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Factors associated with overweight/obesity in children under five years of age, using the 2018 National Health and Nutrition Survey (ENSANUT)

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Abstract

Introduction: Childhood overweight and obesity are an essential public health problem of multifactorial origin associated with a higher probability of death and premature disability in adulthood. Data from the 2018 National Health and Nutrition Survey (ENSANTUT) conducted in Ecuador indicate that 13.6% of children under five years of age are overweight/obese (O/O), 60% more than what was reported in 2012 (8.5%).

Methods: In an analysis of the ENSANUT 2018 database, the prevalence of overweight/obesity was analyzed in 11,050 children under five years of age. The variables with a P value < 0.10 were entered in the bivariate analysis to construct the multiple logistic regression models. Subsequently, the variables that showed a significant association were entered into three logistic regression models: i) national level, ii) urban area, and iii) rural area. The measure of effect used was the OR (at 90, 95 and 99%). The ROC curve and the Hosmer test were used to test the model's robustness. Lemeshow, in which the Null Hypothesis (Ho) is tested, with a *P value* >0.05.

Results: The prevalence of overweight/obesity increased by 60% compared to the data collected in 2012. A total of 64.37% of children with overweight/obesity resided in urban areas, and 35.63% resided in rural areas. The factors significantly associated with overweight/obesity common between the national level and the metropolitan area are drinking water belonging to the first quintile of poverty, exclusive breastfeeding for six or more months, history of overweight/obesity of the mother, and birth weight less than 2500 grams, while for the national level and the urban area, the significantly associated factors were having a mother of Afro-Ecuadorian ethnicity and residing in the Sierra, Coast or Amazon region. In the rural area, elements not shared either at the national level or with the urban area were observed: belonging to the 3rd quintile of poverty, mothers with less than five prenatal check-ups and less than 12 years of study; delivery after 42 weeks, birth weight between 2,500 and 4,000 grams and having had between 5 and 10 prenatal check-ups.

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Conclusions: The prevalence of overweight/obesity presents a significant increase compared to the data collected in 2012, which leads to considerable effects on physical and mental health. Children who are overweight/obese are more likely to suffer in the future, among others, diseases such as metabolic syndrome, diabetes, hypertension, and orthopedic conditions. In addition, it can cause emotional problems such as low self-esteem. Although there are policies that can contribute to strengthening the protective factors found in this study, such as breastfeeding, the right to prenatal check-ups, limitation on the use of breast milk substitutes, the right to health of both the child and the mother, the monitoring of its application and in some cases, by the user, the limitations for access to care, essential services, and the acquisition of healthy products, do not make the application of what is established entirely possible, what should be considered within the policies is how to make their implementation possible according to the different contexts in a country as diverse as Ecuador.

Keywords: **MeSH**: Pediatric obesity, Lactation, Breastfeeding, Childbirth, Birth weight, Metabolic syndrome.

Introduction

Childhood overweight and obesity are major public health problems associated with a higher probability of premature death and disability in adulthood. The conditioning factors of overweight or obesity (O/S) are mainly the deterioration of dietary habits and a sedentary lifestyle; however, factors such as social, economic, cultural, genetic, ethnic, and environmental factors must also be taken into consideration since they are part of the child's environment and consequently affect their nutritional status.

For 2018, 40 million children under five were overweight worldwide, an increase of 10 million compared to 2000. These lived in upper-middle-income countries [1] and Latin America; the figure was maintained between 1990 and 2020, going from 6.2% to 7.5%, respectively [2].

In Ecuador, the 2012 National Health and Nutrition Survey (ENSANUT) indicates that 8.5% of children under five years of age were already overweight/obese (4.7 pp less than in 2018), while 21.6% were at risk of being overweight; the risk of being overweight is approximately double in indigenous people compared to other ethnic groups. Variables such as economic level, mother's education level, and area of residence did not show statistically significant differences. According to joint estimates by the World Bank, UNICEF, and the WHO for 2020 in Ecuador, moderate and severe overweight (9.8%) is above the average for the region (7.5%) [2].

Studies carried out in other countries of the region, such as Peru, indicated that the prevalence of overweight and obesity increases as poverty indicators decrease; likewise, regarding age, there seems to be a higher prevalence in the extreme groups, that is, children from 6 to 11 months with 13.6%, and those from 0 to 5 years with 12.1%. Regarding birth weight greater than 2,500 grams and exclusive breastfeeding, 8.5% and 3.7%, respectively, were overweight/obese [3].

The data from the National Survey of the Nutritional Situation (ENSIN) carried out in Colombia in 2015 showed a stable trend in the prevalence of O/S between 2010 and 2015: 5.2% and 6.3%, respectively, showing that neither the region nor the wealth index nor ethnicity showed significant differences [4].

Given the variety of factors that can influence the presence of overweight/obesity, it is necessary to identify in the national context those that correspond to the reality of children under five years of age in the country to have an input that indicates the variables to be monitored to achieve the constant reduction of this public health problem. The most recent information on the subject is considered in the present study: the National Health and Nutrition Survey, applied in 2018.

The objective of this study was to analyze the factors that affect overweight and obesity in children under five years of age using the data collected in the 2018 National Health and Nutrition Survey.

Materials and methods

Type of study

The present study is an analysis of a cross-sectional database.

Population and sample

The ENSANUT 2018 survey has as its target population: women of childbearing age - MEF (10-49 years), children under five years of age, children between 5 and 11 years of age, people from 5 to 17 years, people older than ten years and men older than 12 years.

To apply ENSANUT 2018, a two-stage stratified probabilistic sample design of elements was used [5]. In the first stage, a stratified sample of primary sampling units (dwellings) was selected with a probability proportional to the sample size. In the second stage, a variable number of homes was chosen within each design domain (province) due to the diversity of target populations, exceptionally corresponding to children under five years of age, as it is a complex population to find since the average "per household is the lowest among all target populations" [5].

The size of the UPM sample corresponding to children under five years of age was obtained differently for each province "considering their demographic characteristics and the operational capacity of the INEC, which set the maximum number of homes to be visited by UPM at 18" [5].

The equation for calculating the sample size was:

$$n \geq \frac{p \cdot (1-p)}{\left(\frac{p \cdot e_{rel}}{z}\right)^2 + \frac{p \cdot (1-p)}{N}} \cdot deff \cdot \frac{1}{1-tnr}$$

where:

n resulting sample size. *P*= prevalence of the estimator. $erel$ = relative error associated with the prevalence p. z= confidence level.

N size of the target population of the estimator. deff= design effect.

tnr= expected nonresponse rate

The total sample was 43,311 dwellings/households. The geographic coverage is national, urban, and rural. In the case of this study, the number of children under five years of age considered is 11,050 who meet the predefined inclusion criteria.

The ENSANUT 2018 survey is a statistical operation carried out by two-stage stratified probabilistic sampling scheduled to be carried out every five years; its objective is to "Generate indicators on the main problems and health situation of the Ecuadorian population to evaluate and generate public policies in health and nutrition issues" [5]. The statistical data of the Ensanut 2018 survey have a relative error of 0.15, a confidence level of 0.95, and a nonresponse rate of 0.05.

This survey was carried out in a period of 2 months of work in its enlistment stage and two months of collecting the information from its five forms: 1) Household, 2) Women of childbearing age (MEF), from 12 to 49 years; 3) Sexual Health and Reproductive Health, men aged 12 and over; 4) Risk Factors, children from 5 to 17 years old; and 5) Child Development, children under five years of age. The choice of informants for the forms was carried out using the closest birthday method, and in this way, randomness was guaranteed in the last selection stage. The sample consisted of 43,311 homes; the scope of geographic coverage was at the national, provincial, and area levels [5].

Inclusion criteria for the study

- Children under five years of age with available anthropometric information.
- Children under five years of age with information available from the mother.

Exclusion criteria for the study

Cases with incomplete information were eliminated from the analysis.

Results

The study was conducted with an anthropometric measurement sample of 11,050 children under five; 13.64% presented overweight/obesity (S/O) (Table 1).

The mothers' age concerning the area of residence had no significant differences, being 28.4 ±6.7 for mothers from the urban zone and 28.0 ± 7.1 for mothers from the rural location.

A total of 64.37% of the children with S/O resided in urban areas, and 35.63% resided in rural areas. Regarding the distribution by sex, this is slightly higher in men:

nationally 0.79:1, in urban areas 1.17:1 and rural areas, almost two men for every woman 1.69:1. The average age of the mother is similar both at the national level (28.24: 6.85) and at the disaggregated level: urban area 28.40:6.69 and rural area 27.95:7.126.

The ethnic self-identification of the mother is mostly mestizo, representing the highest percentages within the urban and rural areas; however, within this, there is also a significant percentage of indigenous mothers (21.79%).

Regarding the economic level, 35.75% of the children who live in rural areas belong to homes in quintile 1, a percentage higher than that represented by this quintile at the level of the country and the urban area.

On the other hand, both at the country and the urban level, the mothers of children identified with S/O show a secondary/high school education. In the rural area, the highest proportion is represented by mothers with a basic level of education, 43.95%.

Within the three territorial levels, higher education represents less than 30%.

Regarding the region of residence of the mother, within the country, 41.14% of children with S/O live in Sierra; within the urban area, 44.23% reside on the coast, and at a rural level, 40.60% indicated living in Sierra.

Finally, children with S/O belong to homes with public water in all the territories under study.

Prevalence of overweight/obesity

The prevalence of overweight/obesity in children under five is more frequent among children two years of age and younger (Table 2).

Regression Logistics

The variables considered in the model are detailed in Table 3. These were water suitable for consumption, history of overweight of the mother, Afro-Ecuadorian ethnicity, prenatal controls, years of mother education, exclusive breastfeeding, postterm birth, birth weight, quintiles 1 and 2, and Sierra, Costa, and Oriente regions.

As evidenced in Table 3, at the national level, the risk factor for suffering from overweight/obesity in children under five years of age is a history of S/O in the mother ($P < 0.01$), increasing the risk of its son in 1.3 times about the children in which their mother does not present this condition. Another risk factor is not having water suitable for consumption ($P < 0.1$).

Table 1. Sociodemographic characteristics of children under 5 years of age with overweight/obesity.according to area of home. Ecuador 2018

	National		urban		Rural	
	Frequency	%	Frequency	%	Frequency	%
Sex	**1,507**		**970**		**537**	
Man	841	55.81%	524	54.02%	317	59.03%
Women	666	44.19%	446	45.98%	220	40.97%
Self identification ethnic	1,507		970		537	
Indigenous	170	11.28%	53	5.46%	117	21.79%
Afro-Ecuadorian	45	2.99%	39	4.02%	6	1.12%
Mestizo	1,222	81.09%	836	86.19%	386	71.88%
White	21	1.39%	16	1.65%	5	0.93%
Montubio or others	49	3.25%	26	2.68%	23	4.28%
Quintile	**1,507**		**970**		**537**	
Quintile 1	332	22.03%	140	14.43%	192	35.75%
Quintile 2	334	22.16%	216	22.27%	118	21.97%
Quintile 3	324	21.50%	217	22.37%	107	19.93%
Quintile 4	267	17.72%	197	20.31%	70	13.04%
Quintile 5	250	16.59%	200	20.62%	50	9.31%
Mother instruction	**1,507**		**970**		**537**	
None	16	1.06%	8	0.82%	8	1.49%
Education basic	460	30.52%	224	23.09%	236	43.95%
Education middle/high school	657	43.60%	441	45.46%	216	40.22%
Superior	374	24.82%	297	30.62%	77	14.34%
Region	**1,507**		**970**		**537**	
Mountain range	620	41.14%	402	41.44%	218	40.60%
Coast	549	36.43%	429	44.23%	120	22.35%
Amazon	288	19.11%	122	12.58%	166	30.91%
Insular	fifty	3.32%	17	1.75%	33	6.15%
Fountain of water	**1,507**		**970**		**537**	
Public network	1,177	78.10%	903	93.09%	274	51.02%
Battery or key public	16	1.06%	7	0.72%	9	1.68%
Other fountain by pipeline	124	8.23%	21	2.16%	103	19.18%
Car delivery man/tricycle	23	1.53%	13	1.34%	10	1.86%
Well	94	6.24%	22	2.27%	72	13.41%
River/spring/ditch	57	3.78%	3	0.31%	54	10.06%
Other	16	1.06%	1	0.10%	50	2.79%

Fountain: ENSANUT 2018. **Elaboration:** The authors.

Table 2. prevalence of overweight/obesity in minors of 5 years according to area of home.

	National				Area urban				Area Rural			
Age in years	Overweight/Obesity				Overweight/Obesity				Overweight/Obesity			
	No	Yeah	Total	% SW	No	Yeah	Total	% SW	No	Yeah	Total	% SW
0	2,032	406	2,438	16.65%	1,301	256	1,557	16.44%	731	150	881	17.03%
1	901	436	2,462	17.71%	125	259	1,509	17.16%	776	177	953	18.57%
2	1,840	254	2,094	12.13%	1,179	165	1,344	12.28%	661	89	750	11.87%
3	1,860	216	2,050	10.54%	1,214	156	1,344	11.61%	646	60	706	8.50%
4	1,785	195	1980	9.85%	1,192	134	1,326	10.11%	593	61	654	9.33%
Total	**9,543**	**1,507**	**11,050**	**13.64%**	**6,136**	**970**	**7,106**	**13.65%**	**3407**	**537**	**3,944**	**13.62%**

Fountain: ENSANUT 2018. **Elaboration:** The authors.

Table 3. ***Variables*** considered in the method stepwise

	P -value		
variables	National	urban	Rural
Water suitable for consumption	0.066	0.117	0.242
Overweight of Mother	0.007	0.001	0.844
Mother indigenous	0.591	0.372	0.389
Mother Afro-Ecuadorian	0.011	0.186	0.009
Mother white	0.562	0.447	0.651
Mother montubia or other	0.367	0.625	0.698
Intake daily of micronutrients	0.845	0.132	0.186
< 5 controls prenatal	0.424	0.793	0.036
5 to 10 controls prenatal	0.936	0.438	0.032
Mother elderly of 30 years	0.535	0.827	0.565
>12 years of study (mother)	0.136	0.219	0.075
Lactation exclusive > 6 m	0.012	0.017	0.520
Birth postmature	0.513	0.988	0.072
Weight at born <2500 gr.	0.009	0.030	0.381
Weight at born between 2500 and 4000 grams	0.863	0.229	0.061
Baby premature	0.754	0.695	0.183
Quintile 1	0.051	0.074	0.837
Quintile 2	0.486	0.665	0.848
Quintile 3	0.715	0.771	0.094
Quintile 4	0.880	0.635	0.648
Mountain range	0.001	0.333	0.038
Coast	0,000	0.108	0.001
Amazon	0.002	0.780	0.005
Sex of the infant women	0.686	0.628	0.946

On the other hand, the fact that the mother of the child is Afro-Ecuadorian decreases the risk that the child suffers O/O by 1.75 (P <0.05) times compared to children whose mothers are mestizo, and a similar situation occurs in the rural area. In the case of urban regions, ethnicity is not a factor that influences the presence of O/O.

At the national level, living in the Sierra, Coast, or Amazon (P >0.01) decreases the risk of children under five years of age having O/O, which is similar to those residing in the Insular region. This happens in rural rather than urban areas, where the region variable appears outside the factors contributing to the model.

Children who live in homes that do not have safe drinking water have a 1.228 (P <0.1) times higher risk of having O/O than children who live in homes with safe drinking water. This factor only contributes to the presence of overweight/obesity nationally.

Another identified factor that influences the presence of O/O as protection in children under five for the country and the urban area is belonging to quintile 1 of poverty, which decreases by 1.23 times (P <0.1) the risk of suffering O/O, compared to children from households belonging to quintile 5. For the urban area, the risk decreases by 1.32 (P <0.1) times.

For its part, having breastfed the child for more than six months constitutes a protective factor at the national level since the risk decreases by 1.50 times compared to children who were breastfed for less time; a similar situation occurs at the urban level, reducing the risk by 1.60 times (Table 4).

Table 4. Multiple logistic regression analysis of the factors associated with overweight/obesity in children minors of 5 years according to area of the home. Ecuador 2018

	Total	Area urban	Area Rural
variables	OR	OR	OR
Mother Afro-Ecuadorian	0.572**		0.261***
	(0.125)		(0.134)
Less of 5 controls prenatal			2.777**
			(1.357)
Further of 12 years of study			1.536*
			(0.370)
Birth postmature			0.536*
			(0.186)
Region Mountain range	0.537***		0.599**
	(0.101)		(0.148)
Region Coast	0.525***		0.424***
	(0.098)		(0.110)
Region amazon	0.572***		0.500***
	(0.106)		(0.122)
Weight to the be born between 2500 and 4000 grams			1.566*
			(0.375)
Between 5 and 10 controls prenatal			2.652**
			(1.205)
suitable water for he consumption human	1.228*		
	(0.134)		
Quintile 1	0.811*	0.757*	
	(0.086)	(0.116)	
Quintile 3			1.428*
			(0.304)
Lactation 6 months and further	0.666**	0.625**	
	(0.108)	(0.123)	
background of about prisoner of the mother	1.322***	1.534***	
	(0.137)	(0.2)	
Weight to the be born minor of 2500	0.637***	0.619**	
	(0.108)	(0.130)	
Observations	11,050	7,106	3,944

*** p<0.01, ** p<0.05, * p<0.1 Errors robust between parenthesis

Source: ENSANUT 2018. Elaboration: The authors.

In addition to the above, the fact that the child was born with a weight of less than 2,500 grams decreases the risk of suffering O/S, both in the country and in the urban area: 1.57 (P <0.01) times and *1.62* (*P* < 0.05) times, respectively; compared to children who weighed more than 2,500 grams at birth, the same occurs with children whose PN was between 2,500 and 4,000 grams, but in rural areas.

For the specific case of rural areas, it has been identified that belonging to quintile 3 of poverty increases the risk of children under five years of age having O/O by 1.43 times compared to those in quintile 5. That the mother has gone to fewer than five prenatal check-ups makes the child 2.7 times more likely to have O/O.

Regarding years of schooling, children residing in rural areas whose mothers have more than 12 years of education are 1.53 times more likely to suffer from O/S than children of mothers with fewer years of schooling.

Another factor influencing overweight/obesity in children under five is being born after 42 weeks, reducing the risk by 1.56 times (*P*<0.1*)*.

Model validation

According to the values of the ROC area (Table 5), the model correctly detects approximately 78 out of 100 cases at the three levels of disaggregation. Regarding the goodness of fit, the results show no significant difference between the actual and predicted values at the national level and in the rural area but not in the urban area, where the P value value is at most *0.05*.

Board 5. Validation of results

Estimate	AreaRock)	p valueProof Hosmer Lemeshow (b)
National	0.7712	0.305
Rural area	0.7752	0.2342
Urban area	0.7818	0.0209

Discussion

Worldwide, the growth of the preschool population with overweight/obesity is alarming. The results of household surveys around the world, especially in low- and middle-income countries, show a 33% increase in overweight children under five years of age between 2000 and 2018 [6-9]. Worldwide, over 41 million children under five are overweight/obese, an increase of 11 million in the last 15 years [10].

The increase is most evident in Eastern Europe and Central Asia: 8.2% in 2000 and 17.9% in 2018, while in

Latin America and the Caribbean, during that same period, the percentage of overweight went from 6.6% to 7.5 [11].

The results obtained in the present study show an increase of 5.1 percentage points at the country level compared to the figures obtained in ENSANUT 2012, while for that year, the overweight/obesity in children under five years of age was 8.5% for 2018, which rose to 13.6%; that is, there was an increase of 60%. Notwithstanding the preceding, there are countries such as Peru in which the figures for overweight/obesity have remained stable. In that country, according to the Demographic and Family Health Survey, the percentage of O/S in children under 18 years of age has fluctuated between 8 and 10% in 2017-2021 [12, 13]. Likewise, in Mexico, according to the ENSANUT 2018, the figures for overweight have oscillated between 8 and 9 during 2006-2018 [7].

Once the variables or factors that do not contribute statistically to the model are excluded, results are obtained that, in some cases, go hand in hand with previous evidence and others that do not; for example, the results show that factors such as a higher level of instruction favor the appearance of overweight when according to other studies, lower levels of education are a determining factor of O/O; therefore, people who have not accessed higher levels of teaching could not know what a diet is healthy. The food choice would need to be more adequate, together with the need for more purchasing power for their purchase [8].

Concerning the poverty quintiles, the observed results coincide with what was found in ENSANUT 2012. As the quintile advances, this becomes a risk factor. The more purchasing power a family has, the more risk you have of being overweight/obese. In this sense, the Childhood Overweight Report prepared by UNICEF 2021 mentions that globally, overweight occurs more in poor countries than in rich ones; however, in Latin America and the Caribbean, the trend is not so clear: "there may be factors that affect the prevalence of overweight more in specific areas. Indicators associated with being overweight suggest that this problem is mostly related to urban lifestyles and obesogenic food environments".

Access to drinking water (through sewerage) proved to be one of the risk factors for the child to suffer O/O; having suitable drinking water is of the utmost importance since the lack of it is replaced by the consumption of sugary drinks that directly influences the appearance of overweight and obesity [12]. High intake of sugar-sweetened beverages was associated with increased postprandial triglyceride concentrations and increased adiponectin, abdominal and visceral fat, and leptin concentrations with body weight and insulin concentration [14].

At the regional level, living in the Galapagos favors the appearance of overweight and obesity; as mentioned in the study "Characterization of food consumption and nutrient intake of the population residing in the Galapagos," the insular region has not been immune to the food transition presented worldwide and "is in a situation of food insecurity due to inadequate availability and demanding access to fresh and quality food [15, 16].

On the other hand, the results of this analysis show, both at the national and rural levels, that having an Afro-Ecuadorian mother is a protective factor; that is, belonging to this ethnic group would reduce the risk of being overweight/obese, which is in contrast to affirmations indicating that racial minorities are more prone to this disease [17, 18].

Breastfeeding in children at the national and urban levels appears to be another protective factor to reduce the risk of O/O in children under five years of age, which coincides with various studies, such as the one carried out in Peru, which also collects information from national surveys of Bolivia and Colombia, where the association between breastfeeding ≥ 6 months and a lower possibility of obesity compared to nonbreastfeeding or breastfeeding < 6 months for Bolivia is evident (OR = 0.30; 95% CI: 0.16-0.57); an association for Colombia (OR = 0.71; 95% CI: 0.47-1.06) and Peru (OR = 0.49; 95% CI: 0.23-1.04 [19].

Additionally, in the country, as in the urban area, low birth weight (<2500 gr) is a protective factor; however, as recognized by several studies, the most significant predictor of overweight/obesity for the future continues to be macrosomia. (PN> 4500 gr) [20]. In the case of rural areas, a weight between 2,500 and 4,000 grams increases the risk (1.56 times) of O/O. Studies such as the one carried out in Bucaramanga, Colombia, showed that children who were born with a greater weight between 4,000 gr and 4,500 gr presented two times more probability of being overweight or obese at

school age, in comparison with children who weighed at birth greater than 2,500 g and less than 3,500 g [15].

Regarding the number of prenatal controls, this was identified only in rural areas as a risk factor. The fact that the woman has had less than five prenatal check-ups increases the child's risk of S/O by 2.77 times. Limiting access to prenatal check-ups could prevent the identification of hazards in pregnancy that may later cause, for example, a higher or lower birth weight.

However, from the results, it must be remembered that the context in which the person develops depends to a great extent on the behavior that they may have regarding a healthy lifestyle, which is why, although the same variables are measured in different studies, the results may not necessarily be precisely the same [18].

It is essential to consider that among the advantages of the study is the use of a standardized survey that allows comparison with previous research. Likewise, it has representativeness at the area level, which makes it possible to infer the results up to this point of disaggregation, which contributes to having a more specific vision of the situation of the condition of overweight/obesity in children under five years of age, which can contribute to further research into the factors associated with overweight/obesity, including more questions related to customs and the cultural aspect, which is different depending on the area where the person resides.

On the other hand, there are some limitations since there are questions in the survey that are at the discretion of the mother's memory, which influences the moment of generating results, since not in all cases are there cross-questions that help to corroborate what is exposed by the mother.

Conclusions

The sex that prevailed in the study was female; patients between 2 and 5 predominated according to age. In the Shimpis community, more than half of the patients evaluated had an average weight; however, chronic malnutrition had a significant prevalence, followed by acute malnutrition, and obesity obtained a lower majority. When analyzing hemoglobin levels, anemia was found in less than half of the population; despite this, its prevalence is still alarming. According to the results of this study, there was a relationship between age group and nutritional status, where it was observed that the older the age, the greater the predisposition to affect nutritional status. However, the age group was not related to anemia. A significant relationship between nutritional status and anemia was also seen, presenting in more than half of the cases with affected nutritional status and even in eutrophic patients, even though their percentage was low. Patients between 6 months and five years are predisposed to present greater affectation in their nutritional status, for which a greater prepregnancy, gestational, and postpregnancy control will provide benefits in the development and growth of the pediatric patient.

Abbreviations

ENSANUT: National Health and Nutrition Survey INEC: National Institute of Statistics and Censuses MSP: Ministry of Public Health
WHO: World Health Organization
BN: Birth weight
UNICEF: United Nations Children's Fund
S/O: Overweight/Obesity
OR: Odds ratio
TRH: thyrotropin-releasing hormone
TSH: thyroid stimulating hormone.

Supplementary information

No supplementary materials are declared.

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Author contributions

Silvia Armas: Conceptualization, data curation, formal analysis, fundraising, research, writing - original draft.

Alexander Andrade: Methodology, project administration, resources, software, supervision, validation, visualization, writing - revision and edition.
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The authors declare they have no conflicts of interest.

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