

Nutritional Status Assessment of Children Who Participated in the "Activarse" Program

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Abstract

Introduction: Knowledge of the nutritional status of children participating in the *Activarse* program allows us to characterize the target population in order to direct actions.

Objective: To evaluate the nutritional status of children who participated in the *Activarse* program during 2012.

Materials and Methods: A descriptive, cross-sectional study. An anthropometric assessment was performed on 1,253 children aged 5 to 10 years old from 16 schools in Argentina participating in the *Activarse* program. The Z score for the Height/Age and BMI/Age indicators was calculated using *Anthro Plus* software. For the Height/Age indicator, children with a Z score between -1.5 and 2 were considered at risk or alert for short stature.

Results: The sample consisted of 54% (n=681) girls and 46% (n=572) boys. The average age was 7.23±1.15 years. The Height/Age index showed that 85.6% had an Adequate Height and 14.2% had height alterations (Short Height Alert, Short Height, Very Short Height and Tall Height), distributed evenly between boys and girls. Using the BMI/Age indicator, it was found that 52.9% were normal weight, 18.1% were obese, 21.4% were overweight, 6.2% were at risk of being underweight, 1% were underweight, and 0.4% were very underweight. In the normal weight category, females had the highest percentage, while males dominated the obese category. There were no differences in the other categories.

Conclusion: It is considered pertinent to carry out educational and nutritional interventions that make it possible to reduce the percentages of overweight and obesity found in the population.

Keywords: estado nutricional; antropometría; sobrepeso/obesidad infantil; enfermedades crónicas no transmisibles.ecnt

Presentation

PepsiCo's commitment to sustainable growth, defined as "Performance with Purpose," unites business performance with a clear sense of social responsibility that promotes consumer care, employee appreciation, the development of the communities in which it operates, and environmental stewardship and respect. To achieve this objective, PepsiCo creates a comprehensive framework for relationships with various stakeholders in society. In this regard, the company actively participates in chambers and organizations that bring together industry and CSR leaders, seeking to promote actions that positively impact the business and its stakeholders. Since 2006, the PepsiCo Foundation has led the company's social investment initiatives, with the mission of developing educational programs, promoting healthy habits, and corporate volunteering. Each of the Foundation's programs aims to provide information, develop knowledge and skills and promote the development of active citizenship.

Get Activated

This program, which has been promoting healthy lifestyle habits since 2006, is part of the Conciencia Association (CSO). *Activarse* focuses on providing children with tools for reflection and action on topics related to promoting healthy and sustainable living. It promotes a space for participation and learning by offering educational and recreational activities. The program targets students between the ages of 6 and 10 who are in 1st, 2nd, and 3rd grade, along with their principals, teachers, and families. The program is implemented in various provinces across the country: Bariloche, Buenos Aires (GBA, Mar del Plata, and Otamendi), Mendoza, San Juan, Santa Fe, and Tucumán. From the *Activarse* program's inception in 2006 to 2012, it reached 45,003 direct and indirect beneficiaries. In 2012, it reached 2,600 children from 17 schools in the Greater Buenos Aires Province (GBA), the Municipality of Buenos Aires (MDP), and Otamendi (Buenos Aires Province), Mendoza, Bariloche (Río Negro), Rosario (Santa Fe), Angaco

and Albardón (San Juan), and Tucumán, as well as more than 150 teachers. The program was declared of educational interest by the Ministry of Education of the Nation, the Directorate of Culture and Education of the Province of Buenos Aires, and the Ministry of Education of the Province of Mendoza.

The Bachelor's Degree in Nutrition at Maimonides University supports the Activarse Program with guidance through the program's courses: Applied Statistics, Nutritional Assessment, Anthropometry, Nutritional Pedagogical Techniques, Research Methodology, and Nutrition Research.

Introduction

Table 1: Descripción de los Colegios evaluados

COLEGIO	LOCALIDAD	PARTIDO
EP N°76	Mar del Plata. Buenos Aires.	General Pueyrredón
EP No. 68	Mar del Plata. Buenos Aires.	General Pueyrredón
CED	Cte. Nicanor Otamendi. Buenos Aires.	General Alvarado
Dorrego	Vicente López. Buenos Aires	West Florida
San José Workshop	Vicente López. Buenos Aires.	West Florida
No. 26	Quilmes. Buenos Aires.	Quilmes
No. 7	Quilmes. Buenos Aires.	Quilmes
No. 79	Quilmes. Buenos Aires.	Quilmes
San José Institute	Tucumán	Beautiful View
No. 388	Tucumán	Beautiful View
Don Bosco Dining Room	Tucumán	San Miguel de Tucumán
No. 133	Rosario. Santa Fe.	Rosary
Argentine flag	Hipódromo Village, Mendoza	Godoy Cruz.
Leonardo Da Vinci	Hipódromo Village, Mendoza	Godoy Cruz.
School No. 295	Neuquén	Bariloche
José María Paz School	Saint John	Albardón

Source: Own elaboration

This research provides an opportunity to characterize a population of school-aged children, even though it is not a closed group nor can the data be extrapolated to the entire population. Childhood malnutrition and undernutrition are common consequences of poor nutrition. Growth assessment using anthropometric indicators is important for reflecting children's health status, as it expresses the final common pathway through which all the factors that modulate growth converge: nutrition, health, and general well-being. Therefore, the objective of this research is to evaluate the nutritional status of children who participated in the Activarse program in the different provinces, implemented during 2012, using the anthropometric indicators T/E and BMI/E. This allows for the identification of children with normal growth parameters and those at risk of

In our country, there are no representative figures on the nutritional status of children aged 6 to 10. The National Nutrition and Health Survey ² was conducted on children under 5 years of age, and the National Risk Factor Survey (2009) ³ was conducted on children over 18 years of age. Isolated studies have been found that reflect a growing increase in the rate of childhood overweight and a decrease in underweight. To determine the nutritional status of the population participating in the Pepsico Foundation's Activarse program, anthropometric measurements of weight and height were taken on 1,253 children from 16 schools in 10 towns in argentina.

malnutrition, either due to nutrient excess or deficiency.

General objective

To evaluate the nutritional status of children between 5 and 10 years old who participated in the Activarse program during 2012.

Conduct a nutritional diagnosis of the sample to guide the program's actions.

Specific objectives

To determine the number of children participating in the Activarse Program who are normal weight, underweight, or overweight using BMI/Age during 2012.

Determine the number of children participating in the Activarse Program who are of normal, short, or

tall stature using the Height/Age indicator who participated during 2012.

Population and Sample

The total population participating in the PepsiCo Foundation's Activarse program nationwide is 2,623 children. This time, 1,253 children, representing 47.76% of the total, were evaluated.

The sample was non-probabilistic by volunteers, attempting to evaluate as many children as possible.

The inclusion criteria were

First-year students from schools participating in the Activarse program who attended class on the day of the measurements.

Have the consent signed by parents/guardian

The total sample consisted of 1,253 children, aged 5 to 10, from 16 schools in 10 localities across 6 provinces in Argentina, selected in a non-random and non-probabilistic manner.

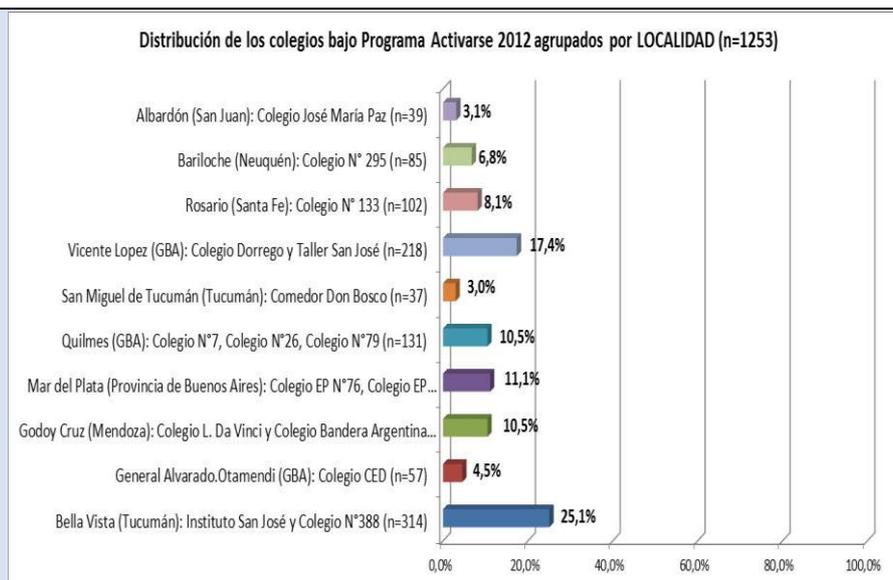


Chart No. 1: Distribution of the Schools participating in the Activarse Program grouped by LOCATION (n=1253).

Source: Own elaboration

The 16 schools evaluated belong to the localities of Vicente López, Quilmes, Mar del Plata and Otamendi (Buenos Aires province), Bella Vista and San Miguel de Tucumán (Tucumán province), Rosario (Santa Fé province), Godoy Cruz (Mendoza province), Bariloche (Neuquén province) and Albardón (San Juan province).

Materials and methods

A quantitative approach, descriptive in scope, and cross-sectional in design. During 2012, anthropometric measurements were taken from participants in the Activarse program to collect the data necessary for the anthropometric assessment. To perform the calculation, the current weight and height of each child are required. The total sample size obtained was 1,253 children nationwide. For this purpose, the University conducted five operations in participating schools in Buenos Aires to collect the data necessary for the anthropometric assessment. Through these operations, a total of 350 children, between 5 and 10 years old, from five of the 16

schools evaluated throughout the research were evaluated.

Each operation consisted of the transport of qualified personnel in a Maimonides University van designated for this purpose, to measure the weight and height of each child and collect personal data for analysis (e.g., first and last name, date of birth, grade, etc.). During each operation, three to four measurement stations were set up with a properly calibrated University stadiometer and scale. To obtain both body weight and height, the children were asked to remove their coats and shoes, leaving only a light t-shirt and pants. Height measurements were obtained according to international parameters regarding the proper posture for participants. The teachers involved as coordinators were Lic. Lucrecia Brovaronne (student coordinator) and Lic. Carla Carrazana (nutrition and public health teacher). The students who participated were Estela Gómez, Roxana Sánchez, Cristina Serna, and Mariela Greizerstein.

The statistical program developed by the World Health Organization (WHO, 2011). the Anthro Plus Software which allows the evaluation of nutritional

status through the use of the Z score [1]. To establish the nutritional diagnosis, the cut-off points were used, as detailed in Table 2. For the Body Mass Index (BMI)/ Age, those published by the WHO and confirmed and adopted by the Argentine Society of

Pediatrics (SAP, 2011), Nutrition Committee were used. [4,5] In relation to the cut-off points used for Height/Age, the points adopted by the Ministry of Health of the Province of Buenos Aires (Plan Nacer, 2011) were used in order to include a larger population at risk of short stature [6].

Table 2: Cut-off points used in children for the BMI/ age indicators and their respective nutritional diagnosis.

BMI/Age		
	Pje Z	PC
Obesity	> 2	>97
Overweight	2 to 1	97-85
Normal weight	1 to -1	85-15
Risk of Low Weight	-1 to -2	15-3
Underweight	2 to -3	3-1
Very Low Weight	<-3	< 1

Table 3: Cut-off points used in children for the T/age indicators and their respective nutritional diagnosis.

Size/Age		
	Pje Z	PC
High Size	> 2	> 97
Appropriate size	2 to -1.5	97-7
Short stature alert	1.5 to -2	7-3
Short stature	-2 to -3	3-1
Very Short Stature	< -3	<1

Source: and obs: BMI: Body Mass Index

After determining the diagnosis of each child, the frequencies, averages and percentages of the variables analyzed were analyzed.

Statistical Analysis: The results were analyzed using Excel® 97-2003. Descriptive statistical functions were used for analysis and interpretation, and frequencies of the variables of interest were assessed.

Results

Total, of 1,253 children between the ages of 6 and 10 were evaluated. The total sample consisted of 46 % (n=572) males and 54% (n=681) females. See Table 4: Description of the participants evaluated in the Activarse program during 2012, distributed by sex and age (n=1,253).

Table 4: Description of the participants evaluated in the Activarse 2012 Program, distributed by sex and age (n=1253).

Age	Female		Male		Total	
	n	%	n	%	n	%
5	9	1.3%	8	1,4%	16	1,3%
6	203	29,8%	146	25,5%	349	27,9%
7	221	32,5%	201	35,1%	422	33,7%
8	185	27,2%	142	24,8%	327	26,1%
9	43	6,3%	40	7,0%	83	6,6%
10	13	1,9%	24	4.2%	37	3.0%
11	5	0.7%	9	1.6%	14	1.1%
12	2	0.3%	2	0.3%	4	0.3%
Grand Total	681	100.0%	572	100.0%	1253	100.0%

Source: Own elaboration

The Height-for-Age index was used to assess longitudinal growth from birth to the present. The results of this indicator showed that 85.6% of the

population had an adequate height, 5.4% had an alert height, 4.4% had a short height, 0.4% had a very short

height, and 4.2% had a tall height, with the same distribution between boys and girls.



Chart 2: Evaluation of Nutritional Status through Height/Age Index of the total number of students evaluated participating in the Activarse 2012 Program (n=1253).

Source: Own elaboration

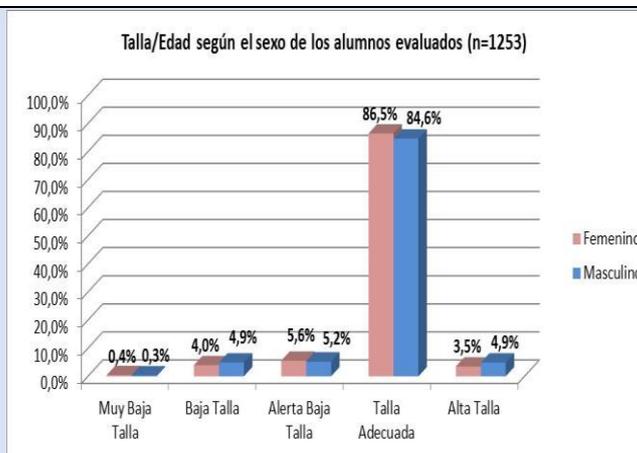


Chart 3: Nutritional Evaluation through the Height/Age Index according to the sex of the total number of students evaluated participating in the Activarse 2012 Program (n=1253).

Source: Own elaboration

To assess current nutritional status, the BMI/Age Index was used. The BMI/Age indicator showed that 52.9% were normal weight, 18.1% were obese, 21.4%

were overweight, 6.2% were at risk of being underweight, 1% were underweight, and 0.4% were very underweight.

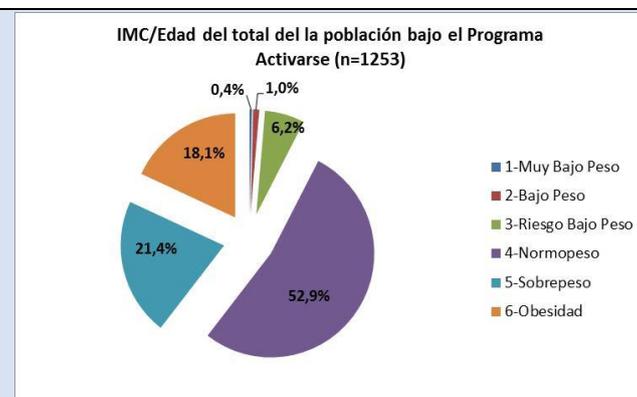


Chart 4: Evaluation of Nutritional Status through BMI/Age Index of the total number of students evaluated participating in the Activarse 2012 Program (n=1253).

Source: Own elaboration

When the data of the BMI/Age indicator shown are divided according to the sex of the children, a greater

presence of Obesity can be observed in the male sex, finding a significant difference of 21.3% in the male

sex versus 15.4% in women, with a score $Z = 2.69$ and the critical $Z 1.96$, alpha 0.05). With respect to the Normal Weight category, it was found that the female sex has a higher percentage (56.1% versus 49.1% in

the male sex) and in relation to the rest of the other categories of the BMI/Age indicator, no differences were found by sex.

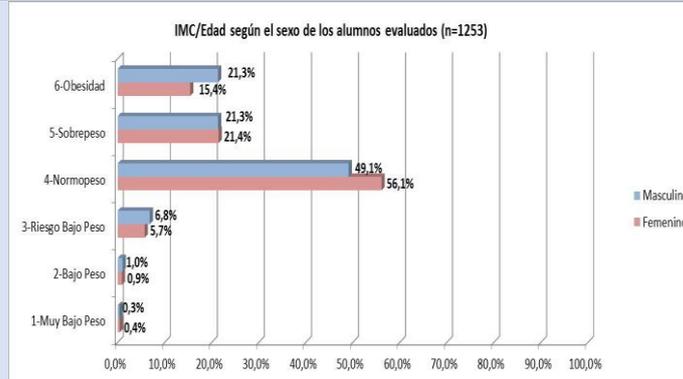


Chart 5: Nutritional Evaluation through the BMI/Age Index according to the sex of the total number of students evaluated participating in the Activarse Program (n=1253).

Source: Own elaboration

When differentiating the results of the anthropometric measurements according to the different provinces, it was found that Neuquén had the highest percentage of normal weight with 75.3%, within all the categories of Risk of Low Weight and Low Weight, it was the province of Neuquén that obtained the highest percentages (20% and 2.4%

respectively), in the category of Very Low Weight, Buenos Aires and Tucumán obtained the highest percentages (0.6%) and within the categories of overweight and obesity, the province of Tucumán reflected the highest percentages (27.1% and 30% respectively).

Table 5: Distribution percentage of the IMC/E indicator according to the different provinces.

Provinces	Very low weight		Underweight		Risk of Low Weight		Normal weight		Overweight		Obesity		Grand Total	
Buens Aires	3	0.6%	8	1.5%	32	5.9%	298	54.7%	122	22.4%	82	15.0%	545	100.0%
Mendoza	0	0%	1	1%	12	9%	81	62%	17	13%	20	15%	131	100%
Neuquén	0	0.0%	2	2.4%	17	20.0%	64	75.3%	2	2.4%	0	0.0%	85	100.0%
Saint John	0	0.0%	0	0.0%	3	7.7%	22	56.4%	9	23.1%	5	12.8%	39	100.0%
Santa Fe	0	0.0%	0	0.0%	2	2.0%	63	61.8%	23	22.5%	14	13.7%	102	100.0%
Tucumán	2	0.6%	1	0.3%	12	3.4%	135	38.5%	95	27.1%	106	30.2%	351	100.0%
Grand Total	5	0.4%	12	1.0%	78	6.2%	663	52.9%	268	21.4%	227	18.1%	1253	100.0%

Source: Own elaboration

Regarding longitudinal growth, the T/E indicator determined that the locality with the highest percentage of normal height was Neuquén with 92%, while the provinces of Tucumán and Mendoza showed a higher percentage of the Very Short Stature

and Short Stature binomial with 7%. Regarding the short height alert, the highest percentage was 6% present in the provinces of Neuquén, Santa Fe and Tucumán, and tall height was 7% belonging to the province of Tucumán.

Table 6: Distribution percentage of the IMC/E indicator according to the different provinces.

Provinces	Very Short Stature	Short stature	Short Stature Alert	Proper Size	High Size	Grand Total	
Buenos Aires	1	0%	16	3%	28	5%	473 87%
Mendoza	1	1%	8	6%	6	5%	116 89%
Neuquén	0	0%	2	2%	5	6%	78 92%
Santa Fe	1	1%	5	5%	6	6%	90 88%
Saint John	0	0%	1	3%	2	5%	36 92%
Tucumán	1	0%	23	7%	22	6%	280 80%
Grand Total	4	0%	55	4%	69	6%	1073 86%

If a comparison is made with respect to the measurements of the year 2011, it can be observed that the total population was lower in the year 2011 (n=534), and in 2012, 5 more provinces were incorporated.

Regarding the comparison of the results of the Height/Age indicator in both years, it can be observed that:

In 2012, the proportion of children with short stature increased from 2.4% to 4.4%. Of children in the categories with some negative alteration in height (alert short height, short height, and very short

height), an increase was obtained from 6.8% to 10.2%, with the population evaluated in 2012 presenting higher rates of chronic malnutrition. Tall height increased in 2012 from 2.2% to 4.2% and adequate height decreased from 90.8% to 85.6%. The main alteration in nutritional status with respect to the BMI/Age indicator in 2011 was the presence of excess body weight (47.4%). In 2012, a lower percentage of the Overweight-Obesity binomial was observed (39.5%). Regarding the Underweight categories, the proportion increased from 3.8% in 2011 to 7.6% in 2012.

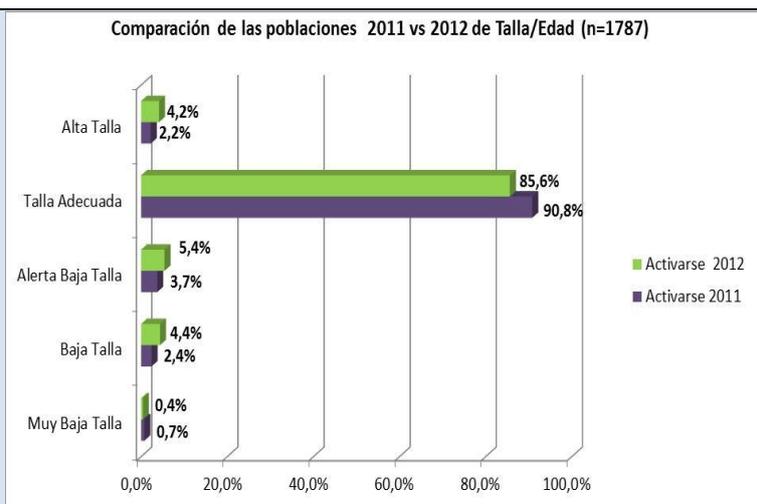


Chart 6: Comparison of the Nutritional Evaluation through the Height/Age Index of the students participating in the Activarse Program 2011 vs. 2012 (n=1787)

Source: Own elaboration

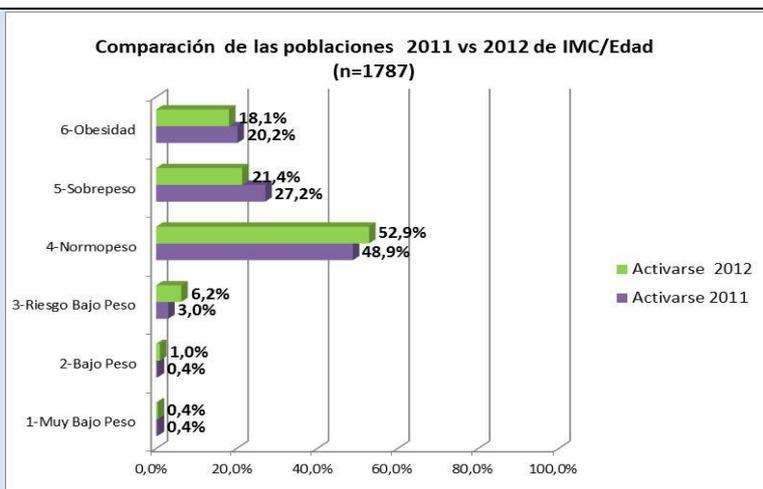


Chart 7: Comparison of the Nutritional Evaluation through the BMI/Age Index of the evaluated population participating in the Activarse Program 2011 vs. 2012 (n=1787).

Source: Own elaboration

Discussion and suggestions

According to the data provided in the first Childhood Obesity Conference "Towards the map of Obesity in Argentina", it was determined that the prevalence of

overweight and obesity in school age is 19% and 17.7% respectively, establishing a total of 36.7% between both categories, with no differences found with the population of this study (39.4% of the Overweight and Obesity binomial) [7].

Regarding the study of nutritional assessment through anthropometric evaluation, differences are observed in the values found with other research conducted in our country. Although there are few published studies that cover the age groups investigated in this study (5 to 10 years), existing articles point to figures between 24 and 54% of overweight and obesity. A study conducted in the province of Santa Fe on children aged 6 to 12 years found that 49% were overweight and obese [8].

Another study conducted at Elizalde Hospital (2005) showed that overweight is found in 20.9% of girls and 19.8% of boys, and in the obesity category in 6.4% of girls and 7.8% of boys. In turn, similar figures of excess weight were found in a study conducted by ILSI (2005-2006) in 80 public schools in the City of Buenos Aires and the Conurbano, presenting Overweight in 16.2% of girls and boys, Obesity in 8.3% of girls and 15.2% of boys [9].

Various studies conducted in different countries show figures similar to those obtained in this study. A recent study conducted in Mexico on children aged 6 to 14 years showed a 43% rate of overweight/obesity among 321 children [10]. A study conducted in Peru also found that 44.8% of children aged 6 to 10 years were overweight/obese out of a total of 600 children evaluated [11].

The NANHES survey of American children, ages 2 to 19, showed obesity rates of 16.9% [12].

In the present study, higher rates of overweight/obesity were found in males (21.3% in both categories). The results are consistent with those described in various studies, such as the study conducted on the Spanish child population, and the study conducted in Peru by Rosado-Cipriano et al., 2011 [13].

Childhood is considered a crucial stage in human evolution, characterized by two phenomena: growth and development, for which adequate nutrition is essential. It is therefore important to highlight that 14.4% of the population studied presented some alteration in their nutritional status with respect to height, and 47.1% presented some alteration in their weight, either due to deficiency or excess.

Regarding the consequences of finding cases of children in the different categories of short stature (10.2%), the WHO has incorporated the term "double burden of malnutrition." This term refers to children who have suffered chronic malnutrition, causing shortening of the stature and, combined with

overnutrition over time, leading to the high prevalence of obesity found in our country [14,15].

The possibility of establishing an early diagnosis of childhood obesity allows for treatment and prevention activities. In turn, it creates an opportunity for social intervention to address a public health problem. Nutritional education is essential for children, parents, and caregivers in the home, as well as for changes in management policies in daycare centers and schools.

The growing epidemic of chronic noncommunicable diseases, which affects both developed and developing countries, is linked to changes in eating habits and lifestyle. In this regard, the WHO supports the need to establish nutritional and physical activity interventions in response to the global epidemic of these diseases [16,17]. Within this framework, PepsiCo's contribution through Activarse (Get Active) is relevant. This program promotes the incorporation of healthy habits, such as physical activity and good nutrition. This program seeks to contribute to the development of children as agents of change for their peers, families, and communities by empowering them with healthy lifestyle habits, increasing physical activity, and developing basic knowledge to lead a healthy and sustainable life.

In terms of future interventions, those focused on qualitative assessments of nutrition, conducted not only by children but also by their parents, are strategic, given the significant impact they have on shaping their children's eating habits. The content of future educational activities should focus on promoting dietary diversification and better food selection, with high-quality nutrients and low in simple sugars and fats, which promote childhood obesity.

In this regard, the Activarse Program has been carrying out activities with teachers, parents, and students, placing special emphasis on the importance of incorporating daily habits that positively impact family Health.

Breakfast intake
Incorporating seasonal fruits and vegetables into your diet

The realization of movement and physical activity
During the 2013 cycle, data collection tools are planned to be incorporated, allowing for continued monitoring of the Program by incorporating abdominal circumference measurements into anthropometric measurements. Work will continue

Work will continue

on education and the promotion of healthy habits, and the integration of school gardens will be promoted to sustainably improve the quality of nutrition and reduce the percentage of obesity and overweight among the total population.

Conclusion

A nutritional assessment was carried out on a total sample of 1,253 children from six provinces in Argentina (Buenos Aires, Mendoza, Neuquén, San Juan, Santa Fé and Tucumán).

The sample was distributed with 54.3% (n=680) girls and 45.7% (n=572) boys.

According to the Height/Age Index, 85.6% of the total population is of adequate height, 10.2% has some alteration in the Short Height categories, and 4.2% is of Tall Height.

When evaluating the BMI/Age Index, it was observed that 52.9% of the total population has Normal Weight, 7.6% belongs to the Underweight categories, 21.4% reflects Overweight, 18.1% Obesity (these last two categories representing 39.5% of the total population).

When the BMI/E indicator results were differentiated by sex, a significant difference was found between the percentage of male cases in the Obesity category compared to women (21.3% vs. 15.4%), and in the Normal Weight category, women had a higher percentage (56.1% versus 49.1% in men). Regarding the remaining categories (Overweight and Underweight categories), no differences were found in the distribution of cases.

The province with the highest percentage of normal height was Neuquén Province 92%.

The province of Tucumán is the one with the greatest alteration in the height /age index (chronic malnutrition), presenting 36.51% (n=46)

The province with the highest percentage of tall stature was Tucumán (7%).

The Province of Neuquén had the highest percentage of Normal Weight, Risk of Low Weight and Low Weight (75.3% and 20%, and 2.4% respectively)

The province of Tucumán had the highest percentage of Very Low Weight (0.6%) and the highest percentage of children diagnosed with Overweight and Obesity (27.1% and 30% respectively).

Compared to 2011 with respect to the Height/S indicator, the presence of some negative alteration (alert low height, low height, very low height) increased from 6.8% to 10.2% in 2012 and a lower

proportion of the total population was obtained with the SP- Obs binomial (47.4% in 2011 vs. 39.5% in 2012). In relation to the number of children within the Low Weight categories, higher percentages were obtained in 2012 (7.6%) versus 3.8% in 2011.

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