

Eating out or in from home: Analyzing the quality of meal according eating locations

Alimentação dentro ou fora do domicílio: análise da qualidade da refeição segundo o local de realização

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ABSTRACT

Objective

The aim of this study was to evaluate the quality of meals consumed by workers from *São Paulo* according to eating location.

Methods

This cross-sectional study used the 24-hour recall to collect dietary data from 815 workers, including where the meal was consumed, and then grouped the meals by eating location: home, workplace cafeteria, and restaurant. Meal quality was assessed according to energy content and density, fiber density, and proportion of macronutrients, 10 food groups, and from sugar-sweetened beverages. These indicators and their respective eating locations were then included in linear regression models adjusted for gender, age, and education level.

Results

Meals consumed at workplace cafeterias had lower energy density, higher fiber density, and higher proportions of vegetables, fruits, and beans than those consumed at home. However, away-from-home meals contain more sugars, sweets, fats, and oils.

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Conclusion

Eating location influences diet quality, so dietary surveys should assess meals consumed away from home more thoroughly since meal quality varies greatly by food service.

Indexing terms: Diet. Feeding behavior. Food services. Nutrition programs and policies. Workers.

RESUMO

Objetivo

Analisar a qualidade da refeição de trabalhadores do município de São Paulo, segundo o local de realização da refeição.

Métodos

Estudo transversal, que avaliou a alimentação de 815 trabalhadores por meio de recordatório de 24 horas. Para o presente estudo, foram avaliados os dados do almoço dos trabalhadores, conforme o local de realização da refeição. Os locais foram agrupados em: domicílio, local de trabalho e restaurante comercial. Como indicadores de qualidade da refeição utilizou-se consumo de energia e densidade energética; participação calórica dos macronutrientes, de 10 grupos de alimentos e de bebidas açucaradas; e densidade de fibras. Comparou-se os indicadores brutos, segundo local de realização da refeição, por meio do teste analysis of variance, e os valores preditos para os indicadores, ajustados por sexo, idade e escolaridade, utilizando modelos de regressão linear múltipla.

Resultados

As refeições realizadas no local de trabalho apresentam menor densidade energética, maior densidade de fibras e maior participação de hortaliças, frutas e leguminosas, se comparadas às realizadas no domicílio. Por outro lado, as refeições realizadas em restaurantes comerciais resultaram em consumo superior de açúcares e doces e óleos e gorduras, quando comparadas àquelas realizadas no domicílio.

Conclusão

Há influência do local de realização da refeição na qualidade da alimentação, portanto, os inquéritos dietéticos devem avançar na questão da avaliação do consumo alimentar dentro ou fora do domicílio, fazendo-se necessário avaliar o local específico em que cada refeição é realizada.

Termos de indexação: Dieta. Comportamento alimentar. Serviços de alimentação. Programas e políticas de nutrição e alimentação. Trabalhadores.

INTRODUCTION

The consumption of foods away from home has increased in the last decades in the West. From 1987 to 2000 in the United States of America (USA), the number of Americans who ate away from home increased roughly 11%¹, and the number of food services almost doubled in 30 years, going from 491,000 in 1972 to 878,000 in 2004².

In Brazil, meals away from home account for about 20% of food expenditures, reaching almost 30% in higher income households and capitals³. Data from the *Associação Brasileira da Indústria de Alimentos* (ABIA, Brazilian Food

Industry Association) show that the mean annual growth of the food service market exceeds 10%.

A recent household budget survey shows that the mean intake of energy away from home corresponds to approximately 16% of the total energy intake, being higher in urban areas, the Brazilian Southeast, males, and higher-income strata⁴.

Some studies have associated meals away from home with higher energy, fat, and sodium intakes, higher energy density, and lower fiber, iron, and vitamin intakes when compared with homemade meals⁵⁻⁸.

In Brazil, soda, sandwiches, appetizers, and snack foods are an important part of meals away

from home, showing that the quality of these meals may be poor⁴. Moreover, a study showed that meals away from home were associated with overweight and obesity in males and the opposite in females⁹.

Only a few studies have analyzed different eating locations and their impact on meal quality. Brazil has some public policies for food services, such as the *Programa de Alimentação do Trabalhador* (PAT, Worker's Food Program), whose objective is to improve workers' nutrition by subsidizing meals. Many workers covered by PAT eat at work cafeterias administered by dietitians. Other benefits include food stamps which can be used in member food services and groceries.

It is essential to assess the impact of eating location on energy, nutrient, and food group intakes. Hence, the present study aimed to analyze how eating location affected the quality of meals consumed by workers from the municipality of *São Paulo*.

METHODS

This cross-sectional study assessed the meals consumed by 831 workers from four companies in the municipality of *São Paulo*. The study workers were mostly administrative employees. Pregnant women and individuals who dieted and lost weight in the past six months and/or used medications that could affect body weight were excluded. The baseline study data were obtained from the mother study entitled "Impact of an intervention to prevent weight gain at work"¹⁰.

Dietary data were collected from August to October 2008 by a 24-hour recall (24HR) using the Multiple Pass Method (MPM) administered by telephone¹¹. The respondent is guided through five-step multiple-pass method (the quick list, the forgotten foods list, time and occasion at which foods were consumed, the detail cycle, and the final probe review) in a standardized process that

aims to keep the interviewees interested and engaged in the interview, helping them to remember all items they consumed¹². The meals were then grouped into homemade meals, workplace meals (prepared by the company's food service), and restaurant meals.

The 24HR data were converted into energy and nutrients by the software NutWin, updated with data from the *Tabela Brasileira de Composição de Alimentos* (TACO, Brazilian Food Composition Table)¹³ and United States Department of Agriculture Food Composition Table version 17 (USDA, 2006)¹⁴. In addition to these data, standardized recipes were also loaded into the software to better represent the consumed foods.

Sixteen individuals were excluded from the study because their energy intakes were either too low or too high (P1 and P99 equivalent to 90.70kcal and 2062.88kcal, respectively), resulting in a sample size of 815 workers.

The present study investigated only lunch since this was the only meal common to all workers.

The indicators used for assessing meal quality were energy intake (kcal); percentage of energy from each macronutrient; intake of the 10 food groups established by the Brazilian Food Guidelines¹⁵, namely grains, tubers and roots, non-starchy vegetables, fruits, beans, meats and eggs, milk and dairy products, oils and fats, sweets and sugars, and energy from sugar-sweetened beverages; energy density (kcal/g); and fiber density (g/1000kcal). The relative proportion of foods and macronutrients was expressed as percentages of total calorie intake. Energy density was determined as recommended by Ledikwe *et al.* 2005, who include all solid foods and exclude all beverages¹⁶.

Questionnaires standardized for characterizing the workers were administered in person at the workers' workplaces by trained interviewees. The collected variables were age (years), education level (years of formal education), and gender (male and female).

The present study compared the lunch composition of different eating locations. The data were analyzed descriptively using frequency and measures of central tendency and dispersion. The differences between the raw quality indicator means of the eating locations were determined by analysis of variance (Anova). The same differences between the quality indicator means adjusted for gender, age, and education level were included in multiple linear regression models, with the dependent variables being the indicators, the explanatory variable, as an indicator, being the eating location, and the category of reference being the home.

The data were treated by the software Stata version 10.1 using a confidence interval of 95% and a significance level of 5%.

This study was approved by the Research Ethics Committee of University of *São Paulo*'s School of Public Health under protocol number 1996 and followed the National Health Council's Resolution 196/96. All participants signed a free and informed consent form before entering the study.

RESULTS

A total of 815 adults were studied, of which 60.4% were females, 64.8% were aged 26 to 45 years, and 52.9% had higher education. Most participants had lunch in restaurants (37.1%) or workplace (35.7%), and less than one-third had lunch at home (Table 1).

Table 2 shows the mean intake of calories, macronutrients, and food groups according to eating location. Individuals who ate at work cafeterias consumed fewer calories (640.34kcal), less dense meals (1.42kcal/g), more non-starchy vegetables (3.28%), more fruits (5.32%), and more beans (6.07%). Those who ate at restaurants consumed more meats (32.16%) and sugars and sweets (6.49%). Finally, those who ate at home consumed more grains and roots and tubers (38.52%), and less oils and fats (9.19%) and sugars and sweets (3.87%).

Linear regression models were used for adjusting the mean calorie, macronutrient, and food group intakes according to sociodemographic variables (Table 3). Meals consumed at workplace cafeterias were less dense (1.67kcal/g) and contained more fibers (14.15g/1000kcal), non-starchy vegetables (3.23%), fruits (5.31%), and beans (5.94%) than those consumed at home. On the other hand, meals consumed at workplace cafeterias and restaurants contained more sugars and sweets, oils, and fats than those consumed at home. Meals consumed in restaurants contained more fats, proteins, and calories from meats.

DISCUSSION

The present study assessed the quality of meals consumed by workers at different eating locations and found that meals consumed at workplace cafeterias were less energy dense and contained more calories from non-starchy vegetables, fruits, and beans than those consumed at home. On the other hand, meals consumed in restaurants containing more fats, proteins, and calories from meats.

Table 1. Sociodemographic variables and lunch eating locations of workers in the city of *São Paulo* (SP), Brazil, 2008.

Characteristic	n	%
<i>Sex</i>		
Female	492	60.4
Male	323	39.6
<i>Age</i>		
18-25	185	22.7
26-35	314	38.5
36-45	214	26.3
46 or more	102	12.5
<i>Education</i>		
Higt School	174	21.3
Some college	210	25.8
Graduate	431	52.9
<i>Lunch eating location</i>		
Home	222	27.2
Workplace	291	35.7
Restaurants	302	37.1
Total	815	100.0

Table 2. Mean (CI95%) of the energy consumption, macronutrients and food groups at lunch, according lunch eating locations, the workers in the city of *São Paulo* (SP), Brazil, 2008.

Nutrient/Food group	Lunch Eating Locations								
	Home			Workplace			Restaurants		
	Mean	CI		Mean	CI		Mean	CI	
Energy (kcal)*	701.42	656.65	746.18	640.34	602.52	678.16	740.74	704.29	777.19
Energy Density (kcal/g)*	1.57	1.50	1.64	1.42	1.35	1.49	1.56	1.49	1.62
Carbohydrates (%)*	49.49	47.32	51.66	46.22	44.59	47.84	43.47	41.63	45.31
Total Fat (%)*	26.23	24.56	27.90	28.89	27.66	30.13	29.66	28.38	30.95
Protein (%)*	24.28	23.00	25.57	24.89	23.62	26.16	26.87	25.57	28.17
Dietary fiber density (g/1000 kcal)*	11.59	10.55	12.63	14.12	13.13	15.11	11.63	10.79	12.47
Group of cereal, tubers and roots (%)*	38.52	35.86	41.18	25.36	23.65	27.06	24.48	22.78	26.18
Group of vegetables (%)*	2.18	1.86	2.49	3.28	2.87	3.68	2.98	2.65	3.32
Group of fruits (%)*	1.20	0.71	1.69	5.32	4.31	6.34	4.49	3.39	5.59
Group of beans (%)*	2.98	2.10	3.87	6.07	4.78	7.37	4.47	3.31	5.63
Group meats and eggs (%)*	27.74	25.22	30.27	28.59	26.58	30.59	32.16	29.95	34.37
Group of milk and dairy products (%)*	3.80	2.96	4.64	6.04	5.13	6.94	4.04	3.42	4.66
Group of oils and fats (%)*	9.19	8.26	10.12	11.19	10.35	12.02	10.38	9.45	11.30
Group of sweets and sugars (%)*	3.87	2.63	5.10	6.26	5.03	7.50	6.49	5.09	7.89
Sugar-Sweetened Beverages (%)	5.66	4.42	6.90	4.30	3.37	5.23	4.74	3.57	5.90

Note: * $p < 0.05$ by Analysis of variance test for difference between means.

Table 3. Mean (95%), adjusted for sex, age and education, of the energy consumption, macronutrients and food groups at lunch, according lunch eating locations, the workers in the city of *São Paulo* (SP), Brazil, 2008.

Nutrient/Food group	Lunch Eating Locations								
	Home			Workplace			Restaurants		
	Mean	CI		Mean	CI		Mean	CI	
Energy (kcal)*	703.86	661.84	745.87	651.44	614.73	688.15	728.26	691.94	764.565
Energy Density (kcal/g)*	1.78	1.72	1.84	1.67	1.62	1.72	1.77	1.71	1.82
Carbohydrates (%)*	49.27	47.22	51.33	46.19	44.39	47.99	43.65	41.88	45.43
Total Fat (%)*	26.31	24.80	27.82	28.77	27.45	30.08	29.72	28.42	31.03
Protein (%)*	24.41	22.99	25.85	25.04	23.79	26.29	26.62	25.39	27.87
Dietary fiber density (g/1000 kcal)*	11.53	10.48	12.58	14.15	13.23	15.07	11.64	10.73	12.55
Group of cereal, tubers and roots (%)*	38.37	36.20	40.56	25.37	23.47	27.28	24.56	22.68	26.45
Group of vegetables (%)*	2.17	1.77	2.56	3.23	2.88	3.58	3.03	2.69	3.38
Group of fruits (%)*	1.14	0.06	2.22	5.31	4.37	6.26	4.54	3.61	5.47
Group of beans (%)*	3.04	1.75	4.33	5.94	4.81	7.06	4.56	3.45	5.67
Group meats and eggs (%)*	27.97	25.51	30.43	28.87	26.72	31.03	31.71	29.58	33.83
Group of milk and dairy products (%)*	3.77	2.90	4.64	6.12	5.36	6.89	3.98	3.22	4.73
Group of oils and fats (%)*	9.16	8.16	10.15	11.05	10.18	11.92	10.56	9.70	11.42
Group of sweets and sugars (%)*	3.82	2.37	5.27	6.09	4.81	7.36	6.63	5.37	7.89
Sugar-Sweetened Beverages (%)	5.68	4.46	6.89	4.39	3.32	5.46	4.68	3.62	5.73

Note: * $p < 0.05$ in the linear regression model adjusted for sociodemographic variables (sex, age and education).

The main limitation of this study is that it was not possible to correct intrapersonal data variability to show the workers' habitual diet because the workers did not always eat at the same location. Another limitation was analyzing

a single meal, lunch, since this was the only meal consumed away from home common to all workers, making it impossible to analyze daily food consumption according to eating location. However, although these limitations can weaken

the regression coefficients, it is unlikely that inexistent associations emerge as significant, which strengthens the study results¹⁷.

Many studies have analyzed eating location to compare meals made at home and away from home, types of restaurants, or consumed foods¹⁸⁻²¹. Even Brazilian studies have failed to analyze meals consumed at work cafeterias.

The Workers' Food Program (*Programa de Alimentação do Trabalhador* - PAT) was created in 1976 to improve workers' nutrition²². Today it covers more than fourteen million workers. Despite its importance and extensive coverage, few studies have investigated the impact of PAT on workers' health, and many studies question the effectiveness of the program in promoting their health²²⁻²⁴. Therefore, studies about the quality of meals consumed away from home in Brazil should include workplace, as they are an important eating location.

After adjustment, the energy content of the meals consumed at different eating locations did not vary significantly, but their quality indicators did. In general, meals realized in the workplace cafeteria have the best results. Their higher quality may be related to PAT's nutritional guidelines set forth by the Interministerial Decree of 2006, which established limits for the macronutrient distribution and energy, saturated fat, fiber, and sodium contents and determined the inclusion of non-starchy vegetables and fruits²⁵.

Energy density is influenced by water and fat content²⁶. Hence, the lower energy density of workplace meals is related to their total fat and fiber contents, different from those of homemade meals. However, in all study locations, energy density is higher than that recommended by the World Cancer Research Fund, which recommends a dietary energy density of 1.25kcal/g as a public health goal²⁷.

The higher fiber intake of individuals who eat at workplace cafeterias stems from a higher intake of fruits, non-starchy vegetables, and

legumes. A study found that PAT workers' lunch contains 6.0g to 8.3g of fiber²³. Other studies found that fiber intake away from home is lower than that at home^{6,8}, but these studies have not assessed fiber intake according to eating location.

In Brazil, less than 45% of the adult population consumes fruits and non-starchy vegetables regularly, and only 7.3% has an adequate intake of these foods²⁸. Thus, the higher intake of fruits and non-starchy vegetables at workplace cafeterias as opposed to homes and restaurants may be related to PAT nutritional guidelines, which establish that companies must include at least one serving of non-starchy vegetables and one of fruits in main meals, such as lunch²⁵. This hypothesis is reinforced by findings of an interventional study at the workplace that found that a greater availability of fruits and non-starchy vegetables increases their intake²⁹.

Been intake was also higher among those eating at workplaces. This result is not surprising since rice and beans are staples in cafeterias - they are served daily. However, at-home consumption of rice and beans has decreased considerably in the last years^{30,31}.

Restaurant meals contained more meat, and, indeed, intake of this food group would hardly be high at workplace because there meats are doled out, and at home, because meats are expensive. Furthermore, people perceive foods consumed at home and away from home differently. For instance, meats should always be included in away-from-home meals because of variety and their possible unavailability at home³².

The greater amount of calories from oils and fats in workplace cafeteria meals is corroborated by a study that assessed the menu of companies in *São Paulo* and found the total fat content to be excessive³³. However, the present study did not assess fat quality, and all study restaurants used vegetable oils for cooking. Increasing the fat content may be a strategy to increase palatability, making foods desirable. This practice did not occur at home, since the proportion of oils and fats in homemade meals was smaller.

Individuals who ate at workplace cafeterias and restaurants also consumed more sugars and sweets, which is confirmed by other Brazilian studies. Soda and sweets are the first and third most consumed food items away from home in Brazil²⁰, and companies in *São Paulo* frequently offer too much free sugar³³.

In conclusion, it is important to assess not only if foods are consumed at home or away from home, but also eating location, it was found that meals realized in the workplace have lower energy density and higher amounts of fruits, non-starchy vegetables, fibers, and beans. Their quality was also considered better than that of homemade and restaurant meals. However, people should pay attention to the offer of high-fat foods and sweets in workplace cafeterias.

These findings reinforce the importance of PAT encouraging member companies to have food services, for healthy foods improve workers' diets. The present study is the first in Brazil to assess meal quality according to eating location, showing that the latter may influence one's diet.

CONTRIBUTORS

All authors participated in all phases of the research article.

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