

Energy and nutrient intake according to away-from-home food consumption in the Northeast Region: an analysis of the 2008–2009 National Dietary Survey

Ingestão de energia e nutrientes segundo consumo de alimentos fora do lar na Região Nordeste: uma análise do Inquérito Nacional de Alimentação 2008-2009

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ABSTRACT: *Introduction:* Away-from-home food consumption has increased in Brazil and is associated with fewer nutritious food choices. *Objective:* To describe energy and specific nutrient intake among consumers and non-consumer of away-from-home food in the Northeast Region. *Methods:* A sample of 11,674 individuals from the National Dietary Survey data, which is part of the 2008–2009 Household Budget Survey, from the Northeast Region, was analyzed. Individuals provided two dietary records in nonconsecutive days, informing the place where foods were consumed (at-home or away-from-home). Away-from-home food was defined as foods acquired and consumed away from home. Linear regression models were developed to assess the relationship between away-from-home food consumption in one of the two-day food record and the energy and nutrient intake, adjusted for age, gender, and per capita income. *Results:* Away-from-home food consumption, in at least one of the two-day food record, was reported by 42% of individuals in the Northeast Region. Individuals who consumed food away from home in the Northeast Region presented poor nutrient intake compared to those who did not report consumption away from home, with higher intake of energy, free sugar, saturated fat, and trans fat and lower intake of protein, iron, and dietary fiber, regardless of age, gender, and income ($p < 0.05$). *Conclusion:* Away-from-home food consumption in the Northeast Region contributed to higher energy and poorer nutrient intake. Therefore, the development of public policies and strategies that favor health food choices when individuals eat away from home is necessary.

Keywords: Food habits. Nutrients. Energy consumption. Diet surveys. Eating. Feeding behavior.

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RESUMO: *Introdução:* O consumo de alimentos fora do lar vem crescendo no Brasil, sendo associado a escolhas alimentares menos nutritivas. *Objetivo:* Descrever a ingestão de energia e nutrientes específicos entre consumidores e não consumidores de alimentos fora do lar, na Região Nordeste. *Métodos:* Foram analisados dados do Inquérito Nacional de Alimentação (INA), provenientes da Pesquisa de Orçamentos Familiares (POF) 2008-2009, em uma amostra de 11.674 indivíduos residentes na Região Nordeste, que forneceram dois registros alimentares em dias não consecutivos, com informação sobre o local de consumo dos alimentos (dentro ou fora do lar). Alimentação fora do lar foi definida como todo alimento adquirido e consumido fora de casa. Modelos de regressão linear foram desenvolvidos para avaliar a relação entre o consumo alimentar fora do lar em um dos dois dias de registro e a ingestão de energia e nutrientes, ajustados por idade, sexo e renda per capita. *Resultados:* O consumo de alimentos fora do lar, em pelo menos um dos dois dias de registro alimentar, foi reportado por 42% dos indivíduos. Os indivíduos que consomem alimentos fora do lar apresentaram pior ingestão de nutrientes em comparação com os que não consomem alimentos fora do lar, com maior consumo de energia, açúcar livre, gordura saturada, gordura trans e menor ingestão de proteína, ferro e fibra alimentar, independente da idade, sexo e renda ($p < 0,05$). *Conclusão:* A alimentação fora do lar no Nordeste contribuiu para uma maior ingestão de energia e uma pior ingestão de nutrientes. Assim, faz-se necessária a elaboração de políticas públicas e estratégias que favoreçam a escolha de alimentos mais saudáveis quando os indivíduos optam por se alimentar fora do lar.

Palavras-chave: Hábitos alimentares. Nutrientes. Consumo de energia. Inquéritos sobre dieta. Ingestão de alimentos. Comportamento alimentar.

INTRODUCTION

The growing processes of urbanization, industrialization, and modernization in the food industry have led to important changes in lifestyle. Among these changes, the development of new dietary habits stands out, such as the increasing number of away-from-home meals^{1,2}.

Away-from-home food consumption is one of the components associated with diet, which apparently is a considerable contribution to fewer nutritious dietary choices and excessive calorie intake, with consequent influence on overweight^{3,4}.

A recent study comparing the intake of macronutrients among consumers and non-consumers of away-from-home foods, in the urban areas of Brazil, showed more inadequacies among away-from-home food consumers³. Therefore, away-from-home food consumption has been the focus of actions to promote health and prevent chronic diseases related to poor diet, such as obesity, diabetes, and hypertension⁵.

The Northeast Region, despite concentrating most of the states with low Human Development Index (HDI) in the country (www.pnud.org.br), presents an important percentage of away-from-home food consumption: 41% of the adolescents, 35% of the adults, and 13% of the elderly reported consuming food outside the household³.

Even though the habit of eating outside the household has increased in the past few years, the studies on this matter are still scarce, especially in the Northeast Region, which already stands out in the national scenario, with high prevalence of overweight in its capitals⁶.

In the entire region, 42.9% of the male gender and 46% of the female gender are overweight, and 9.9% of the men and 15.2% of the women are obese⁷.

Once the intake of foods outside the household may contribute with the inadequate intake of energy and nutrients, besides favoring the development of diseases related to malnutrition, like obesity, this study aims at describing the consumption of energy and specific nutrients among consumers and nonconsumers of food away from home in the Northeast Region.

METHODS

This is a cross-sectional, descriptive and analytic study conducted based on secondary data from the National Dietary Survey (NDS), individual food consumption module in the Household Budget Survey (HBS), carried out by the Brazilian Institute of Geography and Statistics (IBGE), between May 2008 and May 2009.

The study used a complex sampling plan based on a set of 12,800 census sectors, called “Master Sample”, considered in all national IBGE surveys with a household sample. The sample selection took place in two stages. In the first stage, the census sectors were the primary sampling units, selected by systematic sampling, with probability proportional to the number of households in each sector. The secondary sampling units were the households, selected by simple random sampling. Census sectors went through geographic and statistical stratification, with the objective of allowing analyses in different geographic and socioeconomic domains, including the five major Brazilian regions.

The dietary consumption data were collected in a subsample of 25% of the households in 2008–2009 HBS, corresponding to 13,569 households, randomly selected from the research sample. All members aged 10 years or more in these households were selected to take part in the dietary survey ($n = 38,340$). The non-response rate was 11%, resulting in a final sample of 34,003 respondents. For this paper, only individuals living in the Northeast region of Brazil were included ($n = 12,615$). Pregnant women and nursing mothers ($n = 482$) were excluded from the sample, accounting for a final set of 11,674 individuals, each with a two-day diet record.

The food consumption data were collected through dietary records applied in two non-consecutive days. The interviewees were advised to record all foods and drinks consumed in detail, specifying the number of all items consumed, type of preparation of specific foods, time, and place of consumption (inside and outside the household). The classification of away-from-home food consumption included all foods and drinks acquired and consumed outside the household, without entering the family storage. For this study, the two-day dietary record was assessed considering away-from-home consumers those individuals who consumed at least one item outside the household in one of the two recorded days.

Questionnaires with socioeconomic and demographic data were applied with residents of the households during the interviews. The socioeconomic and demographic variables used in this study are age, sex, and per capita family income. Reported homemade measures and portions of foods consumed were transformed in grams or milliliters, using the table of referred measures for food consumed in Brazil⁸. Afterwards, the nutritional composition was estimated based on the Tables of Nutritional Composition of Food Consumed in Brazil, especially developed for the survey⁹.

The average of the two-day dietary record was calculated to estimate the intake of energy, carbohydrates, free sugar, lipids, saturated fat, trans fat, proteins, fibers, and specific micronutrients (sodium, calcium, iron, and vitamin C). The analysis of the intake of nutrients (macro and micronutrients) was adjusted for the total calorie intake using the nutrient density method, obtained by dividing the value of the intake of nutrient by the total energy consumed. Macronutrients, saturated fat, trans fat, and free sugar were estimated according to the percentage of energy consumption: micronutrients were estimated in mg/1,000kcal, and fibers were estimated in g/1,000 kcal.

The frequency of away-from-home food consumption was estimated by sex and age. The mean intake of energy and macro and micronutrients was estimated according to the away-from-home food consumption, and linear regression models were used to assess the relationship between away-from-home food consumption in one of the two days in the food record (yes/no) and the intake of energy and macro and micronutrients. The models were initially adjusted for age and sex and, then, by age, sex, and per capita family income. The relations presenting $p < 0.05$ were considered significant.

The software SAS, version 9.3, was used to calculate the estimations, considering the complexity of the HBS sample and the factors of expansion of the study.

RESULTS

Away-from-home food consumption, on at least one of the two days of the food record, was reported by 42% of the individuals in the Northeast region. Mean age was 35.9 years (standard error [SE] = 0.3), and 50% were women. Away-from-home food consumption was higher in the urban area (45.3%; 95%CI 43.1 – 47.5) than in the rural area (33.7%; 95%CI 30.1 – 37.3), and higher among adolescents than among adults and elders (53.2, 43.3, and 16.9%, respectively). Men reported eating outside the household more often than women (45.7 *versus* 38.5%, $p < 0.0001$). Individuals who reported eating outside the household have lower mean age and higher average of schooling years and per capita income (Table 1).

Away-from-home food consumers presented total calorie intake significantly higher than at-home consumers (2,137 kcal *versus* 1,730 kcal, $p < 0.0001$). As to macronutrients, away-from-home food consumers presented higher intake of total, saturated and trans fat and free sugar than at-home consumers ($p < 0.05$) (Table 2). On the other hand, the intake of protein, fiber, and iron was significantly lower among away-from-home

consumers, when compared to at-home consumers ($p < 0.05$) (Table 2). These relations remained statistically significant even after the adjustment by age, sex, and per capita family income (Table 3).

Table 1. Characteristics of the population (means and 95% confidence intervals), according to away-from-home meals in the Northeast Region: National Dietary Survey 2008–2009.

Characteristics	Away-from-home food consumption		p-value
	No	Yes	
	N = 6949 Mean (95%CI)	N = 4725 Mean (95%CI)	
Age (years)	39.9 (39.1 – 40.6)	30.4 (29.8 – 31.1)	< 0.0001
Per capita household income (R\$)	459.3 (418.0 – 500.6)	686.4 (606.5 – 766.4)	< 0.0001
Schooling years	5.9 (5.5 – 6.2)	7.6 (7.1 – 8.0)	0.0003

Table 2. Intake of energy, macro and micronutrients (means and 95% confidence intervals, according to away-from-home consumption in the Northeast region. National Dietary Survey, 2008–2009.

Nutrients	Away-from-home food consumption	
	No	Yes
	N = 7870 Mean (95%CI)	N = 3804 Mean (95%CI)
Total energy (kcal)	1.730.3 (1.695.0 – 1.765.7)	2.137.2* (2.088.7 – 2.185.6)
Carbohydrate (% of energy)	56.4 (56.0 – 56.7)	55.9 (55.5 – 56.3)
Free sugar (% of energy)	17.1 (16.6 – 17.6)	20.1* (19.6 – 20.7)
Protein (% of energy)	17.6 (17.3 – 17.8)	17.0* (16.8 – 17.2)
Fat (% of energy)	25.8 (25.5 – 26.0)	26.3* (26.0 – 26.5)
Saturated fat (% of energy)	8.7 (8.6 – 8.8)	9.0* (8.8 – 9.1)
Trans fat (% of energy)	0.9 (0.85 – 0.94)	1.0* (0.95 – 1.07)
Fiber (g / 1,000 kcal)	11.5 (11.2 – 11.8)	10.1* (9.9 – 10.4)
Sodium (mg / 1,000 kcal)	854.8 (820.5 – 889.1)	839.1 (811.4 – 866.8)
Calcium (mg / 1,000 kcal)	256.6 (249.3 – 264.0)	246.0 (239.1 – 253.0)
Iron (mg / 1,000 kcal)	5.9 (5.7 – 6.0)	5.6* (5.5 – 5.7)
Vitamin C (mg / 1,000 kcal)	158.9 (131.3 – 186.4)	164.9 (141.5 – 188.2)

*p-value < 0.05 of the difference between means.

DISCUSSION

Away-from-home food consumers presented higher intake of energy, free sugar, saturated fat, trans fat, and lower intake of calcium, protein, iron, and fiber. These facts corroborate other studies that described an important contribution of away-from-home food consumption in the total intake of calories, fats, and sugars^{3,10}.

The intake of foods with high energy density has been associated with the growing obesity and metabolic syndrome¹¹. The increasing size of the portion and the high palatability¹² of the foods consumed outside the household are important factors leading to the high intake of calories. A Brazilian study analyzed the characteristics of away-from-home food consumption and observed that the favorite groups of foods were those with higher energy density, like alcohol, fried and baked snacks, pizza, soft drinks, and sandwiches¹³. It is worth to mention that the reduced energy density of a diet is considered to be a relevant strategy to reduce the prevalence of overweight and obesity in the population¹¹.

The increasing intake of total, saturated and trans fat among away-from-home food consumers can be explained by the higher amount of saturated and trans fat in foods prepared outside the household, especially when they are fried, as the ones served in fast-food restaurants¹⁴.

Free sugar should be consumed in up to 10% of the daily calorie value¹⁵, and it is high not only among away-from-home consumers, but also among at-home consumers.

Table 3. Regression coefficient of the relationship between away-from-home food consumption and intake of energy, macro and micronutrients in the Northeast region: National Dietary Survey 2008–2009.

Nutrients	Model 1 ^a		Model 2 ^b	
	β	p-value	β	p-value
Total energy (kcal)	342.57	< 0.0001	314.29	< 0.0001
Carbohydrate (% of energy)	-0.56	0.03	-0.47	0.06
Free sugar (% of energy)	3.12	< 0.0001	2.73	< 0.0001
Protein (% of energy)	-0.41	0.002	-0.39	0.004
Fat (% of energy)	0.43	0.01	0.32	0.06
Saturated fat (% of energy)	0.31	0.0004	0.23	0.01
Trans fat (% of energy)	0.10	0.01	0.10	0.01
Fiber (g / 1,000 kcal)	-1.27	< 0.0001	-1.15	< 0.0001
Sodium (mg / 1,000 kcal)	-8.06	0.68	-19.4	0.31
Calcium (mg / 1,000 kcal)	1.88	0.69	-4.57	0.33
Iron (mg / 1,000 kcal)	-0.30	0.0006	-0.28	0.001
Vitamin C (mg / 1,000 kcal)	8.69	0.60	8.44	0.61

^aAdjusted for age and sex; ^bAdjusted for age, sex, and per capita family income.

It is a known fact that foods prepared outside the household have high levels of sugar¹⁰. Soft drinks are considered to be important means to the intake of sugar¹⁶, being pointed out as one of the products most consumed away from home^{17,18}, including in the Northeast Region¹⁸, and that may contribute with the intake of free sugar. Therefore, the intake of soft drinks is damaging to the health of individuals, presenting a positive association with excess weight, obesity, and diabetes^{16,19}.

A relevant finding of this study was the lower intake of fibers and micronutrients among away-from-home consumers. Similar data were also reported in 2008–2009 HBS, which showed that 68% of the Brazilian population does not reach the daily recommendation of fibers²⁰. This situation is directly related to the unsatisfactory intake of fruits, vegetables, and whole cereals, besides the low quality of the diet presented by individuals²¹. The deficient intake of fibers is also associated with the characteristics of foods that are mostly consumed outside the household²⁰, which not only are poor in fibers, but also dispose of high energy density and low nutritional quality, thus consisting of a diet prone to nutritional necessities and non-communicable chronic diseases²².

This low-quality diet of the away-from-home consumers in the Northeast region did not have an impact on the body weight of the population. Even though the prevalence of overweight among individuals who eat away from home has been higher among adult men and elderly women, these differences were not statistically significant (data not shown). A study conducted by Bezerra and Sichieri (2009)²³ demonstrated a positive relationship between the habit of having meals outside the household and prevalence of overweight and obesity only among men in the urban areas of Brazil.

The reason why away-from-home food consumption contributes with the growing prevalence of overweight can be related with the nutritional quality of the diet. The food offered in the meal services, with high levels of calories, high levels of fat, low levels of fibers, with a variety of palatable foods, as well as the high intake of soft drinks and candy and the increasing size of portions are the mechanisms most likely associating eating outside the household and weight gain^{10,24}.

On the other hand, it is important to consider that the dietary pattern inside the household can also contribute with the inadequate intake of energy and nutrients. A study assessing the quality of meals consumed inside and outside the household in the city of São Paulo showed that the nutritional quality of these meals was similar, except for lunch outside the household, which presented worse nutritional quality than that consumed in the household. However, the authors point out that both inside and outside the household, dietary choices should be reconsidered, once the low intake of markers of a healthy diet has been observed, such as fruits, vegetables, and whole grains, as well as the high intake of total and saturated fat²⁵.

Besides, the availability of food in the household, in Brazil, has changed in the past few years, with the replacement of traditional food, such as rice, beans, and tubers, with ultra-processed meals, ready for consumption²⁶. These items have characteristics that favor their excessive consumption, such as the high intake of energy, provided by the commercialization of large portions; high palatability; long duration, besides being easy to transport

for the consumer, which stimulates its consumption in between meals, or even replaces them, therefore being associated with excessive weight gain¹².

Even though this study is the first to identify the intake of energy and nutrients in the Northeast region, comparing away-from-home and at-home food consumers, the findings should be analyzed carefully, once the method of data collection was conducted using dietary records, which can change the dietary habits of the interviewees²⁷. Despite the fact that NDS uses the dietary record method, interviewers were also trained to give a detailed review of these diet records. The review was based on the multiple-step method, including questions about foods that are often forgotten, and about details of consumed food. Besides, the interviewers were advised to confirm the information in two situations: when nothing had been consumed in between meals, with intervals longer than three hours, and when there were records with only five items consumed in one day. Once the evaluation about away-from-home food consumption was exclusively based on two days, the intake of energy and nutrients outside the household might have been underestimated, since possible away-from-home consumers may not have consumed anything on the recorded days. However, the collection of more days on dietary surveys with a representative sample of the population has high costs. Many countries also investigate the intake of away-from-home food considering two days of food consumption, and some present data of a single day^{28,29}.

CONCLUSION

Away-from-home food consumers, in the Northeast region of Brazil, presented higher intake of energy, saturated fat, trans fat, and lower intake of protein, iron, and fiber in comparison to at-home consumers. Therefore, it is necessary to elaborate public policies and dietary education strategies that favor the choice of healthier foods when individuals choose to eat outside the household.

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