Original Article

Association between self-perception of health, dietary and weight status: Vigitel survey in the state of Sao Paulo

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ABSTRACT

Objective: To assess the prevalence of self-perception of health in adults (18 to 59 years) and older people (≥60 years) in the state of São Paulo and to analyze the association between negative self-perception of health and markers of healthy and unhealthy eating patterns and nutritional status. **Methods:** Cross-sectional study with 8.420 individuals (4.723 adults and 3.697 elderly people) from the Surveillance System of Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL) 2020 of the state of São Paulo. Self-perceived health was categorized as positive and negative. Markers of healthy and unhealthy eating patterns and nutritional status according to the Body Mass Index were considered. Logistic regression was used, with a 5% significance level. **Results:** Overall, 74.2% and 25.8% reported positive and negative self-perception, respectively. Negative self-perception was higher among older people than among adults (34.9% *vs.* 23.4%, p<0.001). Adults who regularly consumed fruits and vegetables (OR=0.5; 95% CI:0.3-0.7) and five or more minimally processed food groups (OR=0.7; 95% CI:0.5-0.9) had a lower chance of negative self-perception, but those who consumed soft drinks five or more days of the week (OR=1.4; 95% CI:1.0-1.9) had a higher chance of negative self-perception. Obese adults had a higher chance of negative self-perception (OR=1.9; 95% CI:1.4-2.5). Among the elderly, no variable remained associated with negative self-perception. **Conclusions**: A considerable percentage of adults and elderly people reported negative self-perception, and the associated factors were distinct among these population groups. Stratified analyses that consider the particularities of age groups are recommended.

KEYWORDS: Self-concept, adult, elderly, diet, nutritional status.

RESUMO

Objetivo: Avaliar a prevalência de autopercepção de saúde em adultos (18 a 59 anos) e pessoas idosas (≥60 anos) do estado de São Paulo e analisar a associação entre autopercepção negativa de saúde e marcadores de padrões de alimentação saudável e não saudável e estado nutricional. **Métodos:** Estudo transversal com 8.420 indivíduos (4.723 adultos e 3.697 pessoas idosas) do Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (Vigitel) 2020 do estado de São Paulo. A autopercepção de saúde foi categorizada em positiva e negativa. Foram considerados marcadores de padrões saudáveis e não saudáveis de alimentação e estado nutricional segundo o Índice de Massa Corporal. Utilizou-se regressão logística, com nível de significância de 5%. **Resultados:** No total, 74,2% e 25,8% relataram autopercepção positiva e negativa, respectivamente. A autopercepção negativa foi superior entre pessoas idosas do que entre adultos (34,9% *vs.* 23,4%, p<0,001). Adultos que consumiram regularmente frutas e hortaliças (OR=0,5; IC 95%:0,3-0,7) e cinco ou mais grupos de alimentos minimamente processados (OR=0,7; IC 95%:0,5-

0,9) tinham menor chance de autopercepção negativa, mas os que consumiram refrigerantes cinco ou mais dias da semana (OR=1,4; IC95%:1,0-1,9) tinham maior chance de autopercepção negativa. Adultos obesos apresentaram maior chance de autopercepção negativa (OR=1,9; IC95%:1,4-2,5). Entre as pessoas idosas, nenhuma variável permaneceu associada à autopercepção negativa. **Conclusões:** Considerável percentual de adultos e de pessoas idosas relatou autopercepção negativa, e os fatores associados foram distintos entre esses grupos populacionais. Recomenda-se a realização de análises estratificadas que considerem as particularidades das faixas etárias.

PALAVRAS-CHAVE: Autoimagem, adulto, idoso, dieta, estado nutricional.

INTRODUCTION

Self-perception of health is a health status indicator widely used in population inquiries and is a good predictor of mortality.[1-3] Furthermore, this indicator is influenced by biological, mental, social, and functional aspects of the subject, including personal and cultural beliefs, and health behaviors. This, in its turn, could be considered a limitation, but it allows us to identify the influence of these aspects on health and the individual's perception of their health.[4]

Demographic and social aspects have been related to self-perception of health and point out the differences and health needs among population groups. Regarding demographic aspects, the National Health Survey (NHS) for the capital city of São Paulo in 2019 pointed out that people aged 75 years or older reported higher percentages of self-perception of bad or very bad health (13.5%) compared to people aged 18 to 29 years (1.4%); a difference also occurred between people of the male and female sexes: women showed higher percentages of self-perception of bad or very bad health (7.1%) compared to men (4.3%). As for social aspects, the NHS for the capital city of São Paulo in 2019 showed a difference in the level of education, given that people with incomplete primary education reported higher percentages of self-perception of bad or very bad health (11.6%) compared to people with a higher level of education (1.6%). These demographic and social differences also occurred in other Brazilian capitals.[5]

Furthermore, an association between self-perception of health and health-related aspects has been observed. There is evidence that negative self-perception of health is associated with the presence of a diagnosis of non-transmissible chronic diseases,[6] insufficient physical activity,[6,7] and reduced consumption of fruit and vegetables.[7]

National and international studies developed to analyze these associations are mostly of a cross-sectional design;[8,9] therefore, knowledge on the causality of these associations is still incipient.

Thus, it is unclear whether it was health behaviors that led to negative self-perceptions of health or whether it was the other way around. In any case, to reach the goals of the Strategic Action Plan for Confronting Chronic Non-Communicable Diseases,[10] it is necessary to consider self-perception of health, as well as associations with health aspects, such as eating patterns and nutritional status. This way, the health professional will promote, in its entirety, healthy eating and physical activity.

Investigating self-perception of health and these associations becomes even more relevant in the year 2020, which was marked by the pandemic of COVID-19, caused by the Sars-CoV-2 virus because a national study conducted to assess the factors that affected the self-perception of the health of Brazilians during the pandemic of COVID-19 pointed out that 29.4% reported worsening of health status in this period.[11] Thus, the present study, which evaluated data from the 2020 Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Inquiry (Vigitel) survey in the state of São Paulo, aimed to assess the prevalence of self-perception of health in adults (18 to 59 years) and older people (≥60 years) in the state of São Paulo and to analyze the association between negative self-perception of health and markers of healthy and unhealthy eating patterns and nutritional status.

METHODS

Delineation, population, and sample

Cross-sectional population-based study with 8,420 individuals (4,723 adults aged 18 to 59 years and 3,697 elderly people aged over 60 years) living in the state of São Paulo, Brazil. The data were obtained based on probabilistic samples of the adult population from the registration of at least one telephone landline, and collected by the Surveillance System of Risk and Protection Factors for Chronic Diseases Surveillance by Telephone Inquiry (Vigitel) in 2020 in the state of São Paulo (Vigitel-SP). The Vigitel project was approved by the National Research Ethics Committee for Human Beings, of the Brazilian Department of Health (CAAE: 65610017.1.0000.0008).

The sampling procedures employed by Vigitel-SP considered both the state of São Paulo and the 17 Regional Health Care Networks (RHCN) of the São Paulo State Department of Health (SES-SP).[12]

A minimum sample size of 8,500 individuals was established, about 500 individuals in each of the 17 RHCN. Thus, the frequency of all indicators studied by Vigitel presents a maximum error of one percentage point higher or lower in the state of São Paulo, and of four percentage points higher or lower in the 17 RHCN.[12]

The sampling consisted of three stages. In the first stage, a systematic and stratified random selection by postal address code (CEP) of about 10,000 addresses per RHCN was carried out, and the address register was used for statistical purposes in the 2010 Census. At these randomly selected addresses, a telephone line number was assessed in the subscriber guide of the main landline telephone company serving the state of São Paulo, and 5,000 telephone lines were obtained in each RHCN. In the second stage, the lines were again randomly selected, and divided into replications of 100 lines, each replication reproducing the same proportion of lines per postcode as the sample. In the third stage, one of the adults residing in the household corresponding to the chosen line was selected. This step was carried out after identifying, among the lines drawn, those that were eligible for the system. Lines were not considered eligible for the system if they: corresponded to companies, no longer existed, or were out of service, as well as lines that did not answer six call attempts made on various days and times, including Saturdays, Sundays and night periods, which probably corresponded to closed households.[12]

Vigitel allows inferences for the adult population living in households covered by the fixed telephone network since the sample of adults interviewed was obtained from a register of residential telephone lines. It is known that the coverage of this network is not universal, and therefore it is necessary to use weighting factors to compensate for this bias.[12]

Initially, two factors were considered to assign a set of weights to each individual interviewed. The first factor corrects for the higher chance that individuals from households with more than one telephone line have to be selected for the sample. The second factor corrects for the lower chance that individuals from households inhabited by more people have to be selected for the sample. The product of these two factors provides a sampling weight that allows obtaining reliable estimates for the adult population with a telephone.[12]

The final weight attributed to each interviewed individual is called post-stratification weight and has the objective of statistically inferring the results achieved in the study with the estimated sociodemographic composition of the adult population with a telephone in each RHCN in the state. For this purpose, the variables considered in the sociodemographic composition of the total population and the population with telephone were gender (female and male), age group (18-24, 25-34, 35-44, 45-54, 55-64, and 65 and older), and level of education (no education or incomplete elementary school, complete elementary school or incomplete middle school, complete middle school or incomplete higher education, and complete higher education).[12]

The post-stratification weight of each individual in the sample was calculated by the "rake" method[13,14] using the SURVWGT package of the Stata software.[15] This method considers different comparisons of estimates of the distribution of each socio-demographic variable. The estimated

distribution of the variables age and sex was obtained from the SEADE Foundation accordingly to each city. Education levels were calculated based on projections from the 2000 and 2010 Demographic Censuses, considering the average annual variation (geometric rate) in the intercensus period for the group of cities of the greater metropolitan area of São Paulo, São Paulo Capital and other cities.[12]

The post-stratification weight was used to generate estimates for the entire state of São Paulo and for each RHCN.

Procedure and data collection

Data collection of the Vigitel-SP survey took place between February and December 2020. In this period, calls were made to 61,500 telephone lines distributed in 615 replicas, of which 11,893 were eligible lines. In the end, 8,537 interviews were completed, indicating a system success rate of 71.8%. The team responsible for the interviews received prior training and was supervised during the operation by researchers from the Center for Epidemiological Research in Nutrition and Health, University of São Paulo (NUPENS/USP).[12]

The Vigitel questionnaire includes approximately 94 questions, which are divided into modules: demographic and socioeconomic characteristics of individuals, dietary pattern and physical activity, referred weight and height, referred morbidity, and self-perception of health status, among other subjects.[12]

The dependent variable was self-perception of health, which was evaluated according to the question: "How would you classify your health status?" The interviewee could choose the following answers: very good, good, regular, bad, very bad, or does not know/would not inform. The answers were grouped into two categories: (0) positive self-perception—"very good" and "good"—and (1) negative self-perception—"regular", "bad" and "very bad". The answer "do not know/did not want to inform" was classified as a loss in the study.

The main independent variables or covariables were markers of healthy and unhealthy eating patterns and nutritional status. The markers of healthy eating patterns represent positive health indicators, since the greater their magnitude, the better the health status of individuals. These markers followed the Vigitel methodology and were included in the study: regular consumption of fruit and vegetables (five or more days a week); recommended consumption of fruit and vegetables (five daily portions); consumption of beans (five or more days a week); and consumption of minimally or non-processed food groups protective for chronic diseases on the day before the interview (from five or more groups). Markers of unhealthy eating patterns represent negative health indicators because

the greater their magnitude, the worse the health status of individuals. These markers also followed the Vigitel methodology and the consumption of soft drinks (five or more days of the week) and the consumption of ultra-processed food groups on the day before the interview (five or more groups) were assessed. Nutritional status was assessed according to the Body Mass Index (BMI) calculated from the weight in kilograms divided by the square of the height in meters, both self-reported. For adults (18 to 59 years), BMI <18.5 Kg/m^2 was classified as low weight; BMI ≥18.5 and <25 Kgm^2, as adequate weight; BMI ≥25 and <30 Kg/m^2, as overweight; and BMI ≥30 Kg/m^2, as obesity (Brazil, 2011). For older people (≥60 years), BMI ≤22 Kg/m^2 was classified as low weight; BMI >22 and <27 Kg/m^2, as adequate; and BMI ≥27 Kg/m^2, as obesity.[16]

The independent variables were age (age groups [18-29, 30-39, 40-49, 50-59, ≥60]), education (≤8, 9-11, ≥12 years), marital status (married [married or stable union], single [unmarried, widowed, divorced/separated]) and the number of self-reported comorbidities (0, 1, ≥2). The independent variables were age (age groups [18-29, 30-39, 40-49, 50-59, ≥60]), education (≤8, 9-11, ≥12 years), marital status (married [married or stable union], single [unmarried, widowed, divorced/separated]) and the number of self-reported comorbidities (0, 1, ≥2). Self-reported comorbidities were hypertension, diabetes mellitus, and depression.

Statistical analysis

The data were analyzed by the Stata software version 15 (StataCorp., CollegeStation, USA), using the survey command that considers weighting factors and the complex nature of the sample. Prevalences of self-perception of health and respective 95% confidence intervals (95% CI) were estimated, according to the independent variables mentioned. To test the association between the prevalence of self-perception of health and the independent variables, the Chi-square test was used. Next, both univariate and multiple logistic regression were used to evaluate the association of standard markers of healthy and unhealthy eating and nutritional status with negative self-perception of health, through odds ratio (OR) and 95% CI. In the multiple logistic regression analysis, the variables were entered simultaneously into the model. A 5% significance level was considered statistically significant.

RESULTS

A total of 8,537 individuals were interviewed, but 117 did not know or did not wish to inform their self-perception of health and were classified as losses for the study. Thus, the final sample was

8,420. Of this total, 5,590 classified their self-perception of health as positive (1,532 "very good" and 4,458 "good") and 2,430 as negative (2,069 "regular", 271 "bad" and 90 "very bad") (Table 1).

Table 1 presents the characterization of the sample and the association of self-perception of health with sociodemographic variables, markers of eating patterns and nutritional status for the total interviewed population. The sample was composed of individuals with an average age of 44 years (dp=16.8), average education of 10.2 years (dp=4.5), the majority was female (52.0%), married (52.0%), and reported no comorbidities (62.3%). On the markers of healthy eating patterns, the majority did not consume fruits and vegetables regularly (64.5%) or as recommended (73.8%), did not consume five or more minimally or non-processed food groups (69.8%), but consumed beans on five or more days of the week (63.3%). For markers of unhealthy eating patterns, most did not consume soft drinks on five or more days of the week (81.7%) and did not consume five or more ultra-processed food groups (81.0%). Regarding the nutritional status referred to in the adult population, due to the low percentage (2.0%) of adults with low weight, this category was analyzed together with the appropriate weight (data not shown in Table). The quantity of underweight/adequate weight and overweight adults referred showed close values (41.0% and 36.9%, respectively). For the elderly, the nutritional status most prominently reported was overweight (46.5%).

The negative self-perception of health was reported by female subjects (30.7%), elderly (34.9%), with education time of less than or equal to eight years (34.2%), single (28.3%) and with two or more comorbidities (54.2%). In addition, negative self-perception of health was reported by individuals who reported not consuming the markers of healthy eating: they did not consume fruits and vegetables regularly (28.1%) nor as recommended (27.4%), did not consume beans on five or more days of the week (27.4%), and did not consume five or more minimally or non-processed food groups (27.1%). On the other hand, for markers of unhealthy eating patterns, negative self-perception of health was reported by most individuals who consumed soft drinks on five or more days of the week (29.8%) but not by the majority of those who consumed five or more ultra-processed food groups (23.8%). Negative self-perception of health was reported by adult individuals with obesity (37.4%) and by

Table 1. Characterization of the sample and the association of self-perception of health with sociodemographic variables, markers of eating patterns, and nutritional status for the total interviewed population. Vigitel of the state of São Paulo, 2020.

Variable	Total (=8,420)		Self-perception of health				
			Positive (n=74.2%, 5,990)		Negative (n=25.8%, 2,430)		p
	%	95% CI	%	95% CI	%	95% CI	
Gender							
Male	48.0	45,9-50,2	79,6	77,0-81,9	20.4	18,1-23,0	
Female	52.0	49,8-54,1	69.3	66,9-71,5	30.7	28,5-33,1	
Age (Yrs): mean (SD)	44.0 (16.8)		42.8 (16.4)		47.4 (17.7)		
18-29	22.4	20,4-24,4	77.5	73,1-81,3	22.5	18,7-26,9	<0.000
30-39	21.3	19,4-23,4	79.0	74,4-83,0	21.0	17,0-25,5	
40-49	19.5	18,0-21,1	77.4	73,9-80,1	22.6	19,3-26,1	
50-59	15.8	14,4-17,3	71.2	66,8-75,3	28.8	24,7-33,2	
≥60	21.0	19,7-22,2	65.1	62,4-67,6	34.9	32,4-35,6	
Education (Yrs): mean (SD)	10.2 (4.5)		10.6 (4.4)		9.2 (4.6)		
≤8	35.0	32,9-37,2	65.8	63,3-69,1	34.2	30,9-67,7	<0.000
9-11	35.9	34,0-37,8	77.2	74,6	-79,6 22,8	20,4-25,4	
≥12	29.1	27,3-31,0	80.7	77,3-83,7	19.3	16,3-22,7	
Marital status							
Married	52.0	50,1-54,2	76.4	73,9-78,7	23.6	21,3-26,1	0.008
Single	48.0	45,8-49,9	71.7	69,3-74,1	28.3	25,9-30,7	
Number of comorbidities							
0	62.3	60,3-64,3	82.7	80,6-84,6	17.3	15,4-19,4	<0.000
1	28.4	26,5-30,3	64.9	61,3-68,4	35.1	31,6-38,7	
≥2	9.3	8,4-10,2	45.8	41,0-50,6	54.2	49,4-59,0	
Regular consumption of fruit and vegetables							
No	64.5	62,5-66,5	71.9	69,7-74,0	28.1	26,0-30,3	<0.000
Yes	35.5	33,5-37,5	78.4	75,5-81,1	21.6	18,9-24,5	
Recommended consumption of fruit and vegetables							
No	73.8	71,9-75,7	72.6	70,6-74,6	27.4	25,4-29,4	0.005
Yes	26.2	24,3-28,0	78.7	74,9-82,0	21.3	18,0-25,1	
Bean consumption on five or more days of the week							
No	36.7	34,7-38,8	72.6	69,6-75,5	27.4	24,5-30,4	0.170
Yes	63.3	61,2-65,3	75.1	73,0-77,2	24.9	22,8-27,0	

Variable	Total (=8,420)		Self-perception of health				p
			Positive (n=74.2%, 5,990)		Negative (n=25.8%, 2,430)		
	%	95% CI	%	95% CI	%	95% CI	
Consumption of five or more protective minimally or non-processed food groups for chronic diseases on the day before the interview							
No	69.8	67,9-71,6	71.9	69,7-74,0	27.1	26,0-30,3	<0.000
Yes	30.2	28,4-32,1	79.5	76,7-82,1	20.5	17,9-23,3	
Soft drinks consumption on five or more days of the week							
No	81.7	79,9-83,3	75.1	73,2-76,9	24.9	23,1-26,8	0.037
Yes	18.3	16,7-20,1	70.2	65,6-74,4	29.8	25,6-34,4	
Consumption of five or more ultra-processed food groups on the day before the interview							
No	81.0	79,2-82,7	73.7	71,8-75,6	26.3	24,4-28,2	0.289
Yes	19.0	17,3-20,8	76,2	71,9-80,0	23.8	20,0-27,5	
Nutritional status for adults							
Low weight and appropriate weight	41.0	38,4-45,6	81.2	77.8-84.1	18.8	15.8-22.2	<0.000
Overweight	36.9	34,5-39,4	80.0	76.7-83.0	20.0	17.0-23.3	
Obesity	22.1	20,3-24,1	62.6	58.0-66.9	37.4	33.1-42.0	
Nutritional status for older people							
Appropriate weight	34.3	31.8-36.9	66.3	61.7-705	33.7	29.5-38.3	0.793
Low weight	19.2	17.1-21.6	63.8	57.1-70.1	36.2	29.9-42.9	
Overweight	46.5	43.7-49.2	64.7	60.9-68.3	35.3	31.7-39.1	

elderly people with low weight (36.2%) ([Table 1]).

[Table 2] presents the association between self-perception of health and demographic variables, markers of healthy and unhealthy eating patterns, and nutritional status according to the adult population. Negative self-perception of health was reported by more females (29.1%), with education time below or equal to eight years (30.0%), single (26.5%), with two or more comorbidities (58.3%), and who did not report regular consumption of fruits and vegetables (25, 5%) or five or more groups of minimally or non-processed foods (25.4%), but who reported consumption of soft drinks on five or

Table 2. Association between self-perception of health and demographic variables, markers of healthy and unhealthy eating patterns, and nutritional status according to the adult population. Vigitel of the state of São Paulo, 2020.

| Variable | Self-perception of health Adults (18 to 59 years) | | | | p |
| | Positive (n=3,584, 76.6%) | | Negative (n=1,139, 23.4%) | | |
	%	95% CI	%	95% CI	
Gender					
Male	82.5	79.5-85.1	17.5	14.9-20.5	<0.000
Female	70.9	68.0-73.6	29.1	36.4-32.0	
Education years					
≤8	70.0	64.6-74.9	30.0	25.1-35.4	0.001
9-11	77.6	74.8-80.1	22.4	19.9-25.2	
≥12	80.6	76.9-83.9	19.4	16.1-23.1	
Marital status					
Married	79.2	76.3-81.9	20.8	18.1-23.7	0.006
Single	73.5	70.4-76.4	26.5	23.6-29.5	
Number of comorbidities					
0	83.0	80.6-85.1	17.0	14.9-19.4	<0.000
1	66.3	61.4-70.8	33.7	29.2-38.6	
≥2	41.7	33.6-50.2	58.3	49.8-66.4	
Regular consumption of fruit and vegetables					
No	74.5	72.0-77.0	25.5	23.0-28.0	0.006
Yes	80.8	77.1-84.0	19.2	16.0-22.9	
Recommended consumption of fruit and vegetables					
No	75.4	73.0-77.6	24.6	22.4-27.0	0.063
Yes	80.3	75.6-84.3	19.7	15.7-24.4	
Bean consumption on five or more days of the week					
No	74.5	70.9-77.8	24.5	22.1-29.1	0.121
Yes	77.9	75.3-80.3	22.1	19.7-24.7	
Consumption of five or more protective minimally or non-processed food groups for chronic diseases on the day before the interview					
No	74.6	71.9-77.0	25.4	23.0-28.1	0.001
Yes	81.6	78.1-84.6	18.4	15.4-21.9	
Soft drinks consumption on five or more days of the week					
No	77.8	75.5-80.0	22.2	20.0-24.5	0.024
Yes	71.9	66.8-76.5	28.1	23.4-33.2	

Variable	Self-perception of health Adults (18 to 59 years)				
	Positive (n=3,584, 76.6%)		Negative (n=1,139, 23.4%)		p
	%	95% CI	%	95% CI	
Consumption of five or more ultra-processed food groups on the day before the interview					
No	76.4	74.0-78.7	23.6	21.3-26.0	0.691
Yes	77.4	72.8-81.5	22.6	18.5-27.2	
Nutritional status for adults					
Low weight and appropriate weight	81.2	77.8-84.1	18.8	15.8-22.2	<0.000
Overweight	80.0	76.7-83.0	20.0	17.0-23.3	
Obesity	76.6	58.0-66.9	37.4	33.1-42.0	
Nutritional status for older people					
Appropriate weight					
Low weight					
Overweight					

more days of the week (28.1%) and who presented a reported nutritional status of obesity (37.4%).

Regarding the elderly, negative self-perception of health was reported in more female individuals (36.1%), with education less than or equal to eight years (40.0%), with two or more comorbidities (50.8%) and who did not report consuming fruits and vegetables regularly (39.8%) or as recommended (38.3%), or five or more groups of minimally or non-processed food (38.4%) (Table 3).

Table 3. Association between self-perception of health and demographic variables, markers of healthy and unhealthy eating patterns, and nutritional status according to the adult population. Vigitel of the state of São Paulo, 2020.

| Variable | Self-perception of health Older people (60 years and over) | | | | |
| | Positive (n=2,406, 65.1%) | | Negative (n=1,291, 34.9%) | | |
	%	95% CI	%	95% CI	p
Gender					
Male	66.7	62.2-70.8	33.3	29.2-37.8	0.322
Female	63.9	60.6-67.1	36.1	32.9-39.4	
Education years					
≤8	60.0	56.6-63.3	40.0	36.7-43.4	<0.000
9-11	73.1	67.8-77.8	26.9	22.2-32.1	
≥12	81.3	75.6-85.9	18.7	14.1-24.4	
Marital status					
Married	64.0	59.9-67.8	36.0	32.2-40.1	0.467
Single	65.9	62.3-69.3	34.1	30.7-37.7	
Number of comorbidities					
0	80.4	76.7-83.6	19.6	16.4-23.3	<0.000
1	62.1	57.5-66.4	37.9	33.6-42.5	
≥2	49.2	43.9-54.5	50.8	45.5-56.1	
Regular consumption of fruit and vegetables					
No	60.2	56.5-63.7	39.8	36.2-43.5	<0.000
Yes	71.5	67.6-75.0	28.5	25.0-32.3	
Recommended consumption of fruit and vegetables					
No	61.7	58.6-64.8	38.3	35.2-41.4	<0.000
Yes	73.2	68.2-77.7	26.8	22.3-31.7	
Bean consumption on five or more days of the week					
No	65.6	61.1-69.8	34.4	30.1-38.9	0.759
Yes	64,7	61.4-67.9	35.3	32.1-38.5	
Consumption of five or more protective minimally or non-processed food groups for chronic diseases on the day before the interview					
No	61.6	58.2-64.8	38.4	35.2-41.8	<0.000
Yes	72.4	68.3-76.1	27.6	23.8-31.6	
Soft drinks consumption on five or more days of the week					
No	65.8	63.1-68.5	34.2	31.5-36.9	0.148
Yes	59.3	50.5-67.6	40.7	32.4-49.5	

Variable	Self-perception of health Older people (60 years and over)				
	Positive (n=2,406, 65.1%)		Negative (n=1,291, 34.9%)		
	%	95% CI	%	95% CI	p
Consumption of five or more ultra-processed food groups on the day before the interview					
No	65.2	63.4-67.8	34.8	32.1-37.6	0.785
Yes	64.0	55.6-71.6	36.0	28.4-44.4	
Nutritional status for adults					
Low weight and appropriate weight					
Overweight					
Obesity					
Nutritional status for older people					
Appropriate weight	66.3	61.7-70.5	33.7	29.5-38.3	0.793
Low weight	63.8	57.1-70.1	36.2	29.9-42.9	
Overweight	64.7	60.9-68.3	35.3	31.7-39.1	

Table 4 highlights the negative self-perception of health according to socio-demographic variables, markers of healthy and unhealthy eating patterns, and nutritional status in the adult population. Univariate analysis showed the following associated variables (p<0.05): consumption of fruit and vegetables regularly, consumption of five or more groups of minimally or non-processed foods, consumption of soft drinks on five or more days of the week, and nutritional status category of obesity. It was verified in the univariate analysis that positive health indicators were protective factors for negative self-perception of health and negative health indicators were risk factors. In the final multiple logistic regression model adjusted for gender, education, marital status, and the number of comorbidities, these same variables remained associated. Adults who reported regular fruit and vegetable consumption had a lower risk of negative self-perception of health (OR=0.5; 95% CI:0.3-0.7) compared to adults who did not report regular fruit and vegetable consumption. Adults who reported consumption of five or more minimally or non-processed food groups had a lower chance of negative self-perception of health (OR=0.7; 95% CI0.5-0.9) compared with adults who consumed five or more minimally or non-processed food groups. While adults who reported consuming soft drinks five or more days of the week had a higher chance of negative self-perception of health (OR=1.9; 95% CI:1.4-2.5) compared to adults who did not consume soft drinks five or more days of the week. Regarding nutritional status, adults classified with referred obesity had a higher risk of negative self-perception of health (OR=1.8; 95% CI:1.4-2.5) (Table 3).

Table 4. Logistic regression of negative self-perception of health in the adult population. Vigitel of the state of São Paulo, 2020.

Variable	Negative self-perception of health in adults (18 to 59 years)					
	Univariate analysis			Multiple analysis*		
	OR gross	95% CI	p	Adjusted OR	95% CI	p
Regular consumption of fruit and vegetables						
No	1.0	-	-	1.0	-	
Yes	0.7	0.5-0.9	0.006	0.5	0.3-0.7	<0.000
Recommended consumption of fruit and vegetables						
No	1.0	-	-	1.0	-	-
Yes	0.7	0.6-1.0	0.064	1.4	0.9-2.2	0.132
Bean consumption on five or more days of the week						
No	1.0	-	-	1.0	-	-
Yes	0.8	0.7-1.0	0.121	0.9	0.7-1.1	0.326
Consumption of five or more protective minimally or non-processed food groups for chronic diseases on the day before the interview						
No	1.0	-	-	1.0	-	-
Yes	0.6	0.5-0.8	0.002	0.7	0.5-0.9	0.049
Soft drinks consumption on five or more days of the week						
No	1.0	-	-	1.0	-	-
Yes	1.4	1.1-1.8	0.025	1.4	1.0-1.9	0.022
Consumption of five or more ultra-processed food groups on the day before the interview						
No	1.0	-	-	1.0	-	-
Yes	1.0	0.7-1.2	0.691	1.0	0.7-1.3	0.890
Nutritional status						
Low weight and appropriate weight	1.0	-	-	1.0	-	-
Overweight	1.1	0.4-1.4	0.620	1.0	0.7-1.4	0.915
Obesity	2.6	1.9-3.4	<0.000	1.9	1.4-2.5	<0.000

*Adjusted model for gender, education, marital status, and the number of comorbidities.

Table 5 highlights the negative self-perception of health according to socio-demographic variables, markers of healthy and unhealthy eating patterns, and nutritional status in the elderly population. Univariate analysis showed the associated variables (p<0.05): consumption of fruit and vegetables regularly and as recommended and consumption of five or more groups of minimally or non-processed food. In the final multiple logistic regression model adjusted for gender, education, and the number of comorbidities, no variable remained associated with negative self-perception of health.

Table 5. Logistic regression of negative self-perception of health in the elderly population. Vigitel of the state of São Paulo, 2020.

Variable	Negative self-perception of health in elderly people (60 years and over)					
	Simple analysis			Multiple analysis*		
	Gross[OR]	95% CI	p	Adjusted[OR]	95% CI	p
Regular consumption of fruit and vegetables						
No	1.0	-	-	1.0	-	-
Yes	0.6	0.5-0.8	<0.000	0.9	0.6-1.2	0.380
Recommended consumption of fruit and vegetables						
No	1.0	-	-	1.0	-	-
Yes	0.6	0.4-0.8	<0.000	0.9	0.6-1.2	0.409
Bean consumption on five or more days of the week						
No	1.0	-	-	1.0	-	-
Yes	1.0	0.8-1.3	0.759	0.9	0.7-1.2	0.697
Consumption of five or more protective minimally or non-processed food groups for chronic diseases on the day before the interview						
No	1.0	-	-	1.0	-	-
Yes	0.6	0.5-0.8	<0.000	0.8	0.6-1.0	0.106
Soft drinks consumption on five or more days of the week						
No	1.0	-	-	1.0	-	-
Yes	1.3	0.9-1.9	0.149	1.3	0.9-2.0	0.127
Consumption of five or more ultra-processed food groups on the day before the interview						
No	1.0	-	-	1.0	-	-
Yes	1.0	0.7-1.5	0.786	1.1	0.7-1.6	0.726
Nutritional status						
Appropriate weight	1.0	-	-	1.0	-	-
Low weight	1.1	0.8-1.6	0.543	1.1	0.8-1.6	0.538
Overweight	1.1	0.8-1.4	0.587	0.8	0.6-1.1	0.124

*Adjusted model for gender, education, and the number of comorbidities.

DISCUSSION

This study aimed to assess the prevalence of self-perception of health in adults (18 to 59 years) and eldery people (≥60 years) in the state of São Paulo and to analyze the association between negative self-perception of health and markers of healthy and unhealthy eating patterns and nutritional status. It was found that about a quarter of the interviewees had a negative self-perception of health, with this prevalence being higher in older people. The factors associated with negative self-perception were different between the adult and elderly populations.

For adults, negative self-perception was associated, both in the univariate analysis and in the final adjusted model, with soft drink consumption, irregular consumption of fruit and vegetables, consumption of five or more groups of minimally or non-processed food, and obesity. However, for eldery people, associations were present only in the univariate analysis.

A national household survey conducted in 2008, called Social Dimension of Inequalities Survey (SDIS), which evaluated adults and the elderly, indicated, for the total sample, a prevalence of negative self-perception of the health of about 40%.[17] However, this value was different among age groups, and an increase in the prevalence of self-perception of health was verified with increasing age, being 20.3% for adults up to 39 years old, 44.3% for adults between 40 and 64 years old, and, the highest prevalence, 62.2% for the elderly.[17] Moreover, the study showed that the Southeast and Midwest regions of Brazil had the lowest prevalence, around 35%, of negative self-perception of health.[17]

More recent national surveys have indicated different results from the 2008 SDIS study. The 2019 National Health Survey Pesquisa Nacional de Saúde (NHP) shows that 5.8% of Brazilians aged 15 years or older reported negative self-perception of health, with the capital city of São Paulo showing a slightly lower prevalence, 4.4%.[5] The System of Risk and Protection Factors for Chronic Diseases Surveillance by Telephone Inquiry (Vigitel) conducted in 2020 nationwide showed results of self-perception of health slightly lower than those of the 2019 NHP. In the national 2020 Vigitel, 4.5% adults aged 18 years or older reported negative self-perception of health, and this percentage was higher in the capital city of São Paulo, 5.0%.[18]

Specifically among the elderly, a systematic literature review on self-perception of health in the Brazilian elderly population showed a high variation in the prevalence of negative self-perception of health, from 12.6% to 51.9%, with the highest prevalence coming from the Study on Health, Well-Being, and Aging (SHWA), carried out in the city of São Paulo in 2005.[19] In the same southeastern region, in the city of Montes Claros, Minas Gerais, a survey carried out in a health reference service for the elderly showed that 60.5% of the elderly had a negative self-perception of health.[20]

It is noteworthy the pronounced variation in the form of evaluation of self-perception of health between the studies. A systematic review developed by Pagotto *et al* (2013) discusses three points of this discrepancy. The first concerns the questionnaire, as some studies have four and others, five categories of answers for the question of self-perception of health. The second refers to the used categories, which are not totally discordant, but also not the same, and which vary among the studies; they are: "excellent", "very good", "good", "regular", "bad", and "very bad". The third and last point is about the analysis method, that is, how these categories will be grouped for the construction of the self-perception of health variable, which may have two categories (dichotomous variable) or three. Moreover, in the third point, for the studies that evaluate the self-perception of health in a dichotomous way, the category "reasonable" is sometimes grouped among the options of positive answers (good, very good) and sometimes among the negative ones (bad, very bad).[19]

Thus, this lack of standardization of responses and analyses makes it difficult to compare prevalences between studies. However, it is possible to observe that this research presents prevalences consistent with other studies,[6,7,17,19,20] when compared to the NHP (2019) and Vigitel (2020) national surveys, which evaluated the "regular" category together with the positive self-perception of health. In the present study, the inclusion of the subcategories "regular", "bad" and "very bad" in the category of negative self-perception was defined as it has been verified in several studies.[6,7,17,19,20,21] In any case, it is not the objective of this research to compare the prevalence of negative self-perception of health observed with that of others.

As socioeconomic aspects, such as marital status and education, and biological aspects, such as the number of comorbidities, were associated with self-perception of health in the univariate analyses, these characteristics were considered as adjustment variables in the multiple regression model. Negative self-perception of health was reported by individuals who had no partner,[7,22] and perhaps the explanation for this is both social, i.e., the presence of a partner provides benefits to the health of individuals, and biological selection, i.e., people who find partners were already healthier than those who do not.[23]

Regarding education, the literature also points to the association with negative self-perception of health,[6,8,21] and the justification for this association may be the social gradient in health, the result of socioeconomic inequalities. Thus, the higher the level of education, the better the chances of enjoying good health and a longer life.[24] The number of comorbidities was also related to negative self-perception of health, since the presence of multiple diseases can lead to limitations in functional capacity and, consequently, individuals relate this disability to a negative self-perception of health.[6,8,21,25]

Regarding the markers of healthy and unhealthy eating patterns, the literature points to the association of self-perception of health with the consumption of fruit and vegetables. For example, a prospective longitudinal study with individuals 40 years of age or older and living in the Southern region of the country found that the decrease in the consumption of fruit and vegetables was a risk factor for the incidence of negative self-perception of health (RR = 1.95; 95%CI:1.15-3.28); whereas the same decrease in the consumption of fruit and vegetables over the years was a protective factor for the incidence of positive self-perception of health (RR = 0.51; 95%CI:0.29-0.90).[7] Regarding the other patterns of eating behaviors, minimally processed food consumption, and soft drinks, due to the scarcity of literature on the subject, the interpretation of the association with negative self-perception of health is questionable, and further studies are recommended.

Specifically, among older people, the literature has shown no association of self-perception of health with markers of eating patterns. Pagotto (2013), in a systematic review, showed that the aspects predominantly associated with negative self-perception of health are related to biological characteristics such as: the presence of diseases, the number of medications in use, hospitalizations, medical appointments, difficulty/incapacity for activities of daily living, presence of depressive and anxiety symptoms and complaint of insomnia; and the social characteristic of monthly family/household income.

Regarding nutritional status, the literature shows no association with self-perceived health in either adults or the elderly. Similarly to the consumption of minimally ultra-processed foods and soft drinks, the lack of studies makes comparisons difficult. Perhaps this association between nutritional status and self-perception of health is mediated by broader aspects, such as physical activity and satisfaction with body image,[26] which would require studies that analyze these other factors.

This study has some limitations. First, the survey's cross-sectional design precluded any conclusions about the direction of causality. Second, the data was based on self-reports and therefore subject to memory bias. Third, although the analyses controlled for important covariates such as age, marital status, education, and the number of comorbidities, the possibility of residual confounding by non-measurable variables is plausible. However, the study presents as highlights the use of a population-based and representative sample of the state of São Paulo; the use of a method and questionnaire already recognized and validated by the National Vigitel, which has been applied since 2006 in all Brazilian capitals; the realization of stratified statistical analysis for the population of adults and elderly people; and the inclusion of markers of eating patterns and nutritional status.

Public policies focused on changing eating patterns and promoting physical activity need to go beyond laboratory tests, known as "tested" health assessment, and clinical analysis, known as

"observed" health assessment.[27] Thus, it is also necessary to consider "perceived" health, which is based on self-perception of health, that is, on the knowledge and personal beliefs of each individual.[19]

CONCLUSION

A relevant percentage of adults and elderly people with negative self-perception of health is verified, and the associated factors were distinct among these population groups. This demonstrates the need for stratified analyses that consider the particularities of individuals since self-perception of health represents distinct values and thoughts between age groups, as well as health care that considers self-perception of adults and elderly people.

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