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Artículo Original / Original Article

Prevalence of overweight and obesity in the state of Piauí, Brazil: A time trend analysis (2012-2021)

Prevalencia de sobrepeso y obesidad en el estado de Piauí, Brasil: Un análisis de tendencia temporal (2012-2021)

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ABSTRACT

The present study aimed to analyze trends in the prevalence of overweight and obesity in Primary Health Care users in Piauí between 2012 and 2021. We conducted an ecological study with data from the Food and Nutrition Surveillance System. Overweight and obesity were classified as recommended by the World Health Organization. A linear regression was performed to estimate the trend in the prevalence of overweight and obesity. There was an increase in the prevalence of overweight and obesity in Piauí in the period studied in all age groups and in both sexes. However, the growth trend was stationary for overweight in males in the age groups of children and adolescents, and for obesity in both sexes amongst 0-9-year-olds. The study showed an increase in the prevalence of overweight and obesity between 2012 and 2021 in all age groups and in both sexes. However, the growth trend was stationary in some.
Keywords: Nutritional Surveillance; Obesity; Overweight; Primary Health Care.

RESUMEN

El presente estudio tuvo como objetivo analizar las tendencias en la prevalencia de sobrepeso y obesidad en usuarios de la Atención Primaria de Salud de Piauí entre 2012 y 2021. Estudio ecológico realizado con datos del Sistema de Vigilancia Alimentaria y Nutricional. El sobrepeso y la obesidad fueron clasificados según lo recomendado por la Organización Mundial de la Salud. Se realizó una regresión lineal para estimar la tendencia en la prevalencia de sobrepeso y obesidad. Hubo

un aumento en la prevalencia de sobrepeso y obesidad en Piauí en el período estudiado en todos los grupos de edad y en ambos sexos. Sin embargo, la tendencia de crecimiento fue estacionaria para el sobrepeso en varones en los grupos de edad de niños y adolescentes, y para la obesidad en ambos sexos entre los 0-9 años. El estudio mostró un aumento en la prevalencia de sobrepeso y obesidad entre 2012 y 2021 en todos los grupos de edad y en ambos sexos. Sin embargo, la tendencia de crecimiento fue estacionaria en algunos.
Palabras clave: Atención Primaria de Salud; Obesidad; Sobrepeso; Vigilancia nutricional.

INTRODUCTION

Obesity is a chronic non-communicable disease of multifactorial etiology characterized by excessive accumulation of body fat. This condition represents a relevant public health problem due to its high prevalence worldwide, with a general trend towards an increase in all countries between 2006 and 2016, and because it is associated with an increased risk for the development of other chronic diseases, such as diabetes, cancer and cardiovascular diseases[1,2,3].

In Brazil, overweight has been increasing in recent years in both sexes, in all income levels and age groups. According to the National Health Survey published in 2019, the prevalence of obesity and overweight increased significantly in the total population between 2013 and 2019, from 20.8 to 25.9% and from 57.0 to 60.3%, respectively. The state of Piauí follows the trend of national growth and the proportion of overweight individuals in the state increased from 10.6% in 2008 to 14.3% in 2016, while obesity increased from 2.6% to 5.2% in the same period[4,5].

The Food and Nutrition Surveillance System (SISVAN) contains information regarding the anthropometric assessment and food consumption markers of individuals who access primary health services in Brazil. These data are important for monitoring the population and identifying the individuals or groups most susceptible to the development of diseases related to nutritional status, such as obesity, as well as for guiding programs and public policies in the context of food and nutrition and assessing their effectiveness[6].

Considering the increase in the prevalence of obesity in Brazil and in the state of Piauí, and the importance of anthropometric data to guide programs and public policies on food and nutrition, the present study aimed to analyze trends in the prevalence of overweight and obesity in Primary Health Care users in Piauí between 2012 and 2021.

MATERIAL AND METHODS

This is an ecological time series study of the prevalence of overweight and obesity in the population of the northeastern Brazilian state of Piauí, encompassing the years from 2012 to 2021. Secondary data from SISVAN public domain reports were used, through the Tabnet system (DATASUS) of the Ministry of Health. For the present work, all types of follow-ups registered on the platform were considered: (a) SISVAN Web, (b) Bolsa Família Management System (DATASUS) and (c) e-SUS AB.

In 2012, Piauí had an estimated population of 3,171,456 inhabitants, while in 2021 this total was 3,237,279 inhabitants[7]. The percentage of SISVAN coverage was calculated by dividing the number of individuals with a nutritional status record in the system by the total population of the state, and its result multiplied by 100.

To generate reports on the nutritional status of the registered population, the following search criteria were established in the system: reference years from 2012 to 2021, reference month (all), grouping by state (Piauí) and health regions of Piauí (all). In addition, other filters were used: stage of life (child, adolescent, adult, elderly), index (Body Mass Index (BMI) or BMI by age depending on age group), and sex (female and male).

In the system, the classification of nutritional status was performed according to the recommendations of the World Health Organization (WHO)[8]. For adults and elderly people, the BMI was used, and for children (<10 years) and adolescents (10-19 years), the BMI/age. BMI was obtained by calculating weight in kilograms divided by height in meters squared. Such data were measured by the teams in the health services of Primary Health Care in Piauí. The cutoff points used for each age group to determine overweight and obesity in the system were: a) Children up to 5 years: overweight: > z-score +2 and ≤ z-score +3; severe obesity: > z-score +3, b) Children from 5 to 10 years: overweight: > z-score +1 and ≤ z-score +2; obesity: > z-score +2 and ≤ z-score +3; severe obesity: > z-score +3, c) Adolescents – 10 to 19 years: overweight: ≥ z-score +1 and < z-score +2; obesity: ≥ z-score +2 and ≤ z-score +3; severe obesity: > z-score +3, d) Adults – 20 to 59 years: overweight: BMI between 25 and 29.9 kg/m^2; obesity: BMI ≥30kg/m^2; e) Elderly - 60 years or older: overweight: BMI≥27kg/m^2.

It is noteworthy that for elderly people, the classification of nutritional status according to BMI adopted by SISVAN considers only the overweight category.

The outcomes evaluated were the prevalence of overweight and obesity. The formula below was used to calculate the prevalence:

The independent variables used in the study were: age groups, divided into four age categories in years: 0 to 9; 10 to 19; 20 to 59; 60 or more and in total sample, and sex: male and female.

$$\frac{\text{Number of cases of overweight or obesity} \times 100}{\text{(number of registered population)}}$$

In the trend analysis, logarithmic transformation of the values of the time series was performed to measure the rate of variation of the line that adjusts the points of the time series, in addition to reducing the heterogeneity of the residual variance of the linear regression analysis[9].

To identify the existence of autocorrelation between series residues at two successive points in time (1st order autocorrelation), the Durbin-Watson test was used. Generalized linear regression was performed to infer the rate of change, using the Prais-Winsten method, in which random errors include a 1st order serial autocorrelation structure.

From this, the Annual Percentage Variation (APV) was calculated for the quantitative estimate of trend and determination of the 95% confidence interval (95%CI), using the equations, respectively:

$$APV = [-1+10b1]\times 100\%$$

$$95\%CI = [-1+10(b1 \pm t \times SE)]\times 100\%$$

Where: $b1$ is the beta coefficient; t is the tabulated value of the Student's T distribution; SE is the standard error[9].

Analyses were stratified by sex and age group (or stage of life). A level of statistical significance was considered when p-value <0.05. Data tabulation, descriptive analysis, graphics and calculation of prevalence rates were performed using the Microsoft Office Excel 2016® software; and trend analysis, using the Stata software, version 14.0.

This study was built based on a secondary database, from SISVAN, which is in the public domain and freely accessible, thus, it did not present a risk for direct implications for human beings. For this reason, there was no need to refer the study to the Research Ethics Committee.

RESULTS

Regarding the amount of data referring to nutritional status recorded in SISVAN, during the period studied (Table 1), most were female, and, compared to the others, the age group with the highest number of registered information was that of 20 to 59 years. In turn, there was a lower percentage of data referring to males and individuals aged 60 years or older.

Table 1. Characteristics of people registered in the Food and Nutrition Surveillance System, in the state of Piauí, 2012-2021.

Characteristics	2012-2013	2014-2015	2016-2017	2018-2019	2020-2021
Sex					
Female	1,041,535 (87.1)	1,220,107 (84.7)	1,331,931 (80.7)	1,409,982 (79.5)	737,961 (72.3)
Male	154,599 (12.9)	220,881 (15.3)	318,254 (19.3)	364,667 (20.5)	282,893 (27.7)
Age (years)					
0-9	330,921 (27.7)	431,450 (29.9)	475,793 (28.8)	527,963 (29.8)	267,026 (26.1)
10-19	220,154 (18.4)	267,490 (18.6)	275,226 (16.7)	318,795 (18.0)	145,859 (14.3)
20-59	643,161 (53.8)	707,567 (49.1)	804,694 (48.8)	820,371 (46.2)	493,719 (48.4)
≥60	1,898 (0.2)	34,481 (2.4)	94,472 (5.7)	107,520 (6.1)	114,250 (11.2)
Region					
Entre Rios	285,440 (23.9)	373,809 (25.9)	486,426 (29.5)	525,570 (29.6)	320,211 (31.4)
Vale do Canindé	53,347 (4.5)	59,533 (4.1)	69,196 (4.2)	75,426 (4.3)	39,156 (3.8)
Serra da Capivara	75,947 (6.3)	83,313 (5.8)	90,524 (5.5)	102,703 (5.8)	56,899 (5.6)
Cocais	174,541 (14.6)	224,435 (15.6)	266,035 (16.1)	290,408 (16.4)	180,796 (17.7)
Tabuleiro do Alto Parnaíba	19,153 (1.6)	26,624 (1.8)	31,373 (1.9)	37,170 (2.1)	21,355 (2.1)
Vale dos Rios Piauí e Itaueiras	78,833 (6.6)	96.,017 (6.7)	99,071 (6.0)	104,626 (5.9)	42,420 (4.2)
Chapada das Mangabeiras	95,591 (8.00)	114,573 (8.00)	123,140 (7.5)	134,010 (7.6)	66,635 (6.5)
Vale do Rio Guaribas	183,425 (15.3)	189,061 (13.1)	202,895 (12.3)	228,629 (12.9)	142,428 (14.0)
Planície Litorânea	96,419 (8.1)	120,766 (8.4)	117,163 (7.1)	114,405 (6.4)	57,307 (5.6)
Vale do Sambito	48,918 (4.1)	57,974 (4.0)	64,298 (3.9)	60,845 (3.4)	37,023 (3.6)
Canaubais	84,520 (7.1)	94,883 (6.6)	100,064 (6.1)	100,857 (5.7)	56,624 (5.5)

After quantifying the data collected from each health territory in Piauí, it was observed that the information regarding users of the Entre Rios territory, where the capital of the state of Teresina is located, corresponded to most of the data collected.

As for the coverage of SISVAN, in 2012, the system presented information on 16.2% of the population of Piauí, while in 2021 the number of registered people represented 17.7% of the total population of the state, which corresponded to an increase of 9.3% (data not shown in table).

There was an increase in the prevalence of overweight and obesity in Piauí over the years studied when considering the total sample and in all age groups and in both sexes after stratification (Figure 1 and 2). The largest increases in the prevalence of overweight occurred in the age groups from 0 to 9 years and 10 to 19 years of female users. Regarding the prevalence of obesity, the greatest increase occurred in the age group from 10 to 19 years of both sexes.

An increasing trend towards overweight was observed in the general sample of Piauí (Table 2). After stratification, an increasing trend was observed for females of all age groups, with emphasis on an APV of 5.40% and 5.01% for the age groups 10 to 19 years and 0 to 9 years, respectively. In males, there was an increasing trend of overweight in the age groups from 20 to 59 years and ≥60 years.

When analyzing the prevalence of obesity over the years studied (Table 3), it was possible to verify an increasing trend in the general sample of Piauí. After stratification, an increasing trend was observed in both sexes in the age groups from 10 to 19 years and 20 to 59 years (APV>5%).

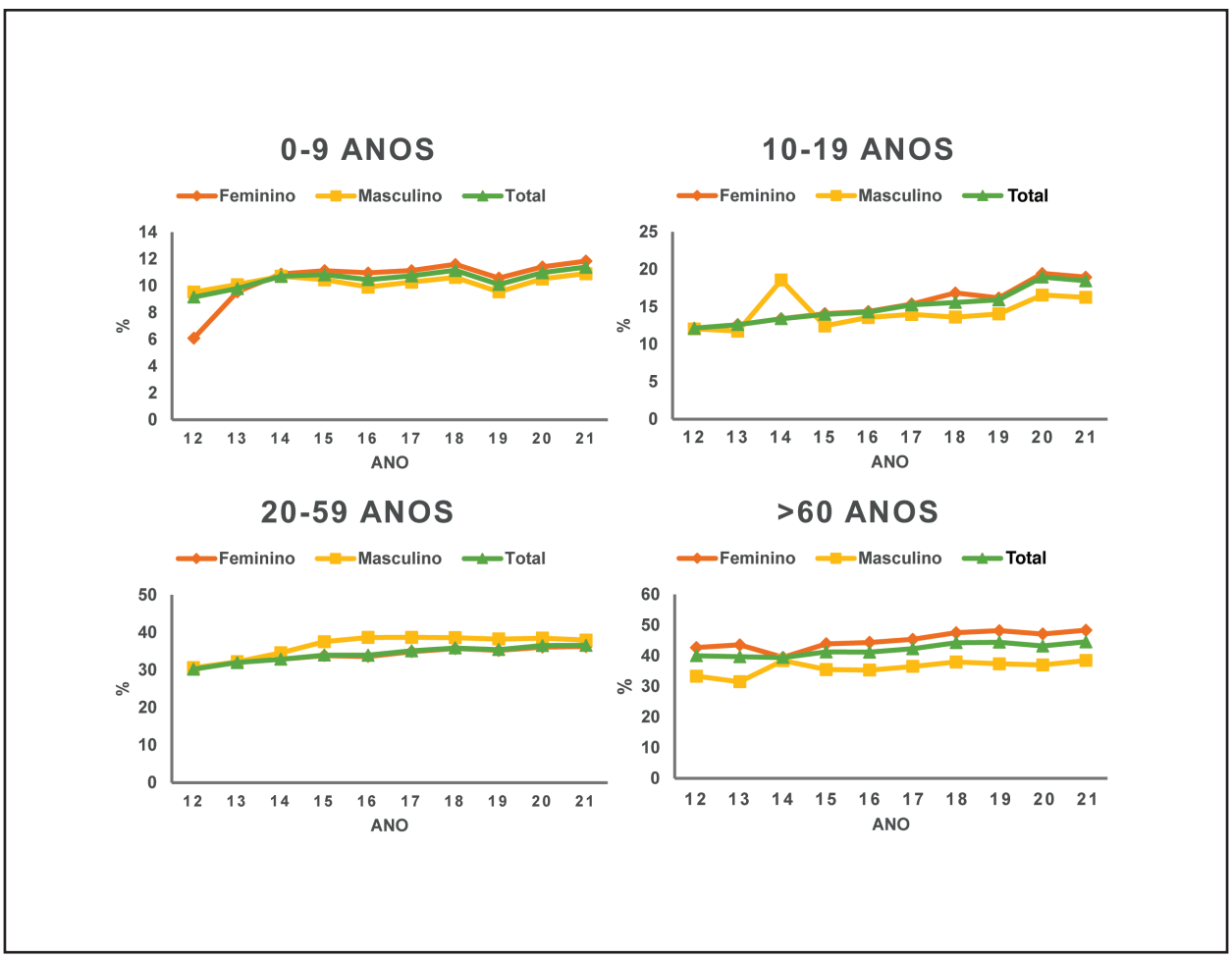

Figure 1: Historical series on the prevalence of overweight among age groups, by sex, in the state of Piauí, 2012-2021. Prevalences (%): 0-9: Female (2012: 6.1; 2021: 11.8), Male (2012: 9.5; 2021: 10.9); Total (2012: 9.1; 2021: 11.4); 10-19: Female (2012: 12.1; 2021:18.9), Male (2012: 12.0; 2021:16.2); Total (2012: 12.1; 2021: 18.5); 20-59: Female (2012: 30.2; 2021: 36.2), Male (2012: 30.6; 2021:38.0); Total (2012: 30.2; 2021: 36.5); >60: Female (2012: 42.7; 2021: 48.3), Male (2012: 33.3; 2021:38.5); Total (2012: 40.0; 2021: 44.5).

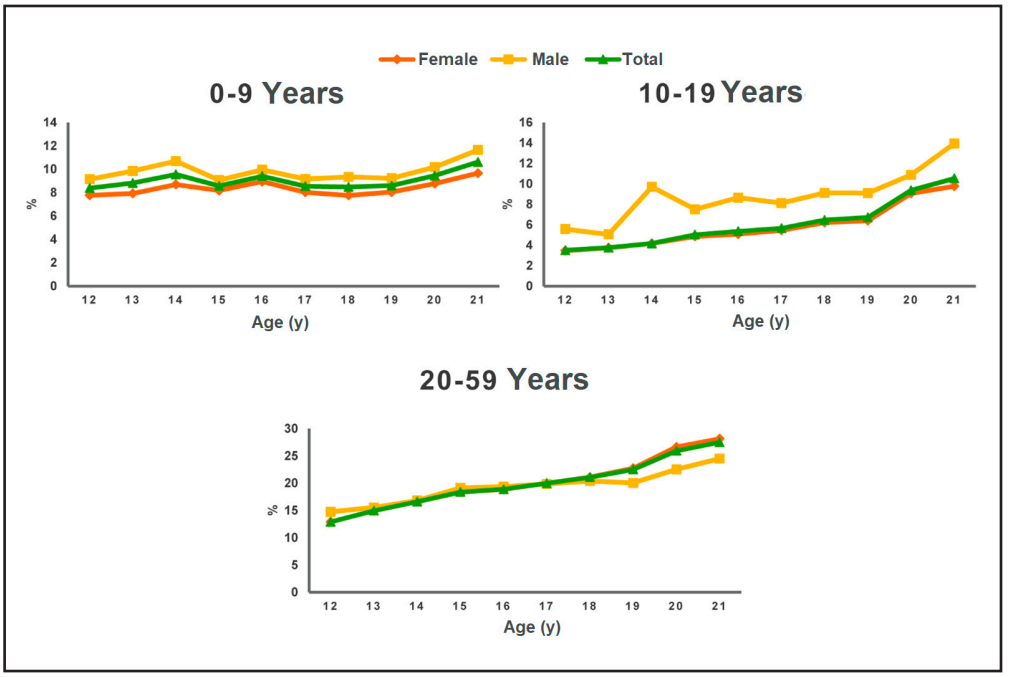

Figure 2: Historical series on the prevalence of obesity among age groups, by sex, in the state of Piauí, 2012-2021.Prevalences (%): 0-9: Female (2012: 7.8; 2021: 9.7), Male (2012: 9.1; 2021: 11.6); Total (2012: 8.4; 2021: 10.6); 10-19: Female (2012: 3.5; 2021: 9.8), Male (2012: 5.6; 2021: 13.9); Total (2012: 3.5; 2021:10.5); 20-59: Female (2012: 12.9; 2021:28.1), Male (2012: 14.8; 2021: 24.5); Total (2012: 12.9; 2021: 27.5).

Table 2. Trend and annual percentage variation of overweight by age group, according to sex, in the state of Piauí, 2012-2021. APV: Annual Percentage Variation; bLL= lower limit; cUL= upper limit.

Variable	Confidence Interval				
	APV[a]	LL[b]	UL[c]	P value	Trend
General					
Female	2.88	2.43	3.32	0.000	Increase
Male	7.28	1.86	12.99	0.014	Increase
Total	3.02	2.41	3.62	0.000	Increase
0 a 9					
Female	5.01	0.04	9.85	0.037	Increase
Male	0.56	-0.50	1.63	0.260	Stationary
Total	1.64	0.30	3.00	0.022	Increase
10 a 19					
Female	5.40	4.90	5.91	0.000	Increase
Male	2.30	-0.34	5.00	0.080	Stationary
Total	4.91	4.15	5.66	0.000	Increase
20 a 59					
Female	1.88	1.31	2.45	0.000	Increase
Male	2.41	0.25	4.62	0.033	Increase
Total	2.00	1.41	2.59	0.000	Increase
≥60					Increase
Female	1.82	0.97	2.68	0.001	Increase
Male	1.53	0.59	2.47	0.005	Increase
Total	1.45	0.91	1.99	0.000	Increase

APV: Annual Percentage Variation; [b]LL= lower limit ; [c]UL= upper limit.

Table 3. Trend and annual percentage variation of obesity by age group, according to sex, in the state of Piauí, 2012-2021.

Variable	Confidence Interval				
	APV[a]	LL[b]	UL[c]	P value	Trend
General					
Female	7.76	6.18	9.36	0.000	Increase
Male	5.67	2.28	9.17	0.005	Increase
Total	5.74	4.26	7.25	0.000	Increase
0 a 9					
Female	1.48	-0.55	3.55	0.132	Stationary
Male	1.20	-1.08	3.53	0.261	Stationary
Total	1.44	-0.68	3.59	0.157	Stationary
10 a 19					
Female	11.87	9.66	14.12	0.000	Increase
Male	8.42	4.89	12.07	0.000	Increase
Total	12.57	10.27	14,92	0.000	Increase
20 a 59					Increase
Female	8.45	7.09	9.82	0.000	Increase
Male	5.33	3.80	6.88	0.000	Increase
Total	8.18	6.84	9.53	0.000	Increase

APV: Annual percentage variation; [b]LL= Lower limit; [c]UL= Upper limit.

DISCUSSION

The present study showed an increase in the prevalence of overweight and obesity in the Brazilian state, Piauí, between 2012 and 2021, in the total population registered in SISVAN and, after stratification, the increase was also observed in all age groups and in both sexes. However, there was no evidence of a significant increasing trend of overweight for males aged 0 to 9 years and 10 to 19 years and for obesity in both sexes in the age group 0 to 9 years.

The results of studies and population surveys carried out in Brazil and in Latin America and the Caribbean are in line with the findings of the present study about the increase in the prevalence of overweight and obesity in recent years[10,11]. In Brazil, the proportion of adults with obesity more than doubled in recent years, going from 12.2% between 2002 and 2003 to 26.8% in 2019. In this period, the proportion of the adult population with overweight increased from 43.3% to 61.7%[4].

Regarding other studies conducted in Piauí, when comparing the information from the 2009 and 2019 editions of the Surveillance of Risk and Protection Factors for Chronic Diseases by Telephone Survey (VIGITEL), it is observed that the prevalence of overweight increased by 33.8%, 39.4% to 52.7%, among the population over 18 years in the capital of of the state, Teresina, while the prevalence of obesity increased by 45.4%, 11.2% to 17.6[12,13].

Data from the Health Department of Piauí also showed an increase in excess weight among adolescents. Between 2008 and 2016, the prevalence of obesity went from 3.4% to 6.6%, which represents a growth of 94%[5]. For children, the 2019 Atlas of Childhood Obesity in Brazil shows a prevalence of obesity of 8.8%, 5.6% and 10.8% for the under-2-year-old, 2–4 year-old, and 5–9 year-old age groups, respectively, in Piauí[14].

The increase in the incidence of obesity in Brazil over the years followed the classic demographic spread, reaching adults first and then adolescents and children[15]. This fact may be related to the results of the present study, which have not yet demonstrated significant growing trend for some age groups of children and adolescents between 2012 and 2021, in Piauí. Despite this, the high prevalence of overweight demonstrated among children and adolescents

represents a worrying scenario, as the tendency is for these numbers to increase throughout life[4].

It is also important to mention, that although the increasing prevalence of overweight in children, adolescents, and adults is concerning, obese people suffer much more serious health consequences and have a higher mortality risk compared to the non-obese population. Thus, obese individuals should be more closely monitored in the health care system[16].

Obesity has a multifactorial character and, despite having a complex etiology, its main determining factors are inadequate diet and physical inactivity[17,18]. Like other countries in Latin America, Brazil has gone through a nutritional transition and changes in life habits in recent decades that have resulted in greater consumption of foods with high caloric density and reduced intake of healthier foods, such as fruits and vegetables, in addition to reduced levels of physical activity over the years, which may be related to the increase in excess weight in the population[19,20].

The 2019 National Health Survey showed that only 8% of the adult population in Piauí (≥18 years) consumes the recommended amounts of fruits and vegetables. The percentage is the second lowest in Brazil[21]. On the other hand, in the 2019 VIGITEL survey, 16.5% of adults (≥ 18 years old) in the capital of Piauí, Teresina, individuals interviewed reported consumption of five or more groups of ultra-processed foods the day before the interview[13].

As for adolescents, the National School Health Survey (PENSE), carried out in 2019, showed that, in Piauí, the percentage of schoolchildren aged between 13 and 17 who had consumed food that was a marker of healthy eating, such as vegetables and/or greens, in the seven days prior to the survey was 29.2%, while the percentage of those who had consumed industrialized crackers and soft drinks the day before the interview was 55.3% and 30.8%, respectively[22].

Another study carried out with adolescents from Piauí showed a high prevalence of consumption of ultra-processed foods among students aged 14 to 19 years enrolled in public and private schools in the capital Teresina. A mean of 27% of the calories consumed by young people in private schools and 24% of the calories consumed by students in public schools came from these foods[23].

A study coordinated by researchers from the Federal University of Rio de Janeiro, carried out in 123 Brazilian municipalities, including the capital of Piauí, between February 2019 and March 2020, showed that 80% of Brazilian children up to 5 years old usually consume ultra-processed foods, such as cookies, flour, and soft drinks. The consumption of this class of food is also part of the diet of children under 2 years of age, the group that consumes the least amounts of fruits and vegetables in Brazil, according to the study[24].

Despite this, some factors such as the increase in the practice of exclusive breastfeeding and the existence of public programs and policies in Brazil aimed at promoting children's health and preventing obesity, such as the National School Feeding Program (NSFP), School Health Program (SHP) and, more recently, the Healthy Growth, may justify a less accentuated increase in excess weight in this age group found in the present study[25,26].

Another factor that may be related to the increase in weight in the population concerns the low energy expenditure that has been evidenced in the population in recent years. The 2019 National Health Survey identified that only 30.1% of Piauí adults practice the recommended level of physical activity during leisure time, that is, 150 minutes a week of light or moderate intensity physical activities, or 75 minutes of vigorous intensity[21].

Among adolescents, a study carried out with 1,112 young people aged between 13 and 19 years living in the municipality of Caracol, Piauí, observed that the prevalence of physical activity was low, especially among females, in young people of more advanced age groups and in those of lowest socioeconomic level[27]. Also in this sense, the 2019 PENSE study showed that 30.5% of students aged 13 to 17 years included in the study did not report any physical education class days at school in the seven days prior to the survey[22].

Studies have shown that the increase in sedentary behavior among children and adolescents is due to technological advances. Individuals in these age groups spend more and more time in front of computer screens, video games and televisions for various reasons, whether for fun or for studies[28,29].

It is also important to emphasize the role of the new coronavirus pandemic in changes in the population's habits related to food and physical activity[30,31,32]. In Brazil, a study carried out with 45,161 individuals aged 18 years or older pointed to an increase in health risk behaviors. According to the authors, Brazilians began to practice less physical activity and spend more time on screens (TV, tablet, and computer). Furthermore, they reduced the consumption of healthy foods and increased the consumption of energy-dense ultra-processed foods such as chips, chocolates, and ice cream, as well as the consumption of alcohol, as a result of the social and economic restrictions imposed by the pandemic[33].

Another research carried out with ten thousand participants of the NutriNet cohort identified growth in the consumption of ultra-processed foods in the North and Northeast regions of the country, where Piauí is located, especially among people with less education[34]. Such behaviors result in increased body fat and may be related to the more pronounced increase in obesity in the years 2020 and 2021 observed in the present study.

It is also important to mention that the economic crisis experienced by the Brazilian population in recent years, especially after the beginning of the COVID-19 pandemic, changed access to food and put a portion of the population in a situation of food insecurity, which encompasses both the lack of food and the replacement of foods rich in nutrients and vitamins for cheaper foods, which are often rich in flour and sugars. When insecurity reaches moderate or severe

levels, there is significant food restriction, culminating in the lack of daily meals for families[35,36].

A survey carried out between November 2021 and April 2022 in 12,745 households, in urban and rural areas of 577 municipalities, distributed in 26 states and the Federal District, showed that more than half (58.7%) of the Brazilian population lives with food insecurity to some degree. In the Northeast, the region where Piauí is located, the numbers reach 68%[37]. Thus, it is important that other studies investigating the trend in the prevalence of overweight are carried out in later years to assess the impact of food insecurity currently experienced.

A 9.3% increase in SISVAN coverage in Piauí was also observed in the present study between 2012 and 2021. Despite this, coverage is still low, covering less than 20% of the total population of the state. In this regard, it is noteworthy that a large part of the people registered in SISVAN are beneficiaries of social programs and belong to the portion of the population with lower income and education[38].

The low coverage of SISVAN Web in Piauí stands out as a limitation of the study because it does not allow the extrapolation of data to the entire population of the state. In addition, as the information used belongs to a secondary database, it was not possible to control possible errors in the anthropometric assessment of the individuals and in the typing and recording of measurements, which can lead to bias in the information and measurement of cases of overweight and obesity of the sample.

CONCLUSION

We conclude that there was an increase in the prevalence of overweight and obesity in the Brazilian state of Piauí between 2012 and 2021 in the total population registered in SISVAN in all age groups and in both sexes. However, there was no evidence of a significant upward trend towards overweight for some groups of children and adolescents. The findings highlight the need for actions to promote health and prevent obesity, especially those that focus on nutritional and food education and on encouraging the practice of physical activity by the population registered in SISVAN. In addition, it is important that Primary Care actors reinforce Food and Nutrition Surveillance actions, such as anthropometric assessment, so that individuals with obesity or at risk of developing it are adequately assisted.

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REFERENCES

1. *Nyberg ST, Batty GD, Pentti J, Virtanen M, Alfredsson L, Fransson EI, et al. Obesity and loss of disease-free years owing to major non-communicable diseases: A multicohort study. Lancet Public Health. 2018; 3: e490-e497.*
2. *World Health Organization. Global Health Observatory. 2022. https://www.who.int/gho/en.*
3. *World Health Organization. Obesity. 2021. https://www.who.int/topics/obesity/en/.*
4. *Brazilian Institute of Geography and Statistics. National Health Survey 2019: Primary health care and anthropometric information. https://biblioteca.ibge.gov.br/visualizacao/livros/liv101758.pdf.*
5. *Secretary of State for Health of Piauí. Epidemiological Situation of Obesity in Piauí: 2006 – 2016. 2017. http://www.saude.pi.gov.br/uploads/document/file/361/BIS-PIAUI__num_II_13-11-2017.pdf.*
6. *Brazil. Ministry of Health. Reference framework for food and nutrition surveillance in primary care. 2015. https://bvsms.saude.gov.br/bvs/publicacoes/marco_referencia_vigilancia_alimentar.pdf.*
7. *Brazilian Health Informatics Department (DATASUS). Health information (Tabnet). 2021. https://datasus.saude.gov.br/informacoes-de-saude-tabnet/.*
8. *Brazil. Ministry of Health. Guidelines for the collection and analysis of anthropometric data in health services: Technical Standard of the Food and Nutrition Surveillance System – SISVAN. 2011. http://189.28.128.100/dab/docs/portaldab/publicacoes/orientacoes_coleta_analise_dados_antropometricos.pdf.*
9. *Antunes JLF, Cardoso MRA. Use of time series analysis in epidemiological studies. Epidemiol Serv Saude. 2015; 24: 565-576.*
10. *Ferreira APS, Szwarcwald CL, Damacena GN, Júnior PRBS. Increasing trends in obesity prevalence from 2013 to 2019 and associated factors in Brazil. Rev Bras Epidemiol. 2021; 24: 1-15.*
11. *Jiwani SS, Carrillo-Larco RM, Hernández-Vásquez A, Barrientos-Gutiérrez T, Basto-Abreu A, Gutierrez L. The shift of obesity burden by socioeconomic status between 1998 and 2017 in Latin America and the Caribbean: A cross-sectional series study. Lancet 2019; 7: E1644-E1654.*
12. *Brazil. Ministry of Health. Vigitel Brazil 2009: Surveillance system for risk and protective factors for chronic diseases by telephone survey. 2013. https://bvsms.saude.gov.br/bvs/publicacoes/vigitel_brasil_2009.pdf.*
13. *Brazil. Ministry of Health. Vigitel Brazil 2019: Surveillance system for risk and protective factors for chronic diseases by telephone survey. 2020. https://bvsms.saude.gov.br/bvs/publicacoes/vigitel_brasil_2019_vigilancia_fatores_risco.pdf.*
14. *Brazil. Ministry of Health. Atlas of childhood obesity in Brazil. 2019. http://189.28.128.100/dab/docs/portaldab/publicacoes/dados_atlas_obesidade.pdf.*
15. *Popkin BM, Conde W, Hou N, Monteiro C. Is there a lag globally in overweight trends for children compared with adults? Obesity (Silver Spring). 2006; 14: 1846-1853.*
16. *Lung T, Jan S, Tan EJ, Killedar A, Hayes A. Impact of overweight, obesity and severe obesity on life expectancy of Australian adults. Int J Obes (Lond). 2019; 43: 782-789.*
17. *Nardocci M, Polsky JY, Moubarac JC. Consumption of ultra-processed foods is associated with obesity, diabetes and hypertension in Canadian adults. Can J Public Health. 2021; 112: 421-429.*
18. *Rauber F, Chang K, Vamos EP, Costa Louzada ML, Monteiro CA, Millett C, et al. Ultra-processed food consumption and risk of obesity: a prospective cohort study of UK Biobank. Eur J Nutr. 2021; 60: 2169-2180.*
19. *Malta DC, Felisbino-Mendes MS, Machado IE, Passos VMA,*

Abreu DMX, Ishitani LH, et al. Risk factors related to the global burden of disease in Brazil and Federated Units, 2015. Rev Bras Epidemiol. 2017; 20: 217-232.

20. *Popkin BM, Reardon T. Obesity and the food system transformation in Latin America. Obes Rev. 2018; 19: 1028-1064.*
21. *Brazilian Institute of Geography and Statistics. National Health Survey 2019: Life cycles. 2020. https://biblioteca.ibge.gov.br/visualizacao/livros/liv101758.pdf.*
22. *Brazilian Institute of Geography and Statistics. National School Health Survey: 2019. 2021. https://biblioteca.ibge.gov.br/visualizacao/livros/liv101852.pdf.*
23. *Lima LR, Nascimento LM, Gomes KRO, Martins, MCC, Rodrigues MTP, Frota KMG. Association between consumption of ultra-processed foods and lipid parameters in adolescents. Cienc Saude Colet. 2020; 25: 4055-4064.*
24. *Federal University of Rio de Janeiro. National Child Food and Nutrition Study – ENANI-2019: Preliminary results – Report 5 – Infant Feeding. 2020. https://enani.nutricao.ufrj.br/wp-content/uploads/2021/12/Relatorio-5_ENANI-2019_Alimentacao-InfantiL.pdf.*
25. *Boklis-Berer M, Rauber F, Azeredo CM, Levy RB, Louzada MLC. The adherence to school meals is associated with a lower occurrence of obesity among Brazilian adolescentes. Prev Med. 2021; 150: 106709.*
26. *Felix AM, Pereira TD, Costa CR, Giannichi BV, Leung MCA, Passadore MC, et al. Qualitative Analysis of the crescer saudável na escola program - View of health professionals, school community and family. J Hum Growth Dev. 2021; 31: 76-83.*
27. *Dumith SC, Santos MN, Teixeira LO, Cazeiro CC, Mazza SEI, Cesar JA. Practice of physical activity among young people in a semi-arid city in Brazil. Cienc Saude Colet. 2016; 21: 1083-1093.*
28. *Guerra PH, Junior JCF, Florindo AA. Sedentary behavior in Brazilian children and adolescents: A systematic review. Rev Saude Publica 2015; 50: 1-15.*
29. *Lucena JMS, Cheng LA, Cavalcante TLM, Silva VA, Júnior JCF. Prevalence of excessive screen time and associated factors in adolescents. Rev Paul Pediatr. 2015; 33: 407-414.*
30. *Gallo LA, Gallo TF, Young SL, Mortiz KM, Akison LK. The impact of isolation measures due to COVID-19 on energy intake and physical activity levels in Australian university students. Nutrients 2020; 12: 1865.*
31. *Martínez-de-Quel Ó, Suárez-Iglesias D, López-Flores M, Pérez CA. Physical activity, dietary habits and sleep quality before and during COVID-19 lockdown: A longitudinal study. Appetite 2021; 158: 105019.*
32. *Jia P, Zhang L, Yu W, Yu B, Liu M, Zhang D, et al. Impact of COVID-19 lockdown on activity patterns and weight status among youths in China: The COVID-19 Impact on Lifestyle Change Survey (COINLICS). Int J Obes. 2021; 45: 695-699.*
33. *Malta DC, Szwarcwald CL, Barros MBA, Gomes CS, Machado IE, Júnior PRBS. The COVID-19 pandemic and changes in the lifestyle of Brazilian adults: A cross-sectional study, 2020. Epidemiol Serv Saude 2020; 29: 1-13.*
34. *Steele EM, Rauber F, Costa CS, Leite MA, Gabe KT, Louzada MLC, et al. Dietary changes in the NutriNet Brasil cohort during the covid-19 pandemic. Rev Saude Publica. 2020; 54: 91.*
35. *Burlandy L. The construction of food and nutrition security policy in Brazil: Strategies and challenges for the promotion of intersectoriality at the federal level of government. Cienc Saude Colet. 2009; 14: 851-859.*
36. *Ribeiro-Silva RC, Pereira M, Campello T, Aragão E, Guimarães JMM, Ferreira AJF, et al. Implications of the COVID-19 pandemic for food and nutrition security in Brazil. Cienc Saude Colet. 2020; 25: 3421-3430.*
37. *Brazilian Research Network on Food and Nutrition Sovereignty and Security. II national survey on food insecurity in the context of the COVID-19 pandemic in Brazil. 2022. https://static.poder360.com.br/2022/06/seguranca-alimentar-covid-8jun-2022.pdf.*
38. *Campos DS, Fonseca PC. Food and nutrition surveillance in 20 years of the National Food and Nutrition Policy. Cad. Saude Publica 2021; 37: e00045821.*