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Beverages consumption in Brazil: results from the first National Dietary Survey

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Abstract

Objective—To provide an overview of beverage consumption patterns using the first nationally representative survey of dietary intake in Brazil.

Design—Beverage consumption data were obtained by 1-day food records in an individual dietary survey.

Setting—nationwide cross-sectional survey, 2008–09.

Subjects—nationally representative sample of individuals ≥10 years (n=34,003).

Results—Beverages contributed to 17.1% of total energy consumption. Caloric coffee beverages provided the greatest level of energy overall (464 kJ or 111 kcal/d). Individuals from 10 to 18 (243 kJ or 58 kcal/d) and from 19 to 39 years old (230 kJ or 55 kcal/d consumed higher proportion of energy from sugar sweetened soft drinks than individuals over this age (142 kJ or 34 kcal/d for those 40–59 and 79 kJ or 19 kcal/d for those >60 years old).

Conclusions—Overall, the contribution of beverages, particularly sugary beverages, to total energy consumption in Brazil represents an important public health challenge and is comparable with those from other countries.

Keywords

dietary survey; energy consumption; sugar sweetened beverages

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INTRODUCTION

In Brazil, in the last decades, Brazilians have experienced an unprecedented increase in the prevalence of overweight, obesity, and related non-communicable diseases [NCD] [1; 2]. In 2008–09, the prevalence of obesity (BMI ≥30kg/m^2) in adults was 12% in men and 17% among women. Additionally, since the mid 1970s, the obesity prevalence increased among teenage boys from 0.4 to 6.0% and from 0.7 to 4% among teenage girls [1]. In 2007, 72% of deaths were attributed to NCD, especially stroke, cardiovascular diseases and cancer, with hypertension and diabetes representing major NCD problems [3; 4].

Declines in physical activity and major changes in overall dietary intake patterns are important contributors to these health outcomes [5; 6; 7]. A critical component of this change has been a shift away from traditional foods toward a marked increase in the consumption of processed foods [8] and greater away-from-home eating [9]. Shifts in overall patterns of beverage consumption have also been found. The growth of food processing industry in parallel with the expansion of supermarkets has been rapidly diversifying beverage choices in Brazil, particularly sugar-sweetened beverages (SSB), a category that include not only soft drinks but also milk- and soy-based beverages [10; 11; 12; 13]. The household availability of sodas and milk-based beverages in the Brazilian metropolitan areas increased 500% between 1974–75 and 2008–09 [14] and the household availability of alcoholic beverages, especially beer, doubled in the same period [15]. However, results such as these, based on household expenditures data, likely underestimate overall individual consumption as they exclude away-from-home eating which is an important source of caloric beverages [16; 17].

Caloric beverage consumption has become an important source for increases in energy intake around the globe. Since the work of Mattes showed that individuals do not compensate as fully for the intake of liquid calories [18; 19; 20], numerous studies and a number of meta-analyses have shown marked effects of SSB intake on increased weight and risk of cardiometabolic outcomes, particularly diabetes [21; 22; 23; 24; 25]. This is particularly true for studies conducted independent of beverage industry funding [26]. SSB consumption has been implicated in a large array of other cardio-metabolic problems [27; 28; 29; 30; 31; 32; 33; 34; 35; 36], and most recently health outcomes like fatty liver disease and visceral fat deposition [37; 38; 39; 40; 41].

In addition, SSB consumption is linked often with poorer dietary quality and reduced milk consumption [42; 43; 44; 45]. A meta-analysis including 88 studies [25] concluded that the available scientific knowledge strongly support recommendations to reduce soft drink consumption as it is associated with lower intakes of milk and calcium and higher intake of added sugar.

This study analyzes data from the first nationally representative dietary intake survey in Brazil to provide some context for understanding one potentially important contributing factor to the shift in obesity and other cardio-metabolic outcomes in Brazil.

METHODS

Study sample

This study analyzes data obtained in the first Brazilian Individual Dietary Survey (IDS), carried out by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatistica - IBGE) along with the 2008–2009 Brazilian Household Budget Survey (HBS). The IDS examined the food consumption of a representative sample of the Brazilian population ≥10 years old sub-sampled from the households investigated in the HBS. The households in the main sample were selected by a two-stage complex cluster sampling design, having the census tracts as primary sampling units and households as secondary sampling units. Prior to the sample selection, homogeneous strata of households were established considering the tracts locations (region, state, rural or urban, capital or other city) and the households' heads income. To reproduce seasonal variations in income, prices, and purchase of food and other products, the tracts were equally allocated among the four quarters of the survey (May 2008 – May 2009) to guarantee that all strata were represented at all quarters [(15)]. One out of five households selected for the HBS was randomly selected to answer the IDS, assuring that all selected census tracts were represented in the IDS sample[(46)]. The IDS protocol was approved by the Ethics Research Committee from the Institute of Social Medicine, University of the State of Rio de Janeiro.

Beverage data collection

Data on beverages consumption were obtained by two non-consecutive 1-day food records in which the individuals reported all foods and drinks consumed, the amount consumed, and the time and place of consumption (at-home or away-from-home). Information on water drinking was not collected. A question related to the consumption of sugar and/or artificial sweetener use preceded the food record and the participants were asked what which type of sweetener they used more frequently: sugar, artificial sweetener, both, or none. Interviewers instructed the participants to complete the food records. Additionally, a booklet was left in the household containing illustrated orientations and examples and including photographs of utensils and containers used to serve food and drinks. The participants were instructed to complete the food records in randomly selected pre-determined days of week following the interviewers' schedule.

The data were first recorded by the participants in an appropriate form and later entered and stored electronically by field interviewers using a computer program specially developed by the IBGE. During the data entry phase, the interviewers reviewed the food records with the participants and probed on usually forgotten foods and periods longer than three hours without any reported intake [(47)] following a previously defined routine.

Interviewers were trained during one week period based on detailed manuals elaborated to guide the training sessions, which included exercises and practical simulations. Additionally, multimedia material containing examples on the correct way of recording foods and preparations were available for the interviewers. The training and the manuals also covered topics on the input of food consumption data on the computer program. The software comprised a database composed by information obtained on previous HBS including about

1,500 pre-coded food items and about 100 units of measurement; however, the interviewers were able to include new food items that were not found on the basic data. Detailed information on the pre-test, interviewers training process, data collection protocol, evaluation of data quality, and validation study are published elsewhere [46].

Portion sizes measures for the beverages cited in the food diaries were defined from the compilation of previous works on food portioning and proper standardized weighing. When there was the report of units of measurement incompatible with a beverage, which were possibly erroneously recorded (for example: a piece of coffee), a value was imputed based on the most commonly cited portion size for the specific beverage [46; 48]. Dilution of fruit in fruit juices, powdered cocoa for chocolate drinks, and powdered drink mixes were standardized based on Brazilian research [46].

Beverages' nutritional composition was based on the Brazilian Food Composition Table [44] and on the University of Minnesota Nutrition Coordination Center Nutrient Databank[49; 50]. To estimate energy intake, the amount of table sugar added to the beverages (except *mate*[1] and flavored drink mix) was computed using standardization conducted by the IBGE [46]: if the respondent informed that "sugar is frequently used in beverages", then 10% of sugarcane was added to the beverage (10g of sugar for each 100ml of beverage); if the respondent informed to use both sugar and artificial sweetener, then 5% of sugarcane was added to the beverage (5g of sugar for each 100ml of beverage).

All 171 beverages cited in the food diaries were placed into one of eight groups defined according to the type of beverage, content of energy, and addition of sugar or artificial sweetener: (a) caloric / sugar sweetened coffee beverages: sweetened coffee and cappuccino, sugar sweetened coffee with milk and teas and infusions; (b) fruit/vegetable juices: plain and sugar sweetened fresh squeezed fruit juices; (c) sugar sweetened soft drinks: sweetened flavored drinks, flavored drinks mix, cola and non cola sodas, soy beverage, sport drinks, energy drinks; (d) caloric milk / soymilk beverages: whole milk, plain soymilk, milk + fruit based smoothies, chocolate flavored milk, fermented milk, flavored milk, whey-based beverage; (e) unsweetened low calorie coffee/tea: plain coffee; unsweetened or artificially sweetened coffee with milk and teas and infusions; (f) alcoholic beverages: beer, wine, liquors, mixed alcoholic drink; (g) low calorie/ low fat milk/ soymilk beverages: skimmed milk, low fat milk, diet/light flavored milk and powdered light soymilk; (h) low calorie soft drinks: diet/light soda, artificially sweetened flavored drink mix, light flavored soy beverage. Meal replacement beverages were excluded from this analysis.

Statistical methods

Data from the first day of food record were used to estimate population means of the amount consumed (mL), energy intake (kJ or kcal), and percent of daily energy intake (%) for each beverage group for four age groups: 10 to 18, 19 to 39, 40 to 59, and ≥60 years old. Differences in means intake across age groups were tested using linear models (GLM) with Bonferroni correction, having the intake of beverages (mL, kJ or kcal and % of total energy

[1]Mate is an infusion prepared from leaves of yerba mate *(Ilex paraguariensis*) traditionally drunk in the Brazilian South and some states from the Central-Western Brazil.

consumption) as dependent variables, and age group as the independent variable, adjusted by sex and income. Differences in the proportions of demographic and socioeconomic variables across the age groups were tested by chi square test for homogeneity.

The odds ratio (OR) (and 95% confidence interval [95%CI]) of consumption of beverage groups according to gender, household income (categorized in quartiles), education (≤1; 2–4; 5–8; 9–12; ≥13 years of schooling), urban or rural location, Brazilian geographic region (North, Northeast, Southeast, South, and Central-West), and place of eating (only at-home; at least once away-from-home) were calculated using multivariate logistic regression models, having the consumption of each beverage group (yes/no) as dependent variables and adjusted for age (continuous) and total energy intake. Chi square tests for trend on beverages consumption according to income and education levels were estimated.

Statistical significance was considered with $p<0.05$. All the analyses were performed using the survey procedures from the software SAS 9.3 (Cary, NC, USA) taking into account the sampling weights and design effect.

RESULTS

Demographics

Adolescents (10–18 years) were most likely to be in low income households. The proportion of illiterate individuals (defined as those with < 1 year of schooling) is higher among older individuals, particularly among those ≥60 years old. About 40% of the overall sample consumed some food away-from home, but only 16% of those over 60 years old reported away-from-home food consumption (Table 1).

Beverages consumption

Overall contribution of beverages to total daily energy intake was 17.1%, which decreased slightly with age ($\beta= -0.005\%$; $p<0.01$; data not shown). The beverage groups that contributed most to total daily energy intake in the full sample were the caloric coffee beverages (6.4%), fruit/vegetable juices (4.7%), and caloric milk / soymilk beverages (2.9%) (Table 2).

The daily amount of beverages consumed (mL) varied across ages groups: individuals between 19–39 years old consumed the highest total amount (635mL/d) and elders (≥60 years), the lowest (533 mL/d; $p<0.01$). Among adolescents, fruit/vegetable juices contributed to daily energy consumption (5.2%) as much as caloric coffee beverages (5.1%). Adolescents presented the highest (4.1%) and individuals between 40 and 59 years old reported the lowest (2.1%) contribution of caloric milk /soymilk beverages to daily energy intake ($p<0.01$). The latter group also presented the highest contribution of alcoholic beverages (1.0%) to total daily energy consumption ($p<0.01$). Caloric coffee beverages contributed most to daily total energy intake among elders (7.7%, Table 2).

Relationship between sociodemographic variables and beverages consumption patterns

Compared to men, women had a lower probability of drinking alcoholic beverages (OR=0.4; 95%CI: 0.3, 0.5) but a higher probability of drinking all other beverage groups except

caloric coffee beverages and sugar sweetened soft drinks (for which there was no difference between sexes, Table 3).

The odds of drinking caloric coffee beverages lowered with income (chi square for trend: $p<0.01$) while the odds of drinking sugar sweetened soft drinks, fruit/vegetable juices, and caloric milk / soymilk beverages increased with income (chi square for trend: $p<0.01$). Additionally, compared to all other levels of income, those in the highest quartile of income presented greater odds of consuming unsweetened / low calorie coffee/tea beverages (OR=1.6; 95%CI: 1.2, 2.2), low calorie soft drinks (OR=5.3; 95%CI: 2.1, 12.7), low calorie / low fat milk / soymilk beverages (OR=2.5; 95%CI: 1.6, 4.0), and alcoholic beverages (OR=1.8; 95% CI: 1.1, 3.6) (Table 3).

The odds of drinking unsweetened / low calorie coffee / tea and alcoholic beverages increased with level of education (chi square for trend $p<0.01$). Additionally, the consumption of low calorie soft drinks (OR=2.8; 95%CI: 1.1, 7.1) and low calorie / low fat milk / soymilk beverages (OR=2.1; 95%CI: 1.2, 3.8) was significantly higher for individuals with ≥13 years of schooling (Table 3).

The odds of drinking alcoholic beverages, unsweetened / low calorie coffee/tea, and low calorie soft drinks was higher in the Southeast, South, and Central-West regions compared to the Northern region, while there was not a significant difference in the probability of drinking alcoholic beverages between the Northeastern and the Northern regions. Moreover, the chance of sugar sweetened soft drink intake was higher in the Southeastern region. Compared to individuals living in the rural areas, the odds of drinking caloric coffee beverages was lower in urban areas (OR=0.6; 95%CI: 0.6, 0.7) but there were greater odds of drinking sugar sweetened soft drinks (OR=1.6; 95%CI: 1.4, 1.9), low calorie soft drinks (OR=2.2; 95%CI: 1.2, 4.2), and low calorie / low fat milk / soymilk beverages (OR=2.1; 95%CI: 1.3, 3.4) among individuals living in urban areas compared to those from rural areas (Table 3).

Individuals reporting away-from-home eating were at increased odds of consuming alcoholic beverages (OR=2.4; 95%IC: 1.8, 3.2), sugar sweetened soft drinks (OR=1.8; 95%IC: 1.6, 2.0), fruit/vegetable juices (OR=1.3; 95%IC: 1.2, 1.5), and low calorie soft drinks (OR=1.9; 95%IC: 1.2, 2.9) (Table 3).

DISCUSSION

In Brazil, beverages contributed roughly 17% to total energy consumption and caloric coffee beverages were the most commonly consumed beverage, regardless of age group. Individuals under 40 years old consumed proportionally larger amounts of energy from sugar sweetened beverages, while individuals between 40 and 59 years old consumed the largest amount of alcoholic beverages. Beverage consumption patterns were differentially associated with gender, income, education, and away-from-home eating. Women were less prone to drink alcoholic beverages, but had greater odds of consuming nearly every other type of beverage. The consumption of most beverages increased with income, except caloric coffee beverages, which presented an inverse relationship. Away-from-home food

consumers presented higher chance of drinking alcoholic beverages, sugar sweetened soft drinks, fruit/vegetable juices, and low calorie soft drinks.

Data on beverage consumption obtained for the Brazilian population are comparable to those observed for adults in the US, where energy from beverages represents 18% of total energy intake [51]. Nevertheless, the contribution of beverages to energy intake was lower than the 22.3% of total energy intake observed in Mexico [52]. Estimates for Brazilian adolescents (17.4% of daily energy consumption) are compatible with those for Mexican adolescents (20.1% daily energy intake) [52], and with results observed for European adolescents who presented daily energy intake from beverages varying between 11.2 (Italy) and 20.4% (Austria) of total energy intake [53]. In spite of the role of beverages in the diet, the literature on beverages intake in Brazil is still limited, few studies have observed high consumption of SSB among adolescents [54; 55] or the role of beverages in away-from-home eating [56].

SSB have been characterized as a possible important contributor to the epidemic of overweight and obesity, due to their high added sugar content and poor energy compensation [18; 19; 24; 57; 58]. In another analysis of these same data, we estimated that beverages (excluding alcoholic beverages and milk and milk-based beverages) provided almost half of total sugar in the Brazilian diet [59], which reinforce that beverage consumption is a serious concern for the public health of Brazilians. The rapid growth in SSB and beer sales over the past decade and the increase in purchasing power of most Brazilians only add to concern for excess SSB and beer intake [60].

SSB's were introduced recently in the human diet [44; 61], nevertheless, the remarkable expansion of large and small stores for selling processed foods has contributed to rapid shifts in consumption of these products [10; 62]. In fact one recent study of processed food estimated that 21% of all processed food sales in Brazil came from these small corner stores referred to as 'mercadinhos' [63]. While sales of soft drinks, both carbonated and noncarbonated, continue to increase rapidly in Brazil, there is a need to be aware of an array of 'new' products marketed as "healthy", "natural" or "functional" that have also been introduced in Brazil [64],[65]. Those sugary beverages often incorporate vitamins and minerals, thus eliminating the label of "empty calorie" foods though they have no proven benefit on human health. Or, as in the US, they may utilize fruit juice concentrate as their caloric sweetener [66]. Additionally, SSB's in Brazil use native fruits flavors, to be identified as domestic traditional beverages, or exotic fruits flavors to enhance their marketing value. Other items known as having beneficial effects have been introduced as "new" SSB, for example, sugar-sweetened green or white tea. Also, processed beverages containing caffeine and other natural products have been rapidly increasing (e.g energy drinks with ginseng and guaraná - a high caffeine Brazilian plant native from the Amazon). Sugar-sweetened and flavored milk- and soy-based beverages are additional new products which often feature fiber, extra-calcium, vitamins, and pre or probiotics.

As showed in Appendix 1(supplemental material) and with more detail in a paper by Kleiman et al [13], which showed very rapid growth in calories from beverages sold in Brazil, sugar sweetened fruit- based and flavored beverages and energy and sports drinks

had remarkable sales increases in the last decade in Brazil, while minimal increases in milk sales were observed. There have been marked increases in beverages sales in Brazil over the last decade and the major increments between 2000 and 2011 were observed for nectars (1,219%), energy drinks (664% between 2005 and 2011), juice drinks (547%), and sports drinks (volume: 168%). On the other hand, drinking milk products had modest increases (8%) in per capita volume sales going from 36kg/ capita/year to 39kg/ capita/year, in the same period. This shift toward these caloric beverages away from milk may at least partially be due to the rising prices of these products. Additionally, it should be pointed out that 80% of the fluid milk in Brazil is treated with Ultra High Temperature [67] and marketed in Tetra Pak® packages, which adds cost to the milk. These conditions can help to explain the high prevalence of inadequate calcium consumption, affecting more than 90% of Brazilian adolescents [46; 68; 69; 70].

One limitation in this survey was the measurement of the quantity of sugar added to coffee and selected other beverages, which was standardized based on previous research in Brazil [15], but limits individual variability. Another limitation was the use of the University of Minnesota Nutrient Data Bank [45] for foods whose composition was not measured in Brazil. Additionally, this analysis is based only on the first (of two) day of available food records; it is recognized, however, that single 24-h recalls and food records provide good estimates for population means in extent studies [71]. On the other hand, the Brazilian IDS food record was evaluated and provides an accurate estimation of energy intake [72] and the estimates of energy and nutrients intake were comparable with data obtained in similar studies [73; 74]. Another limitation is the fact that no data on water consumption were obtained. The role of drinking water consumption on health has been a controversial object of research[75]. Thus, obtaining information about water consumption could be important to assess whether there is a relationship between SSB and water consumption in the Brazilian population.

Caloric beverage intake in Brazil is high and sales trends indicate it is rapidly increasing, particularly for colas and other categories of SSB's [64; 76]. The results from this study evidence the importance of beverages to the food and nutrition scenario in Brazil and are important to support the Brazilian dietary guidelines and other initiatives aiming to reduce overweight and obesity-related chronic diseases. Efforts to encourage the increase in water consumption, the reduction of table sugar use in coffee, teas, and fruit juices, the decrease in the consumption of SSB, including by diluting processed juices and nectars with water should all be supported. Policy research on regulatory and other options to reduce energy intake and improve beverage consumption patterns in Brazil is needed.

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Table 1

Sample demographic and socioeconomic characteristics and mean energy intake according to age group. Brazil, 2008–09.

	Total (n=34,003) (%)	10–18 years old (n=6,939) (%)	19–39 years old (n=13,849) (%)	40–59 years old (n=8,893) (%)	≥60 years old (n=4,322) (%)
Total	100	19	40	27	13
Sex*					
Male	48	52	49	47	44
Female	52	48	51	53	56
Monthly *per capita* Family Income†					
Quartile 1	29	46	31	23	12
Quartile 2	26	27[a]	27[a]	25[a]	27[a]
Quartile 3	23	17	23[a]	25[a]	31
Quartile 4	21	10	20	27[a]	31[a]
Education (years of schooling)					
≤1	11	4	6	14	34
1 to 4	23	29[a]	12	27[a]	37
5 to 8	27	46	24[a]	24[a]	12
9 to 12	29	21[a]	45	23[a]	9
13 to 15	10	0.1	14[a]	13[a]	8
Region					
North	8	10	8	6	5
Northeast	28	30[a]	29[a]	24	27
Southeast	43	39	42	46[a]	46[a]
South	15	14[a]	14[a]	16[b]	16[b]
Central-West	7	7[a]	8[a]	7[a]	6
Location					
Urban	84	80	85[a]	85[a]	82
Rural	17	20	15[a]	15[a]	18
Place of eating					
At-home only	60	52[a]	52[a]	65	84

	Total (n=34,003) (%)	10–18 years old (n=6,939) (%)	19–39 years old (n=13,849) (%)	40–59 years old (n=8,893) (%)	≥60 years old (n=4,322) (%)
At-home and away-from-home	40	48[a]	48[a]	35	16
Mean energy intake (kJ [kcal])	8037 [1921]	8573 [2049]	8397 [2007]	7703 [1841]	6862 [1640]

[*] chi square: p<0.01 for differences in the proportions of individuals across age groups

[a,b] same letters mean **no** differences (p>0.05) between age groups (tested by partitioned chi square test)

[#] the classification of adolescents according to years of schooling is not related to socioeconomic category

[†] Monthly *per capita* Family Income: Total family income divided by the number of family members and categorized into quartiles

Table 2

Per capita mean amount (mL), energy (kJ), and proportion (%) of total daily energy intake from beverages consumption in the Brazilian population with 10 years old and over, 2008–09.

Beverages groups	Total	10–18 years old	19–39 years old	40–59 years old	≥ 60 years old	Total	10–18 years old	19–39 years old	40–59 years old	≥ 60 years old	Total	10–18 years old	19–39 years old	40–59 years old	≥ 60 years old
	mL per day					kJ per day					% total daily energy				
Caloric coffee beverages[1]	**217**	172	208	247[a]	245[a]	**464**	389	452	527[a]	498[a]	**6.4**	5.1	5.9	7.4[a]	7.7[a]
Sugar sweetened soft drinks[2]	**122**	159	148	93	51	**188**	243	230	142	79	**2.3**	2.8	2.7	1.8	1.2
Fruit/vegetable juices[3]	**121**	134[a]	138[a]	102	88	**397**	464[a]	460[a]	331	251	**4.7**	5.2[a]	5.2[a]	4.2	3.4
Caloric milk/soymilk beverages[4]	**67**	98	66[a]	49[b]	62[a, b]	**222**	343	226	155[a]	184[a]	**2.9**	4.1	2.8[a]	2.1[b]	2.7[a, b]
Unsweetened / low calorie coffee/tea[5]	**30**	5	26	46[a]	49[a]	**4**	0.4	4[a]	4[a]	4[a]	**0.0**	0.0	0.0	0.1[a]	0.1[a]
Low calorie soft drinks[6]	**6**	5[a]	6[a]	8[a]	4[a]	**1**	0.4[a]	0.4[a]	1[a]	1[a]	**0.0**	0.0	0.0	0.02[a]	0.01[a]
Low calorie/ low fat milk/ soymilk beverages[7]	**5**	3[a]	4[a]	5[a, b]	10[b]	**8**	4[a]	8[a]	8[a,b]	17[b]	**0.1**	0.1[a]	0.1[a]	0.1[a]	0.3
Alcoholic beverages[8]	**34**	4[a]	39[b]	53[b]	24[a]	**75**	13	79[a]	117[a]	59	**0.7**	0.1	0.7[a,b]	1.0[a]	0.6[b]
Total	**602**	580[a]	635[a]	602[a]	533	**1,360**	1,456[a]	1,452[a]	1,284	1,092	**17.1**	17.4[a]	17.5[a]	16.8	16.0

[a,b] Same letters mean **no** differences (p>0.05) between age groups (tested by GLM with Bonferroni correction, having the intake of beverages (mL, kJ or kcal and % of total energy consumption) as dependent variables, and age group as the independent variable, adjusted by sex and income)

[1] includes sweetened coffee and cappuccino, sugar sweetened coffee with milk and teas and infusions

[2] includes sugar sweetened flavored drinks, flavored drinks mix, cola and non cola sodas, soy beverage, sport drinks, energy drinks

[3] includes plain and sugar sweetened fresh squeezed fruit juices

[4] includes whole milk, plain soymilk, milk + fruit based smoothies, chocolate flavored milk, fermented milk, flavored milk, whey-based beverage

[5] includes plain coffee; unsweetened or artificially sweetened coffee with milk and teas and infusions

[6] includes diet/light soda, artificially sweetened flavored drink mix, light flavored soy beverage

[7] includes skimmed milk, low fat milk, diet/light flavored milk and powdered light soymilk

[8] includes beer, wine, liquors, mixed alcoholic drinks

Table 3

Odds ratios (OR) and 95%confidence intervals (95% CI)[1, *] of beverages consumption according to demographic and socioeconomic variables in the Brazilian population with 10 years old and over, 2008–09.

	Caloric coffee beverages[2]		Sugar sweetened soft drinks[3]		Fruit/vegetable juices[4]		Caloric milk/soymilk beverages[5]		Unsweetened / low calorie coffee/tea[6]		Low calorie soft drinks[7]		Low calorie/ low fat milk/ soymilk beverages[8]		Alcoholic beverages[9]	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Sex																
Male	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-
Female	1.0	0.9, 1.1	1.0	1.0, 1.1	**1.3**	**1.2, 1.4**	**1.2**	**1.1, 1.4**	**1.5**	**1.3, 1.7**	**1.6**	**1.2, 2.1**	**1.9**	**1.5, 2.4**	**0.4**	**0.3, 0.5**
Income**																
quartile 1	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-
quartile 2	**0.7**	**0.6, 0.8**	**1.5**	**1.2, 1.7**	1.1	1.0, 1.3	**1.4**	**1.2, 1.6**	1.3	1.0, 1.7	2.1	1.0, 4.8	1.4	0.9, 2.2	1.1	0.7, 1.8
quartile 3	**0.5**	**0.4, 0.6**	**1.6**	**1.3, 1.9**	**1.3**	**1.1, 1.5**	**1.8**	**1.5, 2.1**	1.2	0.9, 1.6	2.2	0.9, 5.4	1.5	1.0, 2.3	1.3	0.8, 2.2
quartile 4	**0.4**	**0.3, 0.4**	**1.8**	**1.5, 2.2**	**1.4**	**1.2, 1.6**	**1.9**	**1.6, 2.2**	**1.6**	**1.2, 2.2**	**5.3**	**2.1, 12.7**	**2.5**	**1.6, 4.0**	**1.8**	**1.1, 3.0**
Education (years of schooling)**																
≤1	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-
2 to 4	1.2	1.0, 1.4	1.2	1.0, 1.4	**1.3**	**1.1, 1.5**	0.9	0.8, 1.1	1.3	1.0, 1.7	1.6	0.6, 4.3	1.0	0.6, 1.6	**1.8**	**1.1, 2.8**
5 to 8	**1.3**	**1.1, 1.5**	**1.4**	**1.2, 1.6**	**1.3**	**1.1, 1.5**	0.9	0.7, 1.0	**1.4**	**1.1, 1.9**	1.5	0.6, 3.8	1.3	0.8, 2.1	**2.2**	**1.4, 3.6**
9 to 12	1.2	1.0, 1.5	**1.4**	**1.2, 1.7**	**1.7**	**1.5, 2.0**	0.9	0.7, 1.0	**1.5**	**1.1, 2.1**	1.6	0.7, 4.0	1.2	0.7, 2.1	**2.6**	**1.6, 4.3**
≥13	1.0	0.8, 1.3	1.2	1.0, 1.6	**1.9**	**1.6, 2.4**	0.9	0.7, 1.1	**2.7**	**1.9, 3.9**	**2.8**	**1.1, 7.1**	**2.1**	**1.2, 3.8**	**3.1**	**1.8, 5.3**
Region																
North	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-
Northeast	0.8	0.7, 1.0	1.0	0.8, 1.1	1.2	1.0, 1.3	**1.3**	**1.1, 1.5**	1.3	0.9, 1.8	0.7	0.3, 1.3	1.0	0.6, 1.6	1.4	0.9, 2.1
Southeast	**0.7**	**0.6, 0.8**	**1.4**	**1.2, 1.7**	**0.8**	**0.6, 0.9**	**1.4**	**1.2, 1.7**	**1.7**	**1.1, 2.4**	**2.1**	**1.1, 3.9**	1.2	0.7, 1.9	**2.1**	**1.4, 3.2**
South	0.8	0.7, 1.0	1.1	1.0, 1.4	0.9	0.8, 1.1	1.2	1.0, 1.4	**5.1**	**3.5, 7.3**	**2.6**	**1.3, 5.0**	1.4	0.9, 2.4	**2.4**	**1.5, 3.7**
Central, West	**0.6**	**0.5, 0.7**	1.0	0.8, 1.2	1.0	0.9, 1.2	**1.4**	**1.2, 1.7**	**1.7**	**1.1, 2.6**	**2.4**	**1.1, 4.8**	1.5	0.9, 2.5	**1.9**	**1.2, 3.0**
Location																
Rural	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-
Urban	**0.6**	**0.6, 0.7**	**1.6**	**1.4, 1.9**	**1.2**	**1.1, 1.4**	1.1	1.0, 1.3	1.1	0.8, 1.5	**2.2**	**1.2, 4.2**	**2.1**	**1.3, 3.4**	0.9	0.6, 1.2

	Caloric coffee beverages[2]		Sugar sweetened soft drinks[3]		Fruit/vegetable juices[4]		Caloric milk/soymilk beverages[5]		Unsweetened / low calorie coffee/tea[6]		Low calorie soft drinks[7]		Low calorie/ low fat milk/ soymilk beverages[8]		Alcoholic beverages[9]	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Place of eating																
At-home only	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-	1.0	-
At-home and away-from-home	0.9	0.8, 1.0	**1.8**	**1.6, 2.0**	**1.3**	**1.2, 1.5**	1.0	0.9, 1.1	0.9	0.7, 1.1	**1.9**	**1.2, 2.9**	1.2	0.9, 1.7	**2.4**	**1.8, 3.2**

*significant association in bold

**chi square for trend p<0.01 for all beverage groups

*1*Multivariate logistic regression models; dependent variables: consumption of each beverage group (no/yes); independent variables: sex, income, education level, eating location, region, urban-rural situation, total energy intake, and age (continuous variable)

*2*includes sweetened coffee and cappuccino, sugar sweetened coffee with milk and teas and infusions

*3*includes sugar sweetened flavored drinks, flavored drinks mix,cola and non cola sodas, soy beverage, sport drinks, energy drinks

*4*includes plain and sugar sweetened fresh squeezed fruit juices

*5*includes whole milk, plain soymilk, milk + fruit based smoothies, chocolate flavored milk, fermented milk, flavored milk, whey-based beverage

*6*includes plain coffee; unsweetened or artificially sweetened coffee with milk and teas and infusions

*7*includes diet/light soda, artificially sweetened flavored drink mix, light flavored soy beverage

*8*includes skimmed milk, low fat milk, diet/light flavored milk and powdered light soymilk

*9*includes beer, wine, liquors, mixed alcoholic drinks