ORIGINAL ARTICLE

KNOWLEDGE OF HEALTH PROFESSIONALS ON NUTRITIONAL MANAGEMENT OF OBESE ADOLESCENTS IN PRIMARY HEALTH CARE

Layonne de Sousa Carvalho Rodrigues[1]; Jéssica Batista Beserra[2]
Osmar de Oliveira Cardoso[3]; Marize Melo dos Santos[4]

Highlights: (1) Knowledge gaps on nutrition for obese adolescents. (2) General and specific knowledge on nutrition for obese adolescents. (3) Obesity management in primary health care.

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[1] Instituto Federal de Educação, Ciência e Tecnologia da Bahia – IFBA. Brumado/BA, Brazil. http://orcid.org/0000-0002-7795-035X

[2] Universidade Federal do Piauí – UFPI. Teresina/PI, Brazil. http://orcid.org/0000-0001-9420-0166

[3] Universidade Federal do Piauí – UFPI. Teresina/PI, Brazil. http://orcid.org/0000-0001-6093-7629

[4] Universidade Federal do Piauí – UFPI. Teresina/PI, Brazil. http://orcid.org/0000-0003-0699-8062

PRIMARY CARE PERSONNEL'S KNOWLEDGE ON NUTRITIONAL MANAGEMENT FOR OBESE ADOLESCENTS IN PRIMARY HEALTH CARE

ABSTRACT

This study assessed primary care personnel's knowledge regarding nutritional management for obese adolescents receiving care in Primary Health Care under Brazilian Unified Health System in Piauí. This descriptive, cross-sectional, quantitative study used data from the Obesity Prevention and Control Program implemented in Primary Health Care under Brazilian Unified Health System in Piauí, conducted between March and October 2021. Health professionals completed two questionnaires: "Knowledge of Nutrition in Obese Adolescents" and "Diagnosis of the Organization, Management, and Nutritional Care Offered to People with Overweight and Obesity in Primary Health Care". Statistical analyses were performed using Stata version 14. Differences between nutritionists and other health professionals were assessed using the Student's t-test and the Mann-Whitney U test, with a 5% significance level. Out of 585 primary health care units across the 190 municipalities included in the sample, 183 health professionals participated in the study, the majority being nutritionists (71.58%), public sector employees (41.53%), and working in rural areas (51.91%). Among all participants, 59.02% showed knowledge rated as good or very good. Statistical differences were observed between respondent groups, with dietitians demonstrating higher knowledge regarding general adolescent nutrition in obesity (p=0.000) and across specific questionnaire topics: fruit and vegetable consumption (p=0.010), fat intake (p=0.000), and nutritional management for obese adolescents (p=0.000). The implementation of public policies aimed at the training and ongoing education of health professionals, emphasizing obesity prevention and control, should be encouraged.

Keywords: Obesity Management; Primary Health Care; Health Personnel; Adolescent Nutrition.

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INTRODUCTION

Obesity has become a worldwide challenge for primary care personnel and health services in terms of management, as its prevalence continues to rise among increasingly younger populations[1-2]. As a chronic condition linked to disorders such as diabetes, hypertension, cancer, and cardiovascular disease, obesity has also been associated with severe COVID-19 and mortality, contributing to higher health care costs and reduced quality of life in the population[1].

In adolescents, obesity may lead to respiratory problems, a higher risk of osteoarticular conditions, systemic hypertension, early indicators of cardiovascular disease, insulin resistance, polycystic ovary syndrome, menstrual irregularities in girls, cancer, and psychological consequences including low self-esteem, social isolation, and eating disorders[2-3].

In 2019, it was estimated that 27.9% of Brazilians receiving care in Primary Health Care under Brazilian Unified Health System were overweight and 9.7% were obese[2]. Population-based studies have shown a marked rise in overweight among adolescents[4-5]. This epidemiological context underscores the importance of monitoring cases and implementing interventions focused on weight loss and maintenance, including lifestyle modifications, healthy eating habits, physical activity, as well as pharmacological and surgical treatments[6].

To strengthen strategic actions for preventing and controlling obesity among adolescents in Primary Health Care under Brazilian Unified Health System, it is essential that primary care personnel receive continuous training and updates on nutritional management, even when outside their professional background. Such knowledge enables them to guide obese individuals and their families more effectively and to provide appropriate referrals to other professionals and services across the health care network.

From this perspective, this study assessed the knowledge of primary care personnel on nutritional management for obese adolescents receiving care in Primary Health Care under Brazilian Unified Health System in Piauí.

MATERIALS AND METHODS

Study Design

This descriptive, cross-sectional, quantitative study used data from the Program for the Prevention and Control of Obesity in Primary Health Care under Brazilian Unified Health System (SUS) in Piauí (ECOSUS-PI), funded by the Ministry of Health through the CNPq/MS/SAS/DAB/CGAN Call Nº. 26/2018 – Prevention and Control of Obesity in the Brazilian Unified Health System (SUS).

Study Setting and Sample Design

The study was carried out in the state of Piauí from March to October 2021. Piauí is situated in the Northeast region of Brazil, with an estimated population of 3,281,480. The state comprises 224 municipalities, organized into four macroregions: coastal, mid-north, semi-arid, and cerrado[7].

The sample size was calculated based on the number of Primary Health Care Units (UBS) registered in each municipality. For the purpose of sample selection, municipalities were stratified by population size as follows: 1) Size A: the capital and municipalities with over 150,000 inhabitants; 2) Size B: municipalities with 30,000–150,000 inhabitants; 3) Size C: municipalities with fewer than 30,000 inhabitants.

The sample size for each category was calculated using a simple random sampling design, considering a 5% margin of error and a 95% confidence level. The formula applied was based on a finite population framework to determine sample size for estimating population proportions[8].

$$n = \frac{N \cdot \hat{p} \cdot \hat{q} \cdot (Z_{\alpha/2})^2}{\hat{p} \cdot \hat{q} \cdot (Z_{\alpha/2})^2 + (N-1) \cdot E^2}$$

Where:

n = Sample size

N = Population size

^p = Population proportion to be estimated

^q = Complementary population proportion

$Z\alpha/2$ = Confidence level

E = Margin of error.

Following the stratification of municipalities by size and applying the sample size formula based on the total number of Primary Health Care Units (UBS) in each stratum, a random selection was performed using Excel to choose the UBS from the municipalities within each stratum. Accordingly, the sample included 190 municipalities and 585 Primary Health Care Units (UBS).

Eligibility Criteria for Participants

Primary care personnel working in urban and rural areas of the selected municipalities and Primary Health Care Units (UBS) were eligible, with dietitians prioritized; if unavailable, nurses, physicians, physical education professionals, physiotherapists, or psychologists were included. A single professional from each Primary Health Care Unit was responsible for completing the questionnaires.

Study Variables

Sociodemographic

Participant characteristics: profession, employment type, and location of the Primary Health Care Unit (UBS) where they work.

Knowledge of nutritional management for obese adolescents

Knowledge was classified according to quartiles: "insufficient," "reasonable," "good," and "very good."

Data Collection

Two electronic questionnaires were administered: "Knowledge of Nutrition in Obese Adolescents" (KNOA), developed and validated by Pinho et al., and "Diagnosis of the Organization, Management, and Nutritional Care Provided to People with Overweight and Obesity in Primary Health Care", both directed to primary care personnel from the selected municipalities and Primary Health Care Units under the Brazilian Unified Health System. The second instrument was developed and standardized by the Ministry of Health in collaboration with researchers funded under the CNPq/MS/SAS/DAB/CGAN Call Nº. 26/2018. The questionnaire comprised nine question blocks and was administered via SurveyMonkey®.

The electronic questionnaires were administered from March to October 2021. The links were emailed, with instructions that the questionnaires should preferably be completed by dietitians; if unavailable, nurses, physicians, physical education professionals, physiotherapists, or psychologists could respond. For this study, analyses were conducted using only questionnaires that were fully completed.

Data Collection Instruments

To characterize respondents, the Diagnosis of the Organization, Management, and Nutritional Care Provided to People with Overweight and Obesity in Primary Health Care questionnaire was employed, comprising nine question blocks for primary care personnel in the selected municipalities and UBS under the Brazilian Unified Health System. For the purposes of this study, data from blocks A, B, and C were utilized, corresponding solely to respondent identification, municipality, and UBS, as presented in Chart 1.

Chart 1. Structure of the electronic questionnaire Diagnosis of the Organization, Management, and Nutritional Care Provided to People with Overweight and Obesity in Primary Health Care, applied to primary care personnel in selected municipalities and UBS under the Brazilian Unified Health System.

BLOCK A	Municipality Identification
BLOCK B	UBS Identification
BLOCK C	Respondent Identification

Source: ECOSUS-PI (2021).

To evaluate primary care personnel's knowledge of nutritional management for obese adolescents, the Knowledge of Nutrition in Obese Adolescents – KNOA questionnaire was employed, comprising seven knowledge dimensions and 26 questions. For each item, respondents could choose "Correct," "Incorrect," or "I don't know" (Chart 2).

Chart 2. Knowledge dimensions regarding nutritional management for obese adolescents as assessed in the KNOA questionnaire.

Section	Dimension	Objective	Items
1	Epidemiology of Obesity in Adolescence	Understanding the distribution and determinants of obesity in adolescence.	1 - 2
2	Clinical Implications of Obesity in Adolescence	To examine the relationship between adolescent obesity and health loss, related diseases, and complications.	3 - 6
3	Mapping Obesity in Adolescence	To examine how adolescent obesity is diagnosed and communicated with patients.	7 - 9
4	Nutritional Management for Obese Adolescents	To understand general nutritional strategies for the management of obese adolescents.	10 - 13

5	Fruit and vegetable consumption	To understand the nutritional properties, requirements, and significance of fruits and vegetables for obese adolescents.	14 - 17
6	Fat consumption	To understand the nutritional properties of fats, their recommended intake for adolescents, and adjustments for obese individuals.	18 - 22
7	Sugar consumption	To understand adolescents' nutritional requirements regarding carbohydrates and sugars, and how these should be adjusted for obese individuals, taking into account their dietary habits (sweets, desserts, and sweeteners).	23 - 26

Source: Adapted from Pinho and colleagues[9].

Data Analysis

For this study, data from the Diagnosis of the Organization, Management, and Nutritional Care Provided to People with Overweight and Obesity in Primary Health Care questionnaire were used to identify respondents, UBS, and municipalities, and to support analyses of the KNOA questionnaire for primary care personnel under the Brazilian Unified Health System.

To evaluate primary care personnel's knowledge of nutritional management for obese adolescents, items were scored as follows: −1 for incorrect responses, 0 for "I don't know," and +1 for correct responses. Item scores were summed to calculate the total score of the questionnaire.

The assigned scores were expressed as numeric values and subsequently categorized into quartiles (Q1, Q2, Q3, Q4). Primary care personnel's knowledge of nutritional management for obese adolescents was classified according to Pinho et al. (2013) as: Insufficient (Score < Q1), Reasonable (Score Q1–Q2), Good (Score Q2–Q3), and Very Good (Score Q3–Q4).

Statistical Analysis

Statistical analysis (descriptive and inferential) was performed using Stata version 14 (StataCorp LP, College Station, EUA). In the descriptive analysis, qualitative variables were summarized using frequency tables (absolute and relative). The Kolmogorov-Smirnov test was used to evaluate the normality of quantitative variables. For normally distributed variables, the mean and standard deviation (SD) were presented, while variables with non-normal distributions were summarized using the median and interquartile range (IQR). Differences in section scores

between dietitians and other primary care personnel were assessed using the Student's t-test for normally distributed data or the Mann-Whitney U test for non-normal data. A significance level of 5% was adopted.

Ethical Considerations

The study was registered in Plataforma Brasil and approved by the Research Ethics Committee of the Federal University of Piauí (opinion Nº. 4,062,789; CAAE: 04514818.4.0000.5214), in compliance with Resolution 466/12 of the Brazilian National Health Council[10].

Municipal participation was formalized via the Term of Adherence, signed by the Municipal Health Secretary or an authorized representative designated by the municipal manager. Additionally, primary care personnel participants signed an Informed Consent Form (ICF) after receiving information about the study.

RESULTS

Among the 585 UBS in the 190 selected municipalities, 183 primary care personnel completed both electronic questionnaires, representing 31.28% of the initial sample (Figure 1). Data collection was challenged by the COVID-19 pandemic, as the heavy workload of primary care personnel involved in pandemic response decreased adherence to the study. Among respondents, 71.58% were dietitians, 51.91% were based in rural areas of Piauí, and 72.13% worked in municipalities with fewer than 30,000 residents.

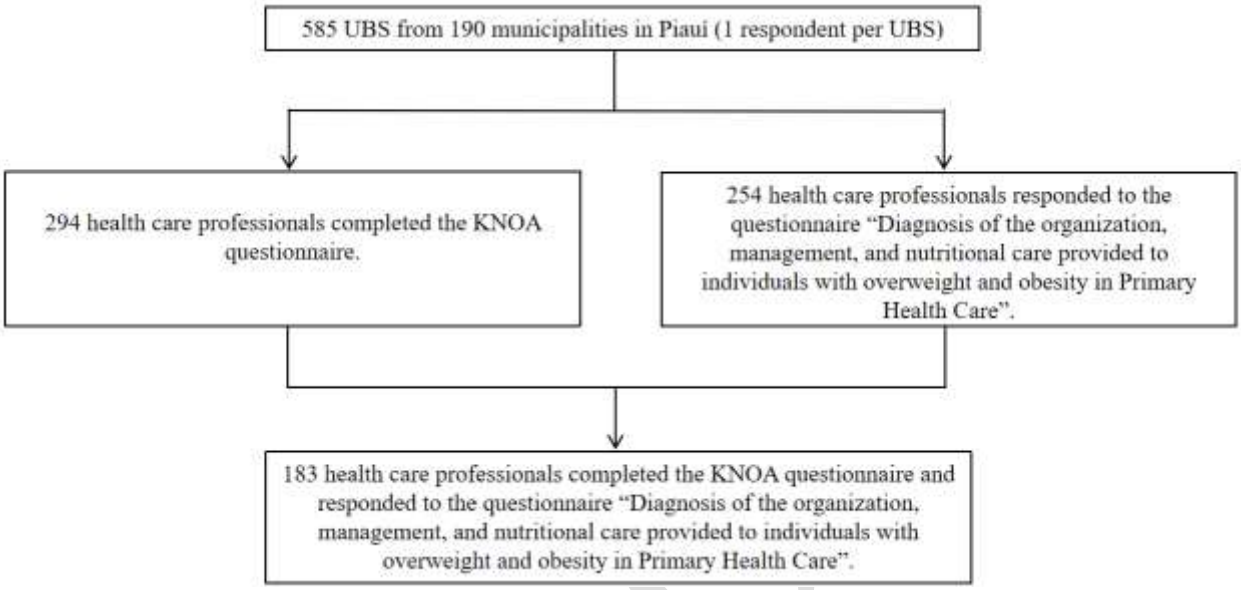

Figure 1. Flow diagram of the study sample composition. ECOSUS-PI (2021).

Among respondents, 59.02% demonstrated good or very good knowledge. Municipalities with more than 30,000 residents exhibited higher proportions of primary care personnel with good or very good knowledge (Table 1).

Table 1. Primary care personnel knowledge of nutritional management for obese adolescents, stratified by municipality population size (n=183). ECOSUS-PI, Piauí, Brazil, 2021.

Classification of primary care personnel knowledge regarding nutritional management for obese adolescents	Primary Health Care Units (UBS) by municipal population size and total							
	Size A		Size B		Size C		Total	
	n	%	n	%	n	%	n	%
Insufficient (<Quartile 1)	0	0	10	20.83	31	23.48	41	22.40
Fair (Quartile 1 - 2)	0	0	8	16.67	26	19.70	34	18.58
Good (Quartile 2 - 3)	2	66.67	17	35.42	41	31.06	60	32.79
Very good (Quartile 3 - 4)	1	33.33	13	27.08	34	25.76	48	26.23
Total	3	100.00	48	100.00	132	100.00	183	100.00

Legend: Size A: >150,000 residents; Size B: 30,000 to 150,000 residents; Size C: <30,000 residents.

Among participants, 66.41% of dietitians demonstrated good or very good knowledge, while 59.62% of other health care professionals showed insufficient or fair knowledge, revealing greater gaps among those without formal training in Nutrition (Table 2).

Table 2. Primary care personnel knowledge regarding nutritional management for obese adolescents (n=183). ECOSUS-PI, Piauí, Brazil, 2021.

Classifications of primary care personnel knowledge regarding nutritional management for obese adolescents	Dietitians (n=131)		Other health care professionals (n=52)		Total (n=183)	
	n	%	n	%	n	%
Insufficient (<Quartile 1)	23	17.56	18	34.62	41	22.40
Fair (Quartile 1 - 2)	21	16.03	13	25.00	34	18.58
Good (Quartile 2 - 3)	45	34.35	15	28.85	60	32.79
Very good (Quartile 3 - 4)	42	32.06	6	11.54	48	26.23

Analyzing the KNOA knowledge score, a statistically significant difference was observed between the respondent groups, showing that dietitians possess greater overall knowledge about adolescent nutrition in the context of obesity (p=0.000), as well as in specific topics addressed in the questionnaire, such as fruit and vegetable consumption (p=0.010), fat consumption (p=0.000), and nutritional management of obese adolescents (p=0.000) (Table 3).

Table 3. Median scores by section of the KNOA questionnaire regarding primary care personnel knowledge (n=183). ECOSUS-PI, Piauí, Brazil, 2021.

	Dietitians (n= 131)		Other health care professionals (n=52)		p
	Median	**IQR***	**Median**	**IQR***	
SECTION 1 - Epidemiology of Obesity in Adolescence (Items 1–2)	0.50	1.00	0.00	0.50	0.150
SECTION 2 - Clinical Implications of Obesity in Adolescence (Items 3-6)	1.00	0.38	0.88	0.50	0.742
SECTION 3 - Mapping Obesity in Adolescence (Items 7-9)	0.33	0.83	0.33	0.75	0.372
SECTION 4 - Nutritional Management for Obese Adolescents (Items 10-13)	0.50	0.50	0.25	0.50	0.000*
SECTION 5 - Fruit and vegetable consumption (Items 14-17)	1.0	0.50	0.88	0.50	0.010*
SECTION 6 - Fat consumption (Items 18-22)	0.60	0.45	0.60	0.40	0.000*
SECTION 7 - Sugar consumption (Items 23-26)	0.50	0.50	0.50	0.50	0.666
KNOA total score	**0.41****	**0.5*****	**0.31****	**0.38*****	**0.000******

IQR = Interquartile Range; *Mann–Whitney U test; **Mean; ***Standard Deviation (SD); ****Student's t-test.

DISCUSSION

This study evaluated primary care personnel's knowledge of nutritional management for obese adolescents in Piauí. The majority of participants demonstrated satisfactory knowledge, particularly dietitians, supporting Pinho et al.'s findings[9], where 80% of dietitians were classified as having "very good" knowledge. Nonetheless, the high proportion of non-dietitian professionals with limited knowledge remains concerning, as they play a role in the therapeutic management of obese adolescents across the analyzed municipalities in Piauí.

Research evaluating primary care personnel's knowledge of adolescent obesity remains limited. A cross-sectional study in Ceará reported that many professionals were not adequately trained in the management of overweight and obesity within primary care and lacked familiarity

with the resources used for such care[11]. Additionally, an observational study based on the PMAQ-AB 3rd cycle found that primary care personnel's actions related to nutritional care, obesity prevention, and management were insufficient, and that available equipment and infrastructure were limited[12], highlighting gaps and shortcomings in primary health care for tackling obesity.

Most health care professionals reportedly do not feel adequately prepared or trained to provide guidance on nutrition-related topics[13], whereas dietitians have been shown to be more effective in applying this knowledge within primary care[14]. This aligns with their professional training and underscores the importance of integrating dietitians into the multidisciplinary team managing care for obese individuals.

Literature indicates that knowledge shared by primary care personnel in healthy eating promotion empowers individuals to make informed choices regarding their diet and lifestyle, positively impacting health promotion and disease prevention[15-16]. However, the dissemination of evidence-based nutrition knowledge by primary care personnel has been challenged by the spread of misinformation on food and nutrition, leading to uncertainty and difficulties for adolescents in discerning reliable information online[17].

Results indicated significant differences between dietitians and other primary care personnel on questionnaire topics, including fruit and vegetable consumption, fat intake, and the nutritional management of obese adolescents. This finding could impact the quality of care and guidance delivered to this population within Piauí's primary health care system.

The Brazilian Dietary Guidelines were established as the first official dietary recommendations for the Brazilian population, designed to promote healthy eating practices and provide a valuable resource for professionals addressing obesity[18]. In 2022, the Ministry of Health released the Protocol for Using the Brazilian Dietary Guidelines in Adolescent Dietary Counseling to support primary care personnel in delivering individualized care in Primary Health Care. Of the seven key recommendations in this protocol, particular emphasis is placed on discouraging sugar-sweetened beverages and ultra-processed foods, while encouraging adolescents to consume beans, fruits, vegetables, and leafy greens daily[19].

Conversely, a key challenge for primary care personnel and the health system is the rise in food insecurity among Brazilian families during the COVID-19 health crisis. The II VIGISAN reported that 15.5% of Brazilian households faced severe food insecurity in 2021–2022. Consequently, Brazilian families with moderate to severe food insecurity decreased their intake of healthy foods, including beans (46.5%), rice (49.0%), meat (39.4%), vegetables (48.5%), and fruits (45.5%)[20]. Accordingly, primary care personnel should be attentive to families' social and economic vulnerabilities, as well as to the social, school, and obesogenic environments surrounding obese adolescents.

In this context, dietitians can play a key role in optimizing the management of obese individuals within primary health care. Their scope of practice extends from Food and Nutrition Surveillance and obesity-focused nutrition education to activities within the National School Feeding Programme (PNAE) and the School Health Program (PSE). In addition, their work may include roles as health counselors, public health inspectors, and managers of government programs. By taking on a reference role in food and nutrition actions within primary care, dietitians can guide the team on appropriate approaches and nutrition care protocols, ensuring alignment with their professional competencies as well as those of other primary care personnel.[21].

Thus, dietitians are expected to play a leading and supportive role within multiprofessional teams addressing obesity, enhancing food and nutrition interventions and helping other primary care personnel bridge knowledge gaps and overcome challenges in clinical practice[14]. The pursuit of knowledge should be fostered within therapeutic groups, individualized care plans, focus groups, shared consultations, and across individual, group, and community-based care settings where the team operates.

To strengthen the qualification and empowerment of professionals for effective action in obesity control, it is recommended that barriers within their academic training be overcome. Health professional training programs should incorporate specific topics on food and nutrition, including the role of macro- and micronutrient intake in the development and prevention of chronic diseases such as obesity, as well as life-course nutritional guidance for individuals living with obesity.

It is noteworthy that, although dietary prescription is an inherent responsibility of dietitians, dietary guidance may involve contributions from the entire health care team. Furthermore, appropriate referral to the specific professional should be made according to the existing demand.

Obesity management should involve multiprofessional follow-up with evidence-based practices, supporting family counseling from primary care[22-23], which serves as a key setting for obesity prevention and control through education and health promotion.

The Overweight and Obesity Care Line (LCSO) strategically strengthens an integrated and humanized network, with primary care coordinating management and guiding individuals with obesity to appropriate health services at varying levels of technological complexity[24]. In Piauí, data from ECOSUS-PI reveal that only 11.8% of health professionals reported the existence of an Overweight and Obesity Care Line (LCSO) in the municipalities[25], indicating that further efforts are needed to strengthen Primary Health Care in the control and management of obesity in the state.

In 2022, the Brazilian Ministry of Health published the Guideline for the Care of Children and Adolescents with Overweight and Obesity within the scope of primary health care, aiming to support and improve the quality of the work carried out by health care teams. The document comprises seven chapters, covering the following themes: the magnitude and repercussions of obesity; how to diagnose overweight and obesity; how to organize care in primary health care units; the care process itself; strategies to support behavior change; multicomponent care; and when to refer patients to specialized care[2]. This document, as well as others addressing adolescent obesity, may serve as a resource for continuing education initiatives aimed at training and capacity building of health care professionals. Its purpose is to enhance their understanding of this condition by providing useful information applicable to their work settings and to the multiprofessional teams involved.

Study limitations include challenges from the COVID-19 pandemic, which reduced health professionals' adherence due to work overload in primary care units. In addition, the questionnaires applied were extensive and required considerable time to be completed. These obstacles hindered data collection and affected the completeness of the responses.

This study is the first in the state of Piauí to conduct an assessment of health professionals' knowledge regarding the nutritional management of adolescents with obesity. Thus, the findings may enable the development of further research on the topic, aiming to deepen the understanding of the determinants and conditioning factors of the study object and to support proposals for public policies focused on obesity control and management within primary health care.

CONCLUSION

The obesity epidemiological profile in Piauí underscores the importance of public policies promoting continuous education for primary care personnel, focusing on the prevention and management of overweight and obesity across all life stages, particularly among youth.

Addressing obesity requires strategic investments by the government and public sector in workforce development. Effective training of primary care personnel tackling the obesity epidemic depends on coordinated efforts from public management and the professionals themselves, enabling better guidance for obese individuals and optimal organization of services within the state health care network.

This study seeks to promote training for primary care personnel, enabling them to deliver evidence-based guidance for the early and timely prevention of excessive weight gain during adolescence, which may positively influence the quality of life of the future adult population.

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Authors' contributions	
Layonne de Sousa Carvalho Rodrigues:	Conceptualization, Investigation, Visualization, Writing – original draft, Writing – review & editing.
Jéssica Batista Beserra:	Conceptualization, Investigation, Visualization, Writing – original draft, Writing – review & editing.
Osmar de Oliveira Cardoso:	Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – review & editing.
Marize Melo dos Santos:	Conceptualization, Investigation, Methodology, Project administration, Supervision, Writing – review & editing.
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Corresponding author:	Layonne de Sousa Carvalho Rodrigues Instituto Federal de Educação, Ciência e Tecnologia da Bahia Campus Brumado. Brumado/BA, Brazil. CEP 46110-364. layonne.rodrigues@ifba.edu.br
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