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Approach of the Dietary Guidelines for the Brazilian Population in elementary school science books

Abordagem do Guia Alimentar para a População Brasileira em livros de ciências do ensino fundamental

Abstract

Objective: To analyze the approach to the content of the *Dietary Guidelines for the Brazilian Population* in elementary school science books. **Methods:** A descriptive cross-sectional study was carried out. The 13 science books of the 8th year of the collections approved by the Ministry of Education were analyzed for use from 2017 to 2019. By reading the chapters that addressed food and nutrition, content related to the theme of the Ten Steps for an Adequate and Healthy Diet in the Dietary Guidelines, mention of the Guidelines and the food pyramid was identified. From the contents identified, the data were subjected to descriptive statistical analysis and were categorized according to the directions identified in the perspective of adequate and healthy diet.

Results: All themes were identified in the books, those related to the consumption of natural, ultra-processed foods and culinary ingredients were present in all. The topic of commensality was frequent, but punctual, and the others that can encourage the adoption of an adequate and healthy diet were little explored. Few mentions of the Guidelines and a wide mention of the food pyramid were identified. There was a tendency in books to maintain the biological focus on the approach to food.

Conclusions: The presence of contents of the Dietary Guidelines in science books was evidenced, however in the approach the perspective of nutritional rationalism predominated. There was a need to revise the contents to better disseminate the expanded concept of food and nutrition, which can enable the insertion of Food and Nutrition Education in the school environment.

Keywords: Dietary guidelines. Teaching materials. Food and nutrition education. Elementary and secondary school.

Resumo

Objetivo: Analisar a abordagem do conteúdo do Guia Alimentar para a População Brasileira em livros de ciências do ensino fundamental. **Métodos:** Realizou-se um estudo transversal descritivo. Foram analisados os 13 livros de ciências do 8º ano das coleções aprovadas pelo Ministério da Educação para serem usadas no triênio 2017 a 2019. Mediante a leitura dos capítulos que abordavam a alimentação e nutrição, foi identificada a presença de conteúdos relacionados à temática dos dez passos para uma alimentação adequada e saudável do Guia Alimentar, à menção ao Guia e à pirâmide alimentar. A partir dos conteúdos identificados, os dados foram submetidos à análise estatística descritiva e foram categorizados de acordo com os sentidos identificados na perspectiva da alimentação adequada e saudável. **Resultados:** Todas as temáticas foram identificadas nos livros, as relacionadas ao consumo de alimentos naturais, ultraprocessados e ingredientes culinários estiveram presentes em todos. O tema da comensalidade foi frequente, mas pontual, e os demais que podem estimular

a adoção de uma alimentação adequada e saudável foram pouco explorados. Foram identificadas poucas menções ao Guia e ampla citação à pirâmide alimentar. Observou-se uma tendência dos livros de manter o enfoque biológico na abordagem da alimentação. **Conclusões:** Evidenciou-se a presença de conteúdos do Guia Alimentar nos livros de ciências, porém na abordagem predominou a perspectiva do racionalismo nutricional. Verificou-se a necessidade de revisão dos conteúdos para melhor difusão do conceito ampliado de alimentação e nutrição, o que pode viabilizar a inserção da Educação Alimentar e Nutricional no ambiente escolar.

Palavras-chave: Guias alimentares. Materiais de ensino. Educação alimentar e nutricional. Ensino fundamental e médio.

INTRODUCTION

Dietary guidelines are official recommendations designed to guide healthier food choices and habits for a population.^{1,2} The first *Guia Alimentar para a População Brasileira* (Dietary Guidelines for the Brazilian Population) was published by the Ministry of Health in 2006, in which foods were divided into groups according to their nutritional content and recommendations for consumption of daily portions for each.³

In 2010, Monteiro et al.⁴ proposed a new classification of foods based on the level of processing, which was considered for the preparation of the second version of the Dietary Guidelines. In the new Guidelines, foods were classified as natural and minimally processed, processed and ultra-processed, which consumption is recommended to prefer, limit and avoid, respectively. In addition, its content emphasizes other dimensions of food, highlighting the cuisine of the country and regions, cultural habits, commensality and the appreciation of the food process as a whole.¹

Currently, the Brazilian food pattern is marked by the spread of consumption of ultra-processed foods, reaching in some cases almost 50% of energy consumption at the expense of consumption of natural and minimally processed foods.⁵ This pattern varies according to the age group, and the worst diet profile is observed among adolescents.⁶

In this age group, in addition to the nutritional aspect, the exercise of valuing food has been essential, since the growing network of access to information on food, diet and body can negatively affect the meanings of eating and food.⁷ In the study by São Pedro et al.,⁷ adolescents showed theoretical knowledge about healthy eating, associating it with the consumption of natural foods and eating without exaggeration, but often had a conflicting relationship with the food, reporting the pleasure and guilt of consuming foods that they considered “rubbish”, as well as the adoption of different strategies for weight control.

In this context, Food and Nutrition Education (FNE) stands out for its objective of promoting the autonomous and voluntary practice of healthy eating habits. The school emerges as a field of practice suitable for its fulfillment, since it is a place where adolescents spend a large part of their time.⁸ An obstacle to this fulfillment, according to elementary school teachers, is the lack of didactic material about FNE.⁹

Therefore, textbooks that are usually used and valued as a pedagogical resource in the school context are potential tools for FNE, as they encourage the approach of the theme in the classroom when they present related content.^{10,11} Books are theoretical and visual tools that can be used by the teacher as a support to promote dialogue, stimulate students' senses and creativity.¹² They also tend to be the main source of information about food and nutrition for teachers.¹³

In this case, elementary education science books stand out, since the National Curriculum Parameters (NCP) of sciences guide the approach to nutritional content and the discussion of eating habits in this discipline. In 2017, the National Common Curricular Basis (NCCB) was approved as a normative reference for the preparation of curricula and teaching materials. In line with the NCP, the NCCB determines the approach to themes mentioned in the science discipline.^{14,15}

However, researchers who have analyzed science books declared that there are limitations in the content covered, especially regarding the superficiality of topics related to FNE.^{10,16,17} In view of the need to discuss eating habits in schools, the Dietary Guidelines stand out as an educational tool, since it is the national guide for adequate and healthy diet and its recommendations are based on the habits of Brazilian families. Thus, this study aimed to analyze the approach to the content of the *Dietary Guidelines for the Brazilian Population* in elementary school science books.

MATERIALS AND METHODS

A descriptive cross-sectional study was carried out, with a quantitative and qualitative approach. Thirteen science books of the eighth grade of collections approved by the Ministry of Education were analyzed in the Programa Nacional do Livro e do Material Didático (National Book and Didactic Material Program - PNLD) for 2017, published in 2015. Among these collections, each school could choose one to be used in 2017-2019. The eighth-grade book was selected because it is the only one whose program content included the study of topics related to food and nutrition.

To obtain the materials, all elementary schools in the urban region of Governador Valadares, Minas Gerais state, Brazil were contacted to identify the adopted book. Ten books from different collections were found, from which a loan of a printed copy was requested; three books were acquired in its electronic version.

Data collection was carried out through an exhaustive reading of book chapters that included content related to food and nutrition. Guiding questions were listed to investigate the presence of the theme of each of the Ten Steps for an Adequate and Healthy Diet in the *Dietary Guidelines for the Brazilian Population* (figure 1). The mention of the Guide and the food pyramid was also investigated, totaling 12 analysis variables. We chose to investigate the pyramid as it is a socially known tool and used for years in the Nutrition field. During data collection, a spreadsheet was organized in which the presence of content was recorded, and excerpts were identified.

Figure 1. Description of the Dietary Guidelines steps and questions that guided the investigation of their themes.

1. Make natural or minimally processed foods the basis of feeding.	Is the consumption of natural foods and / or a variety of foods encouraged? Does the book deal with the importance of drinking water?
2. Use oils, fats, salt and sugar in small amounts when seasoning and cooking food and creating culinary preparations.	Is there information regarding the risks of excessive consumption of oils, fats, salt and sugar?
3. Limit consumption of processed foods.	Is the consumption of processed foods considered complementary to food based on natural foods?
4. Avoid consumption of ultra-processed foods.	Does the book present the health damage resulting from the consumption of processed foods, or are there guidelines on labeling?
5. Eat regularly and carefully, in appropriate environments and, whenever possible, accompanied.	Is the social aspect of food addressed? Does the book deal with the pleasure of eating and / or the importance of chewing slowly?
6. Shopping in places that offer natural or minimally processed varieties of food.	Is the purchase of food in markets and fairs or the purchase of seasonal and local vegetables encouraged?
7. Develop, exercise and share culinary skills.	Is the importance of the act of cooking addressed or is this practice encouraged in somehow?
8. Plan the use of time to give food the space it deserves.	Does the book address the importance of dedicating time to the stages of selecting and preparing food and integrating the family in this context?
9. Give preference, when not at home, to places that serve freshly made meals.	Is the consumption of homemade meals when away from home valued at the expense of fast-food chains?
10. Be critical of information, guidance and messages about food in commercial advertisements.	Does the book's content contribute to the critical formation regarding food advertising and media influence?

Source: The authors.

In the quantitative analysis, descriptive statistics was used, calculating the absolute and relative frequency of the presence of content using Microsoft Office Excel 2016. In the qualitative analysis, we sought to interpret the understanding of adequate and healthy diet that grounded the contents of the selected excerpts; then different meanings of approach were identified, allowing the categorization of contents.

RESULTS AND DISCUSSION

In the content analysis of the 13 science books, 12 themes under investigation were identified (table 1): ten referring to the steps for an adequate and healthy diet, one about the mention of the Guidelines and one about the mention of the food pyramid. Three themes were present in all books: preference for the consumption of natural foods, moderation in the use of culinary ingredients and minimal consumption of ultra-processed foods, meeting the recommendations of the *Dietary Guidelines for the Brazilian Population*.¹

Table 1. Content approach of the *Dietary Guidelines for the Brazilian Population* in Science books of the 8th grade of elementary school. Governador Valadares-MG, 2019.

Content investigated	Absolute frequency (n)	Relative frequency (%)
Preference for consumption of natural foods	13	100.0
Moderate use of culinary ingredients	13	100.0
Little consumption of ultra-processed foods	13	100.0
Commensality	9	69.2
Mention of the food pyramid	8	61.5
Critical stance regarding food advertisements	6	46.2
Shopping in places with a variety of natural foods	5	38.5
Mention of the Dietary Guidelines	5	38.5
Time planning for food	4	30.8
Preference for freshly cooked meals	3	23.1
Little consumption of processed foods	2	15.4
Development of culinary skills	1	7.7

Source: The authors.

However, it was found that themes such as shopping in places with a variety of natural foods (38.5%), planning the time dedicated to food (30.8%) and preference for freshly made meals (23.1%) were rarely mentioned in the books. These are significant themes for an adequate and healthy diet, as they aim to stimulate the purchase, preparation and consumption of natural foods. Thus, the reduced presence in textbooks implies a lack of informational support for students.

The development of a critical attitude towards food advertising is an issue that, when present, stimulated students' reflection, but was also rarely found (46.2%). This is worrying, given that there is a high prevalence of daily consumption of ultra-processed foods among Brazilian adolescents, which is generally explained by its practicality and the influence of advertisements.^{18,19} About this, Costa et al.¹⁸ refer that school plays an important role in clarifying food options, and Greenwood and Fonseca¹⁰ reinforce the potential of textbooks as an FNE tool.

A theme found in most (69.2%) of the analyzed books was commensality. This is a differential of the Brazilian Dietary Guidelines when compared to other guides, as it focuses on the pleasure of eating when dealing with eating

in company, in appropriate environments, with regularity and attention.² This presence is considered a positive factor, because it may favor the perception of the social value of food among adolescents.

Themes with the lowest frequency of identification were the limited consumption of processed foods (15.4%) and the development of culinary skills (7.7%). In the first, the authors used excerpts from the Dietary Guidelines in its entirety, and in the second the content was inserted in an exercise that stimulated the execution of a recipe:

[...] choose natural ingredients based on the food pyramid and come up with a recipe that looks appetizing to people your age [...] (Book 13)

In the study by Rosa and Morh,²⁰ some science teachers reported indicating the exercises in books, but others indicated its use only for reading texts or as a source of research by students. This may be a limitation of the exclusive approach to some themes in exercises, as it also happened with the planning of the time allocated to food and the preference for fresh meals, in most books in which they appear. Therefore, these subjects may go unnoticed by students or be misunderstood, compromising the educational process.¹⁰

An important finding refers to the mention of the food pyramid in 61.5% of books, while the Dietary Guidelines, which are the official Brazilian recommendations, appear in 38.5% of them. When analyzing the books from nine collections approved by PNLD 2014, Bianco¹⁶ also found images of the pyramid in the majority (55.6%). Thus, it is observed that even after the publication of the Guidelines in 2014, few authors attempted to insert it in textbooks and the pyramid continued to be used as the main reference for healthy eating.

The pyramid models presented in the analyzed books are different versions of the one adapted for the Brazilian population by Philippi et al.,²¹ found five times, and the pyramid proposed by Willet,²² found three times. It is noteworthy that this graphic representation was never adopted by the Brazilian public policies as official dietary recommendation, and that it is related only to the biological dimension of food, in contrast to the proposal of the current guidelines.

Lobo and Martins²³ criticize the use of the pyramid, listing different reasons why it can bring a misunderstanding of what healthy eating would be: the difficulty of understanding the concept of portion; the cultural association of the pyramid with levels of hierarchy, which can generate relative importance between foods; the isolated representation of food and not possible combinations; and the omission of foods that undergo different levels of processing, leaving doubts about their consumption.

In the books analyzed, the mention of the Dietary Guidelines was scarce and occurred in different ways. Three books used passages in their entirety, one book only cited its elaboration, another encouraged the search of the Ten Steps for an Adequate and Healthy Diet and two of them suggested access through the Guide's electronic address, one of which included the cover image. Some of these occurrences are highlighted below:

In 2014, the Ministry of Health published the *Dietary Guidelines for the Brazilian Population* free of charge on the Internet. (Book 1)

In 2014, the Ministry of Health published the 2nd edition of the *Dietary Guidelines for the Brazilian population* [...]. The Guideline's recommendations are summarized in ten steps. In group, research what are the "ten steps for an adequate and healthy diet" and discuss: why are these recommendations important? How do they affect people, families and society? [...] (Book 6)

Be sure to access: Dietary Guidelines: how to have a healthy diet [e-mail address] (Book 10)

Greenwood and Fonseca¹⁰ studied the presence of FNE in textbooks and point out that its content can be arbitrary depending on the authors' culture. Thus, they consider that aligning the textbook recommendations with the Dietary Guidelines is a way of ensuring that they are adapted to the reality of teachers and students in different regions of Brazil, as this document was based on discussions with different professionals and representatives of the civil society.

Regarding the meanings of approach to the contents, two perspectives were identified, categorized as: nutritional rationality, understood as eating practices focused on the permanent consumption of adequate nutrients, dissociated from other values attributed to food;²⁴ and the expanded concept of food, being that which includes the socio-cultural aspects of food and commensality, from which the recommendations of the Dietary Guidelines were formulated.²⁵

Approach from the perspective of nutritional rationalism

In the analyzed books, there was a recurrence of a strongly biological approach to food. This approach derives from the biomedical health model, characterized by a mechanistic view of the human being, in which each component of the body is understood in a fragmented way and from the perspective of its function. For a long time, the supremacy of this model restricted the concept of health to a normal biological state and healthy eating to a tool to maintain that state, by supplying the nutrients to meet physiological demands. This approach favors an excessive rationality of food, which is seen from a curative and preventive perspective of diseases, in which food becomes only a carrier system of nutrients.^{25,26} This is often the message conveyed in science books, according to the following excerpts:

The second dish is the most balanced of the three, as the food combines carbohydrates (rice, beans), lipids (meat), proteins (meat, beans), as well as vitamins and minerals (salad). (Book 1)

Although we need small daily amounts of vitamins, their deficiency can cause a series of undesirable changes and diseases. Therefore, it is extremely important to keep a nutritious and varied diet. (Book 7)

From this understanding, healthy eating is determined and dictated by science through nutritional recommendations that become normative of what to eat and what not to eat,^{24,26} as noted below:

It is necessary to [...] give preference to low calorie vegetables. (Book 3)

It is worth reinforcing once again: Fatty or high sugar foods should be avoided or consumed infrequently, as they do not bring any benefit to the body. (Book 9)

This approach was contained in the first *Dietary Guidelines for the Brazilian Population*,³ and is still quoted in some books:

[...] Eat at least 3 servings of vegetables and fruits daily [...] Decrease the amount of salt in the food and remove the salt shaker from the table [...] Drink at least 2L of water per day. (Book 4)

In addition to the recommendations directly related to which foods to eat, nutritional rationality may also be implicit in phrases associated with the act of eating, as discussed from the following examples:

Obesity has several causes [...] Bad eating habits help to put on weight, such as: Not having fixed times to eat [...] fasting for long periods (Book 11).

In this passage, regularity at mealtimes, encouraged by the Dietary Guidelines as a way to naturally control what one eats, is treated with a focus on “getting fat”, referring to an exclusive concern with the body.

However, advertisements often lead us to consume products with no nutritional value, bad for health and in general, more expensive than healthy options. (Book 13).

In this passage, food advertising is approached, but under the strict perspective of low nutritional value. However, it is known that there is also advertising around foods that can have good nutritional value. In this case, the formation of critical opinion about food advertising must include other aspects, such as the understanding that the intention of the industry is to sell and not to educate.¹

It is noteworthy that, when dealing with food, the central contents pointed out by the NCP of sciences focus on understanding the functions of nutrients, the processes of digestion, absorption and nutrition and discussion of eating habits in view of the health-disease process, favoring the rational approach to food.¹⁵ This knowledge is necessary for students; however, its exclusive acquisition can lead to a technical and restricted conception of food, depriving the process of preparing and consuming its meanings.²⁴ These findings allow a reflection on the capacity of science textbooks to promote health education. The use of the imperative to point out recommendations, such as “do” and “eat”, without considering the theme, reflects a concept of health education that has already been criticized, whose main objective is to transmit information.²⁷ Currently, the conception that directs FNE practices are inspired by the liberating pedagogy of Paulo Freire.⁸ Authors highlight the relevance of the teaching model proposed by this Brazilian educator, based on dialogue and reflection-action, which contributes to the promotion of students' emancipation and autonomy.^{27,28}

In textbooks, this can be worked on both in the display of texts and in the exercises, as illustrated in the following excerpts:

Knowing regional cuisine and including typical foods in the diet, in addition to conserving the country's gastronomic culture, make meals richer and more interesting. (Book 9)

Obesity is a nutritional disorder that has been affecting an increasing number of people. Try to relate this fact to the way of life of the population nowadays. (Book 12)

In the first, the way information is presented allows the reader to reflect on the importance of knowing the local cuisine, instead of imposing that he knows it. In the second, the exercise allows the reader to establish various relationships, not being limited by a text that imposes them.

Approach from the perspective of the expanded concept of food

The Dietary Guidelines recommendations are based on a comprehensive view of health, characterized as a social construction. Likewise, they are considered an expanded concept of adequate and healthy diet that includes both biological, social, cultural, economic and environmental aspects.²⁵ The approach under this perspective was present in several books studied, which demonstrates an expansion of the FNE space in the school context. However, it often occurs in a punctual or decontextualized way, pointing to the need to better explore, in these materials, the several dimensions of food.

The Guideline's proposal is to present food as more than the intake of nutrients, encouraging the consumption of natural foods, also with a view to cultural aggregation and the promotion of a socially and environmentally sustainable food system. It is also reinforced that the combination of various foods is what contributes to health.¹ This approach was observed in some books, as follows:

It is often said that the more colorful a meal, the better it will be. This is a good tip, considering the diversity of colors that can be found in meals based on natural foods [...] (Book 3)

[...] Nutrients are important, however, food cannot be reduced to vehicles for them, as they add unique cultural, behavioral and affective meanings that can never be neglected [...] (Book 5)

As for commensality, which also makes up an adequate and healthy diet,¹ implications were observed in this regard, with a focus on sharing, the environment and the pleasure of eating:

Eating meals with friends or family, in a clean and pleasant environment, is also part of having a healthy diet. (Book 7)

[...] The conditions in which eating is performed are also factors to be considered, as meals can be moments of pleasure and socialization [...] (Book 8)

In addition to eating in company, the Guide suggests that the other stages that precede and follow meals are divided among those involved. For this, it is necessary to plan the time allocated to food, from purchase to consumption.¹ This stimulus to planning was addressed in the books by encouraging the preparation of shopping lists and, in one case, it was associated with the economic relevance of value seasonal foods:

[...] Therefore, it is necessary to plan food purchases and preservation, prioritizing those consumed by everyone in the household and getting to know the seasonal vegetables in the region, to reduce food expenses. (Book 5)

Adolescents are exposed to an excess of unreliable information about food and the Dietary Guidelines point out this excess as an obstacle to the adoption of their recommendations.^{1,7} Therefore, the use of the Guidelines as a reference on the subject is reinforced, as they are based on current knowledge, but also consider traditional feeding practices.

A limitation of the study is that the investigation was restricted to science textbooks. According to the NCP, the theme of food and nutrition is a component of health that must be worked across the school curricula.¹⁵ However, Menon found that in the disciplines of elementary education, with the exception of science, this issue is not very much addressed.²⁹

Furthermore, in the case of public schools, the approach to food and nutrition is reinforced by the Programa Nacional de Alimentação Escolar (National School Meal Program), which proposes the use of content and food as educational tools in educational actions.²⁹ However, another limitation of this study is that the content analysis in the books does not necessarily reflect what is worked on in the classroom, since the problematization depends on the teacher. Thus, it is suggested that studies be carried out to investigate the approach of the themes of the Ten Steps of the Dietary Guidelines in other disciplines, as well as to assess the teachers' knowledge about these issues.

Finally, the relevance of the question investigated is highlighted, since as the contents of the Guideline are aligned with the public policies of the country, its approach in the school context can be a trigger for interdisciplinary actions and practices that strengthen FNE in the school environment and, consequently, the promotion of adequate and healthy diet for adolescents.

CONCLUSIONS

The study showed that the themes of the Ten Steps for an Adequate and Healthy Diet in the *Dietary Guidelines for the Brazilian Population* are present in science textbooks, some more prevalent than others. However, it was found that the direct mention of the Guide is surpassed by the mention of the food pyramid, and that in the approach to food the perspective of nutritional rationalism predominates.

A starting point to enable the inclusion of FNE in the school curriculum is the discussion of the several food dimensions. In this sense, the Dietary Guidelines are a didactic resource that must be valued and disseminated, in view of its alignment with public policies.

Therefore, the need to review the content on food and nutrition of science textbooks prepared in the country, in order to contribute to the strengthening of national policies and programs, is highlighted. And yet, the need to implement permanent education actions carried out by an intersectoral team, so as to enable the actors of the school community to act in the promotion of FNE, creating an environment that leads to the development of healthy eating habits.

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Contributors

Costa GB participated in the collection, analysis and interpretation of data and writing of the work; Vincha KRR participated in the definition of the study design, critical review of the content and approval of the final version to be published; Carneiro ACLL participated in the definition of the study design, data interpretation, critical review of the content and approval of the final version to be published.

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