, Fogliano V, Pellegrini N, Stanton C, Scholz G, Lalljie S, et al. A review on the beneficial aspects of food processing. Mol Nutr Food Res. 2010;54(9):1215-47. https://doi.org/10.1002/mnfr.200900608

3.   Knorr D, Augustin MA. Food processing needs, advantages and misconceptions. Trends Food Sci Technol. 2021;108:103-10. https://doi.org/10.1016/j.tifs.2020.11.026

4.   Misra NN, Koubaa M, Roohinejad S, Juliano P, Alpas H, Inácio RS, et al. Landmarks in the historical development of twenty-first-century food processing technologies. Food Res Int. 2017;97:318-39. https://doi.org/10.1016/j.foodres.2017.05.001

5.   Knorr D, Watzke H. Food Processing at a Crossroad. Front Nutr. 2019;0:85. https://doi.org/10.3389/fnut.2019.00085

6.   Moskowitz HR. The perfect is simply not good enough – Fifty years of innovating in the world of traditional foods. Food Control. 2022;109026. https://doi.org/10.1016/j.foodcont.2022.109026

7. Welch RW, Mitchell PC. Food processing: a century of change. Br Med Bull. 2000;56:1-17. https://doi.org/10.1258/0007142001902923

8. Botelho R, Araújo W, Pineli L. Food formulation and not processing level: Conceptual divergences between public health and food science and technology sectors. Crit Rev Food Sci Nutr. 2017;58(4):639-50. https://doi.org/10.1080/10408398.2016.1209159

9. Anastácio COA, Oliveira JM, Moraes MM, Damião JJ, Castro IRR. Perfil nutricional de alimentos ultraprocessados consumidos por crianças no Rio de Janeiro. Rev Saude Publica. 2020;54:89. https://doi.org/10.11606/s1518-8787.2020054001752

10. Mendes C, Miranda L, Claro R, Horta P. Food marketing in supermarket circulars in Brazil: An obstacle to healthy eating. Prev Med Reports. 2021;21:101304. https://doi.org/10.1016/j.pmedr.2020.101304

11. Tatlow-Golden M, Garde A. Digital food marketing to children: exploitation, surveillance and rights violations. Glob Food Sec. 2020; 27:100423. https://doi.org/10.1016/j.gfs.2020.100423

12. Fardet A, Rock E. Ultra-processed foods: a new holistic paradigm? Trends Food Sci Technol. 2019;93:174-84. https://doi.org/10.1016/j.tifs.2019.09.016

13. Seferidi P, Scrinis G, Huybrechts I, Woods J, Vineis P, Millett C. The neglected environmental impacts of ultra-processed foods. Lancet Planet Heal. 2020;4(10):437-8. https://doi.org/10.1016/S2542-5196(20)30177-7

14. Swinburn BA, Kraak VI, Allender S, Atkins VJ, Baker PI, Bogard JR, et al. The Global Syndemic of obesity, undernutrition, and climate change: The Lancet Commission report. Lancet. 2019;393(10173):791-846. https://doi.org/10.1016/S0140-6736(18)32822-8

15. Bortolini GA, Moura ALP, Lima AMC, Moreira HOM, Medeiros O, Diefenthaler ICM, et al. Guias alimentares: estratégia para redução do consumo de alimentos ultraprocessados e prevenção da obesidade. Rev Panam Salud Pública. 2019;43. https://doi.org/10.26633/RPSP.2019.59

16. Rong S, Liao Y, Zhou J, Yang W, Yang Y. Comparison of dietary guidelines among 96 countries worldwide. Trends Food Sci Technol. 2021;109:219-29. https://doi.org/https://doi.org/10.1016/j.tifs.2021.01.009

17. Clifford Astbury C, Aguirre E, Cullerton K, Monsivais P, Penney TL. How supportive is the global food supply of food-based dietary guidelines? A descriptive time series analysis of food supply alignment from 1961 to 2013. Popul Heal. 2021;15:100866. https://doi.org/10.1016/j.ssmph.2021.100866

18. Fabri RK, Martinelli SS, Perito MA, Fantini A, Cavalli SB. Absence of symbolic and sustainable aspects in recommendations for healthy eating: a qualitative analysis of food-based dietary guidelines. Rev Nutr. 2021;34:e200120. https://doi.org/10.1590/1678-9865202134e200120

19. Food and Agriculture Organization of the United Nations, World Health Organization. Preparation and use of food-based dietary guidelines [Internet]. Geneva: WHO; 1996 [cited 2021 Dec 20]. Available from: http://www.fao.org/3/x0243e/x0243e00.htm

20. Herforth A, Arimond M, Álvarez-Sánchez C, Coates J, Christianson K, Muehlhoff E. A Global Review of Food-Based Dietary Guidelines. Adv Nutr. 2019;10(4):590-605. https://doi.org/10.1093/advances/nmy130

21. Cámara M, Giner RM, González-Fandos E, López-García E, Mañes J, Portillo MP, et al. Food-based dietary guidelines around the world: a comparative analysis to update AESAN scientific committee dietary recommendations. Nutrients. 2021;13(9):1-14. https://doi.org/10.3390/nu13093131

22. Fischer CG, Garnett T. Plates, pyramids, planet. Developments in national healthy and sustainable dietary guidelines: a state of play assessment [Internet]. Roma: FAO; 2016 [cited 2021 Dec 20]. Available from: https://www.fao.org/documents/card/en/c/d8dfeaf1-f859-4191-954f-e8e1388cd0b7/

23. Martini D, Tucci M, Bradfield J, Di Giorgio A, Marino M, Bo CD, et al. Principles of sustainable healthy diets in worldwide dietary guidelines: Efforts so far and future perspectives. Nutrients. 2021;13(6):1827. https://doi.org/10.3390/nu13061827

24. Mazac R, Renwick K, Seed B, Black JL. An Approach for integrating and analyzing sustainability in food-based dietary guidelines. Front Sust Food Systems. 2021;5:84. https://doi.org/10.3389/FSUFS.2021.544072/BIBTEX

25. James-Martin G, Baird DL, Hendrie GA, Bogard J, Anastasiou K, Brooker PG, et al. Environmental sustainability in national food-based dietary guidelines: a global review. Lancet Planet Health. 2022;6(12):977-86. http://dx.doi.org/10.1016/S2542-5196(22)00246-7

26. Comerford KB, Miller GD, Boileau AC, Masiello SNS, Giddens JC, B KA. Global Review of Dairy Recommendations in Food-Based Dietary Guidelines. Front Nutr. 2021;8. https://doi.org/10.3389/fnut.2021.671999

27. Klapp AL, Feil N, Risius A. A Global Analysis of National Dietary Guidelines on Plant-Based Diets and Substitutions for Animal-Based Foods. Curr Dev Nutr. 2022;6(11):144. https://doi.org/10.1093/cdn/nzac144

28. Dwyer JT. The importance of dietary guidelines. Bethesda: Elsevier; 2019. https://doi.org/10.1016/B978-0-08-100596-5.22519-5

29. Lauria F, Dello Russo M, Formisano A, Henauw S, Hebestreit A, Hunsberger M, et al. Ultra-processed foods consumption and diet quality of European children, adolescents and adults: results from the I. Family study. Nutr Metab Cardiovasc Dis. 2021;31(1):3031-43. https://doi.org/10.1016/j.numecd.2021.07.019

30. Srour B, Fezeu LK, Kesse-Guyot E, Allès B, Méjean C, Andrianasolo RM, et al. Ultra-processed food intake and risk of cardiovascular disease: prospective cohort study (NutriNet-Santé). BMJ. 2019;365. https://doi.org/10.1136/bmj.l1451

31. Gil AC. Como elaborar projetos de pesquisa. 4th ed. São Paulo: Atlas; 2002.

32. Gil AC. Métodos e técnicas de pesquisa social. 6th ed. São Paulo: Atlas; 2008.

33. Ronie Sá-Silva J, Domingos De Almeida C, Guindani JF. Pesquisa documental: pistas teóricas e metodológicas. RBHCS. 2009;1(1)1-14.

34. Food and Agriculture Organization of the United Nations. Food-based dietary guidelines. 2020-2025 [Internet]. Rome: FAO; 2020 [cited 2021 Oct 12]. Available from: https://www.fao.org/nutrition/education/food-based-dietary-guidelines

35. Bardin L. Análise de Conteúdo. Lisboa: Edições 70; 1977.

36. Moreira SV. Análise documental como método e como técnica. In: Duarte J, Barros A, editors. Métodos e técnicas de pesquisa em comunicação. São Paulo: Atlas; 2005. p. 269-79.

37. Bodirsky BL, Dietrich JP, Martinelli E, Stenstad A, Pradhan P, Gabrysch S, et al. The ongoing nutrition transition thwarts long-term targets for food security, public health and environmental protection. Sci Reports. 2020;10(1):1-14. https://doi.org/10.1038/s41598-020-75213-3

38. Chen X, Zhang Z, Yang H, Qiu P, Wang H, Wang F, et al. Consumption of ultra-processed foods and health outcomes: a systematic review of epidemiological studies. Nutr J. 2020;19(1):1-10. https://doi.org/10.1186/s12937-020-00604-1

39. Jardim MZ, Costa BVL, Pessoa MC, Duarte CK. Ultra-processed foods increase noncommunicable chronic disease risk. Nutr Res. 2021;95:19-34. https://doi.org/10.1016/j.nutres.2021.08.006

40. Pagliai G, Dinu M, Madarena MP, Bonaccio M, Iacoviello L, Sofi F. Consumption of ultra-processed foods and health status: a systematic review and meta-analysis. Br J Nutr. 2021;125(3):308. https://doi.org/10.1017/S0007114520002688

41. Slimani N, Deharveng G, Southgate DAT, Biessy C, Chajès V, Van Bakel MME, et al. Contribution of highly industrially processed foods to the nutrient intakes and patterns of middle-aged populations in the European prospective investigation into cancer and nutrition study. Eur J Clin Nutr. 2009;63:S206-25. https://doi.org/10.1038/ejcn.2009.82

42. Monteiro CA, Levy RB, Claro RM, Castro IRR, Cannon G. A new classification of foods based on the extent and purpose of their processing. Cad Saude Publica. 2010;26(11):2039-49. https://doi.org/10.1590/S0102-311X2010001100005

43. Monteiro CA. Nutrition and health. The issue is not food, nor nutrients, so much as processing. Public Health Nutr. 2009;12(5):729-31. https://doi.org/10.1017/S1368980009005291

44. Monteiro CA, Cannon G, Moubarac J-C, Levy RB, Louzada MLC, Jaime PC. The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing. Public Health Nutr. 2017;21(1):5-17. https://doi.org/10.1017/S1368980017000234

45. Food and Agriculture Organization of the United Nations. Guidelines on the collection of information on food processing through food consumption surveys [Internet]. Rome: FAO; 2015 [cited 2022 Feb 1]. Available from: https://www.fao.org/documents/card/fr/c/a7e19774-1170-4891-b4ae-b7477514ab4e/

46. Monteiro CA, Cannon G, Lawrence M, Costa-Louzada ML, Pereira-Machado P. Ultra-processed foods, diet quality, and health using the NOVA classification system [Internet]. Roma: FAO; 2019 [cited 2022 Feb 1]. Available from: http://www.wipo.int/amc/en/mediation/rules

47. Poti JM, Mendez MA, Ng SW, Popkin BM. Is the degree of food processing and convenience linked with the nutritional quality of foods purchased by US households? Am J Clin Nutr. 2015;101(6):1251-62. https://doi.org/10.3945/ajcn.114.100925

48. Talens P, Cámara M, Daschner A, López E, Marín S, Martínez JA, et al. Informe del Comité Científico de la Agencia Española de Seguridad Alimentaria y Nutrición (AESAN) sobre el impacto del consumo de alimentos "ultra-procesados" en la salud de los consumidores. Rev Com Científico AESAN. 2020;31:49-76.

49. Brooks K, Place F. Global food systems: can foresight learn from hindsight? Glob Food Sec. 2019;20:66-71. https://doi.org/10.1016/j.gfs.2018.12.004

50. Aguirre A, Borneo MT, El Khori S, Borneo R. Exploring the understanding of the term "ultra-processed foods" by young consumers. Food Res Int. 2019;115:535-40. https://doi.org/10.1016/j.foodres.2018.09.059

51. Menegassi B, Almeida JB, Olimpio MYM, Brunharo MSM, Langa FR. The new food classification: theory, practice and difficulties. Cien Saude Colet. 2018;23(12):4165-76. https://doi.org/10.1590/1413-812320182312.30872016

52. Ares G, Vidal L, Allegue G, Giménez A, Bandeira E, Moratorio X, et al. Consumers' conceptualization of ultra-processed foods. Appetite. 2016;105:611-7. https://doi.org/10.1016/j.appet.2016.06.028

53. Monteiro JS, Nakano EY, Zandonadi RP, Botelho, RBA, Araujo WMC. How do consumers understand food processing? a study on the Brazilian population. Foods. 2022;11(16):2396. https://doi.org/10.3390/foods11162396

54. Erve I van 't, Tulen CB, Jansen J, Laar ADE van, Minnema R, Schenk PR, et al. Overview of Elements within National Food-Based Dietary Guidelines. Eur J Nutr Food Saf. 2017;7(1):1-56. https://doi.org/10.9734/EJNFS/2016/32645

55. Sadler CR, Grassby T, Hart K, Raats M, Sokolović M, Timotijevic L. Processed food classification: conceptualization and challenges. Trends Food Sci Technol. 2021;112:149-62. https://doi.org/10.1016/j.tifs.2021.02.059

56. Gibney MJ, Forde CG. Nutrition research challenges for processed food and health. Nat Food. 2022;3:104-9. https://doi.org/10.1038/s43016-021-00457-9

57. Gibney MJ. Ultra-processed foods: definitions and policy issues. Curr Dev Nutr. 2019;3(2):1-7. https://doi.org/10.1093/cdn/nzy077

58. Melissa A, Sêrodio P, Baeza F. Criticism of the NOVA classification: who are the protagonists? World Nutr. 2018;9(3):176-240. https://doi.org/10.26596/wn.201893176-240

59. Gibney MJ, Forde CG, Mullally D, Gibney ER. Ultra-processed foods in human health: a critical appraisal. Am J Clin Nutr. 2017;106(3):717-24. https://doi.org/10.3945/ajcn.117.160440

60. Jones JM. Food processing: criteria for dietary guidance and public health? Proc Nutr Soc. 2018;78:4-18. https://doi.org/10.1017/S0029665118002513

61. Martinelli SS, Cavalli SB. Alimentação saudável e sustentável: uma revisão narrativa sobre desafios e perspectivas. Cien Saude Colet. 2019;24(11):4251-62. https://doi.org/10.1590/1413-812320182411.30572017

62. Reyes LI, Constantinides S V, Bhandari S, Frongillo EA, Schreinemachers P, Wertheim-Heck S, et al. Actions in global nutrition initiatives to promote sustainable healthy diets. Glob Food Sec. 2021:100585. https://doi.org/10.1016/j.gfs.2021.10058

CONTRIBUTORS

CCT GRIS was responsible for the study conception and design, performed data analysis and interpretation, and drafted the manuscript. SS MARTINELLI contributed to data interpretation and article drafting. RK FABRI assisted in reviewing and adapting the article. SB CAVALLI was responsible for coordinating the research and guiding and reviewing the paper.