Public Health Nutrition: 23(6), 1041–1048 doi:10.1017/S1368980019002623

The consumption of ultra-processed foods according to eating out occasions

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Submitted 14 February 2019: Final revision received 29 May 2019: Accepted 12 June 2019: First published online 23 September 2019

Abstract

Objective: To describe out-of-home consumption according to the purpose and extent of industrial processing and also evaluate the association between eating out and ultra-processed food consumption, taking account of variance within and between individuals.

Design: Cross-sectional study.

Setting: Brazil.

Participants: The study was based on the Individual Food Intake of the Brazilian Household Budget Survey, carried out with 34 003 individuals aged 10 years or more, between May 2008 and May 2009. All food items were classified according to food processing level. The habit of eating out was evaluated through the frequency of days each individual reported eating out, described according to sociodemographic characteristics. The contribution of food energy per group and subgroup was estimated according to the frequency of eating out. In addition, multilevel modelling was employed to evaluate the association between eating out and ultra-processed food consumption.

Results: In Brazil, culinary preparations accounted for most of the energy eaten out. However, it was possible to observe a higher contribution of ultra-processed foods, especially sugary beverages and ready-to-eat meals, as the frequency of out-of-home consumption increased. Compared with food consumption exclusively at home, eating out increased the consumption of ultra-processed foods by 0·41 percentage points within and between individuals.

Conclusion: In Brazil, the same individual and different individuals had greater consumption of ultra-processed foods when they ate out of home compared with when they ate at home. So, it is necessary to implement public policies which discourage the out-of-home consumption of ultra-processed foods and that provide affordable and accessible less-processed food options.

Keywords
Eating out
Ultra-processed food
Multilevel analysis
National food survey

Ultra-processed foods are industrial formulations created mainly from food extracts or constituents, with little or no intact food and often contain flavourings, colorants and other additives that confer hyper-palatability[1,2]. The consumption of ultra-processed foods is negatively associated with dietary contribution of protein, fibre, vitamins and minerals, and positively associated with free sugar and total fats, saturated and *trans*-fats[3–6]. Moreover, recent studies have shown an association between the consumption of ultra-processed foods and the occurrence of obesity, hypertension and cancer in adults[7–10], and metabolic syndrome, asthma and wheezing in children and adolescents[11,12].

Evidence suggests that the consumption of ultra-processed foods may be associated with eating out. As pointed out by studies conducted in the Brazil, the food groups with the highest consumption away from home in the country were

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foods characterized by high processing degree, such as baked and fried snacks, pizza, soft drinks and sandwiches[13–15]. Additionally, studies have shown an association between eating out and high amounts of saturated fat, free sugars and higher energy density[16], characteristics also found in ultra-processed foods[3–6].

The possible association between eating away from home and ultra-processed food consumption is of concern, as the habit of eating out tends to grow in the country. In Brazil, studies conducted with representative samples show an increase in expenditures on meals out of home from 24 to 31 % of total diet cost between 2002–2003 and 2008–2009[17]. This increase was concentrated among households with higher incomes, but it was present in all regions and areas of the country[18].

Despite this fact, studies conducted so far with regard to out-of-home food consumption have been limited to comparison between individuals and thus susceptible to confounding biases since individuals who eat at home and away from home tend to be very different[13,14].

Given the above, the present study aimed to describe the consumption of food away from home according to the purpose and extent of industrial processing and also evaluate the association between eating out and ultra-processed food consumption, taking account of variance within and between individuals.

Methods

Source of data

The present study is a cross-sectional analysis based on data obtained from the Household Budget Survey (POF) conducted by the Brazilian Institute of Geography and Statistics (IBGE) between May 2008 and May 2009 in the urban and rural areas of Brazil.

The sampling plan of POF 2008/2009 was developed from the master sample of IBGE's Integrated System of Household Surveys. This sample was submitted to geographical stratification considering administrative regions (municipality of the capital and metropolitan region), spatial/geographical divisions (municipalities) and census tracts (rural or urban area), and subsequently statistical stratification (income).

From the master sample, a subset of census tract samples was selected from each stratum by simple random sampling (totalling 4696 sectors). Subsequently, in the same manner, households within each sector were selected for the interviews (totalling 55 970 households).

Information concerning the socio-economic and demographic characteristics of the households and residents was collected through interviews conducted by trained agents with the help of portable microcomputers and standardized electronic questionnaires.

The Individual Food Intake module, of particular interest to the present research, was applied in a sub-sample of the households randomly selected from POF, totalling 13 569 households (24·5 %). In these households, information on individual food consumption was collected through food records taken on two non-consecutive days among residents aged 10 years or older.

In the present study, only individuals who completed the 2 d food records were included, totalling 32 930 people.

Dietary intake

The participants were instructed to record all foods and beverages (except water) consumed during 24 h, reporting type of preparation, amount of food, mealtime, day of the week and place where meal was eaten (home or away from home). Also, they responded to a question regarding the habit of sweetening drinks with sugar or sweetener. The interviewers reviewed the submitted records, investigating the consumption of commonly forgotten foods, and corrections were made with participants when necessary. Lastly, the collected information was transcribed into the electronic system.

Using the 'Table of Reference Measures of Foods Consumed in Brazil'[19], the quantities of foods and beverages were converted into grams and millilitres, respectively. Then, they were transformed into energy using the Brazilian food composition table. Following IBGE guidelines, when participants reported the habit of adding only sugar to beverages, 10 % of the volume of fruit juice, coffee or tea consumed was considered sugar content, whereas this percentage was 5 %[20] for those with the habit of adding sugar and artificial sweeteners.

After this step, the 1120 food items were divided into groups and subgroups following NOVA's classification according to the degree and extent of processing. NOVA (non-acronym name) divides foods into four groups: (i) natural or minimally processed foods (directly obtained from nature undergoing minor changes, such as removal of parts and cleaning; this group includes cereals, legumes, fruits, vegetables, roots, tubers, meats, eggs, milk and others); (ii) processed culinary ingredients (substances extracted from foods or from nature consumed as items of culinary preparations such as salt, table sugar, oils and fats); (iii) processed foods (composed of natural or minimally processed foods with added ingredients such as salt, oil and sugar; this group includes foods such as processed breads, cheeses, preserves and salted or smoked meats); and (iv) ultra-processed foods (characterized by high degree of processing and addition of substances exclusive to the food industry; this group includes cookies, snacks, soda, dairy drinks, breakfast cereals, frozen meals among others)[1,21]. In the present study, natural and minimally processed foods and culinary ingredients were grouped in a category called 'culinary preparations'.

Data analysis

Out-of-home food consumption was assessed through the frequency of days each individual reported eating any

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food away from home. For this purpose, the individuals were divided into three categories: 'did not eat away from home' (including individuals who ate exclusively inside home), 'ate away from home (1 d)' (including individuals who ate away from home for only one day) and 'ate away from home (2 d)' (including individuals who ate away from home for two days). First, this indicator was described according to the characteristics of the individual (age range (10–19 years, 20–39 years, 40–59 years, ≥60 years), sex and schooling (≤4 years, 5–8 years, 9–12 years, >12 years of schooling)) and household characteristics (family per capita income (in quintiles), area (urban and rural) and region (North, Northeast, Midwest, Southeast and South)).

Next, the contribution of culinary preparations, processed and ultra-processed foods to dietary intake, as well as their subgroups, was estimated according to the frequency of eating away from home. Therefore, the contribution of food groups and subgroups to energy intake (percentage in relation to total energy) was estimated using mean consumption based on the two days of research.

We performed multilevel models in order to evaluate the association between eating out and the contribution of ultra-processed foods (percentage in relation to total energy) to dietary intake. Such a model allows the effect of ultra-processed consumption to be evaluated in two ways: (i) comparing the percentage of ultra-processed foods in the diet of an individual on days when he/she ate at home and away from home; and (ii) comparing the percentage of ultra-processed foods in the diet of individuals who ate exclusively at home *v.* those who ate at least one food item away from home. The dependent variable was the percentage contribution of ultra-processed foods to dietary intake on each of the two evaluated days. The independent variable was 'status' in relation to out-of-home consumption, in which individuals were classified as 'did not eat away from home' (when he/she reported eating exclusively at home) and 'ate away from home' (when any food item was consumed away from home throughout the day).

It is expected that the diet of an individual on different days is correlated, as well as the diet of different individuals living in the same household. The hierarchical structure of the data in question was therefore composed of three levels: the first, second and third level being daily food consumption, the individual and the household, respectively.

The data were analysed using negative binomial regression due to the large number of zeros in the number of individuals who did not report consumption of ultra-processed foods on any of the record days.

The analysis was adjusted for potential confounding variables: socio-economic and demographic characteristics (time invariant) and day of the week (time variant). The fit of the model was verified by residual distribution plots, which should follow a normal distribution[22].

Results

The mean daily energy intake per capita of the population was 7888·9 kJ (1885·5 kcal), of which 15·1 % was consumed away from home. About 51·3 % of the population reported not eating away from home, 20·6 % reported eating out on only one of the two food record days and, finally, 28·2 % reported having consumed at least one food item away from home on both data collection days (Table 1).

The percentage of individuals who ate away from home on both days was higher among men, in the age group of 20–39 years, in persons living in the urban area, and directly related to schooling and income.

Table 2 presents the percentage contribution of culinary preparations, processed foods and ultra-processed foods and their subgroups in the dietary intake of the total population and according to frequency of consumption away from home. Among the energy consumed by the population, approximately 69 % came from culinary preparations, 10·6 % from processed foods and 20·4 % from ultra-processed foods. As the frequency of out-of-home consumption increased, a decrease in the proportion of culinary preparations (from 73·3 to 63·4 %) was observed, contrary to the increase in the percentage of ultra-processed foods (from 16·0 to 26·2 %).

Regarding the subgroups of culinary preparations, only the consumption of natural juices increased as out-of-home food consumption frequency increased, while the opposite was observed for rice, beans and other legumes, roots and tubers, corn and other cereal-based dishes, fish and seafoods, eggs, milk and natural yoghurt, coffee and tea. Among the subgroups of processed and ultra-processed foods, however, an increase in energy intake from fermented alcoholic beverages, biscuits and savoury snacks, sweets, bakery products, ultra-processed breads, ultra-processed meats, ready meals, sugar-sweetened drinks, artificial juices and other sweetened beverages, and dairy drinks was found as the frequency of out-of-home consumption increased.

The result of the multilevel model showed that eating out was positively and significantly associated with energy from ultra-processed foods in the diet at both the within- and between-individual levels (Table 3). The estimated gross effect of out-of-home consumption corresponded to an increase of 0·53 (95 % CI 0·51, 0·56) percentage points in the contribution of ultra-processed foods in the diet. After adjustment for potential confounding variables, this value was 0·41 (95 % CI 0·39, 0·43) percentage points. That is, between individuals, the consumption of ultra-processed foods was higher among individuals who had consumed at least one food item away from home compared with individuals who ate exclusively at home. This association was also valid within individuals; in other words, when comparing energy consumption on different days for the same individual, the proportion of ultra-processed foods

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Table 1 Distribution of population socio-economic and demographic characteristics according to frequency of out-of-home consumption, Brazilian Household Budget Survey, May 2008–May 2009

	Population (*n* 32 900)	Did not eat away from home		Ate away from home (1 d)		Ate away from home (2 d)	
	%	%	95 % CI	%	95 % CI	%	95 % CI
Brazil	100·0	51·3	50·4, 52·2	20·6	19·8, 21·3	28·2	27·4, 29·0
Age group							
10–19 years	21·3	41·5	39·7, 43·3	26·4	24·8, 28·1	32·1	30·4, 33·8
20–39 years	38·0	43·7	42·2, 45·1	20·8	19·7, 22·0	35·5	34·1, 37·0
40–59 years	27·3	55·9	54·2, 57·7	19·5	18·1, 21·0	24·6	23·1, 26·1
≥60 years	13·3	78·9	76·5, 81·2	12·6	10·6, 14·8	8·5	7·2, 10·1
Sex							
Male	48·1	47·1	45·8, 48·4	21·0	20·0, 22·2	31·9	30·6, 33·2
Female	51·9	55·1	53·9, 56·4	20·1	19·1, 21·2	24·7	23·7, 25·9
Area							
Rural	16·6	64·9	63·3, 66·4	18·3	17·0, 19·6	16·8	15·7, 18·1
Urban	83·3	48·5	47·5, 49·6	21·0	20·2, 21·9	30·4	29·5, 31·4
Schooling							
≤4 years	33·2	67·7	66·3, 69·0	16·2	15·2, 17·3	16·1	15·1, 17·2
5–8 years	26·5	50·7	49·0, 52·4	22·0	20·6, 23·5	27·3	25·8, 28·9
9–12 years	29·5	41·1	39·5, 42·9	22·9	21·4, 24·5	35·9	34·3, 37·6
≥12 years	10·8	29·9	27·2, 32·8	23·9	21·3, 26·7	46·2	43·1, 49·4
Income							
Q1	20·0	61·3	59·7, 62·9	19·5	18·2, 21·0	19·1	17·9, 20·4
Q2	20·0	55·6	53·7, 57·5	19·7	18·3, 21·2	24·7	23·0, 26·4
Q3	20·1	53·0	51·1, 55·0	20·4	18·8, 22·0	26·6	24·8, 28·4
Q4	19·8	47·8	45·7, 50·0	21·5	19·7, 23·5	30·6	28·7, 32·6
Q5	20·0	38·4	36·2, 40·7	21·6	19·7, 23·6	39·9	37·6, 42·2
Region							
North	7·5	47·3	45·4, 49·2	22·3	20·8, 23·9	30·4	28·6, 32·2
Northeast	27·4	58·3	57·0, 59·6	19·4	18·4, 20·5	22·3	21·2, 23·4
Southeast	43·0	47·3	45·6, 49·0	21·6	20·1, 23·0	31·1	29·5, 32·7
South	14·8	51·9	49·8, 54·0	19·3	17·7, 21·1	28·7	26·9, 30·6
Midwest	7·2	50·7	48·5, 52·8	19·6	17·9, 21·4	29·7	27·7, 31·9

was higher for days when at least one food item was eaten away from home compared with days when all meals were eaten at home (Table 3).

Discussion

The methodology of the present study is notable for permitting the comparison of both within- and between-individual consumption which, in turn, reduces possible biases related to non-measurable variables that determine food choices. The results obtained allow us to conclude that eating out may be one of the risk factors for poor diet quality in Brazil. Although most of the energy eaten out is from culinary preparations, a higher contribution of ultra-processed foods in the diet was observed as the frequency of out-of-home consumption increased. This difference was particularly important for sugar-sweetened beverages and ready meals.

The findings of the present study broaden the evidence from previous studies conducted in Brazil and other countries, pointing out the relationship between eating out and gender, age group, schooling and income. In the present study and in the literature, out-of-home consumption frequency was higher among men, in the age group of 20–40 years, in people living in the urban area, and directly related to schooling and income[13,14,23,24]. These findings are probably related to different eating habits in elderly people[25], the greater availability of commercial establishments and difficult mobility from work to home in the urban area[18,26] and the high food price away from home[18].

Besides finding similar socio-economic characteristics, the present paper and the international and national literature also show an association between eating out and the increase in consumption of some specific food items that could be classified as ultra-processed foods, such as soft drinks, fast foods, fried and baked savoury snacks, and sweets. These items are characterized by the high processing degree and are associated with the consumption of nutritional indicators, such as saturated fat and free sugars[13,14,23,26].

The only subgroup of culinary preparations that increased according out-of-home food consumption frequency was natural fruit juice. A Brazilian study indicates similar results, showing that away-from-home food consumers presented higher chance of drinking fruit/vegetable juices[27]. This finding is probably a reflection of the high availability of natural juices in food establishments in Brazil; however, we found no studies in the literature exploring this theme. Additionally,

Table 2 Percentage contribution of NOVA food groups and subgroups to dietary intake according to frequency of out-of-home consumption, Brazilian Household Budget Survey, May 2008–May 2009

	Did not eat away from home		Ate away from home (1 d)		Ate away from home (2 d)	
	%	95 % CI	%	95 % CI	%	95 % CI
Culinary preparations	73·3	72·9, 73·7	65·9	65·2, 66·7	63·4	62·8, 64·1
Rice	13·7	13·5, 13·9	11·8	11·5, 12·1	11·0	10·8,11·3
Beans and other legumes	11·5	11·3, 11·8	9·5	9·2, 9·8	9·0	8·7, 9·2
Red meat	9·7	9·5, 9·9	9·5	9·2, 9·8	9·9	9·6, 10·2
Milk and natural yoghurt	5·8	5·6, 6·0	4·9	4·7, 5·1	4·9	4·7, 5·2
Poultry	5·0	4·8, 5·2	4·9	4·6, 5·1	4·6	4·3, 4·8
Roots and tubers	3·8	3·7, 4·0	3·6	3·4, 3·8	3·2	3·1, 3·4
Natural fruit juice	3·6	3·5, 3·7	4·4	4·1, 4·6	5·1	4·9, 5·3
Coffee and tea	3·3	3·2, 3·4	2·5	2·4, 2·6	2·3	2·2, 2·5
Fruits	3·1	3·0, 3·2	3·0	2·9, 3·2	2·9	2·7, 3·0
Pasta	3·1	2·9, 3·2	2·9	2·7, 3·1	2·8	2·7, 3·0
Corn and other cereal-based dishes	2·2	2·0, 2·3	1·4	1·2, 1·5	1·1	1·0, 1·2
Fish and seafoods	2·0	1·9, 2·1	1·5	1·3, 1·6	1·3	1·2, 1·4
Other culinary ingredients*	1·8	1·6, 1·9	1·9	1·7, 2·1	1·5	1·3, 1·6
Vegetables and green leafy vegetables	1·7	1·6, 1·8	1·6	1·5,1·7	1·6	1·5, 1·7
Other culinary preparations†	1·7	1·5, 1·8	1·6	1·5, 1·8	1·9	1·7, 2·1
Eggs	1·6	1·6, 1·7	1·2	1·1, 1·3	1·1	1·0, 1·2
Processed foods	10·7	10·4, 10·9	10·7	10·3, 11·0	10·4	10·0, 10·7
French bread	8·2	8·0, 8·4	7·7	7·4, 8·0	7·2	7·0, 7·5
Processed cheeses	1·0	0·9, 1·1	1·1	1·0, 1·2	1·1	1·0, 1·2
Processed meats	0·9	0·8, 0·9	0·7	0·6, 0·8	0·5	0·4, 0·7
Canned fruits, leafy green vegetables, vegetables and legumes	0·3	0·2, 0·3	0·3	0·3, 0·4	0·3	0·2, 0·4
Fermented alcoholic beverages	0·3	0·2, 0·4	0·8	0·7, 1·0	1·3	1·1, 1·5
Ultra-processed foods	16·0	15·7, 16·4	23·4	22·7, 24·1	26·2	25·6, 26·9
Ready meals	2·7	2·5, 2·8	5·6	5·2, 6·1	6·9	6·6, 7·3
Bakery products	2·6	2·4, 2·7	3·4	3·1, 3·7	3·4	3·1, 3·6
Soft drinks, artificial juice and other sugar-sweetened drinks	1·9	1·8, 2 0	3·1	2·9, 3·3	3·7	3·5, 3·9
Crackers and savouries	1·9	1·8, 2·1	2·0	1·8, 2·1	2·2	2·0, 2·5
Sausages and other ultra-processed meats	1·5	1·4, 1·6	1·7	1·5, 1·9	1·8	1·6, 1·9
Margarine	1·5	1·4, 1·5	1·3	1·2, 1·4	1·2	1·1,1·3
Ultra-processed meat	1·3	1·2, 1·4	1·4	1·3, 1·6	1·6	1·5, 1·8
Sweets	1·2	1·1, 1·3	2·5	2·3, 2·8	2·8	2·6, 3·1
Dairy drinks	1·2	1·1, 1·3	1·9	1·7, 2·1	2·0	1·8, 2·2
Other ultra-processed foods	0·2	0·2, 0·3	0·4	0·3, 0·5	0·4	0·4, 0·5

*Composition: sugar, animal fat, vegetable fat, viscera.
†Composition: homemade cakes, regional meals.

Table 3 Multilevel model: association between frequency of out-of-home eating and ultra-processed foods as a percentage of energy intake, Brazilian Household Budget Survey, May 2008–May 2009

	Model without adjustment		Adjusted model*	
	Crude coefficient	95 % CI	Adjusted coefficient	95 % CI
Fixed effect				
Did not eat out	–		–	
Ate out	0·53	0·51, 0·56	0·41	0·39, 0·43
Random effect†				
Variance level: home	0·79	0·02	0·63	0·01
Variance level: individual	$3{\cdot}10 \times 10^{-34}$	$3{\cdot}11 \times 10^{-19}$	$9{\cdot}44 \times 10^{-36}$	$5{\cdot}37 \times 10^{-20}$

*Coefficient adjusted for time-variant (day of the week) and time-invariant (region, area, income, schooling, age, race and sex) variables.
†Data presented are variance and SE.

the classification of juices according to processing degree is challenging, since instruments of food consumption do not always allow the differentiation between *in natura* and ultra-processed juices.

No other subgroup of culinary preparations increased according frequency of out-of-home consumption, demonstrating that eating away from home favours the substitution of traditional foods for ultra-processed foods.

The increasing share of out-of-home consumption in the diet of the Brazilian population[17,18] and its association with the consumption of ultra-processed foods are of concern, as these foods are characterized by poor nutritional quality and are associated with worse health outcomes[5,6,8,28]. Ultra-processed foods are characterized by high energy density, high glycaemic index and high fat content, in contrast to low amounts of fibre and micronutrients[3,4,6,29]. In addition,

these foods are related to increased risk of developing non-communicable diseases such as obesity[7,8], some types of cancer[9], asthma and metabolic syndrome in children[11,12] and gastrointestinal disorders[28].

The increase in the consumption of ultra-processed foods out of home can be partly attributed to the characteristics of these products such as wide availability, convenience, marketing appeal, convenience and ease of transportation and storage, allowing their consumption at any place[30–32].

In addition to easy access, a comparison of the out-of-home cost of ultra-processed foods and meals shows that, in Brazil, ultra-processed foods have lower price away from home[13]. Thus, individuals with low purchasing power would be the most vulnerable to the consumption of ultra-processed foods out of home, since price has a greater influence on the food choices made by these individuals[33].

A study conducted in Brazil demonstrated that eating out may have a negative impact on diet when based on typical Brazilian breakfast/tea or ultra-processed foods. However, the same study showed that it is possible to maintain a healthy diet out of home when adhering to traditional Brazilian cooking standards[34]. In this sense, the establishment of subsidies for popular restaurants with affordable price, along with zoning policies, could ensure a greater number of healthy food establishments and discourage the sale of unhealthy foods.

The Dietary Guidelines for the Brazilian Population suggest restaurants such as self-service per kilo as a healthy option for out-of-home consumption. Such restaurants offer a wide variety of culinary preparations, allow the client to serve him/herself and pay only for the amount consumed, being a good alternative to eating out on a daily basis[2].

Additionally, approaches such as limiting convenience food stores, especially in workplaces and schools, are important for the promotion of a healthy environment out of home[35]. Recently, the Brazilian Ministry of Health issued a decree prohibiting the sale of ultra-processed foods in the ministry's work environment and related entities as well as increasing the supply of *in natura* and minimally processed foods and culinary preparations[36]. This initiative is promising as it promotes adherence to healthy eating out of home, but should be extended to other institutions, including public agencies, hospitals and educational units.

In Brazil, federal guidelines recommend restricting the sale and commercial promotion of foods with high fat, saturated fat and *trans*-fat, free sugars and salt in schools[37]. However, in schools and surrounding neighbourhoods, the sale of foods characterized by poor nutritional quality and ultra-processing is still common and is associated with an increase in consumption frequency[38].

The current study presents some limitations in relation to the instrument used for the collection of food information. The instrument was not designed to evaluate the extent and purpose of food industrial processing and therefore some items may have been misclassified. In cases where it was not possible to differentiate minimally processed foods from ultra-processed foods (e.g. cakes), we chose the most usual form of consumption in the country to classify the food item.

The 24 h food record could also underestimate food consumption, so, as a way to minimize errors in the estimation of consumption, strategies such as pre-testing and validation of the collection instrument, quality control procedures performed during data collection, exclusion of inconsistent records and substitution with imputed values were utilized[39]. In addition, the analyses were based on population means of a large and representative sample, which is sufficient to provide adequate estimates of food consumption[40].

The analyses are based on only 2 d of food consumption which may not reflect the usual out-of-home consumers. However, the study aimed to evaluate if eating away from home increases the consumption of ultra-processed foods on the day that the food record was collected. We therefore believe that this limitation does not affect our estimates.

The present study stands out for characterizing and evaluating the consumption of subgroups of ultra-processed foods at home and away from home. Besides employing multilevel modelling and comparing the diet of different individuals, the present study also evaluated the diet of the same individual at two moments, allowing an individual's consumption at home and away from home to be compared as well as that of different individuals. Importantly, the probabilistic nature of the studied sample allowed results that are representative of the Brazilian adolescent and adult population. Another positive point is that the study widens the scope of research related to consumption at home and away from home, besides the analysis of specific nutrients and foods. Thus, our study fills gaps in the literature regarding the degree of food processing and out-of-home consumption.

Further studies, however, need to be conducted to better understand the influence of the environment on food choices made out of home, such as the impact of specific commercial establishments and other forms of commercialization (such as soft drink and goodies vending machines). It is also necessary to better distinguish between consumption of foods prepared at home and consumed away from home, and foods prepared away from home and consumed at home (delivery), evaluating the characteristics associated with their consumption and impact on diet.

Conclusion

Our study showed that in Brazil, for the same individual and different individuals, there is higher consumption of ultra-processed foods when meals are eaten away from home compared with when only home meals are eaten. Therefore, actions and strategies aimed at promoting and stimulating environments that provide healthier food choices outside the home should be prioritized.

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Acknowledgements

Acknowledgements: The authors thank the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for financial support. *Financial support:* This work was supported by FAPESP (grant number 2015/14900-9) and CAPES. FAPESP and CAPES had no role in the design, analysis or writing of this article. *Conflict of interest:* The authors declare that they have no competing interests. *Authorship:* G.C.A., the first author, participated in the design and planning of the study, analysis and interpretation of data and the manuscript writing. The other authors, M.L.C.L., M.F.G.-V., C.M.A. and R.B.L., participated in the planning of the study, data interpretation, the critical review of the content and approval of the final version of the manuscript. *Ethics of human subject participation:* The present paper used the Individual Food Intake Survey from the POF collected by the IBGE between 2008 and 2009. The information contained in the POF 2008/09 microdata provided by IBGE does not allow the identification of the families studied since the specific data of each household, such as their address, telephone number and the census tract number in which the household is inserted, are omitted. In the same way, information necessary for the identification of the residents of each household is also suppressed. This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Research Ethics Committee of the Faculdade de Medicina da Universidade de São Paulo (FMUSP) and approved with the protocol number 266/15. Verbal informed consent was obtained from all subjects.

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