

## Differences between men and women in the quality of their diet: a study conducted on a population in Campinas, São Paulo, Brazil

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**Abstract** *This study aimed to evaluate differences between men and women on a global index and for each component of the Brazilian Healthy Eating Revised-Index (BHEI-R), as well as with reference to associated factors of the BHEI-R. This is a cross-sectional population-based study which analyzed information for 949 adults. For each sex, the mean for BHEI-R and its components were estimated. Women showed higher scores in the components of: fruits, vegetables and milk. Amongst men, the score was higher only in the component of: meat and eggs. Regarding associated factors, important differences were observed between the sexes. For men, better scores were observed among those aged 40 years or over and for those who did not do anything to lose weight. For women, in relation to better quality of diet, the following was observed: the advancing age, the practice of physical activities in leisure time, not smoking, living with less than three people in their household and the presence of chronic diseases. The results pointed to the need to develop strategies to improve the quality of diets in adults, especially men.*

**Key words** *Sex, Adult, Food consumption, Health surveys, Population groups*

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## Introduction

The differences between men and women for morbidity and mortality<sup>1-3</sup> largely reflect the differences in their life styles and their respective behavior in relation to health<sup>4,5</sup>. With regard to food, an increase in the consumption of fruits and vegetables and reduction in the consumption of salt and saturated fats and trans fats have all been recommended for the prevention of diseases<sup>6,7</sup> and significant reductions in deaths owing to cardiovascular diseases and neoplasms in some areas<sup>8</sup>.

Research in Brazil that uses reference marks for the consumption of healthy food and unhealthy food has shown that compared with women, men show a higher prevalence in the consumption of: salt<sup>9</sup>, soft drinks and meats with an excessive amount of fat as well as showing a low consumption of fruits and vegetables<sup>4,5,10</sup>.

Studies that analyzed the eating characteristics of Brazilian adults and those of North Americans through the Brazilian Healthy Eating Revised-Index (BHEI-R) or the Healthy Eating Index-2005, found a better quality of diet for females<sup>11-13</sup>, due to the greater consumption of fruits, vegetables, oils, milk and its derivatives<sup>11,12</sup>.

Taking into account that food and eating habits are one of the elements that highlight the inequality in health in the population, this study sought to analyze the eating habits and food standards of men and women through the use of the BHEI-R. This tool permits the evaluation of the meeting and compliance to the nutritional recommendations in relation to food, nutrients and/or culinary ingredients<sup>14</sup>. The BHEI-R came from the Healthy Eating Index-2005<sup>15</sup> that was created in 1995<sup>16</sup> and it is currently in its third revised form<sup>17</sup>. It is periodically revised to incorporate advances in nutritional science. The BHEI-R went through some alterations in order to take into account the food guidelines as set out for the Brazilian population in 2006<sup>18</sup>.

A number of factors were taken into consideration in order to define the study objective: the greater work burden for adults who must provide and care for a family; the reduction in time spent on their own health; the impact that work has on the consumption of food; the fact that gender differences constitute a relevant factor in social inequality in relation to food<sup>1-3</sup>; and the importance of food in the prevention of illnesses and the promotion of health<sup>6,7</sup>. As a result, the objective of this study was to evaluate the differences in the quality of the diets between men and women adults with consideration for the global

indicator and the various components investigated by the BHEI-R and to also identify the possible differences between the sexes with reference to the standards for the factors associated with quality eating.

## Methods

The information used in this article was obtained from the Health Survey of Campinas (ISACAMP 2008), which was a transversal study done on a base population.

The survey covered the analysis of the health conditions of those in the age range of: adolescents (10-19 years old), adults (20-59 years old) and the elderly (60 years old and over). The target population was non-institutionalized residents in households in the urban municipality of Campinas. In this study, we opted to analyze just the adults.

The samples were randomly selected and they were all equal in size being 1,000 people in each age range taking into account: the estimation of a proportion of 0.50 with a sample error between 4 and 5 percentage points, a confidence interval of 95% and a design effect of 2.

The sample process for the ISACAMP 2008 was organized in two stages: sector census and households. In the first stage, a systematic random selection was done for the 50 census sectors with a proportional probability based on the number of households. The IBGE (Brazilian Institute of Geography and Statistics) defined sectors were used which had been defined for the 2000 Census and consideration was given to the time that had past since the Census. There was an updating of the addresses of the selected sectors. In the second stage, the number of households that should be selected from the sample was determined, based on the ratio people/households for each age group. In this way, 700 households were randomly selected for interviews with adult members. This included the losses due to the expectation of having a response rate of 80%.

The interviewers were trained and supervised to carry out interviews in selected households directly with the residents that were randomly selected.

The information was collected between February 2008 to April 2009 using a structured questionnaire in 14 thematic blocks, which was tested in a pilot study. The thematic block on the consumption of food included keeping a record for 24 hours. This method consists in research and quantification of all food and drinks that were

consumed in the day prior to the interview. The quantitative character of this record for 24 hours resulted in an estimation that was more accurate for the quantities and types of food consumed and it permitted the verification of how much was consumed and whether the recommended nutritional values were met or not. The interviews were conducted on different days of the week and months of the year to minimize the variability of the consumption of food<sup>19</sup>.

### Variables analyzed in this study

The dependent variable was the global scoring on the Brazilian Healthy Eating Revised-Index (BHEI-R)<sup>14</sup>. The tool is made up of 12 components with eight referring to the groups of foods (*Total fruits; Whole fruits; Total vegetables; Dark green and orange vegetables and legumes; Total grains; Whole grains; Milk and dairy products; Meat, eggs and legumes*) and four relative to the nutrients and/or culinary ingredients (*Sodium; Saturated fat; Oils; SoFAAs* that represent the percentage of the participation of the fats being,

saturated fat and trans-fat, as well as alcohol and added sugar in relation to the energy value of the diet).

The components received specific scores that varied from zero (minimum) to a maximum of 5, 10 or 20 depending on the component (Chart 1). The minimum point is attributed to the void consumption (components 1 to 9) or to the consumption above the limit advocated (components 10 to 12), while the maximum point for each component is established when the recommended value for consumption is reached or passed. The scores for the intermediate values of consumed food took into account the intervals between criteria for the minimum points and the maximum, ones which were calculated on a proportional basis. The components from 1 to 9 evaluated the adequateness of the consumption and the consumption from 10 to 12 covered the moderation of the consumption, which conferred opposite senses to the meaning of the points, meaning the increase of consumption reflecting positively in the points for the groups 1 to 9 and negatively in the groups 10 to 12. The

**Chart 1.** Scoring criteria for the components of the BHEI-R.

Components of the BHEI-R	Range of points (minimum to maximum)	Criteria for the minimum points	Criteria for the maximum points
<b>Adequacy (high scores mean greater consumption)</b>			
1. Total fruits*	0 to 5	No consumption	1.0 portion/1.000 kcal
2. Whole fruits	0 to 5	No consumption	0.5 portion/1.000 kcal
3. Total vegetables	0 to 5	No consumption	1.0 portion/1.000 kcal
4. Dark green and orange vegetables	0 to 5	No consumption	0.5 portion/1.000 kcal
5. Total grains	0 to 5	No consumption	2.0 portion/1.000 kcal
6. Whole grains	0 to 5	No consumption	1.0 portion/1.000 kcal
7. Milk and dairy products	0 to 10	No consumption	1.5 portion/1.000 kcal
8. Meat and eggs <sup>#</sup>	0 to 10	No consumption	1.0 portion/1.000 kcal
9. Oils**	0 to 10	No consumption	0.5 portion/1.000 kcal
<b>Moderation (high scores means less consumption)</b>			
10. Saturated fat	0 to 10	≥ 15% of the VET***	≤ 7% of the VET
11. Sodium	0 to 10	≥ 2.0g/1.000 kcal	≤ 0.75g/1.000 kcal
12. SoFAAS	0 to 20	≤ 35% of the VET	≤ 10% of the VET
<b>BHEI-R total</b>	<b>0 to 100</b>		

Source: Previdelli et al.<sup>14</sup>.

\* They represent the consumption of fruits in the form of natural juice; \*\* They include oils from oleaginous and from fish; \*\*\* VET: total energy value; <sup>#</sup> Leguminous plants were excluded from the meat and egg components.

total BHEI-R is represented by the sum of the components being able to reach the maximum of 100 points. The calculation of the BHEI-R is based on the information obtained through the application of the 24-hour record that was kept.

During the fieldwork, the content of the records were checked meticulously by a nutritionist to identify the necessary corrections. The quantification of the records was carried out with the purpose of changing into grams or milliliters the food quantities and preparations that had been listed using household measures. In order to do this, information was taken from household measurement tables<sup>20,21</sup>, food labels and customer service providers.

The software *Nutrition Data System for Research* (NDS-R) version 2007 was used for inputting the consumption information and to produce the necessary values to calculate the BHEI-R. In order to correct the typing mistakes, we conducted a consistency analysis of data from records that added to fewer than 800 kcal or to more than 3,500 kcal.

Based on the Healthy Eating Index-2005, the BHEI-R used the energy from the leguminous plants to add on points to the components of meat and eggs, and given the increased scores in the leguminous plants category, these points were added successively to the total vegetable component and to the dark green and orange vegetables component. Due to the fact that the Brazilian population consumes more leguminous plants than the Americans, this method results in overestimated scores in the components referred to. In addition to this, beans and meats, as well as beans and vegetables show important differences in the nutritional profile and in the quality and protein use. Thus, in this study the leguminous plants were not included in these three components.

Four groups of independent variables were selected to analyze the associated factors for the quality of the diet for each sex:

- *Demographics and socioeconomics*: age (in years), race color of skin self-referred, number of residents in the household, marital status, number of equipment in the household (radio, television, refrigerator, freezer, air conditioning, vacuum cleaner, among others), family income per capita (in minimum wage) and level of education (in years of study).

- *Behavior related to health*: smoking, the disposition for having rules in the home on smoking; frequency of consumption of alcoholic drinks, the dependency on the use of alcohol evaluated by the *Alcohol Use Disorder Identifica-*

*tion Test* (AUDIT) with the cutting point being equal to or greater than eight in the range from 0-40<sup>22</sup>; physical activity in the context of leisure measured by the International Questionnaire on Physical Activity (IPAQ), the long version, categorized in: active people (adults that practice at least 150 minutes per week distributed over a minimum of three days), insufficiently active people (those that practiced at least 150 minutes per week or they practiced more however in less than three days per week) and those being sedentary (those that did not practice any type of physical activity during their leisure time on any day in the week); if they wanted to change their weight (increase or decrease) and if they were doing anything to lose weight (watching what they ate, diet, practicing physical exercise, the use of medications and the omission of meals).

- *Morbidities*: number of chronic diseases amongst those included on the *checklist* (hypertension, diabetes, heart diseases, cancer, arthritis, osteoporosis, asthma/bronchitis/emphysema, tendonitis and circulatory problems).

- *Body Mass Index (BMI)*: calculated based on the information related to weight and height<sup>23,24</sup>. The nutritional state was classified in accordance with the recommendation from the World Health Organization for adults<sup>25</sup>: low weight BMI < 18.5kg/m<sup>2</sup>, IMC eutrophy between 18.5 and 24.9kg/m<sup>2</sup>, overweight BMI between 25.0 and 29.9kg/m<sup>2</sup> and obesity BMI ≥ 30kg/m<sup>2</sup>.

Independent analysis was done for the men and women. Initially the average values were estimated from the global BHEI-R and from each component, as well as from the global BHEI-R according to the categories of the independent variables, through the use of simple linear regression with an interval of confidence being 95% (95%CI). Then the multiple linear regression model was developed in two stages. Firstly, the demographic and socioeconomic variables were introduced with a category that had a significance level of below 0.20 in the bivariate analysis, while variables with  $p < 0.05$  were retained in the model. Secondly, what was kept in the model were the variables that remained from the first stage; these were then added to behaviors relating to health and morbidities with  $p < 0.20$  in the bivariate analysis, staying in the second stage having variables with  $p < 0.05$ . The models were adjusted by the total energy of the diet according to the recommendation from Willett et al.<sup>26</sup>

The interviews were entered into the database developed with the use of EpiData 3.1 (EpiData Assoc., Odense, Denmark) and the statistical analyses were carried out using the *svy* module

from version 11.0 of the Stata software (Stata Corp. College Station, the United States) that permitted the analysis of data of the complex samples.

The research project was approved by the Ethics Committee on Research at the Universidade Estadual de Campinas and by the National Commission for Ethics in Research (system CEP/ CONEP).

## Results

Of the 957 adults identified to participate in the research, eight refused to respond by recording their eating habits for 24 hours. This analysis included 949 individuals, with 444 men and 505 women, being an average age of 37.0 years (95%CI: 36.0-37.9) and 37.8 years old (95%CI: 36.9-38.8), respectively.

The classification of diet being “better” or “worse” in quality used in this study was based on complying with the nutritional recommendations of the food and nutrients in the BHEI-R.

The components of the BHEI-R that showed the worse points, for the population group of adults that were analyzed, concerned the inadequate consumption of: whole grains, sodium, total and whole fruits, milk and dairy products, and dark green and orange vegetables. Compared to

men, the women had scores that were less in only the components of meat and eggs, and greater points in those related to fruits, vegetables, milk and milk derivatives (Table 1).

The global quality of the diet reached 52.7 points, being significantly higher in women (54.1; 95%CI: 51.7-56.4) than the men (51.2; 95%CI: 50.0-52.3). Entre os homens, foi verificado um aumento nos escores do IQD-R a partir dos 40 anos de idade, e a menor média de pontos nos solteiros situou-se no limiar da significância estatística.

Amongst the men, it was shown that there was an increase in the BHEI-R score from the age of 40 years old and the lowest average number of points for single men was found to be on the threshold of statistical significance. In the women, the quality of the food showed itself to be better in the people that were advanced in age as well, as in the men, and it was better in the segment that reported having 15 or more appliances in the household. On the other side, the women who lived in households with six or more residents had the worse quality of diet in relation to those that lived alone or with only one other resident (Table 2).

The sub-group of the male sex that alleged that they would like to lose weight and that they would do something to lose weight, showed diets that were of poor quality. Lesser points from the

**Table 1.** Average score for each component of the BHEI-R according to sex for adults aged between 20 and 59. Health Survey of Campinas, São Paulo State, Brazil, 2008.

Components of the BHEI-R	Total	Sex		P-value <sup>#</sup>
	Global average*	Male (1)	Female (2)	
Total grains	4.63	4.64	4.62	0.728
Whole grains	0.22	0.19	0.25	0.143
Total vegetables	2.97	2.74	3.18	<b>0.000</b>
Dark green and orange vegetables	1.45	1.24	1.65	<b>0.006</b>
Total fruits	1.80	1.41	2.16	<b>0.000</b>
Whole fruits	1.91	1.52	2.26	<b>0.000</b>
Milk and dairy products	4.12	3.67	4.53	<b>0.001</b>
Meat and eggs	8.37	8.62	8.12	<b>0.003</b>
Oils	8.73	8.86	8.61	0.319
Sodium	2.27	2.12	2.41	0.063
Saturated fat	6.29	6.40	6.40	0.244
SoFAAS	9.92	9.76	10.07	0.382
<b>BHEI-R total</b>	<b>52.70</b>	<b>51.22</b>	<b>54.10</b>	<b>0.000</b>

\* Averages obtained through simple linear regression; <sup>#</sup> In bold the value of p < 0.05.

**Table 2.** Averages of the BHEI-R according to socioeconomic and demographic variables for men and women adults between the ages of 20 and 59. Health Survey of Campinas, São Paulo State, Brazil, 2008.

Variables	Men			Women		
	n	Averages**	P-value*	n	Averages**	P-value*
<b>Age range (in years)</b>						
20 to 29*	153	48.92		150	50.43	
30 to 39	100	50.97	0.108	131	54.39	<b>0.005</b>
40 to 49	96	52.54	<b>0.002</b>	124	56.13	<b>0.000</b>
50 to 59	95	54.01	<b>0.001</b>	100	56.84	<b>0.000</b>
<b>Race / Color of skin</b>						
White*	322	51.40		367	54.40	
Black	42	51.74	0.847	43	52.13	0.337
Mixed-race	76	50.41	0.533	92	53.64	0.574
<b>Number of people in household</b>						
1 to 2*	102	51.62		112	56.06	
3 to 5	268	51.31	0.803	307	54.02	0.061
6 or +	74	50.34	0.433	86	51.73	<b>0.005</b>
<b>Marital status</b>						
With spouse*	276	51.75		311	54.67	
Separated	33	52.82	0.624	57	54.60	0.973
Single	132	49.66	<b>0.053</b>	125	52.34	0.063
<b>Number of appliances in household</b>						
1 to 9*	168	50.86		170	52.83	
10 to 14	140	50.70	0.892	170	53.58	0.566
15 or +	135	52.27	0.406	164	55.82	<b>0.040</b>
<b>Family income per capita (minimum wage)</b>						
< 1*	160	51.76		216	54.16	
1 to 3	201	50.76	0.291	193	53.18	0.439
> 3	83	51.32	0.753	96	55.70	0.379
<b>Level of education (in years)</b>						
0 to 7*	119	51.50		153	54.33	
8 to 11	188	50.07	0.190	211	53.38	0.422
12 or +	137	52.49	0.521	141	54.89	0.698

\* Category of used reference for comparisons; \*\* Averages obtained through simple linear regression; # In bold the value of  $p < 0.05$ .

BHEI-R were found for the women who lived in households in which they were permitted to smoke, while higher scores were found amongst the physically active in their leisure time, showing that they did something to lose weight and that referred to the presence of chronic disease (Table 3).

The results of the analysis of multiple linear regression for the male sex showed average points that were significantly higher in the individuals that were 40 years old or over and an average that was significantly less in those that said they did something to lose weight (Table 4). In the women, what was observed, was a better quality of diet with the increase in age, in those that practiced some level of physical activity in

their leisure time, and in those that referred to having a chronic disease. Women smokers and those that lived in households with three or more people had a poor quality of food (Table 4).

## Discussion

The findings of this article showed a better quality of diet for women. This was especially due to the greater consumption of fruits, vegetables, milk and dairy products in relation to men.

The other researchers also analyzed the American population and noted that the quality of the diet for women there is better than that

**Table 3.** Averages of the BHEI-R according to the variables: behaviors related to health, morbidities and Body Mass Index (BMI) for men and women adults between the ages of 20 and 59. Health Survey of Campinas, São Paulo State, Brazil, 2008.

Variables	Men			Women		
	n	Averages**	P-value#	n	Averages**	P-value#
<b>Smoking</b>						
Never smoked*	280	50.98		363	54.19	
Ex-smoker	53	51.70	0.627	56	56.66	0.166
Smoker	110	51.66	0.613	85	52.07	0.133
<b>Rules of households with reference to smoking</b>						
Not permitted to smoke*	186	51.70		204	55.92	
Permitted to smoke in some areas / times	117	50.46	0.355	145	52.98	<b>0.010</b>
No rules	140	51.28	0.689	155	52.83	<b>0.010</b>
<b>Frequency of alcohol consumption</b>						
Do not drink*	174	51.97		323	54.59	
1 to 4 times in the month	172	50.23	0.115	155	53.39	0.423
2 or + times in the week	98	51.68	0.848	25	52.47	0.435
<b>AUDIT***</b>						
Negative*	375	51.61		487	54.25	
Positive	69	49.12	0.140	17	49.72	0.145
<b>Practice of physical activity at leisure (IPAQ)</b>						
Sedentary*	260	50.65		377	53.17	
Insufficiently active	100	51.37	0.530	54	56.66	0.102
Active	84	52.74	0.210	74	56.88	<b>0.010</b>
<b>Would like to change their weight</b>						
No*	251	51.84		152	54.39	
Yes, gain weight	49	52.96	0.543	37	49.94	0.068
Yes, lose weight	143	49.58	<b>0.038</b>	312	54.37	0.982
<b>Do something to lose weight</b>						
No*	397	51.67		373	53.09	
Yes	47	47.41	<b>0.021</b>	132	56.87	<b>0.005</b>
<b>Number of chronic diseases</b>						
0*	301	50.49		288	52.30	
1 or +	140	52.63	0.091	210	56.52	<b>0.001</b>
<b>IMC (Kg / m<sup>2</sup>)</b>						
Low weight / eutrophy*	223	51.44		264	54.05	
Overweight	152	51.75	0.809	147	54.51	0.676
Obesity	58	49.44	0.213	85	54.01	0.979

\* Category of used reference for comparisons; \*\* Averages obtained through simple linear regression; \*\*\* *Alcohol Use Disorder Identification Test*; # In bold the value of  $p < 0.05$ .

of men<sup>11</sup>. This was noted by Hiza et al.<sup>12</sup> showing average values of 54.0 in men and 59.0 in women between the ages of 18 to 64 years old who had participated in the NHANES 2003-04 (National Health and Nutrition Examination Survey). These scores are higher for those observed in this study, which were 51.2 for males and 54.1 for females. However, the greater difference for the women was not confirmed in the other Brazilian

studies that found higher points for the Healthy Eating Index in adolescents<sup>27</sup> and in male adults<sup>28</sup>.

The points for the components of fruits, vegetables, milk and dairy products were significantly higher in women. Other authors documented a higher amount of points for women in the components of fruits, vegetables, oils and this as also the case when an evaluation was done on the energy percentage coming from solid fats,

**Table 4.** Model of multiple linear regression: variables associated with the global averages of the BHEI-R in men and women from the ages of 20 to 59. Health Survey of Campinas, São Paulo State, Brazil, 2008.

Men				
Variables	First step** (CI95%)	P-value#	Second step*** (CI95%)	P-value#
<b>Energy (Kcal)</b>	54.79 (50.60-58.98)		55.35 (51.20-59.50)	
<b>Age range (in years)</b>				
20 to 29*	54.79 (50.60-58.98)		55.35 (51.20-59.50)	
30 to 39	56.84 (50.15-63.52)	0.106	57.42 (50.79-64.07)	0.101
40 to 49	57.18 (50.61-63.74)	<b>0.048</b>	57.65 (51.07-64.24)	0.064
50 to 59	59.07 (51.91-66.24)	<b>0.006</b>	59.71 (52.50-66.92)	<b>0.006</b>
<b>Do something to lose weight</b>				
No*			55.35 (51.20-59.50)	
Yes			50.82 (43.30-58.35)	<b>0.010</b>
Women				
Variables	First step** (CI95%)	P-value#	Second step*** (CI95%)	P-value#
<b>Energy (Kcal)</b>	58.70 (54.80-62.60)		57.55 (53.46-61.64)	
<b>Age range (in years)</b>				
20 to 29*	58.70 (54.80-62.60)		57.55 (53.46-61.64)	
30 to 39	62.07 (55.65-68.48)	<b>0.010</b>	60.82 (54.19-67.44)	<b>0.013</b>
40 to 49	63.73 (57.31-70.14)	<b>0.000</b>	62.05 (55.10-69.00)	<b>0.003</b>
50 to 59	63.88 (56.76-71.00)	<b>0.002</b>	61.31 (53.89-68.73)	<b>0.028</b>
<b>Number of people in household</b>				
1 to 2*	58.70 (54.80-62.60)		57.55 (53.46-61.64)	
3 to 5	56.52 (50.52-62.51)	<b>0.042</b>	55.37 (49.26-61.47)	<b>0.034</b>
6 or +	54.55 (47.65-61.46)	<b>0.008</b>	53.63 (46.43-60.83)	<b>0.014</b>
<b>Smoking</b>				
Never smoked*			57.55 (53.46-61.64)	
Ex-smoker			58.14 (50.49-65.79)	0.741
Smoker			54.01 (47.03-61.01)	<b>0.018</b>
<b>Practice of physical activity at leisure (IPAQ)</b>				
Sedentary*			57.55 (53.46-61.64)	
Insufficiently active			61.49 (53.80-69.18)	<b>0.033</b>
Active			60.44 (53.64-67.23)	<b>0.037</b>
<b>Number of chronic diseases</b>				
0*			57.55 (53.46-61.64)	
1 or +			60.50 (53.98-67.02)	<b>0.018</b>

\* Category of used reference for comparisons; \*\* In the first stage of the model, the following were introduced for males: age range, marital status, level of education. For females were: age range, the number of people in household, marital status and the number of appliances in residence. Adjusted by energy and by demographic and socioeconomic variables; \*\*\* In the second stage, the following was included for males: the frequency of consumption of alcohol drinks, use of the risk of alcohol evaluated by AUDIT, if they would like to change their weight, if they did anything to lose weight, and the number of chronic diseases. For females: smoking, rules in the home on smoking, AUDIT, the practice of physical activity, if they wanted to change their weights, if they did anything to lose weight and the number of morbidities. Adjusted by all the variables in the table; # In bold the value of  $p < 0.05$ .

alcohol and the addition of sugar<sup>11,12</sup>. The Vigitel (Surveillance System for Risk and Protective Factors for Chronic Diseases by Telephone Survey) also showed that in females there was a greater prevalence in the consumption of fruits and veg-

etables and a lesser prevalence for soft drinks/artificial juice and meat with apparent fat<sup>4</sup>.

Other Brazilian research has shown better eating standards for women in relation to other nutrients. Data from the INA (National Dietary



Survey, 2008-09) showed that women's ingestions were lower for sodium and higher for vitamins A and C, Zinc and riboflavin<sup>29</sup>.

The best quality of diet for women has been attributed to distinct factors. In relation to men, the women are more concerned with the quality of the food and tend to check with greater frequency and attention the nutritional information contained on the food labels, including the list of ingredients, the size of the portions and the nutritional appeal<sup>30</sup>. The care women take in their selection and in preparing food, results in part, to the fact that these tasks have been historically done by them<sup>31</sup>. The pressure of work and the need to eat quickly makes them search out for fast food snack bars, bars and street food sellers, which contributed to the lower scores for men. With reference to the consumption of food outside of the household, the men were highlighted in comparison to women in the regions in Brazil<sup>32</sup>.

The low score for women in the component of meat and eggs is consistent with the ingestion of iron observed in the National Dietary Survey, with a divergent prevalence concerning the inadequacy of the nutrient amongst men (4.1%) and women (31.5% in the age range of 20-50 and 8.9% in the age range between 51 to 59)<sup>29</sup>. On the other side, in relation to the consumption of meat, data from Vigitel reveal a lesser prevalence for female ingestion of meat with apparent fat<sup>4</sup>.

The rationality of the science of nutrition brings with it: an imaginary idea in relation to food, traditional knowledge that has been accumulated, beliefs and representations produced by the act of eating and the hierarchy of need measured by the buying power of families. The dietary tradition of classifying the food as "hot/cold", "strong/weak" and "reimoso" (bad for you) is anchored by a group of beliefs that are a part of the food ideology<sup>33</sup>. For the men, beef symbolizes masculinity, virility and eating prosperity, being considered a strong food that keeps a person satisfied for a long period of time. Fruits and vegetables are considered more adequate for women, the elderly and children and they are considered to be unnecessary items in bad financial situations<sup>31</sup>.

With reference to associated factors to the quality of the diet, the only one that was seen in both sexes was age, with an average increase in the points of the BHEI-R with the advancement of age. In research that analyzed the scores for Healthy Eating Index-2005 of three groups of different age groups, there was a tendency of a worsening in the quality of eating in the age groups between 2-17 years old and a trend for improved quality of eating in the age groups of 18 to 64

and for the over 65s<sup>12</sup>. A study based on information from the ISACAMP survey on health did not detect differences in the quality of the diet with the increase in the age from 12 to 19 years<sup>34</sup>, but the other study on the elderly population, with the same database, found a better quality of food in the individuals that were 80 years old or over compared with those aged 60 to 69 years old<sup>35</sup>.

In contrast with the women, the men that said that they did something in order to lose weight had a diet that was worse than the men that did nothing. In the bivariate analysis, doing something to lose weight among women was found to be associated with a better quality of diet, but this was no longer present in the final model due to the strength of the variable of the physical activity. Also in the bivariate analysis, the men that stated that they would like to lose weight, showed worse scores than the men that did not intend to change their weight. This finding is important because it reveals that even amongst men who were concerned with their body weight and who embarked on a diet or activity to lose weight, they showed a standard of diet that was worse. This result was due to the different behavior amongst the men and women in relation to the access to health services and the search for nutritional information. It is probable that the men are trying to lose weight by themselves and in doing so they are not consuming the necessary quantity of energy or they are excluding/avoiding certain types of food. Uptake of consultations regarding nutritional guidance was proved to be greater among adults up to the age of 74, while after this age there was no longer a difference<sup>36</sup>.

Only for the women, the number of residents in households was associated with the quality of the diet. Evaluating the data from the PNAD (National Household Sample Survey) for 2004, Hoffmann<sup>37</sup> observed that the proportion of households in situations of food safety lowered with the increase in the number of people in the household. Households with a greater number of residents covered individuals in low socioeconomic classes. The task of managing and controlling the distribution of food quotas for the domestic group is one of the obligations of the women as mothers and housewives<sup>31</sup>. In Campinas, 78% of the women that resided with six or more people had a monthly family income per capita that was less than the minimum wage. Therefore, it is possible that in addition to the economic restrictions that impede the acquisition of healthy food such as fruits and vegetables, these women regulated their consumption in a way that it benefited other members of their family<sup>38</sup>. Research done by

Canesqui<sup>31</sup> showed that the distribution of food covers having a scale of priorities according to age, gender and the fact of having work or not.

Different to the men, the women that smoked and did not practice physical activity had low scores on the BHEI-R. The results revealed a congruence of healthy behavior for the women and not for the men. This means that the women that had healthy eating habits tended, in a larger proportion, practiced physical exercise and not to smoke. Also in the bivariate analysis, the women showed better quality eating habits than those that lived in houses where rules prohibiting smoking existed. In relation to the quality of the diet, Guenther et al.<sup>15</sup> observed that the smokers had 8.6 points less in the Healthy Eating Index-2005 score compared with the non-smokers. In the survey in the municipality of São Paulo, the ex-smokers had 5.4 points more than those that had never smoked<sup>39</sup>. This is probably the result of reverse causality effect meaning the appearance of diseases may have forced the individual to eat more healthy food.

The presence of a chronic disease showed an association with the quality of the diet just for the women. This finding may result in greater concerns for the women in relation to their own health and greater attention being paid to the signs and symptoms of illnesses. The women also use more health services and exchange health experiences with other women. The impact of the diagnosis of a chronic disease may prompt the person into sticking to a healthier diet as a part of their treatment<sup>40</sup>. In research done with adults aged 20 and over showed a gradient of better scores on the Healthy Eating Index-2005 with an increase in the number of morbidities<sup>41</sup>.

Amongst the limitation of this study one can highlight the application of just one 24-hour food registration, which may not necessarily be representative of the individual's typical food ingestion on account of the intra-individual variability regarding food ingestion. However, when applied to a population-based sample and when consideration is given to the different days and months of the year, the average consumption for

the target population can be estimated<sup>42</sup>. On the other hand, the transversal study impedes the interpretation of the associations found as a result of the relations between cause and effect. The survey that was used as a source of data in this study encompasses a broader issue and was not designed specifically for nutrition, which may reduce the level of detail in questions about food consumption, but at the same time it increases the health variables that can be evaluated in relation to diets. Also, it is important to mention that subsequently during the carrying out of this study there was a revision of the national guidelines on food, that was published through the Dietary Guidelines for the Brazilian Population in 2014<sup>43</sup>, that brought implications for the analysis of the quality of the diet.

It is important to highlight that the recognition of the worse health profile, the high rates of mortality and the greater resistance of men in seeking out health services, led to the creation of the Men Health Comprehensive Attention National Policy<sup>44</sup> with the perspective of improving primary health care for men with a focus on ensuring a more extensive level of services.

The differences observed in the quality of the consumption of food and in the associated factors with the quality of the diet amongst men and women may be a result of the fact that a greater portion of men have their lives marked by their work, the difficulty in looking for health care which may be due to a lack of time or through thinking that there is no need for health care, in addition to the greater consumption of food outside of the home. The results show the need for measures that promote improvements in eating habits for a part of the population and that special attention ought to be given to men, as this study shows, that they have poor diets.

Taking into account the aging population and the increase in life expectancy, studying adults is essential due to the possibility of promoting intervention focused on behavior related to health, with the aim of reducing the incidences of chronic diseases in old age and improving the quality of life.

## Collaborations

D Assumpção came up with the proposal for this paper and also conducted a revision of the literature in this area as well as having analyzed the data and drafted the text. SMA Domene, AM Canesqui e RM Fisberg collaborated in interpreting the data as well as drafting and critically revising the intellectual content. MBA Barros participated in coming up with the proposal for this paper as well as analyzing the data and drafting the text.

## Acknowledgments

To the Conselho Nacional de Desenvolvimento Científico e Tecnológico for the funding of the research and the MBA Barros and RM Fisberg productivity grants. To the Municipal Health Secretariat of Campinas and to the Secretariat of Health Surveillance of the Ministry of Health, for the financial support to the field research of ISACAMP 2008. To CAPES for the doctoral scholarship granted to D Assumpção.

## References

- Barros MBA, Francisco PMSB, Zanchetta LM, César CLG. Tendências das desigualdades sociais e demográficas na prevalência de doenças crônicas no Brasil, PNAD: 2003-2008. *Cien Saude Colet* 2011; 16(9):3755-3768.
- Pinheiro RS, Viacava F, Travassos C, Brito AS. Gênero, morbidade, acesso e utilização de serviços de saúde no Brasil. *Cien Saude Colet* 2002; 7(4):687-707.
- Laurenti R, Jorge MHPM, Gotlieb SLD. Perfil epidemiológico da morbi-mortalidade masculina. *Cien Saude Colet* 2005; 10(1):35-46.
- Iser BPM, Yokota RTC, Sá NNB, Moura L, Malta DC. Prevalência de fatores de risco e proteção para doenças crônicas nas capitais do Brasil – principais resultados do Vigitel 2010. *Cien Saude Colet* 2012; 17(9):2343-2356.
- Malta DC, Andrade SSCA, Stopa SR, Pereira CA, Szwarcwald CL, Silva Júnior JB, Reis AAC. Estilos de vida da população brasileira: resultados da Pesquisa Nacional de Saúde, 2013. *Epidemiol Serv Saúde* 2015; 24(2):217-226.
- O'Flaherty M, Flores-Mateo G, Nnoaham K, Lloyd-Williams F, Capewell S. Potential cardiovascular mortality reductions with stricter food policies in the United Kingdom of Great Britain and Northern Ireland. *Bull World Health Organ* 2012; 90(7):522-531.
- Willett WC, Stampfer MJ. Current evidence on healthy eating. *Annu Rev Public Health* 2013; 34:77-95.
- World Health Organization (WHO). *Global status report on noncommunicable diseases 2010*. Geneva: WHO; 2011.
- Oliveira MM, Malta DC, Santos MAS, Oliveira TP, Nilsson EAF, Claro RM. Consumo elevado de sal autorreferido em adultos: dados da Pesquisa Nacional de Saúde, 2013. *Epidemiol Serv Saúde* 2015; 24(2):249-256.
- Souza AM, Pereira RA, Yokoo EM, Levy RB, Sichieri R. Alimentos mais consumidos no Brasil: Inquérito Nacional de Alimentação 2008-2009. *Rev Saude Publica* 2013; 47(Supl 1):190-199.
- Ervin RB. Healthy Eating Index-2005 total and component scores for adults aged 20 and over: National Health and Nutrition Examination Survey, 2003-2004. *National Health Statistics Reports* 2011; 44(13):1-9.
- Hiza HAB, Casavale KO, Guenther PM, Davis CA. Diet quality of americans differs by age, sex, race/ethnicity, income, and education level. *J Acad Nutr Diet* 2012; 113(2):297-306.
- Loureiro AS, Silva RMVG, Rodrigues PRM, Pereira RA, Wendpap LL, Ferreira MG. Qualidade da dieta de uma amostra de adultos de Cuiabá (MT): associação com fatores sociodemográficos. *Rev Nutr* 2013; 26(4):431-441.
- Previdelli AN, Andrade SC, Pires MM, Ferreira SRG, Fisberg RM, Marchioni DM. Índice de Qualidade da Dieta Revisado para população brasileira. *Rev Saude Publica* 2011; 45(4):794-798.
- Guenther PM, Reedy J, Krebs-Smith SM, Reeve BB, Basiotis PP. *Development and Evaluation of the Healthy Eating Index-2005: Technical Report*. Washington: U.S. Department of Agriculture; 2007.
- Kennedy ET, Ohls J, Carlson S, Fleming K. The Healthy Eating Index: Design and applications. *J Am Diet Assoc* 1995; 95(10):1103-1108.
- Guenther PM, Casavale KO, Reedy J, Kirkpatrick SI, Hiza HAB, Kuczynski KJ, Kahle LL, Krebs-Smith SM. Update of the Healthy Eating Index: HEI-2010. *J Acad Nutr Diet* 2013; 113(4):569-580.
- Brasil. Ministério da Saúde (MS). Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Coordenação-Geral da Política de Alimentação e Nutrição. *Guia alimentar para a população brasileira: promovendo a alimentação saudável*. Brasília: MS; 2006.
- Domene SMA. Avaliação do consumo alimentar. In: Taddei JA, Lang RME, Silva GL, Toloni MHA, editores. *Nutrição em Saúde Pública*. Rio de Janeiro: Rubio; 2011. p. 41-54.

20. Fisberg RM, Villar BS. *Manual de receitas e medidas caseiras para cálculo de inquéritos alimentares*. São Paulo: Editora Signus; 2002.
21. Pinheiro ABV, Lacerda EMA, Benzecry EH, Gomes MCS, Costa VM. *Tabela para avaliação de consumo alimentar em medidas caseiras*. São Paulo: Editora Atheneu; 2004.
22. Lima CT, Freire ACC, Silva APB, Teixeira RM, Farrel M, Prince M. Concurrent and construct validity of the AUDIT in an urban Brazilian sample. *Alcohol and Alcoholism* 2005; 40(6):584-589.
23. Peixoto MRG, Benicio MHDA, Jardim PCBV. Validade do peso e da altura auto-referidos: o estudo de Goiânia. *Rev Saude Publica* 2006; 40(6):1065-1072.
24. Connor Gorber S, Tremblay M, Moher D, Gorber B. A comparison of direct vs. self-report measures for assessing height, weight and body mass index: a systematic review. *Obes Rev* 2007; 8(4):307-326.
25. World Health Organization (WHO). *Physical status: the use and interpretation of anthropometry*. Geneva: WHO; 1995.
26. Willett WC, Howe GR, Kushi LH. Adjustment for total energy intake in epidemiologic studies. *Am J Clin Nutr* 1997; 65:S1220-8.
27. Andrade SC, Barros MBA, Carandina L, Goldbaum M, Cesar CLG, Fisberg RM. Dietary Quality Index and Associated Factors among Adolescents of the State of Sao Paulo, Brazil. *J Pediatr* 2010; 156(3):456-60.
28. Morimoto JM, Latorre MRDO, Cesar CLG, Carandina L, Barros MBA, Goldbaum M, Fisberg RM. Fatores associados à qualidade da dieta de adultos residentes na Região Metropolitana de São Paulo, Brasil, 2002. *Cad Saude Publica* 2008; 24(1):169-178.
29. Araujo MC, Bezerra IN, Barbosa FS, Junger WL, Yokoo EM, Pereira RA, Sichieri R. Consumo de macronutrientes e ingestão inadequada de micronutrientes em adultos. *Rev Saude Publica* 2013; 47(Supl. 1):177-189.
30. Stran KA, Knol LL. Determinants of food label use differ by sex. *J Acad Nutr Diet* 2013; 113(5):673-679.
31. Canesqui AM. Mudanças e permanências da prática alimentar cotidiana de famílias de trabalhadores. In: Canesqui AM, Garcia RWD, organizadores. *Antropologia e nutrição: um diálogo possível*. Rio de Janeiro: Editora Fiocruz; 2005. p. 167-210.
32. Bezerra IN, Souza AM, Pereira RA, Sichieri R. Consumo de alimentos fora do domicílio no Brasil. *Rev Saude Publica* 2013; 47(Supl. 1):200-211.
33. Canesqui AM. A qualidade dos alimentos: análise de algumas categorias da dietética popular. *Rev Nutr* 2007; 20(2):203-216.
34. Assumpção D, Barros MBA, Fisberg RM, Carandina L, Goldbaum M, Cesar CLG. Qualidade da dieta de adolescentes: estudo de base populacional em Campinas, SP. *Rev Bras Epidemiol* 2012; 15(3):605-616.
35. Assumpção D, Domene SMA, Fisberg RM, Barros MBA. Qualidade da dieta e fatores associados entre idosos: estudo de base populacional em Campinas, São Paulo. *Cad Saude Publica* 2014; 30(8):1680-1694.
36. Endevelt R, Baron-Epel O, Viner A, Heymann AD. Socioeconomic status and gender affects utilization of medical nutrition therapy. *Diab Res Clin Pract* 2013; 101(1):20-27.
37. Hoffmann R. Determinantes da insegurança alimentar no Brasil: análise dos dados da PNAD de 2004. *Rev Seguranca Alimentar e Nutricional* 2008; 15(1):49-61.
38. McIntyre L, Glanville NT, Raine KD, Dayle JB, Anderson B, Battaglia N. Do low-income lone mothers compromise their nutrition to feed their children? *CMAJ* 2003; 168(6):686-691.
39. Andrade SC. *Mudanças na qualidade da dieta e seus fatores associados em residentes do Município de São Paulo em 2003-2008: estudo de base populacional* [tese]. São Paulo: Universidade de São Paulo; 2013.
40. Dorner TE, Stronegger WJ, Hoffmann K, Stein KV, Niederkrotenthaler T. Socio-economic determinants of health behaviours across age groups: results of a cross-sectional survey. *CEJMed* 2013; 125(9-10):261-269.
41. Wang Y, Chen X. How much of racial/ethnic disparities in dietary intakes, exercise, and weight status can be explained by nutrition- and health-related psychosocial factors and socioeconomic status among US adults? *J Am Diet Assoc* 2011; 111(12):1904-1911.
42. Breslow RA, Guenther PM, Juan W, Graubard BI. Alcoholic beverage consumption, nutrient intakes, and diet quality in the US adult population, 1999-2006. *J Am Diet Assoc* 2010; 110(4):551-562.
43. Brasil. Ministério da Saúde (MS). Secretaria de Atenção à Saúde. Departamento de Atenção Básica. *Guia Alimentar para a População Brasileira*. Brasília: MS; 2014.
44. Brasil. Ministério da Saúde (MS). Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. *Política Nacional de Atenção Integral à Saúde do Homem: princípios e diretrizes*. Brasília: MS; 2009.

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Article submitted 04/05/2015

Approved 16/11/2015

Final version submitted 18/11/2015