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COMPARATIVE ANALYSIS OF GROWTH PATTERNS WHO 2007 AND NATIONAL REFERENCES IN THE ASSESSMENT OF CHILD NUTRITIONAL STATUS IN ECUADOR

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ABSTRACT

This study examined the degree of agreement between the growth patterns established by the WHO in 2007 and national references used to assess the nutritional status of children aged 6 to 12 in Ecuador. Materials and Methods: This observational, retrospective, descriptive, cross-sectional study used a sample obtained from an open database of the National Institute of Statistics and Census (INEC). The database contained information on 2,540 schoolchildren between the ages of six and 12 from different cities in Ecuador. Age, city of birth, weight, and height data were collected to establish anthropometric indicators, such as weight-for-age (WFA), height-for-age (HFA), and body mass index (BMI), for each model to be compared. The mean and standard deviation were calculated for the anthropometric measurements. For the comparison between groups of women and men, the t-test for independent samples was carried out. Additionally, percentage frequency tables were generated for the nutritional status and height variables according to the WHO 2007 and national references. These were compared using the Pearson chi-square independence test, considering $p < 0.05$ as significant. Additionally, 95% confidence intervals were calculated for both proportions and means. To compare nutritional status according to the two national classification criteria and the WHO 2007 criteria, concordance was analyzed using the Kappa index. Results: An analysis of the anthropometric characteristics of the sample population revealed no significant differences between the sexes with respect to weight and height values according to age. A comparison of the nutritional diagnosis according to the World Health Organization's reference with the national reference indicated a decrease in the prevalence of overweight individuals by 3%.The prevalence of obesity was found to be 5%, and in individuals with normal nutritional status, it was 12.9%. In comparison, the prevalence of morbid obesity increased by 7.1%. The prevalence of obesity was 0.7%, that of thinness was 6.7%, and that of severe thinness was 1.9%. Finally, when comparing the two evaluation models, a Kappa index of 0.53 was obtained, equivalent to moderate agreement. Conclusion: The analysis indicated that, when employing national benchmarks, the prevalence of obesity and morbid obesity is significantly higher than when utilizing WHO benchmarks. A particularly salient finding was the marked increase in diagnoses among 10-year-old boys and 12-year-old girls. The observed discrepancy indicates that national references are more suitable for the population under study, thereby facilitating a more precise evaluation of the nutritional status of children in this region.

KEYWORDS: Growth, nutritional status, child, anthropometry, height, body weight

1. INTRODUCTION

Nutritional status serves as a pivotal indicator of overall health, determined by the balance between energy expenditure and nutrient intake through diet (1). This equilibrium is of particular significance during early childhood, a period marked by rapid growth and substantial physical and cognitive development (2). Nutritional adequacy during this period has been demonstrated to influence physical growth, academic performance, emotional development, and the prevention of chronic diseases. Therefore, regular nutritional evaluations are essential during the first years of life (3). Among the methods for assessing nutritional status, anthropometric, biochemical, and clinical indicators stand out. The former, including weight, height, and waist-to-hip ratio, are frequently employed due to their ease of application and their efficacy in identifying problems such as malnutrition and overweight (4). Biochemical indicators, derived from blood or urine analysis, have been demonstrated to detect specific nutritional deficiencies. However, their application in school settings is limited due to their complexity (4). Finally, clinical indicators, such as the observation of physical signs of malnutrition, serve to complete the comprehensive assessment of nutritional status (4).

Theories on child growth and the use of reference standards have become essential tools for diagnosing nutritional alterations (5). Given that child growth is reflective of both health status and environmental and socioeconomic conditions, constant monitoring is imperative through indicators such as weight, height, and body mass index (BMI) (6). Consequently, growth curves have emerged as a pivotal instrument in clinical practice and public health programs (6). In Ecuador, as in numerous Latin American countries, the international standards established by the World Health Organization (WHO) are employed to assess child growth (7). These standards, derived from multicenter studies conducted between 1997 and 2003, establish growth patterns based on children from various regions and have been implemented since 2006 (8). However, the implementation of these standards in Ecuador has given rise to a discourse surrounding their appropriateness, particularly in light of the country's ethnic, cultural, and geographical heterogeneity (9).

Anthropometry has been utilized since the eighteenth century as a method to analyze physical development and nutritional status, evolving to become a fundamental tool in the evaluation of child growth (8). Variables such as weight and height remain the primary indicators due to their accessibility and their capacity to reflect general nutritional status (10). In the field, various experts have underscored the significance of each nation formulating its own growth standards, adapted to the genetic and environmental particularities of its population (11). In this regard, countries such as Japan, the United Kingdom, Venezuela, and Argentina have developed their own growth curves, which are regularly updated. This development has enabled these countries to improve the detection of nutritional problems (9).

In Ecuador, the absence of national growth curves poses a significant challenge to the precise evaluation of child nutritional status. Researchers such as Yvan Lepage have indicated that the exclusive utilization of international standards can result in diagnostic inaccuracies, thereby impacting the timely identification of nutritional deficiencies within the Ecuadorian population (9). This situation is particularly salient in light of the demographic diversity of the country, where factors such as ethnicity, socioeconomic conditions, and geographical environment directly influence child growth. Consequently, international organizations such as the WHO and FAO have recommended that countries lacking their own anthropometric data conduct studies to establish national standards or adopt standards from countries with similar population characteristics (11, 12). This approach would facilitate the incorporation of references that are more aligned with the local context, thereby enhancing the precision of nutritional assessments and promoting the adoption of more efficacious interventions. Child growth assessment is widely regarded as one of the most reliable indicators of children's overall well-being. Since the 1970s, the WHO has advocated for the establishment of international standards that reflect optimal growth in health conditions. This initiative culminated in the Multicenter Study of Growth Patterns (MGRS) and the subsequent publication of new standards in 2006 (13). While these standards have represented a significant advance, their application in countries with high population diversity, such as Ecuador, necessitates a critical review.

The influence of cultural differences, dietary habits, socioeconomic conditions, and environmental factors on children's growth and development in Ecuador is a multifaceted and region-specific phenomenon, with significant variations across different geographical areas (13). The development of growth patterns tailored to national particularities would facilitate a more precise evaluation and enhanced diagnostic precision regarding growth-related health concerns (14). Anthropometric indicators, including weight-for-age (W/E), height-

for-age (T/E), and BMI, are critical for evaluating child growth and identifying early signs of malnutrition, overweight, or obesity (15, 16). These indicators offer health professionals valuable information that facilitates timely interventions and contributes to the prevention of long-term complications.

The present study focuses on the comparative analysis of the growth patterns established by the WHO in 2007 and the national references for the assessment of nutritional status in Ecuadorian children aged 6 to 12 years. The research is grounded in data from the National Institute of Statistics and Census (INEC), which includes a representative sample of 1,756 schoolchildren from diverse regions of the country. The study's analytical framework encompassed a range of variables, including age, geographical origin, anthropometric measures such as weight and height, and health indicators. This comprehensive data set facilitated the calculation of key anthropometric indicators. These indicators were then benchmarked against both World Health Organization (WHO) standards and national references that have been adapted to reflect the unique characteristics of the Ecuadorian context.

The present research aims to determine if there are significant differences between international standards and national references in child nutritional assessment, which could justify the need to develop growth patterns specific to Ecuador. This information is imperative for enhancing the precision of nutritional diagnoses, optimizing public health interventions, and ensuring effective monitoring of child growth within the nation.

Materials and methods

The study described was carried out through a quantitative, observational comparative approach, and was aimed at comparing the level of agreement between the WHO 2007 growth patterns and national references in the assessment of nutritional status in children aged 6 to 12 years in Ecuador. The study was structured and executed with a non-experimental design because data were collected from secondary sources and the study variables were not modified or altered, but were based on observations for concordance analysis with retrospective temporality. The unit of analysis for this research is children between the ages of 6 and 12, whose characteristics and data are documented in the open-access database of the National Institute of Statistics and Census (INEC) of Ecuador. The database under consideration provides detailed information on various socio-economic, educational, and demographic aspects of the child population.

Inclusion criteria

- Children from 6 to 12 years of age born in Ecuador.
- Children within the study ages who belong to the open database of the National Institute of Statistics and Census (INEC).

Exclusion Criteria

- Infants, preschoolers, adolescents and people outside the age range.

Population and sample

The population selected for the development of this study comprised Ecuadorian schoolchildren between the ages of 6 and 12 years old, utilizing open-access data provided by the National Institute of Statistics and Census (INEC) of Ecuador. The study encompassed a total of 11,566 schoolchildren, with 5,896 identified as male and 5,670 as female. The sample comprised infants within the established age ranges for the research, as drawn from an open database of the National Institute of Statistics and Census (INEC). A stratified probabilistic sampling method was employed, which involved the division of the population into seven groups based on sex, with random selection being utilized for the selection of the sample. The methodology employed to calculate the sample size was to utilize the formula for a finite population. Subsequent to the application of the aforementioned formula, a sample of 2,540 infants was determined, for which a population of 11,566 infants was considered, a confidence level of 95%, and a 3% margin of error, considering a proportion of 0.5. A stratified probabilistic sampling method was employed, which involved the division of the population into seven groups based on sex, with random selection being utilized for the selection of the sample.

Data analysis

The study's variables were recorded by extracting the values of the variables age, weight, height, BMI, and city of birth from the open database of the National Institute of Statistics and Census (INEC). Variables that did not contribute to the objectives of this study were discarded. The analysis was conducted using descriptive statistics, which rendered the findings in the form of numerical measures, tables, and graphs. The central tendency and dispersion estimators, including the mean and standard deviation, as well as the position estimators, such as the median and percentiles, were calculated for the quantitative variables that described the study group. Procedures were also implemented to evaluate the variations between the variables of interest.

The initial phase of the analysis incorporated the utilization of descriptive statistics, a method of data representation and aggregation. This approach facilitated the organization and summary of the collected data. This technique was essential to describe the fundamental characteristics of the sample and to obtain a clear picture of important variables such as weight, height, body mass index (BMI), and nutritional status. The mean and median values were computed. The arithmetic mean of the quantitative variables was represented by the median, which also served to ascertain the central value of the data, thereby reducing the influence of abnormal values. The standard deviation (SD) was employed to quantify the dispersion of the data. This approach facilitated a more precise evaluation of variability around the mean and a more accurate understanding of sample heterogeneity.

Furthermore, the children were classified according to their relative position in the sample distribution using percentiles, which are crucial in growth studies. According to national references and WHO standards, these percentiles facilitated the categorization of children in terms of weight and height in relation to their age, which made it possible to identify cases of underweight, adequate weight, overweight, or risk of obesity. For independent samples, the T-test was utilized to assess differences between interest groups, particularly between boys and girls. The employment of this technique enabled the demonstration of statistically significant differences in the means of the anthropometric measurements obtained from both groups. The T-test is predicated on the assumption that the distribution of the data is normal.

The study's findings, which were based on a statistical analysis of the data, indicated significant differences between the groups with a p-value less than 0.05. These results suggested the presence of potential variations in growth patterns and nutritional status between boys and girls. Percentage frequency tables were created for categorical variables such as nutritional status and height. These tables provided an accurate representation of the distribution of the population into various categories. These tables facilitated a comparative analysis of the methods employed to categorize the nutritional statuses of the groups. Pearson's Chi-square independence test was employed to ascertain the existence of any significant associations between the two classification systems. The disparities in the allocation of nutritional status categories can be assessed through the implementation of this evaluation instrument. The investigation revealed substantial disparities between the reference systems, suggesting that the WHO standards might not fully align with the nutritional requirements of Ecuadorian students, with a p-value less than 0.05.

The Kappa index (κ), a metric that quantifies the degree of agreement between two systems beyond what would be expected by chance, was employed to assess the congruence between national classifications and those established by the World Health Organization (WHO) in 2007. The Kappa index is a particularly useful metric for comparing different evaluation or diagnostic techniques. Furthermore, the analysis proved instrumental in ascertaining whether classifications made by national benchmarks and WHO standards led to the identification of children as malnourished. Given the low Kappa value, there is a possibility that substantial discrepancies exist between the two classification systems. This suggests the necessity for adapting international standards to accommodate local contexts. The Kappa values and confidence intervals (CIs) were calculated and reported. Moreover, 95% CIs were calculated for proportions and means throughout the analysis. These intervals were determined to indicate the range within which the true value was expected to fall with 95% certainty, thereby enhancing the study's conclusions with increased robustness.

The processing and analysis of the data were carried out using the R and SPSS programs (version 23). Both programs have gained significant recognition within the research community for their ability to process substantial amounts of data and conduct sophisticated statistical analyses. R was particularly advantageous for conducting customized analyses and generating complex visualizations, while SPSS facilitated the execution of descriptive and comparative analyses. The two software programs enabled the cleansing, organization, and effective analysis of the data, thereby contributing to the attainment of reliable and valid results.

Table 1. General characteristics of children in Ecuador according to sex

Variable	Total Prom ± DE	Man Prom ± DE	Woman Prom ± DE	P – value
Weight (kg)	33.77 ± 12.34	33.26 ± 11.39	32.39 ± 13.28	NS
Size (cm)	130.4 ± 13.48	131.54 ± 12.71	130.34 ± 14.26	NS
Age (months)	111.31 ± 24.51	111.93 ± 24.69	110.70 ± 25.02	NS
72 – 83 (months)	104	77.22 ± 1.51	76.14 ± 1.42	NS
84 – 95 (months)	93	89.25 ± 1.42	88.12 ± 1.45	NS
96 - 107 (months)	104	102.42 ± 1.49	100.51 ± 1.65	NS
108 – 119 (months)	88	114.34 ± 1.31	112.29 ± 1.52	NS
120 – 131 (months)	76	125.63 ± 2.39	123.81 ± 2.78	NS
132 – 153 (months)	117	145.21 ± 5.45	143.37 ± 4.93	NS

Results

The study encompassed a total of 2,540 children from Ecuador, with 1,368 identified as male and 1,172 as female. The general characteristics of the sample are presented in Table 1, where various weight values are observed. However, a statistically significant difference between the sexes in relation to weight ($p > 0.05$) could not be established. The ages of the children evaluated were classified, showing a higher concentration in the ranges of 72 to 83 months and 96 to 107 months. It is noteworthy that 11.9% (n = 304) of the children were under the age of 132 months.

The Z-score according to national and WHO references was used to assess the nutritional status of the children. The results showed differences between both references, with the national curves being more representative for girls than for boys. When assessing body mass index (BMI) in both genders, significant differences were observed in this category ($p < 0.001$).

Table 2. Indicators of nutritional status based on body mass index (BMI) according to the World Health Organization (WHO) and at the national level

Indicator	Z score Nacional	Z score WHO	P-Value
BMI/Age	1.41±2.89	1.04±1.92	0,0001
Men	1.38±2.81	1.04±1.86	0,0001
Women	1.40±2.93	1.05±2.17	0,0001

It can be seen in figures 1 and 2 that according to the BMI/Age indicator, with the WHO reference, children appear with a normal BMI in most age groups, however, with the national standard, this shifts increasing the Z score value, which indicates that this model is more demanding in the BMI. The age group of 6 years appears with negative values in both models.

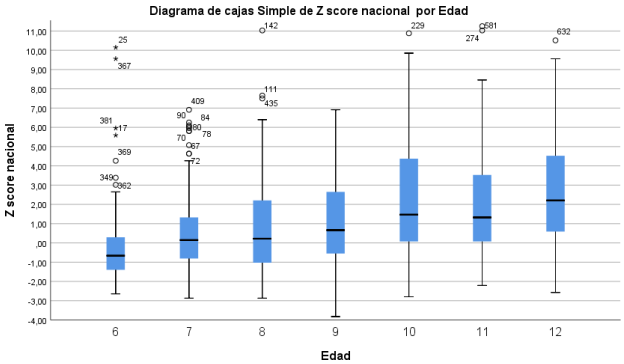

Figure 1. BMI/Age Z-score for sex of children in Ecuador categorized by age

According to the nutritional diagnosis, as referenced by the World Health Organization (WHO), and in comparison with the regulations established at the national level (see Table 5), a decline in overweight cases is observed, amounting to 3.5%, and in cases categorized as normal, amounting to 12.9%. Conversely, there was an increase of 7.1% in the prevalence of morbid obesity, 0.7% in obesity, 6.7% in thinness, and 1.9% in severe thinness.

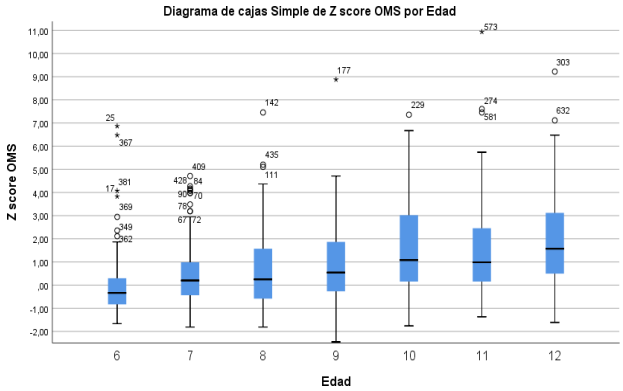

Figure 2. Z score of BMI/Age for sex of girls and boys in Ecuador categorized by age in relation to WHO curves.

Table 3. Nutritional status of infants in Ecuador according to WHO standards and national references

,Nutritional diagnosis	WHO		National		P value	Kappa Index	95% confidence interval
	n	%	n	%			
Obesity Morbid	112	4,4	74	11,5	0,0001	0,55 (Moderate)	0,43-0,67
Obesity	332	12,9	348	13,6	0,7417		
Overweight	500	19,5	412	16,0	NS		
Normal	1564	60,9	1232	48,0	0,0001		
Thinness	24	0,9	196	7,6	0,0001		
Thinness severe	8	0,3	46	2,2	0,0025		
	2540	100	2540	100			

According to the nutritional diagnosis of children based on the World Health Organization (WHO) reference and compared to the national reference (see Table 4), there is evidence of a decrease in overweight by 2.6% and in cases classified as normal by 13.8%. Conversely, there has been an observed increase of 8.1% in morbid obesity, 1.8% in obesity, 4.9% in thinness, and 1.4% in severe thinness.

In regard to the nutritional assessment of female subjects, a comparison of the World Health Organization (WHO) reference with the national regulations (see Table 5) reveals a decline of 0.7% in obesity, 4.5% in overweight, and 12.3% in cases classified as normal. However, there has been an

increase of 6.1% in cases of morbid obesity, 8.9% in cases of thinness, and 2.4% in cases of severe thinness.

Table 4. Nutritional status of children in Ecuador according to WHO standards and national references

Nutritional diagnosis	WHO		National		P value	Kappa Index	Interval of 95% trust
	n	%	n	%			
Morbid obesity	76	5,6 %	188	13,7 %	0,0003	0,51	0,39-0,65
Obesity	200	14,6 %	224	16,4 %	NS		
Overweight	272	19,9 %	236	17,3 %	NS		
Normal	800	58,5 %	612	44,7 %	0,0003		
Thinness	12	0,9 %	80	5,8 %	0,0003		
Thinness severe	8	0,6 %	28	2,0 %	NS		
	1368	100	1368	100			

Table 5. Nutritional status of girls in Ecuador according to WHO standards and national references

Nutritional diagnosis	Woman		Woman		P value	Kappa Index	Interval of 95% trust
	n	%	n	%			
Morbid obesity	36	3,1 %	108	9,2 %	0,0020	0,59	0,47-0,63
Obesity	132	11,3 %	124	10,6 %	NS		
Overweight	228	19,5 %	176	15,0 %	NS		
Normal	764	65,2 %	620	52,9 %	0,0025		
Thinness	12	1,0 %	116	9,9 %	0,0001		
Thinness severe	0	0,0 %	28	2,4 %	0,0078		
	1172	100	1172	100			

Discussion

This study provides a comprehensive analysis of the nutritional status of children in Ecuador. It compares World Health Organization (WHO) references and national regulations concerning body mass index (BMI) and nutritional diagnosis. The findings underscore the necessity of adapting international standards to local characteristics for a more precise assessment of child growth. The data analysis revealed no statistically significant differences in terms of weight, height, and average age of the children considered. This finding suggests that these variables are not biased with respect to gender. The observed similarity in the distribution of these traits across both genders indicates that males and females in the Ecuadorian context may exhibit comparable growth patterns. However, a notable discrepancy emerges when comparing the national curves with those delineated by the WHO. The BMI z-score demonstrates a notable increase when utilizing the predicted national benchmarks, indicating that international reference curves may not accurately reflect child growth patterns. This suggests that national standards might be more effectively adapted to local characteristics. This finding has been corroborated by a comprehensive review of the extant literature, which emphasizes the importance of adapting or elaborating growth curves according to the sociocultural, regional, and genetic context of a given population. According to the predicted national curves, there was an increase in severe obesity and a decrease in the prevalence of overweight cases, while the WHO reference curves indicated a higher number of cases of thinness and severe thinness. The quality of the product is satisfactory.

The findings of this study indicate that international criteria for the identification and classification of malnutrition may underestimate the recurrence of obesity exposure in early childhood in Ecuador, while potentially exaggerating the prevalence of malnutrition. Consequently, the accentuated standardization underscores the necessity of adapting international standards to local realities, taking into account factors such as genetic diversity, accessibility of health services, and disparities in socioeconomic environment. This finding underscores the necessity for a multifaceted approach to nutritional status assessment, entailing the utilization of a range of measurement tools that are both distinct and complementary, as opposed to the employment of a solitary set of health benchmarks. This work is consistent with and builds upon previous research that compared international and local references in the study of child growth. For instance, Mera R and Toledo N conducted a study on children from Manabí, ranging in age from 7 to 10 years, and compared the growth curves of Ecuador and the WHO. Their findings indicated a Kappa index of 0.74 for BMI. This value exceeds the Kappa index of 0.55 reported in this study, indicating moderate agreement. The observed variations in outcomes could be attributed to regional or methodological discrepancies (17).

Conversely, in Argentina, Anigstein et al. (18) also observed significant discrepancies when comparing national references with those of the WHO, thereby corroborating the findings of this study. Furthermore, Cauce G and Moya Z, in their evaluation of BMI in children and adolescents, determined that WHO references have a tendency to overestimate nutritional deficit, a finding that aligns with the results of the present study (19). A similar study was conducted in Spain by Carrillo López et al., which demonstrated suboptimal agreement (K <

0.20) between national and international criteria for assessing nutritional status. The study indicated a higher prevalence of obesity when using WHO criteria. In contrast, the present study found moderate agreement (K < 0.40) and a similar prevalence of obesity, suggesting that the observed discrepancies could be due to differences in data collection methods or to particularities of the populations studied (20).

The discrepancies observed between the Ecuadorian reference standards and those established by the World Health Organization (WHO) in nutritional diagnosis hold significant ramifications for a comprehensive public health approach and for clinical practice. The findings underscore the necessity to formulate and employ growth references tailored to local characteristics. This approach would facilitate the evaluation of Ecuadorian children with reduced bias concerning their nutritional status, thereby addressing the prevailing issues of malnutrition, encompassing malnutrition, obesity, and overweight. Moreover, these discrepancies underscore the imperative for health professionals and specialists to adhere to the limitations imposed by international standards. Exclusive reliance on WHO referrals has the potential to result in misdiagnosis, thereby affecting the planning of appropriate interventions. Therefore, a more flexible approach is imperative. This approach should utilize a variety of methods for measuring growth parameters and diagnosing children's nutritional status.

Conclusions

At present, the issue of infantile overweight and obesity represents a considerable challenge for health policies in Ecuador, with disconcerting projections both on a global scale and within our nation. In Ecuador, a notable discrepancy exists between the nutritional status of infants as determined by international standards set by the World Health Organization (WHO) and national standards. The aforementioned discrepancies underscore the necessity to adopt an alternative perspective, one that is tailored to the distinct characteristics of diverse geographical regions within Ecuador. This approach is pivotal in addressing the issues of malnutrition, overweight, and childhood obesity with greater efficacy. The findings of the present study demonstrate that, in instances where references from Ecuador are utilized, the prevalence of obesity and morbid obesity among children exhibits a marked increase in comparison to assessments conducted in accordance with the standards established by the WHO. A notable increase in obesity diagnoses was observed among 10-year-old boys and 12-year-old girls. This finding indicates that national references offer a more precise and comprehensive evaluation of nutritional status in the Ecuadorian child population. This finding is of critical importance, as obesity in infants is widely regarded as a significant public health concern, with escalating prevalence observed not only in Ecuador but also on a global scale. National standards appear to offer a more precise reflection of local population characteristics with respect to body weight. In contrast, WHO international benchmarks, which are designed for a global population, may not adequately capture local realities. A thorough examination of the available data indicated a substantial surge in obesity and morbid obesity cases among Ecuadorian children, as measured against established national standards. This increase was particularly pronounced among 10-year-old boys and 12-year-old girls, who are critical ages in child development. These findings are consistent with previous research suggesting that childhood obesity rates tend to increase during pre-adolescence, due to factors such as hormonal changes, unhealthy eating habits, and less physical activity. The observation that national standards detect an increase in prevalent cases of obesity compared to WHO benchmarks suggests that they are better adapted to the local context. This is of particular significance for public health policymaking, as the early identification of obesity and overweight is critical to the implementation of appropriate preventive interventions.

Conversely, the utilization of WHO references for datasets yielded a substantially elevated number of diagnoses of thinness. This finding underscores the disparities in methodologies and reference thresholds employed in foreign countries as compared to national guidelines. While the issue of thinness is a salient problem in many foreign countries, it is possible that the WHO reference is overestimating its prevalence in Ecuadorian society. The local diet, access to nutrient-rich foods, and the genetic characteristics of the population are factors that could influence such outcomes. Therefore, the evaluation instruments employed for global population assessments may not be the optimal tools for accurately gauging the nutritional status of Ecuadorian children. In general, the observed discrepancies between diagnoses derived from comparing data obtained with WHO references and national norms underscore the necessity to adapt international standards of nutritional assessment to the local characteristics of the population. The utilization of national references that are more aligned with Ecuadorian realities will be imperative to enhance the assessment of nutritional status and, consequently, the development of more effective public policies in the domain of health.

Concurrently, the implementation of national standards facilitates the precise identification of issues such as overweight and obesity in the United States. The diagnosis of these conditions in the United States aligns more closely with the physiological and environmental characteristics of Ecuadorian children. Consequently, international studies emphasize the necessity of adapting nutritional assessment tools and growth curves to the characteristics of each population.

The utilization of national benchmarks is imperative for enhancing the precision of nutritional diagnoses and for directing the prevention and treatment of childhood malnutrition, overweight, and obesity. The findings of this study indicate that interventions exclusively guided by WHO standards may not adequately align with the needs of Ecuador. Consequently, it is imperative that public policy fosters the utilization of national benchmarks in school and community nutrition assessments. Conversely, intervention programs must be adapted to the particularities identified, that is, to the specificities of the populations' eating habits and the accessibility to healthy foods and exercise. For 10-year-old boys and 12-year-old girls, who exhibited a higher prevalence of obesity according to national benchmarks, interventions could prioritize this age group through programs that incorporate nutrition education, and the implementation of physical activities tailored to the needs of preadolescents. These strategies, grounded in local data, have the potential to be implemented in collaboration with schools, families, and communities.This study underscores the significance of adapting the diagnostic instrument to the distinctive characteristics of the population under examination. In light of a population-based study conducted in Argentina and Spain, it is further postulated that when engaging with the representative of the population at risk, such as children, it is imperative to adapt diagnostic instruments to the prevailing context. The national references offer a more precise evaluation of the nutritional status in this municipality, particularly with regard to cases of obesity and underweight obesity. Therefore, the present study indicates that Ecuador needs a more contextualized approach to SP policies, based on national standards for the diagnosis and development of comprehensive interventions. The utilization of national benchmarks for diagnosis has been demonstrated to facilitate a more timely "early warning" system. In addition, this approach enables a more organized and planned intervention, thereby facilitating the development of more specific and effective programs in the field of child health.

Declaration statements

Author contributions statement

The author designed the study, collected data, curated and analyzed the dataset, wrote the first version of the manuscript, read, reviewed and approved the final version of the manuscript.

Conflict of interest

The authors declare that there is no conflict of interest related to the conduct, results or publication of this study.

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Data availability

The data supporting the findings of this study are available from the corresponding author, upon reasonable request.

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