








Strategic program for the fortification of infant foods with micronutrient powders: the voice of managers

Programa estratégico de fortificação da alimentação infantil com micronutrientes em pó: vozes dos gestores

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ABSTRACT

Objective: to describe the perception of health and education coordinators regarding the operationalization, strengths, and weaknesses of a Strategic Program for the Fortification of Infant Foods with Micronutrient Powders. **Methods:** qualitative search in nine municipalities that joined the program. Data collection was carried out using a semi-structured questionnaire based on the operational manual of the program. Statements were analyzed considering content analysis. **Results:** 11 coordinators participated. Data found suggests differences regarding inadequate storage of sachets and the interval between cycles. There were difficulties regarding communication, team involvement, and professional turnover. **Conclusion:** actions associated with children diets are in accordance with primary health care attributes, having a positive impact on the identification of vulnerable groups, so we can seek health promotion and disease prevention. **Contributions to practice:** the results of this study can contribute to improve intersectoral work and raise questions about the difficulties associated with it, leading to an increased access to basic units and encouraging actions to promote adequate and healthy diets, in addition to organizing nutritional care.

Descriptors: Child Health; Child Nutrition; Applied Nutrition Programs; Health Promotion.

RESUMO

Objetivo: descrever a percepção dos coordenadores de saúde e educação quanto à operacionalização, potencialidades e fragilidades do Programa Estratégico de Fortificação da Alimentação Infantil com Micronutrientes em Pó. **Métodos:** pesquisa qualitativa, abrangendo nove municípios que aderiram ao programa. A coleta de dados foi realizada por meio de um questionário semiestruturado com base no manual operacional do programa. Os depoimentos foram analisados à luz da análise de conteúdo. **Resultados:** participaram 11 coordenadores. Os dados apontaram divergências quanto ao armazenamento inadequado dos sachês e ao intervalo entre os ciclos. Foram encontradas dificuldades na comunicação, envolvimento das equipes e rotatividade de profissionais. **Conclusão:** evidenciou-se que ações direcionadas à alimentação infantil fortalecem os atributos da atenção primária à saúde e repercutem de forma positiva na identificação de grupos vulneráveis, para que se possa buscar a promoção de sua saúde e a prevenção de doenças. **Contribuições para a prática:** os resultados deste estudo podem contribuir no aperfeiçoamento da intersectorialidade e na problematização das dificuldades associadas, levando à ampliação do acesso às unidades básicas e estimulando as ações de promoção da alimentação adequada e saudável, bem como à organização da atenção nutricional.

Descritores: Saúde da Criança; Nutrição da Criança; Programas de Nutrição Aplicada; Promoção da Saúde.

Introduction

The early stages of life are characterized by a remarkable process of growth and development. In the first years of life, the lack of adequate nutrients can compromise a healthy growth and development, resulting in malnutrition. It is widely accepted that inadequate dietary practices in this stage are closely linked to infant morbidity and mortality, causing ailments such as respiratory diseases, malnutrition, dental cavities, excessive weight, and lack of specific micronutrients, such as zinc, iron and vitamin A⁽¹⁻²⁾.

Babies under two are particularly susceptible to the effects of nutritional deficiency, due to the high demands of iron needed for growth, which are rarely met by diet alone. The National Study on Child Diets Nutrition showed that children aged 6 to 23 months show the highest prevalence of all types of anemia, with a mean national rate of 18.9%. This percentage decreases to 5.6% in children from 2 to 5 years old. Therefore, preventive measures are recommended, including adequate dietary practices in childhood, combined with supplementation⁽³⁾.

Partnerships between educational institutions and Primary Health Care (PHC) have an essential role in the promotion of healthy eating habits⁽⁴⁾. Therefore, interdisciplinary actions involving the sectors of health and education must prioritize initiatives targeted at improving children diets, within the scope of the Health at School Program. These actions contribute to the sustainability of the program and to the construction of co-responsibility networks.

In this setting, the Ministries of Health, Education, and Social Development and Fight against Hunger released the NutriSUS, a strategic program to fortify children diets with micronutrient powders. This involves the distribution of sachets with supplements that include 15 micronutrients, such as vitamins, zinc, folic acid and iron, intended for children enrolled in daycare centers that participate in the Health at School Program and choose to participate. This strategy aims to mitigate nutritional deficiencies associated to the lack of these micronutrients, showing a joint com-

mitment for the promotion of child health⁽⁵⁾.

It is noteworthy that the directives of NutriSUS are based on the promotion of health and the prevention of disease, encouraging the adoption of healthy dietary habits and dealing with potentially vulnerable situations that can have an impact on school progress⁽⁵⁾.

NutriSUS went through a reformulation, incorporating PHC as the setting for the implementation of the program⁽⁶⁾. To ensure the efficient use of resources, equal access, and sustainability, there must be a broad evaluation of the program, addressing both quantitative and qualitative issues⁽⁷⁾.

Considering the above, the goal of this study was to describe the perception of health and education coordinators regarding the operationalization, strengths, and weaknesses of a Strategic Program for the Fortification of Infant Foods with Micronutrient Powders.

Methods

This is a qualitative study, which followed the directives of the Consolidated Criteria for Reporting Qualitative Research (COREQ), a 32-item list to guide the development and writing of articles.

The study was conducted in 2021 in the state of Acre, Brazil, and included all municipalities that were part of the NutriSUS program in 2018: Acrelândia, Brasiléia, Cruzeiro do Sul, Jordão, Mâncio Lima, Manoel Urbano, Rio Branco, Santa Rosa do Purus, and Xapuri. These municipalities have a total of 22 daycare centers included in the Health at School Program.

Regarding the period of implementation of the program, the year chosen for evaluation was 2018, since this was the last year in which both recommended cycles were carried out. In 2019, this did not happen due to the unavailability of the raw materials used to produce the sachets.

The population of the study included all coordinators of the NutriSUS program that were formalized in the Food and Nutrition Center of the Health Department of the State of Acre, a total of 13 health

workers and 15 education workers. Inclusion criteria was: program coordinators, such as legal representatives informed by the municipality who accepted participating in the research. We excluded those whose contact information, address, or municipality were different from the records, as well as those who did not answer contact attempts, adding up to a total of 17 exclusions. The final sample included 11 participants.

Data collection was virtual, via e-mail and/or WhatsApp®. A semistructured questionnaire was elaborated including 29 questions, including close and open ones, based on the operational manual of the program and divided into three axes: manager profile, operational process, and potential weaknesses/challenges from the perspective of the managers. It should be noted that the questionnaire was not validated before its use⁽⁴⁾.

Manager profile included sex, age, field of knowledge, city where the manager works, education, specialization, and time in this line of work. In the “operational process” axis, questions were raised about aspects such as previous knowledge about NutriSUS, sachet storage, whether sachets were delivered in time for use/before expiration dates, whether cycles were in accordance with school calendars, number of cycles, pauses or interruption in cycles, conclusion of cycles, school menu adjustment, parental resistance, donation of sachets, use of the registration form, and use of the control form.

To identify the strengths and weaknesses of the program, three open questions were asked: The importance of the NutriSUS as a strategy to prevent anemia in the context of PHC; positive aspects; and suggestions for improvement. This questionnaire was made using Google Forms®. The link with the form was sent to participants together with the Informed Consent.

The research was based on the operational model that was in effect until 2021, since, starting in May 2022, the Ministry of Health published new guidelines, with some changes to the NutriSUS operationalization, including the distribution of the sachets throughout the primary health care network. The per-

tinence of this research, therefore, also includes its potential to help improve this new format.

The data associated with the profile of managers and the operational process were tabulated into a Microsoft Excel spreadsheet by a single researcher, consolidated and analyzed in descriptive form, and later presented in a table. To analyze the non-structured questions that originated the axes of strengths and weaknesses, a triangulation of methods was used to understand the results. The methods used were the Descending Hierarchical Classification (DHC), the similarity analysis, and the content analysis.

For the DHC, and the similarity analysis, the text *corpus* was exported into a Microsoft Word file, which was coded and standardized in regard to gender and number inflections. It was then saved using as a .txt Unicode UTF-8 file, as this is the format recognized by the software *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires* (IRAMUTEQ).

Data from the DHC was presented in a dendrogram with emerging classes, where the higher the X^2 , the more the word is associated with the class. Words with $\chi^2 < 2.2$ and $p < 0.05$. were not considered. Data from the similarity analysis generated an image that allowed analyzing the graphs, identifying word frequency and the connection between words, enabling the identification of the structure of the *corpus*.

After the thematic content analysis, there were the stages of pre-analysis, data exploration, and data treatment. This analysis, proposed by Bardin, has two main functions: a heuristic function, that improves prospecting and enriches attempts at exploration; and a function of proof administration, that is, of search for proof of a certain hypothesis through analysis⁽⁸⁾.

In the pre-analysis, the organization of ideas attempted to show how representative and homogeneous the elements of the object being studied was. In the exploration, 75 units stood out as the ones which gave support to data treatment and based the thematic categories related to the strengths and weaknesses being analyzed. 38 units were listed as weaknesses and 37 as strengths.

To ensure the anonymity of the statements, interviewees were identified by the word manager (M), followed by a number in accordance with the order of participation. This research followed resolutions No. 466/2012 and No. 580/2018 of the National Health Council and was approved by the Research Ethics Committee of the *Universidade Federal do Ceará* under opinion No. 5,002,726/2021 and Certificate of Presentation of Ethical Appreciation No. 49994121.2.0000.5054.

Results

Considering the analysis, for the purposes of this discussion, the profile of NutriSUS managers and the operational process of the program are presented below. Then, we discuss the weaknesses and strengths that emerged from their statements, which were categorized in data analysis.

Profile and operationalization process of NutriSUS managers

Most of the 11 managers were females, from 30-49 years old (10 – 90.9%), and health professionals (7 – 63.6%). Regarding their education, most were graduated in pedagogy (4 – 36.4%), followed by nutritionists (3 – 27.3%) and professionals from other fields 9 were specialists (81.8%) and 7 had more than 10 years of experience in their field (63.3%).

In 2018, in the state of Acre, the setting of this study, there was a low adherence of cities to the program, including less than 50% of the municipalities. The participating cities had a mean of 30% coverage. However, the state of Acre, in general, seems to give support to the municipalities in the form of education and orientation to conduct the program, provided through its State Health Department.

Regarding the operationalization of the program, seven managers (63.6%) stated that they were not aware of NutriSUS before coordinating the program, and nine had (81.8%) received specific training in the area.

Managers stated they receive the sachets in a

timely manner. Regarding relevant strategies, they emphasized the choice of a specific professional in the team to be the responsible for including the contents of the sachet into the children’s meal. Table 1 shows their answers regarding the operational process.

Table 1 – Aspects of the operationalization of NutriSUS (n=11). Rio Branco, AC, Brazil 2021

Variables	n (%)
Knew about the program	
Yes	4 (36.4)
No	7 (63.6)
Was trained by the State Health Department of Acre	
Yes	9 (81.8)
No	2 (18.2)
Received sachets within the expiration date and in a timely manner	
Yes	11 (100)
No	-
There was a suitable place for storage	
Yes	2 (18.2)
No	9 (81.8)
In accordance with the school calendar	
Yes	8 (72.7)
No	3 (27.3)
Parents resisted allowing their children to participate	
Yes	2 (18.2)
No	9 (81.8)
Recommended pauses between cycles	
Yes	6 (54.5)
No	5 (45.5)
Some cycle was interrupted in the beginning of the year	
Yes	4 (36.4)
No	7 (63.6)
A professional from the team was chosen to be responsible for adding the contents of the sachet to the meal of the children	
Yes	11 (100)
No	-
School lunch menu adjustments	
Yes	2 (18.2)
No	9 (81.8)
There was some cycle which was not included in the year	
Yes	2 (18.2)
No	9 (81.8)

(the Table 1 continue in the next page...)

Variables	n (%)
In 2020, the program took place in your city	
Yes	1 (9.1)
No	10 (90.9)
Parents or guardians searched the daycare center to get the sachet at home even when there was some impediment	
Yes	3 (27.3)
No	8 (72.7)
The chart of the child was used as a way to register	
Yes	8 (72.7)
No	3 (27.3)
The control form of the administration was filled in daily	
Yes	11 (100)
No	-
Sachets were donated to other eligible daycare centers in the municipality that were not a part of the program at the beginning.	
Yes	4 (36.4)
No	7 (63.6)

The use of the children’s health handbooks as tools to record and follow up their evaluation stood out, as 72.7% of professionals resorted to it. Also, 100% of them filled in the control form of sachet administration daily.

Text Statistics and Descending Hierarchical Classification

Regarding basic lexicographic information, the corpus consisted of 11 texts, divided into 27 Text Segments (TS), of which 23 were utilized (85.2%). 857 occurrences (words, forms, or terms) stood out, with 325 distinct words, 192 of which only appeared once. The content was classified into four classes: Class 4- Communication Problems, with 7 TS (25.9%); Class 1- The Role of Management, with 6 TS (22.2%); Class 2- Impact on Children’s Health 1, with 9 TS (33.3%); and Class 3- Impact on Children’s Health 2, with 5 TS (18.5%). The classes are presented in the hierarchical classification dendrogram, in Figure 1.

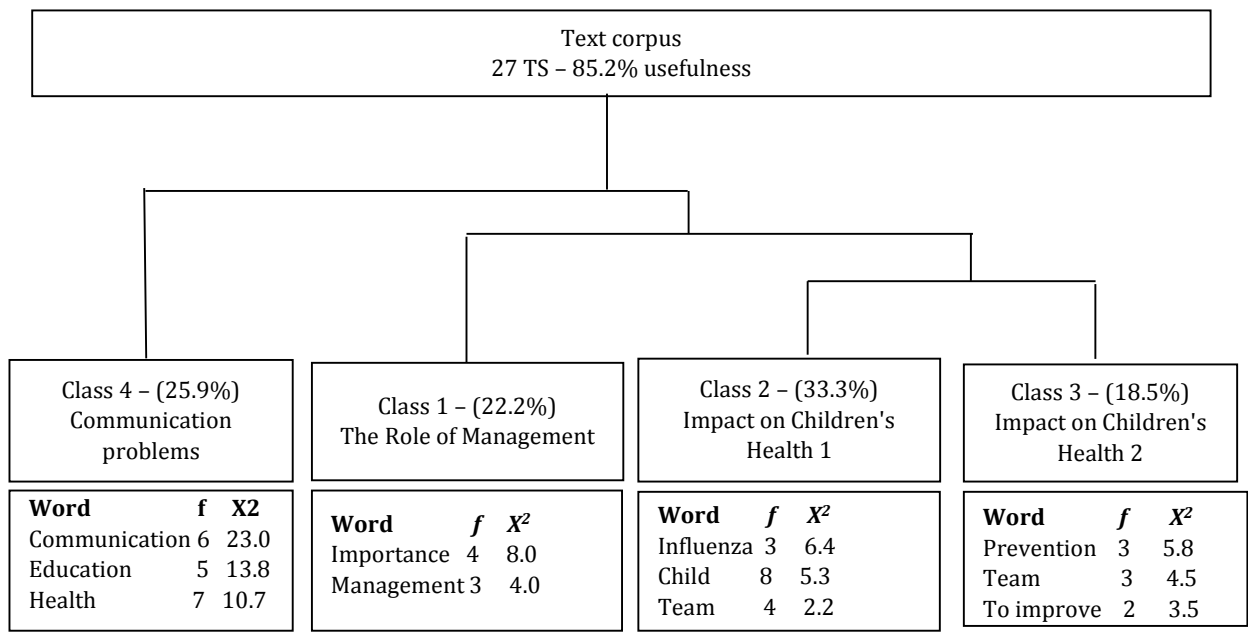


Figure 1 – Dendrogram of the descending hierarchical classification of the perception of managers regarding NutriSUS. Rio Branco, AC, Brazil 2021

The convergence of classes into the categories of weaknesses and strengths

Classes 2 and 3 had a dialogical relationship, since they had a positive impact on the health of the child, as shown by the excerpts found in the content analysis, in the category “program strengths”: *The absenteeism of children was reduced (G05). Flu symptoms decreased in the period (G08). It contributed to the nutritional status of the children (G09). We noticed less absenteeism from children, since it decreased the symptoms of flu in the period (G08).*

These two classes also show the contribution of the teacher team as a strength. The word “team” stood out in both classes: *Cases of flu decreased and the team of teachers got involved (G11). The program was managed in a responsible and coherent way by the team (G08). There was a lot of learning, many experiences were exchanged with the education team (G07). The team of teachers and all workers got involved (G11).*

The association of Class 1 with the two mentioned above shows that, even with positive results, problems related to municipal management, when it comes to investments in structure and team, were prominent elements in the category “weaknesses”: *Unfortunately, municipal management didn’t really treat this program as a really important, and the health department was not very engaged or interested (G02). The Internet in our city is really bad(G07). Changes in the team due to political issues really impair its management (G05). A more active involvement of the managers to motivate the team more (G07). The health department needs more professionals to help at school (G04). We heard statements that prove the efficacy of the supplements in the improvement of the nutritional state and the appetite of the child (G02). A better appetite and school performance of our children (G11).*

Class 4 had an association with the previous ones, showing that problems in communication between management, education, and health were crucial points that had a significant contribution to the weaknesses of the program, as the excerpts show: *I believe that closer communication between the school and management would yield more satisfactory results (D02). Improve the communication between health and education (G06). NutriSUS should be distributed according with the school calendar(G05). There should be*

more interest and importance given to a program as fantastic a NutriSUS (G09). I recently became the manager of the program, but I’m still getting information and studying about it (G10).

In the similarity analysis (Figure 2), four words stood out from the corpus analyzed. The main word was “child”. The terms “program”, “diet”, and “health” emerged from it, branching into other words that can further specify its meanings.

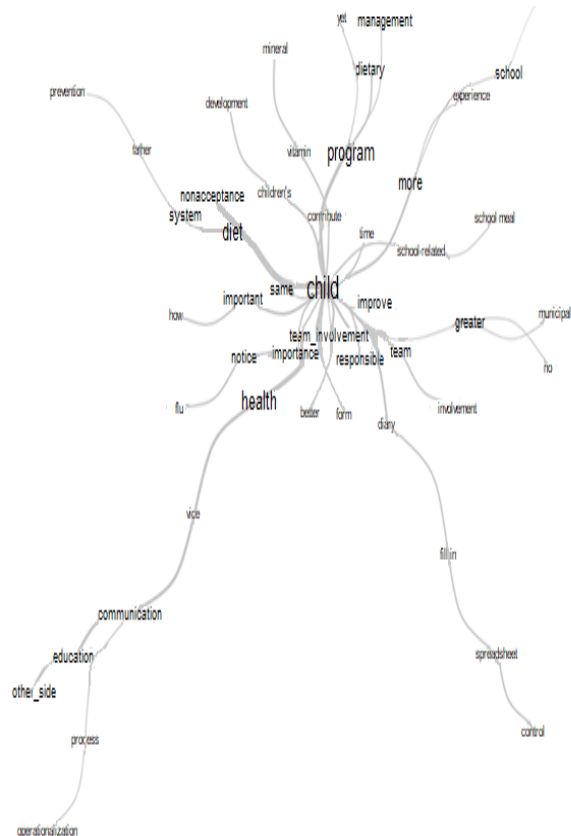


Figure 2 – Similarity analysis of the text corpus Rio Branco, AC, Brazil, 2021

In this analysis, new inferences emerge that should be considered. In the “diet” branch, the term “non-acceptance” appears, indicating difficulties when the child does not accept the supplement, which can be a weakness of the program. The other peripheral words corroborate previous analysis, leading to the inference that communication, education, health, and team involvement frequently appear in the perception of management.

Discussion

Health workers, especially nutritionists, have a main role in the implementation and follow up of interventions, due to the integration of the program with the activities of diet and nutrition in the Primary Health Care (PHC). It is important to construct these practices as a team, as recommended by the management handbook of the Health at School Program⁽⁶⁾. Although the participation of education workers is less evident, there are visible efforts to enhance the collaboration between education and health. This is in line with the NutriSUS manual, which prescribes joint action of primary care and education workers⁽⁵⁾.

Regarding the previous lack of knowledge of managers regarding NutriSUS, it can be a reality in any region of the country, since not all who participate in the Health at School Program experience it. The same situation can be observed in other contexts, in which workers reported having no knowledge of the program, with the exception of the nutritionist⁽⁹⁾. It can be inferred that this lack of knowledge is the cause of the difficulties in communication and regarding the role of manager in the development of the program, as later analyses showed.

The analyses have shown obstacles in the execution of the program, highlighting administrative challenges - especially those related to local logistics and the storing of sachets in inadequate places⁽¹⁰⁾. Regarding storage, the Ministry of Health states that intrinsic factors, such as humidity and pH, as well as extrinsic ones, as the conditions of the package, temperature, materials, and conditions of storage, can affect the expiration date of the products, consequently affecting its quality and efficacy⁽⁶⁾.

A comparison among Brazilian regions showed that storage facilities in the North and Northeast were more vulnerable due to the fact that environmental conditions were different, being specially favorable for storage in the Southeast and Midwest⁽¹⁰⁾. Thus, the importance of good storage practices stood out, as well as that of adjusting intervals according to the

school calendar of the daycare center, in order to avoid interruptions in the stages of the program.

As for the execution of the cycles, a break of three to four months is recommended. However, there were variations in the pauses. Some cities opted for two-month breaks, others for six-month ones, and there were cases in which no breaks were taken. The risk of intoxication due to the excess of some nutrient, however, is little, since many sachets would need to be consumed in a single day for that to take place⁽⁴⁾.

Studies that identify nutritional deficiencies before and after these interventions are scarce. Therefore, in some cases, people may be receiving more than necessary. Common implementation strategies involving nutrition and other health interventions have an essential role in the prevention of excessive micronutrient intake⁽¹¹⁾.

Regarding health promotion, aspects associated with food insecurity in the school community must be pointed out, since nearly 80% of this community is enrolled in basic education. However, NutriSUS helps guarantee their human right of access to adequate and healthy foods⁽¹²⁾. Regarding food insecurity, it is one of the pillars that indicate social vulnerability, with a direct impact on Brazilian family, especially those from the North and Northeast⁽¹³⁾ and those who receive support from welfare programs.

The managers who participated in this study pointed out that they choose one professional of their teams to be responsible for adding the contents of the sachet to the meal of the child. On the other hand, professionals interviewed in other experiences⁽⁵⁾ reported not having enough time to do more than one task within the schedule established. Furthermore, the limited space of the places where the food is made and distributed became an obstacle, especially when this role was performed by someone that did not work in the kitchen, which was true for 50% of cases.

In addition to the interventions in the NutriSUS program, parents or guardians play a crucial role as providers of food to the children. They have a significant influence on their eating habits, especially in

the case of those who spend most of their days living with their families⁽¹⁴⁾. Starting with an analysis of the perception of managers regarding the parents of students, it became clear that they have a positive opinion about the strategy, and most parents allowed the inclusion of the supplement in their children's diet.

Since this is a universal and preventive public health intervention, carried out in child education establishments such as daycare centers, parents and guardians play an essential role, since they compound can only be fed to the child if the child's guardian authorizes it by signing a consent form for the use of the sachet⁽⁵⁾.

Although the program has the potential to improve children's diets, there are communication barriers. These, coupled with the need to improve records, monitor, and use evaluation processes, are the main obstacles to consolidate the program, as the opinions of managers show⁽¹⁵⁾.

A crucial strategy to record these actions, including activities to promote children's health, is to continuously feed the e-SUS Primary Care system, which enables opportunities to advance and improve our use of information. However, the success of this system does not lie only on its technical features. It also depends on its acceptance on the part of the several actors involved, and on the mobilization and training of professionals, so they can effectively use it⁽¹⁶⁾.

An essential resource for recording and monitoring is the child health handbook, which has a section called "Records of supplementation of vitamin A, iron, or other micronutrients", where health professionals are guided to monitor supplementation using sachets. It is important to reiterate that children who participate in the NutriSUS strategies should not receive ferrous sulfate nor other forms of iron supplementation during the cycles⁽⁴⁾.

Although the handbook has an essential role in monitoring child health indicators and promoting health' due to its educational nature, a previous study indicated that it is often missing records, showing shortcomings

in the integral growth and development of the child, especially in early childhood, and in children whose main guardian had low education level and was not a parent or grandparent⁽¹⁷⁾.

Current guidelines state that, if sachets are donated to daycares that were not participating in the program due to external reasons, the number of children involved should be added to the roster of children who received supplements, and the event must be justified⁽⁵⁾. This has happened in the cities that participated in the study.

Regarding the challenges faced for the implementation of the program, as shown in these discussions, it is noteworthy that high turnover and the unreliability of work contracts are difficulties mentioned, which are influenced by political party issues and by the precarious nature of working conditions. In this context, it is essential for health workers to have a solid career plan, investments in physical infrastructure, and adequate materials, as well as continued education opportunities⁽¹⁸⁾.

Another relevant issue is the relevance of knowledge for an effective communication between workers, especially as responsibilities and colleagues are understood in the context of interprofessional work⁽¹⁹⁾. In this regard, authors reiterate the importance of interprofessional communication as a crucial tool in the working process of PHC, as it has a direct influence on the quality of services provided to the community that uses the service.

Furthermore, the importance of respecting differences and constructing coherent discussions stand out. The ability to express oneself and actively listen requires dedication and time from the participants. It is an essential component of dialogical communication⁽²⁰⁾.

Concerning the elements that can improve the program, it is essential to consider the impact of the use of micronutrients in the reduction of morbidity and mortality in this age group, as well as its contributions to full child development. Within this context,

NutriSUS plays an essential role in children's health⁽⁶⁾.

Thus, the school environment has a fundamental role in the formation of eating habits and the promotion of health. These habits contribute for school-age children and adolescents to have an adequate and healthy diet, favoring their growth and development, in addition to having a positive impact on learning and academic performance⁽⁴⁾.

The lack of nutrients such as iron can have an impact on the ability to focus as one studies, leading to a worse academic performance. Health managers must improve their abilities, starting with their academic training, so they can motivate professionals to seek continuous improvement themselves⁽²¹⁻²²⁾. These strategies can transform work processes, promoting reflections and improving practices, so potential learning difficulties can be identified.

Study limitations

Limitations of this study included the scarcity of previous studies on the topic; the data collection period; the fact that data collection had to take place on a virtual environment, due to the COVID-19 pandemic; the outdated records of these services, which made it more difficult to contact participants; the lack of regular Internet access; and the loss of managerial positions and changing jobs.

Contributions to practice

The results of this study can contribute to improve the program and show the issues found in intersectoral work. Thus, they can give support to new actions associated with this operational processes, guiding them to new challenges, including an adaptation of the operational part of the program. These factors can expand access to primary units, encourage actions to promote adequate and healthy diets, and promote the organization of nutritional care.

Conclusion

Managers who participated in this study found that the NutriSUS program is relevant for children's health, being an essential tool in the context of child health promotion. They also indicated that teamwork was a strong point of its execution. Nonetheless, the lack of communication and engagement of municipal management were found to be shortcomings in the development of the program. Therefore, it is essential for local authorities to provide support to overcome the challenges found, ensuring the NutriSUS continues to perform a vital role in the health of Brazilian children.

Authors' contributions

Concept and design or analysis and interpretation of data: Vieira DO, Martins MC.

Writing of the manuscript or relevant critical review of the intellectual content: Gubert FA, Fernandes MAM, Castro TH.

Approval of the final version to be published: Gubert FA, Cavalcante VMV, Coelho MMF.

Responsibility for all aspects of the text, ensuring the accuracy and integrity of any of its parts: Vieira DO, Martins MC, Cavalcante VMV, Coelho MMF.

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