

Lenise Mondini^I

Suzana Alves de Moraes^{II}

Isabel Cristina Martins de Freitas^{II}

Suely Godoy Agostinho Gimeno^{III}

Fruit and vegetable intake by adults in Ribeirão Preto, Southeastern Brazil

ABSTRACT

OBJECTIVE: To assess fruit and vegetable intake by adults and identify sociodemographic and life style variables associated with this intake.

METHODS: A population-based cross-sectional study was performed in the urban area of the city of Ribeirão Preto, Southeastern Brazil, in 2006. Sample was selected using three-stage cluster sampling, with census tracts as primary units. Sample was comprised of 930 participants aged 30 years and more and the design effect was considered in data analysis. Fruit and vegetable intake was based on a semi-quantitative food frequency questionnaire, using mean scores of frequency of fruit and vegetable intake, daily intake and minimum intake of such foods as indicators. The independent variables analyzed were as follows: age group, marital status, level of education, per capita household income, nutritional status, smoking and physical activity. Mean scores of frequency of intake were estimated by point and 95% confidence intervals. Prevalence ratios were also estimated by point and 95% confidence intervals to analyze association, using Poisson regression. Linear trend tests were applied, adopting a 5% confidence level.

RESULTS: Only 24% of men and 38% of women met the minimum recommendation for fruit and vegetable intake; there was a positive association with age and per capita income. Women with a higher level of education and men who lived with a female partner consumed more fruits and vegetables than others. Physical activity, smoking and nutritional status were not associated with the minimum recommended fruit and vegetable intake.

CONCLUSIONS: Socioeconomic factors have an important influence on fruit and vegetable intake and, as these are subject to intervention, they can contribute to the adoption of healthy eating habits.

DESCRIPTORS: Adult. Food Consumption. Fruit. Greens. Vegetables. Diet Surveys. Socioeconomic Factors. Cross-Sectional Studies.

INTRODUCTION

An inadequate diet composition represents one of the main risk factors for non-communicable chronic diseases. Studies show that a high intake of fruits and vegetables is associated with a reduction in cardiovascular diseases and all-cause mortality.^{3,9,14} Worldwide consumption of such foods is, in the majority of regions, below the minimum per capita intake of 400 grams or at least five servings per day, as recommended by the World Health Organization (WHO).²⁵

At the end of the last decade, approximately half of the population of European Union countries showed a mean daily per capita intake of fruits and vegetables lower than 275 g, while meeting the minimum recommendation could prevent

^I Instituto de Economia Agrícola. Secretaria de Agricultura e Abastecimento do Estado de São Paulo. São Paulo, SP, Brasil

^{II} Escola de Enfermagem de Ribeirão Preto. Universidade de São Paulo. Ribeirão Preto, SP, Brasil

^{III} Departamento de Medicina Preventiva. Universidade Federal de São Paulo. São Paulo, SP, Brasil

Correspondence:

Lenise Mondini
Instituto de Economia Agrícola
Secretaria de Agricultura e Abastecimento do Estado de São Paulo
Av. Miguel Stéfano, 3900 – Água Funda
04301-903 São Paulo, SP, Brasil
E-mail: lenise@iea.sp.gov.br

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about 26,000 annual deaths of Europeans aged less than 65 years.¹³

In the United States, the trend towards an adequate intake of fruits and vegetables did not change between 1994 and 2005: 24.6% and 25.0% of adults, respectively, consumed these foods at least five times a day.⁵

Results from a Brazilian study with an adult population and national representativeness¹² showed a positive association between intake of fruits and vegetables and socioeconomic factors and age; in addition, women consumed more fruits and vegetables than men, results that are in agreement with the findings from international studies.^{10,18,21,23} Less frequent in the literature, however, are the studies that investigate the influence of types of behavior associated with the lifestyle of individuals on intake of fruits and vegetables.^{4,20,22}

Thus, aiming to contribute to a more in-depth understanding of the dietary pattern and measures that promote the adoption of healthy eating habits in the population, the objective of present study was to assess the intake of fruits and vegetables by adults and identify its association with sociodemographic, lifestyle and nutritional status variables.

METHODS

A population-based, cross-sectional study was performed. Data were obtained from the Project entitled “*Fatores de Risco para o Sobrepeso, a Obesidade e o Diabetes Mellitus no município de Ribeirão Preto – SP, 2006*” (OBEDIARP – Risk Factors for Overweight, Obesity and Diabetes Mellitus in the City of Ribeirão Preto, SP, Brazil, 2006), which aimed to estimate the prevalence of excess of weight, diabetes mellitus and associated factors in a population aged 30 years and older, living in an urban area of the city of Ribeirão Preto, Southeastern Brazil, in 2006.

The sampling plan was based on three-stage cluster sampling, with a precision of estimates calculated in a sample of 1,205 individuals, corresponding to sampling errors fixed at approximately 2% (for prevalences lower than 15% or higher than 75%) and at approximately 3% (for prevalences between 20% and 80%). Census tracts were the primary unit of the IBGE-2000 (Brazilian Institute of Geography and Statistics) sample;^a households were randomly selected in the second stage; and individuals, in the third one. Random selection per cluster with a distribution proportional to size was adopted in the two first stages. In the second stage of selection, stratification per mean nominal income of head of family was included. In the third stage, the stratification considered the distribution of the population per age group, in each stratum,

corresponding to sex, with an individual aged 30 years or older being randomly selected among the residents in the selected households.

In all, 81 census tracts, 1,671 addresses and 1,205 individuals were randomly selected, eligible in the first, second and third stages, respectively. A total of 930 individuals were interviewed (277 males and 653 females), with a response rate equal to 78%. The variability introduced, especially in the second and third fraction of the sample, was considered, attributing sample weights to the non-response rate correction and that of eligible units in each household.

Data were collected from structured interviews, performed in the eligible households by a team of qualified and standardized interviewers. To control quality of information, 20% of the household interviews were repeated, obtaining coefficients of agreement (Kappa statistics and intra-class correlation coefficients) above 80%.

Information about intake of fruits and vegetables (vegetables in general, except for tubers) was obtained by applying a semi-quantitative questionnaire of food intake frequency, containing 128 items.⁸ Respondents answered the frequency of intake of foods in question (17 items corresponding to fruits and 23 items corresponding to vegetables), using the last six months prior to the interview as reference period, based on the following categories: never or less than 1 time/month; 2-4 times/month; 2-4 times/week; 5-6 times/week and 1 time/day; 2-3 times/day; 4-5 times/day; and 6 or more times/day, in the case of a respondent answering affirmatively about the daily intake of a certain food.

Using the model proposed by Fornés et al⁷ to change different frequency categories into daily intake, a weight was attributed to each category and the sum of values resulted in scores that corresponded to the number of times/day when foods were consumed.

The following were considered as outcomes: a) intake of fruits and vegetables, shown as mean scores of frequency of intake; b) the proportion of individuals meeting the daily intake of fruits and vegetables (consume daily: yes/no, regardless of the number of times per day); and c) the proportion of individuals meeting the minimum intake of fruits and vegetables recommended of at least five times per day, as an adapted indicator, compared to the number of servings recommended by the WHO.²⁵

Sociodemographic variables (age, marital status, level of education and income), nutritional status and life habits (smoking and physical activity) were considered as independent variables.

^a Fundação Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2000. Dados Tabulares.

The difference between the date of interview and participant's date of birth was used to calculate age, divided by 365.25 days to obtain age in complete years. The variable age was subsequently categorized into 10-year intervals. Per capita household income in *reais* (R\$) was classified into thirds of income. Level of education was defined according to the number of years of school successfully completed in the formal educational system and subsequently classified into three categories: 0-3, 4-7, 8 years or more. With regard to marital status, participants were classified according to the presence or absence of a partner, at the moment of the interview, regardless of a formal union.

Nutritional status of participants was assessed using the body mass index (BMI – weight/height²) and classified into three categories: “normal”, “pre-obese” and “obese”, using the cut-off points for BMI values recommended by the WHO.²⁴

Anthropometric measures were taken two times by qualified and standardized interviewers, using the mean of each pair of measures.⁶ Portable electronic scales with an accuracy of 100 grams (Tanita, model BF 680) were used to obtain weight measurements; stadiometers with a scale in tenths of centimeters (Seca) were used to measure height, in accordance with the WHO recommendations.²⁴

Individuals were asked about smoking habits and classified into three categories: “non-smokers”, “ex-smokers” and “smokers”.

The short version of the International Physical Activity Questionnaire (IPAQ) was used to obtain information about physical activity practice. Individuals were classified into the “lightly active”, “moderately active” and “very active” categories, according to the recommendations of the IPAQ protocol.¹⁷

The descriptive analysis included calculations of mean values and confidence intervals (95% CI) for the scores of “frequency of intake of fruits” and proportions for the “daily intake of fruits and vegetables” and “minimum intake of fruits and vegetables recommended” variables. Comparisons among means of frequency scores were performed by variance analysis and F-statistics values were estimated for proportions, adopting a 5% significance level.

Prevalence ratios (PR), obtained from Poisson regression analysis², were used to identify the association between minimum intake of fruits and vegetables recommended and independent variables, according to sex. Independent variables, associated with the outcome-variable in the bivariate analysis with a significance level of up to 20%, were selected to comprise the multiple models, considering the male and female sexes individually.

In the construction of the final model, variables that showed a 5% significance level for Wald tests were maintained. Variables remained in the model when more than 10% of the PRs of the remaining variables were changed.¹⁶

All estimates were calculated considering the design effect and using the Stata 8.02 software (Survey module) in all stages of data analysis.

The *OBEDIARP* Project was approved by the Research Ethics Committee of the Escola de Enfermagem de Ribeirão Preto-USP (São Paulo University, Ribeirão Preto School of Nursing) under Protocol 0528/2005, on June 1st, 2005. All participants signed an informed consent form, according to recommendations from Resolution 196 of the *Conselho Nacional de Ética em Pesquisa* (Brazilian Research Ethics Council).

RESULTS

Mean daily frequency of intake of fruits and vegetables by men and women aged more than 30 years, in the city of Ribeirão Preto, in 2006, is shown in Tables 1 and 2, respectively. Among men, frequency of intake of fruits and vegetables was higher among the elderly (60 years or more). It should be emphasized that men with higher income and level of education and living with a partner consumed vegetables more times a day.

Frequency of intake of fruits and vegetables among women also increased with level of education and income and it was higher among those classified as “very active”. Fruit intake was more frequent with the increase in age; while that of vegetables, among women who lived with a partner.

Comparison of intake of fruits and vegetables according to sex revealed that women consumed these foods with more frequency than men: 4.64 times/day (95% CI: 4.41;4.86) vs. 3.70/day (95% CI: 3.40;3.99) (data not shown).

Table 3 shows that daily intake of fruits and vegetables was very high for both sexes (more than 70%); although especially among women, when compared to men (85.3% vs. 74.9%, $p = 0.0008$). The proportion of men and women who consumed fruits daily increased with age and income, whereas there was also a positive association with level of education among women. With regard to the daily intake of vegetables among both sexes, the same trend was observed in terms of level of education and, particularly, in terms of income among women; intake was lower among male smokers and women living without a partner.

However, considering the minimum recommendation of daily intake of fruits and vegetables, only about ¼ of men and 40.0% of women consumed these foods at least five times a day (Table 3).

Table 1. Mean scores of frequency of intake of fruits and vegetables among men, according to sociodemographic and lifestyle variables. City of Ribeirão Preto, Southeastern Brazil, 2006.

Variable	n ^a	Fruits		Vegetables		Fruits and vegetables	
		Mean	95% CI	Mean	95% CI	Mean	95% CI
Age (years)							
30 to 39	105	1.64	1.39;1.89	1.87	1.62;2.12	3.49	3.04;3.93
40 to 49	69	1.62	1.32;1.92	1.90	1.58;2.21	3.50	3.00;4.01
50 to 59	54	1.68	1.38;1.98	1.61	1.30;1.93	3.27	2.77;3.76
60 and more	49	2.39	2.03;2.74	2.45	2.09;2.81	4.81	4.21;5.42
p*		0.0022		0.0089		0.0006	
Marital status							
Without a partner	68	1.89	1.62;2.16	1.68	1.34;2.02	3.56	3.01;4.10
With a partner	181	1.78	1.57;1.98	2.06	1.87;2.25	3.81	3.47;4.15
p*		0.5236		0.0417		0.4229	
Level of education (years)							
0 to 3	42	1.69	1.23;2.15	1.54	1.23;1.84	3.22	2.51;3.92
4 to 7	89	1.82	1.50;2.14	1.82	1.54;2.10	3.61	3.07;4.15
8 and more	146	1.78	1.57;2.00	2.10	1.89;2.33	3.87	3.52;4.23
p*		0.8712		0.0030		0.2241	
Income							
Low	79	1.47	1.10;1.85	1.61	1.33;1.90	3.07	2.47;3.68
Average	77	1.80	1.46;2.14	2.07	1.79;2.35	3.85	3.34;4.38
High	113	1.90	1.66;2.13	2.04	1.78;2.30	3.91	3.48;4.35
p*		0.0657		0.0493		0.0203	
Nutritional status							
Normal	79	1.67	1.40;1.94	1.78	1.53;2.03	3.42	2.99;3.84
Pre-obese	135	1.90	1.64;2.15	2.11	1.86;2.36	3.99	3.57;4.42
Obese	55	1.72	1.34;2.09	1.85	1.48;2.23	3.55	2.93;4.18
p*		0.3976		0.1610		0.1441	
Smoking status							
Non-smoker	146	1.80	1.56;2.04	2.02	1.79;2.25	3.80	3.39;4.20
Ex-smoker	72	1.61	1.35;1.86	1.94	1.66;2.21	3.52	3.09;3.95
Current smoker	59	1.96	1.65;2.26	1.72	1.42;2.02	3.66	3.17;4.15
p*		0.2951		0.3462		0.6737	
Physical activity							
Very active	27	1.85	1.29;2.40	1.78	1.22;2.33	3.57	2.59;4.55
Moderately active	76	1.75	1.48;2.01	1.93	1.66;2.20	3.66	3.20;4.12
Lightly active	170	1.78	1.57;1.98	1.98	1.74;2.21	3.74	3.36;4.12
p*		0.9419		0.7672		0.9221	
Total	277	1.78	1.61;1.95	1.94	1.77;2.10	3.70	3.40;3.99

^a Sample of participants effectively studied (not-weighted n)

* P-values for F statistics.

Note: values in bold are variables associated with the outcomes, statistically significant in the linear trend test ($p < 0.05$).

Finally, Table 4 shows that, among men, an adequate intake of fruits and vegetables was associated with age, reaching 2.8 times among the elderly, when compared to younger adults (between 30 and 39 years of age), and almost double the amount among those living with a partner, when compared to men who lived alone.

Among women, the number of those who met the WHO recommendations was higher in the 50-to-59-year age group, when compared to the 30-to-39-year age group (1.57 times), and about two times higher among women with four years of education or more and high income (higher third of income).

Table 2. Mean scores of frequency of intake of fruits and vegetables among women, according to sociodemographic and lifestyle variables. City of Ribeirão Preto, Southeastern Brazil, 2006.

Variable	n ^a	Fruits		Vegetables		Fruits and vegetables	
		Mean	95% CI	Mean	95% CI	Mean	95% CI
Age (years)							
30 to 39	173	1.79	1.56;2.03	2.51	2.25;2.77	4.29	3.86;4.71
40 to 49	217	2.00	1.80;2.20	2.68	2.48;2.88	4.66	4.32;5.01
50 to 59	142	2.25	1.99;2.51	2.60	2.35;2.86	4.84	4.41;5.27
60 and more	121	2.47	2.23;2.71	2.40	2.12;2.68	4.85	4.39;5.30
p*		0.0004		0.3704		0.1717	
Marital status							
Without a partner	182	2.02	1.75;2.29	2.37	2.14;2.60	4.37	3.94;4.81
With a partner	425	2.15	2.00;2.29	2.67	2.52;2.82	4.80	4.56;5.04
p*		0.3448		0.0258		0.0620	
Level of education (years)							
0 to 3	111	1.69	1.43;1.95	1.96	1.73;2.20	3.64	3.25;4.02
4 to 7	207	2.17	1.94;2.40	2.55	2.37;2.74	4.70	4.34;5.05
8 and more	335	2.17	2.01;2.32	2.75	2.57;2.93	4.91	4.61;5.21
p*		0.0085		0.0000		0.0000	
Income							
Low	231	1.72	1.48;1.96	2.26	2.07;2.46	3.96	3.58;4.35
Average	212	1.96	1.78;2.15	2.45	2.26;2.64	4.40	4.10;4.70
High	184	2.53	2.30;2.76	2.97	2.70;3.23	5.48	5.07;5.90
p*		0.0000		0.0000		0.0000	
Nutritional status							
Normal	240	2.11	1.92;2.30	2.62	2.40;2.84	4.71	4.36;5.06
Pre-obese	221	2.16	1.91;2.41	2.65	2.40;2.90	4.79	4.32;5.25
Obese	183	2.02	1.81;2.22	2.41	2.21;2.60	4.41	4.07;4.74
p*		0.6133		0.2391		0.3081	
Smoking status							
Non-smoker	359	2.14	1.96;2.33	2.58	2.43;2.74	4.71	4.43;4.99
Ex-smoker	158	2.00	1.80;2.20	2.51	2.31;2.70	4.49	4.18;4.81
Current smoker	136	2.05	1.81;2.30	2.57	2.28;2.87	4.61	4.13;5.09
p*		0.5695		0.8604		0.6639	
Physical activity							
Very active	42	2.47	1.96;2.99	3.29	2.69;3.89	5.75	4.72;6.78
Moderately active	165	2.22	1.96;2.48	2.64	2.40;2.87	4.84	4.42;5.25
Slightly active	446	2.01	1.85;2.16	2.46	2.34;2.59	4.46	4.22;4.69
p*		0.0577		0.002		0.0031	
Total	653	2.09	1.95;2.22	2.56	2.43;2.69	4.64	4.41;4.86

^a Sample of participants effectively studied (not-weighted n)

* P-values for F statistics.

Note: values in bold are variables associated with the outcomes, statistically significant in the linear trend test ($p < 0.01$).

DISCUSSION

The main results of the present study show that a small part of the adult urban population of the city of Ribeirão Preto meets the minimum recommendation of daily intake of fruits and vegetables established by the WHO. Intake of fruits and vegetables was proportionately

higher among women, older individuals and those with higher income; in particular, women with a higher level of education and men who lived with a partner were those who consumed more fruits and vegetables.

Results from health surveys, including eating habits and performed in several countries representing different world regions, also pointed to a high prevalence of low

Table 3. Proportion of adults meeting the daily intake and minimum intake of fruits and vegetables recommended, according to sex and sociodemographic and lifestyle variables. City of Ribeirão Preto, Southeastern Brazil, 2006.

Variable	Daily intake (%)				Recommended intake of fruits and vegetables (%)	
	Fruits		Vegetables		Men	Women
	Men	Women	Men	Women	Men	Women
Age (years)						
30 to 39	65.29	65.64	74.59	82.51	20.58	31.46
40 to 49	67.71	73.66	80.08	87.37	18.60	39.34
50 to 59	68.00	77.61	62.53	88.69	15.83	48.15
60 and more	88.06	80.64	81.29	81.78	48.03	35.81
p*	0.0367	0.0181	0.0893	0.2452	0.0003	0.0290
Marital status						
Without a partner	73.85	72.66	69.58	77.60	17.54	36.64
With a partner	70.34	74.98	77.71	88.72	27.52	40.32
p*	0.5635	0.5493	0.1692	0.0010	0.1000	0.3563
Level of education (years)						
0 to 3	60.63	63.09	64.45	77.39	19.27	19.19
4 to 7	70.63	75.25	66.93	82.92	23.93	40.29
8 and more	73.26	76.13	82.14	89.09	25.88	43.32
p*	0.3406	0.0212	0.0156	0.0018	0.6854	0.000
Income						
Low	53.95	62.50	63.59	79.02	16.04	27.32
Average	71.12	76.07	80.70	87.43	26.95	32.34
High	79.71	84.44	78.31	90.22	26.21	55.84
p*	0.0049	0.0000	0.0209	0.0043	0.2683	0.000
Nutritional status						
Normal	66.03	78.08	72.22	85.33	17.79	37.93
Pre-obese	74.13	72.33	79.20	85.18	28.90	42.83
Obese	67.21	70.42	72.16	85.80	25.55	34.02
p*	0.3522	0.2249	0.3556	0.9836	0.2399	0.2460
Smoking status						
Non-smoker	70.59	73.92	78.37	86.16	26.96	37.45
Ex-smoker	69.15	77.02	79.70	86.00	19.07	40.71
Current smoker	72.67	69.34	59.98	82.14	24.12	38.53
p*	0.8899	0.3034	0.0172	0.4679	0.4200	0.7783
Physical activity						
Very active	62.10	75.94	57.77	87.94	30.99	52.78
Moderately active	70.90	73.11	76.54	87.15	21.32	37.76
Slightly active	71.67	73.76	76.18	84.35	25.19	37.33
p*	0.5458	0.9310	0.1191	0.6833	0.5768	0.1150
Total**	70.65	73.74	74.88	85.29	24.33	38.47

* P-values for F statistics.

** Fruits (men x women $p=0.3303$); Vegetables (men x women $p=0.0008$); Recommended intake of fruits and vegetables (men x women $p=0.0002$)

Note: values in bold are variables associated with the outcomes, statistically significant in the linear trend test ($p < 0.05$).

intake of fruits and vegetables in the adult population.¹¹ Women consumed more fruits and vegetables than men,^{15,23} variables such as age,^{15,23} income and level of education^{18,19} were positively associated with intake of fruits and vegetables, although methods to assess food intake of individuals may vary in different studies.

As regards marital status, results of this study are similar to those of British⁴ and Finnish studies,²¹ where it was observed that married men consumed more fruits and vegetables, compared to those without a partner. In fact, women, especially older ones, seem to recognize and value the relationship between food and health, in

Table 4. Prevalence ratios for recommended minimum intake of fruits and vegetables, according to sex, sociodemographic and lifestyle variables. City of Ribeirão Preto, Southeastern Brazil, 2006.

Variable	Men		Women	
	Gross PR (95% CI)	Adjusted PR (95% CI)	Gross PR (95% CI)	Adjusted PR (95% CI)
Age (years)				
30 to 39	1	1*	1	1
40 to 49	0.90 (0.47;1.75)	0.81 (0.39;1.70)	1.25 (0.93;1.68)	1.30 (0.95;1.77)
50 to 59	0.77 (0.38;1.56)	0.90 (0.45;1.81)	1.53 (1.12;2.08)	1.57 (1.14;2.17)
60 and more	2.33 (1.45;3.75)	2.78 (1.59;4.85)	1.14 (0.81;1.59)	1.31 (0.93;1.85)
Marital status				
Without a partner	1	1	1	-
With a partner	1.57 (0.89;2.75)	1.86 (1.06;3.24)	1.10 (0.89;1.35)	
Level of education (years)				
0 to 3	1	-	1	1
4 to 7	1.24 (0.61;2.53)		2.10 (1.42;3.10)	1.99 (1.34;2.95)
8 and more	1.34 (0.67;2.69)		2.26 (1.55;3.28)	1.84 (1.26;2.68)
Income				
Low	1	-	1	1
Average	1.68 (0.82;3.44)		1.18 (0.88;1.58)	1.08 (0.81;1.45)
High	1.63 (0.81;3.28)		2.04 (1.54;2.72)	1.80 (1.34;2.41)
Physical activity				
Very active	1	-	1	-
Moderately active	0.69 (0.37;1.28)		0.71 (0.50;1.02)	
Slightly active	0.81 (0.41;1.59)		0.71 (0.51;0.97)	

* Linear trend test $p = 0.0008$

addition to their being culturally responsible for food preparation.¹

Likewise, some of the findings from the present study are comparable to those from a study performed on a national level, with a representative sample of the Brazilian adult population.¹² In this study, intake of fruits and vegetables was more frequent among adults who had better socioeconomic conditions and those who were older; authors attributed a possible cohort effect to the “age” factor, because older individuals were less exposed to the modern eating pattern, which includes high-energy-density, processed foods. However, in the present study, the proportion of individuals with adequate daily intake of fruits and vegetables, even if low, was double that found in the urban area of Brazil.

Recent data^b from 26 capitals and the Federal District also show that the frequency of intake of fruits and vegetables recommended is higher among women, older individuals and those with a higher level of education. The greatest percentages of adult women and men who meet the WHO recommendation were observed in the cities of Florianópolis (28.1%) and Natal (16.4%), although such values were not higher than those found

in the adult population of Ribeirão Preto (38.5% and 24.3% among women and men, respectively).

One possible limitation to the present study refers to the fact that the indicator showing the minimum daily intake of fruits and vegetables proposed by the WHO, based on the amount (in grams)/number of servings consumed, was replaced by the frequency of intake. Nonetheless, the adoption of the “frequency of intake of fruits and vegetables (number of times/day)” indicator is very common in the world literature.^{3,5,21-23}

In the present study, daily intake of vegetables was higher among non-smoking males, when compared to smokers, a result similar to those found in studies with British⁴ and Portuguese men and women,²⁰ where the smoking habit was strongly associated with low daily intake of fruits and vegetables. An association between the minimum intake of fruits and vegetables recommended and the variables related to lifestyle was not found, as observed in the American study.²² In that study, the proportion of those who consume fruits and vegetables at least five times a day increases according to the level of physical activity practice. However, women who practiced physical activity

^b Ministério da Saúde. Secretaria de Vigilância em Saúde. Secretaria de Gestão Estratégica e Participativa. VIGITEL Brasil 2008: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico. Brasília, DF; 2009. (Série G. Estatística e Informação em Saúde).

intensely consumed fruits and vegetables more times a day, compared to those less active.

A great number of adult women and men, living in an urban area of the city of Ribeirão Preto, did not reach the minimum intake of fruits and vegetables recommended.

As a result, there is an urgent need to greatly promote measures that boost the intake of such foods, especially among males, younger individuals and those with a low level of education and income, considering the fact that access to information and purchasing power are important factors to acquire healthy eating habits.

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