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## Development and validation of a diagnostic tool for Food and Nutrition Education actions in the school environment

### *Desenvolvimento e validação de instrumento para diagnóstico das ações de Educação Alimentar e Nutricional no âmbito escolar*

#### Abstract

**Introduction:** Food and Nutrition Education is acknowledged as a practice to form adequate eating habits and, especially in the school environment, has gained strength through several guidelines and regulations. **Objective:** Develop and validate a diagnosis tool for Food and Nutrition Education [EAN - *Educação Alimentar e Nutricional*] actions developed in schools. **Method:** Methodological study with questionnaire design in 3 steps: a survey of the questionnaire's items and sections through a literature review of scientific articles, institutional documents, and current legislation; drafting the questionnaire items based on the definition of themes and domains, respecting techniques and strategies to prepare items for measurement scales; and content validation by checking the representativeness of the items to the content to be evaluated. **Results:** A self-administered questionnaire was obtained for those responsible for schools at all levels of elementary education, with 25 items divided into 4 sections: 1) School identification - 7 items, 2) EAN in schools - 10 items, 3) Use of the school garden - 5 items; and 4) Interaction of professionals and family members with EAN actions - 3 items. **Conclusions:** The proposed questionnaire can be used to initially review the EAN situation in schools, drive important developments, and should qualify the planning of future actions. Although it was developed with a focus on public schools, its use can also be extrapolated to private schools, which allows comparisons between different scenarios.

**Keywords:** Food and Nutrition Education. Questionnaire. School Healthcare Promotion. School food

#### Resumo

**Introdução:** A Educação Alimentar e Nutricional é reconhecida como uma prática de formação de hábitos alimentares adequados e, especialmente no ambiente escolar, ganhou força por meio de uma série de orientações e normativas. **Objetivo:** Desenvolver e validar instrumento para o diagnóstico das ações de Educação Alimentar e Nutricional (EAN) desenvolvidas em escolas. **Método:** Estudo metodológico com elaboração de questionário em 3 etapas: levantamento dos itens e seções do questionário por meio de revisão bibliográfica de artigos científicos, documentos institucionais e legislação vigente; redação dos itens do questionário a partir da definição dos temas e domínios, respeitando técnicas e estratégias de elaboração de itens para escalas de medida; e validação do conteúdo pela verificação da representatividade dos itens ao conteúdo a ser avaliado. **Resultados:** Obteve-se um questionário autoaplicado aos responsáveis por escolas de todos os níveis da educação básica, com 25 itens divididos em 4 seções: 1) Identificação da escola - 7

itens, 2) EAN na escola – 10 itens, 3) Utilização da horta escolar – 5 itens; e 4) Interação de profissionais e familiares com as ações de EAN – 3 itens. **Conclusões:** O questionário proposto pode servir para uma análise inicial da situação da EAN em escolas e gerar importantes desdobramentos, devendo qualificar o planejamento das ações futuras. Embora tenha sido elaborado com foco nas escolas públicas, seu uso pode ser extrapolado também para escolas particulares, o que possibilita comparações entre diferentes cenários.

**Palavras-chave:** Educação Alimentar e Nutricional. Questionário. Promoção da Saúde Escolar. Alimentação Escolar.

## INTRODUCTION

Food and Nutrition Education (EAN), as a strategy for promoting healthy eating habits in food and nutrition policies and programs,<sup>1-3</sup> has been gaining strength and visibility in recent decades around the world.<sup>4,5</sup>

Given its relevance, the *Reference Landmark of Food and Nutrition Education for Public Policies [Marco de Referência de Educação Alimentar e Nutricional para as Políticas Públicas]* was published in Brazil a decade ago, aiming to create a common field for reflection, theoretical consolidation, guidance, and promotion of practice, especially in the public sphere, including the many industries linked to food production, distribution, supply, and consumption processes.<sup>3</sup>

In that context, Brazilian School Feeding Program [PNAE - *Programa Nacional de Alimentação Escolar*] stands out in pioneering the inclusion of EAN in its guidelines,<sup>1</sup> gaining strength, especially as of 2009, through federal legislation that included EAN in school curricula.<sup>6</sup>

Considering that balanced food environments enable appropriate choices and that school is one of the main components of the food environment, where children spend much of the day, it is crucial to plan and develop EAN actions in this area. The food environment in school involves everything, from the cost and acquisition of food to availability and intake. In this process, adequate provision of information on food and nutrition to the public involved must be ensured, as this is a strategic action to promote healthy and adequate food.<sup>7,8</sup>

It should also be noted that the articulation between nutrition and education, essential knowledge in the process of PNAE implementation, goes beyond the pure supply of food, placing school feeding as a pillar of change in eating habits among students, families and the school community.<sup>8,9</sup>

EAN, as a practice to form adequate eating habits, has been recently ratified in the PNAE legislation. Its importance in the teaching-learning process was highlighted, as it promotes the reflective construction of knowledge about food and nutrition.<sup>10</sup> It assumes innovative methodologies, with a contextualized approach, that use food pedagogically, stimulating children's cognitive development and adding food-related themes to the school curriculum.<sup>3,6</sup>

Many documents on EAN have been published in Brazil, especially in the school environment,<sup>11,12</sup> even noting an increase in scientific production that endorses the legal landmarks and favors the implementation and expansion of EAN actions in different contexts. Meanwhile, few studies are seeking to perform an extensive diagnosis of the EAN practice in schools. The existing publications are based on describing methods and results obtained.<sup>13,14</sup>

In this regard, this study aimed to develop and validate a tool that included the different categories related to the implementation and development of EAN actions in schools, aiming to obtain a diagnosis of EAN situation in schools.

## METHODS

A methodological study proposing the development of a self-administered questionnaire to principals and/or pedagogical staff of public education, including all levels of elementary education.

The questionnaire was designed in 3 main steps: 1) survey of items and sections of the questionnaire; 2) drafting of the items; and 3) content validation.

In step 1, the questionnaire proposed by Silva et al.<sup>15</sup> was used to identify categories related to implementing and developing EAN actions in schools. Additionally, a literature review was carried out to review and include new items, covering as much information as possible on the theme. This included scientific articles, dissertations and theses, institutional documents, and current legislation on the topic. The search was carried out in Scielo Brazil, PubMed, Scopus, and Plataforma Sucupira-Capes databases, using the descriptors: "Food and Nutrition Education", "Brazilian Food and Nutrition Program" and "School food", also translated into English and Spanish. Documents published on official websites of government bodies and renowned institutions were also analyzed, as well as laws/bylaws/executive orders/decrees/resolutions. The search resulted in 24 articles and papers describing EAN actions, projects and/or programs in the school environment, published between 2010 and 2021. Suggestions from professors at a public university, internship supervisors in Public Health Nutrition, were also included due to their extensive experience in EAN in schools. The results were organized, and a text document was created, compiling all possible items and sections of the questionnaire.

Then, step 2 began, drafting the items based on the definition of themes and domains, respecting the techniques and strategies to prepare items for measurement scales.<sup>16,17</sup> At this step, one of the purposes was to adapt the measurement tool to the proposed objective and ensure its applicability. This questionnaire proposal was discussed and reviewed by the research group members.

In step 3, the tool was validated. It should be noted that content validation starts the process of association between abstract concepts with measurable indicators, as well as represents the extent to which each item of the measure proves the phenomenon of interest and the dimension of each item within what it proposes to investigate.<sup>18</sup> The content validation aims to refine and adjust the items of the tool, assessing the representativeness of the items to the content to be assessed.<sup>19</sup> The methodology proposed by Di Lorio was used,<sup>17</sup> which suggests calculating the Content Validity Index - CVI. To this end, a panel of experts was formed with acknowledged expertise in the fields of health and education, including two professors/investigators, two nutritionists working with school food in public schools, a nutritionist from a school feeding collaborating center (Cecane), a municipal school food public manager, a public-school teacher, and a public education unit manager.

The experts received the questionnaire and an evaluation form via Google Forms®. The tool's evaluation form allowed the experts to analyze each item through a scale of four levels of agreement: "not relevant" to "very relevant" for relevance, objectivity, clarity, simplicity, feasibility, and vocabulary. A space to include suggestions for each item was also available. At the end of the questionnaire, the specialists made a global evaluation of the tool, using the same criteria, through an open question, which allowed suggestions for the tool as a whole.

The purpose of this evaluation was to identify whether the items included in the tool were actually important to measure what the tool proposed to measure, and also which items should be excluded or redesigned. Regarding the score, there was an agreement between the experts regarding the relevance of the items, both regarding the total scale and the individual items, as well as per section of the tool through the CVI proposed by Di Lorio,<sup>17</sup> where:

Item CVI = (number of answers 3 or 4/number of experts) x 100

Section CVI = (number of answers 3 or 4 in the section/number of questions in the section)/ number of experts

Total scale CVI =  $\sum$  percentages of answers 3 or 4 from each expert/number of experts)

The results section shows the description of the first version of the questionnaire, the content validation, and the final questionnaire.

It is noteworthy that this study was part of the project “Strengthening Food and Nutrition Education in the school environment: multidisciplinary and intersectoral actions”, submitted and approved by the Institutional Review Board under the CAAE number: 09839119.3.0000.0121.

## RESULTS

### Questionnaire - first version

The version sent to the experts had 21 items, divided into 3 sections: 1) school identification - 7 items, 2) EAN in schools - 10 items, and 3) use of the school garden – 4 items.

In the first section, questions were included to identify the school. In the second one, detailed information was requested on projects and actions taken and/or planned (methodology, length, person responsible for the activity and main results or expected results), relationship with the knowledge areas, involvement of the nutritionist, and provision of training for educators. And in the third one, questions regarding school gardens.

### Content validation

Table 1 shows the CVIs based on the experts' scores. Most of them (15 out of 21 items) reached a 100% coefficient value. In the sections' analysis, all of them reached a coefficient higher than 80%, and the total scale had a 93.33% validity coefficient (CVI).

**Table 1.** Content validity coefficient (CVC) of the questionnaire items. Florianópolis, SC, 2021.

Items	Item CVI (%)
<b>Section 1. School Identification</b>	
1. Data collection date	60.00
2. Name of education unit	80.00
3. Respondent (full name and position/role)	80.00
4. Type of education unit	100.00
5. Number of students in the unit	100.00
6. Number of teachers	100.00
7. Number of cooks	80.00
Item CVI - Section 1	85.70
<b>Section 2. Food and Nutrition Education in schools</b>	
8. Does the education unit's political-pedagogical project unit include food and nutrition education activities?	100.00
8.1. If so, describe below how the theme is inserted into the pedagogical project	100.00
8.2. If so, did the nutritionist responsible for the unit attend discussions about including the theme Food and Nutrition Education in the Political-Pedagogical Projects?	100.00
9. Does the unit develop, or has planned for the year, projects and/or educational actions on food and nutrition?	100.00
9.1. If so, for each project and/or action, please describe: a) Title; b) Objective; c) Methodology ; d) Audience and number of participants; e) Responsibility for the project/action; f) Start and end date; g) Frequency; h) Expected/obtained results.	100.00
9.2. Were the projects and/or actions carried out guided by the unit's nutritionist?	100.00
9.3. Were the projects and/or actions carried out monitored by the unit's nutritionist?	80.00
9.4. Is there any way to evaluate the projects and/or actions?	100.00
10. Has the school received any specific training to work on the topic of food and nutrition in the curriculum?	100.00
11. In which subjects are food education projects and/or actions carried out?	100.00
CVI Item - Section 2	96.00
<b>Section 3. School Garden</b>	
12. Does the unit have an active educational garden?	100.00
12.1. Who is responsible for maintaining the garden?	100.00
12.2. Who uses the garden as a pedagogical space?	100.00
12.3. If there is no educational garden or it is not active, please comment on the reasons.	80.00
CVI Item - Section 3	95.00
<b>CVI Total Scale</b>	<b>93.33</b>

### Questionnaire - final version

The items with lower CVI were redesigned, in accordance with the experts' suggestions. The modifications in section 1 aimed at adjusting some questions regarding the characterization of the school and a new section was included (section 4), called *Interaction of professionals and family members/caregivers in EAN actions*, with three questions about the existence of articulation between professionals from other areas and the involvement of families in EAN actions (Chart 1).

**Chart 1.** Modifications to the items and sections of the questionnaire.

Item	Change	Rationale (after experts' suggestions)
12.4. If it does not have a pedagogical garden, does the education unit use community gardens or medicinal gardens for pedagogical activities?	New item.	A question was created to identify other EAN spaces related to the garden.
13. Is there articulation between education professionals and other areas (health, agronomy, etc.)?	New items in a new section.	A final section was developed to identify the characteristics of interdisciplinarity and family participation in EAN actions.
14. Are the students' families/guardians involved in EAN actions?		
14.1. If so, please describe how this occurs.		

Thus, once the reorganization and adaptation were complete, the questionnaire was finished with 25 items, divided into four sections: 1) School identification - 7 items, 2) EAN in schools - 10 items, 3) Use of the school garden - 5 items; and 4) Interaction of professionals and family members with EAN actions - 3 items (Figure 1).

Figure 1. Final version of the Questionnaire

1. → Date of questionnaire completion:.....¶

2. → Name of the education unit (it will not be published, only for contact in case of doubt):¶

3. → Respondent (position/role):¶

4. → Type of education unit:¶  
 Center for Early Childhood Education →  Middle School  Blended Unit → ¶

5. → Number of students in the unit:¶

6. → Number of teachers:¶

7. → Number of cooks:¶  
 ¶

8. → Does the education unit's political-pedagogical project unit include food and nutrition education activities?  yes  no ¶

8.1. → If the previous answer was positive, describe below how the theme is inserted in the pedagogical project.¶

8.2. → If so, did the nutritionist responsible for the unit attended discussions about including the theme Food and Nutrition Education in the Political-Pedagogical Projects?  yes →  no ¶  
 ¶

9. → Does the unit develop, or has planned for the year 20\_\_\_, projects and/or educational actions on food and nutrition?¶  
 yes  no ¶

9.1. → If so, for each project and/or action, please describe: a) Title; b) Objective; c) Methodology; (d) Audience and number of participants; e) Responsibility for the project/action; f) Start and end date; g) Frequency; h) Expected/obtained results. ...¶

9.2. → Were the projects and/or actions carried out guided by the unit's nutritionist?  always  never  sometimes ¶

9.3. → Were the projects and/or actions carried out monitored by the unit's nutritionist?  always  never  sometimes ¶

9.4. → Is there any way to evaluate the projects and/or actions?¶  
 no ¶  
 yes, choose from the following options below:¶  
 parents' feedback¶  
 change of heart in the classroom¶  
 change in food choices¶  
 insights of the lunch ladies and other professionals in the unit¶  
 others:¶  
 ¶

10. → Has the school received any specific training to work on the topic of food and nutrition in the curriculum?¶  
 no ...  yes, choose who attended it:¶  
 managers .....  teachers .....  lunch ladies¶  
 educational staff .....  others:¶  
 ¶

11. → In which subjects are food and nutrition education actions taken?¶  
 All (Early Childhood Education) ...  Portuguese ...  Mathematics¶  
 Science/Biology .....  History .....  Geography¶  
 Arts .....  Physical Education .....  Foreign Language¶  
 None .....  Others:¶  
 ¶

12. → Does the unit have an active educational garden?  yes  no ¶

12.1. → Who is responsible for maintaining the garden?¶  
 teacher .....  city worker  students' parents  trainees ¶  
 lunch ladies  nutritionist  students  others ¶

12.2. → Who uses the garden as a pedagogical space?¶  
 teacher  trainees →  nutritionist → ...  others:¶

12.3. → If there is no educational garden or it is not active, please comment on the reasons.¶

12.4. → If it does not have a pedagogical garden, does the education unit use community gardens or medicinal gardens for pedagogical activities?¶  
 yes  no ¶  
 ¶

13. → Is there articulation between education professionals and other areas (health, agronomy, etc.)?  
 →  yes →  no ¶  
 ¶

14. → Are the families/guardians of the students involved in EAN actions?¶  
 yes →  no ¶  
 ¶

14.1. If so, please describe how this occurs:¶



## DISCUSSION

Publications on EAN have been increasing, something that may be related to its prominence in public health policies, especially on food and nutrition, and in education policies of national and international bodies.<sup>3,20</sup>

This condition strengthens the practice of EAN and encourages scientific production, which although growing, is still punctual. Thus, this article's differentiating factor is the contribution the proposed questionnaire can bring to the analysis and discussion of EAN in schools. Due to its aspect focused on quantitative and qualitative description, in a broader and more general way, it allows an initial analysis that is fundamental for advances in the field of EAN evaluation; and also, as provided for in the details of the actions taken, it enables to identify the closeness with the EAN Brazilian landmark. As a result, this tool can provide a diagnosis of the EAN implementation in schools and its result can support the planning of future actions.

Still, concerning the intent and relevance of the proposed tool, which is to provide an expanded diagnosis of EAN actions in schools, to a lesser or greater extent, it is worth recalling the relevance of educational diagnoses for the proper knowledge, understanding and subsequent planning and design of educational actions in the field of health, food and nutrition. Namely, the educational actions in the area should stem from an educational diagnosis, which enables the development of a detailed action plan and that accounts for the situation, involving everything from the objectives, resources, required activities, to evaluation and monitoring mechanisms.<sup>21</sup>

Considering a decade since the publication of the great EAN reference in Brazil, the Reference Landmark,<sup>3</sup> it is now possible to assess how and how much of its guidelines are in practice in the school environment. While the evaluation is included in one of the guidelines - the ninth one, "Planning, evaluation, and monitoring of actions" - few studies have yet been identified that propose this objective - to evaluate EAN actions. It is also worth noting there is no institutional guidance material for this purpose.

It thus becomes crucial to think of tools and strategies for assessing the actions. And included in the existing possibilities, questionnaires are often pointed out as effective, low-cost, and easy to handle. They can ensure anonymization and/or be answered without the researcher, and when virtual, they allow for geographical extension.<sup>22</sup> The proposed questionnaire can be answered remotely, a modality that has risen in investigations from all areas in recent years, especially as a result of the Covid-19 pandemic.<sup>23,24</sup> Limitations, however, such as differences in interpretations, can drive results that are far from reality. To minimize problems like this, steps are necessary, which were followed in this study, such as the adequate planning of the tool, involving different actors, and following protocols for preparing questionnaires.<sup>25</sup>

It should be noted that this questionnaire has been used to survey and analyze EAN actions, involving two Latin American countries so far.

For the preparation, there was concern with robustness, seeking support in literature, discussions, reflections and comparisons with other studies. The purpose was to propose a tool that could map EAN actions and that would also allow an analysis of the actions developed, that could be used in different schools and, thus, would allow comparisons and broader discussions, things that were not identified in the literature. In general, the articles describe isolated experiences that, due to different methodological characteristics, do not allow comparisons or more substantial advances in the discussion about the practice of EAN in school.

In the proposed questionnaire, the section titled *Food and Nutrition Education in Schools* was expected to be the most important part of the questionnaire. It allows a quantitative diagnosis of the actions taken and

planned, as well as a qualitative analysis by identifying the methodologies used and approaching the recommendations regarding the practice of EAN.<sup>3,26</sup>

While EAN is included in the school curriculum, it is still in the implementation process and is quite heterogeneous in Brazilian cities.<sup>27</sup> Thus, identifying how EAN has been performed can contribute to the advance of this process, including from the point of view of theoretical ground.<sup>28</sup> Understanding the role of the nutritionist, as well as the multi and interdisciplinary action constructions and the methods used, can drive reflections to consolidate EAN in the school environment. The methods used in the actions may reflect the nutritionist's and other multiplying actors' professional education. In a study conducted in the southwest of Bahia, which addressed the perception of EAN by PNAE nutritionists, it was found that the professional education was not sufficient to work in the field, indicating the lack of theoretical, methodological and operational references as the main causes for non-implementation and/or discontinuity of actions.<sup>29</sup> Also, the frequency of actions and in which curricular units (subjects) they are, can be related to the dimension understanding of the EAN concept by those involved.<sup>26,27,30</sup>

Therefore, it can be seen that this section of the questionnaire has the potential to help identify the weaknesses and gaps found in the EAN implementation in schools, contributing to the planning aimed at optimizing this process, such as the training initiatives for teaching coordinators conducted in Bahia and Sergipe,<sup>31</sup> as well as actions to implement and systematize EAN in a school in Paraíba.<sup>32</sup>

It is also ratified that the interpretations of the answers obtained in this section should be in the light of EAN Landmark,<sup>3</sup> seeking alignment with the concept and principles presented in the document. It is also relevant to consider that, as the questionnaire is directed towards the school management and/or educational staff, there may be interpretations that may lead to answers that do not exactly define the EAN practice in schools, even due to a lack of knowledge or understanding of the EAN dimension. In these situations, studies with different methodologies, such as case studies, are indicated.

The next section of the questionnaire, *Use of the school garden*, has questions to identify its use as a pedagogical tool, shown in many studies.<sup>33,34</sup> Also, the garden has characteristics that are highlighted in the EAN Brazilian landmark, such as a greater possibility to perform active methodologies and continuous practice scenarios, which makes easy the approach to healthy eating, the food system, and aspects of social, environmental, and economic sustainability, as well as local food culture.<sup>3</sup>

Research on the garden is also justified because it is a space for interpersonal exchanges, which can bring together different actors, enabling dynamic activities, involving multidisciplinary knowledge, group work, construction and socialization of knowledge.<sup>31</sup> Landry et al. also point out that the garden can have an impact beyond the school sphere, even reaching the home environment.<sup>34</sup>

This section also provides for the identification of difficulties in implementing and using the garden, since this information can contribute to planning that minimizes possible problems. Studies show the difficulty to maintain the garden, lack of adequate space, lack of inputs and technical support, as well as poor integration with the curriculum. Partnerships with institutions that maintain gardens, family support, and other volunteers may be options to enable the school garden.<sup>33,35</sup>

Furthermore, an attempt was made to identify the use of other spaces outside the school, such as gardens at health centers or community gardens, as an option to mitigate some of the issues already mentioned. This questioning may also be related to the next section of the tool since the opportunity to be in other spaces tends to facilitate intersectoral practice.

However, it is important to point out that other EAN practice scenarios, in addition to the garden, may deserve greater detailing to identify their role. In the proposed questionnaire, the garden was highlighted as a scenario for EAN practice due to the many studies found, but actions such as cooking workshops and guided tours, for example, are also very rich spaces for EAN and enhance its effect through the diversity they offer.

The inclusion of the last section, *Interaction of professionals and family members with EAN actions*, was based on the national and international theoretical framework, highlighting the importance of these interactions.<sup>20,33,35</sup> The articulation, inter-sector collaboration, and complementarity contribute to the expanded approach and are of utmost importance in a tool aiming to analyze Food and Nutrition Education.

The School Health Program [PSE - *Programa Saúde na Escola*] is an example of inter-sector collaboration, with the integration and articulation of health and education. Nevertheless, it still lacks induction and support mechanisms for its consolidation, pointing to the intersectoral performance itself as one of the bottlenecks.<sup>36,37</sup> The need to plan actions and policies in an integrated way increases every day, which requires collective construction by the involved sectors. There is a permanent challenge of the sector management tradition and due to the recurrent leading role of one of the sectors in its conduction.<sup>37</sup> Therefore, identifying partners becomes crucial for planning actions, both in terms of reducing potential conflicts and divergences, and optimizing resources, infrastructure, and interests.

And finally, family involvement in the EAN process benefits and encourages social participation through supportive experiences of collective activities, besides favoring the connection between school and home environments.<sup>34,35</sup> Ratifying these statements, some studies point to the positive influence of family involvement, both for the success of the actions and for the results that can be generated.<sup>33</sup>

## CONCLUSIONS

Considering diagnosis plays a key role in schools, a questionnaire was proposed and validated to serve as an initial analysis of the EAN situation in the units and drive developments, with the potential to qualify the planning of future actions. The content validity of the questionnaire proved to be satisfactory and, due to the possibility of self-completion, the questionnaire can be administered remotely, eliminating the geographical barrier that sometimes prevents investigations from being performed. Although it was designed with a focus on public schools, its use can also be extrapolated to private schools, which would also enable comparisons between different scenarios

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**Contributors**

Soar C: conception of the study design; data collection, analysis and interpretation; study writing; and approval of the manuscript for submission. Gabriel CG: conception of the study design; data analysis and interpretation; study writing; and final review of the manuscript for submission. Hinnig PF: data collection, analysis, and interpretation; study writing; and approval of the manuscript for submission. Uggioni PL: data analysis and interpretation; and final review of the manuscript for submission. Souza IC: conception of the study design and study writing.

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