

Nutritional composition of dishes commonly consumed by Japanese Brazilians in São Paulo, Brazil

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Abstract

Primary objective To calculate the nutritional composition of commonly consumed Brazilian foods and beverages to analyze dietary intake data obtained with a quantitative food frequency questionnaire in a colorectal adenoma case-control study in Japanese Brazilians.

Methods and procedures Weighed recipes were collected in São Paulo, Brazil and analyzed using NutriBase Clinical Nutrition Manager.

Main outcomes and results A total of 387 recipes for 76 dishes commonly consumed by Japanese Brazilians were collected: 30 composite main course dishes, 26 composite vegetable dishes, 19 snack foods and desserts, and one beverage. The nutritional composition (energy and 32 macronutrients and micronutrients) was calculated per 100 g for each dish.

Conclusions We provided, for the first time, complete and up-to-date calculated nutritional composition data for commonly consumed Brazilian food items, which are essential to assess the current dietary intake among Japanese Brazilians.

Keywords: *Nutritional composition, Japanese Brazilians, main course dishes, composite vegetable dishes, snack foods, desserts, beverages, São Paulo*

Introduction

Brazil has the largest population of Japanese migrants (1.3 million); approximately 350,000 Japanese live in the city of São Paulo and 900,000 in the state of São Paulo (Wakisaka 1998). Exposure to the lifestyle of their adopted country appears to have increased the prevalence of obesity and other diet-related chronic diseases among Japanese Brazilians (Freire et al. 2003; Schwingel et al. 2007; Ferreira et al. 2008).

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Colorectal cancer (CRC) is the fourth most common malignancy in São Paulo, and its incidence has increased two-fold between 1969 and 1993 (Cancer no Brazil 2003). The first generation of Japanese migrants to Brazil have shown patterns of CRC incidence and mortality that are quite comparable with those in Japan, but very different from first-generation Japanese in America, who experienced a marked increase in risk for CRC (Tsugane et al. 1990a, 1990b; Cancer no Brazil 2003). Second-generation Japanese Brazilians appear to have relatively increased CRC mortality, compared with other cancers, although no population denominator figures exist and therefore no rates for CRC mortality can be computed for this population (Iwasaki et al. 2004).

The traditional Japanese diet is low in simple carbohydrates and fat (Bevilacqua et al. 2007). However, with immigration to Brazil, the diet of Japanese Brazilians has acculturated to that of local Brazilians (Bevilacqua et al. 2007). Specific dietary behaviors have been linked to the development of CRC in the Japanese Brazilian population. Snack foods and desserts comprise a large portion of the Japanese Brazilian diet. Consumption of fruits and vegetables by Japanese Brazilians has decreased while consumption of fried snacks and sugar has increased (Massimino et al. 2007; Schwingel et al. 2007). Research also indicates a higher consumption of red meat in the Japanese Brazilian population compared with Japanese residing in Japan (Tsuagne 1996; Iwasaki et al. 2004). There is evidence of a direct positive association between CRC or, its precursor lesion, adenoma and red meat (or saturated fat) intake (Giovannucci et al. 1992; Neugut et al. 1993; Sandler et al. 1993; Norat and Riboli 2001; Gonzalez 2006; World Cancer Research Fund/American Institute for Cancer Research 2007; Lin 2009), while a protective effect has been reported with vegetable intake (Ryan-Harshman and Aldoori 2007; Wu et al. 2009).

A Quantitative Food Frequency Questionnaire (QFFQ) consisting of 161 foods and beverages was developed specifically to investigate the associations of dietary intake with risk for CRC among Japanese Brazilians and compare findings with those of our on-going adenoma studies among Japanese residing in Hawaii, USA and Tokyo, Japan (Sharma et al. 2009a). To analyze dietary intake captured by the QFFQ, it is essential to have accurate nutritional composition data for the foods listed on the QFFQ. Nutritional intake data are obtained by multiplying the reported portion weight in grams by the frequency of consumption by the nutritional composition per 100 g provided in the food composition table (FCT).

The existing Brazilian FCT omits many foods or contains only limited nutritional composition data for single-ingredient foods (e.g. raw fruits and vegetables, and cooked beans) (TACO 2006). Thus, there was a need to obtain nutritional composition data for foods listed on the QFFQ and commonly consumed in Brazil. The aim of the present study was to calculate the nutritional composition of commonly consumed composite (i.e. dishes that contain more than one ingredient). These data will be used to analyze nutrient intakes calculated from the QFFQ for the colorectal adenoma case-control study among Japanese Brazilians.

Methods

The development and description of the QFFQ have been previously presented in detail (Sharma et al. 2009a). In brief, subjects were recruited to complete a 24-h dietary recall interview if they fulfilled the following criteria: aged 40–79 years old; at least 75%

Japanese (at least three grandparents of complete Japanese ancestry) and São Paulo residents for ≥ 6 months. Recall data were collected for 60 subjects (29 men and 31 women; mean age 58 and 57 years, respectively) and provided information on foods typically consumed by Japanese Brazilians. These data were used to develop the QFFQ. Thirty composite main course dishes, 26 composite vegetable dishes, 19 snack foods and desserts, and one beverage commonly consumed by Japanese Brazilians were selected from the QFFQ for recipe collection and analysis.

A nutritionist (A.B.) was trained by a nutrition researcher for 5 days in how to collect, weigh, and record ingredients and the final cooked weight. A recipe collection form and manual of procedures were developed to standardize recipe data collection as done previously (Sharma et al. 2007, 2008, 2009a, 2009b). The diet of Japanese Brazilians includes a mixture of Brazilian and Japanese foods; therefore, all of the recipes were collected from Brazilians, as well as Japanese Brazilians.

To capture the variation of each recipe, the nutritionist attempted to obtain weighed recipes from at least five different households of various age groups (ranged from 20 to 85 years old) and socioeconomic backgrounds residing in São Paulo. Participants were reimbursed for the cost of the ingredients for each dish. An appointment was scheduled with the participants at their homes. The nutritionist weighed all initial ingredients as well as the final cooked weight of each dish. If foods had inedible portions, such as bones, edible yields were obtained by subtracting the weight of the inedible parts. All of the ingredients and cooked dishes were weighed using Salter Aquatronic kitchen scales (Aquatronic Baker's Dream Scale; Salter Houseware, Ltd, Fairfield, NJ, USA).

The nutritionist recorded the name and amount of each ingredient for each dish, the cooking method and duration, as well as the Portuguese, Japanese and English names of the dish.

All of the data were entered into and analyzed using Nutribase Clinical Nutrition Manager version 7.17 (Cybersoft Inc., Phoenix, AZ, USA). Nutribase version 7.17 is a computerized dietary database based on the US Department of Agriculture National Nutrient Database for Standard Reference (SR19). The nutritional composition of each dish was calculated by entering the weight of the individual ingredients and the final cooked weight. An average recipe was calculated per 100 g for each dish, using the methods we described previously (Sharma et al. 2007, 2008, 2009a, 2009b).

Results

Nutritional composition of main course dishes

A total of 152 recipes were collected for 30 composite main course dishes from 45 Brazilian and Japanese Brazilian households (51% Japanese Brazilian): four bean-based dishes including Feijoada, two rice dishes, two spaghetti dishes, one lasagna, six beef-based dishes, two ground beef-based dishes, two pork-based dishes, three sausage-based dishes, four chicken-based dishes, and four fish/seafood-based dishes. A detailed description of each dish is presented in Appendix 1 (Online version only). Tables I–IV provide the nutritional composition (energy and 32 selected macronutrients and micronutrients) per 100 g of each main course dish.

Feijoada, a traditional Brazilian black bean dish, contained 200 kcal/100 g and was high in fat (44.1% calories from total fat; 9.8 g total fat/100 g) and protein (26.3% calories from protein). Lasagna had 30.2% calories from total fat. Beef stroganoff had the highest proportion of calories from total fat (60.8%) among the beef-based dishes.

Table I. Nutritional composition (per 100 g) of commonly consumed main course dishes: beans, rice and pasta.

	Beans (carioca) with meat (Feijão com carne)	Beans (carioca) without meat (Feijão sem carne)	Bean soup without meat (Sopa de feijão sem carne)	Feijoada	Brazilian rice (Arroz brasileiro)	Fried rice (Yakimeshi)	Spaghetti in tomato sauce with meat (Macarrão a bolonhesa)	Spaghetti in tomato sauce without meat (Macarrão ao molho sugo)	Lasagna (Lasanha)
Number of recipes	5	5	5	5	5	6	5	5	5
Energy (kcal)	150	99	87	200	139	142	138	116	171
Energy (kJ)	628	413	365	836	582	594	576	485	716
Protein (g)	8.3	5.0	3.7	13.1	2.6	4.4	9.2	5.0	10.2
Carbohydrate (g)	15.0	15.2	14.2	14.9	28.1	23.3	18.5	21.6	19.1
Fat (g)	6.3	2.2	1.7	9.8	1.5	3.3	2.7	0.9	5.6
Saturated fat (g)	1.9	0.3	0.5	3.4	0.2	0.7	0.7	0.1	2.3
% Calories from protein	22.2	19.9	17.1	26.3	7.5	12.5	27.3	17.5	24.4
% Calories from carbohydrates	40.0	60.5	65.1	29.7	82.7	66.6	54.6	75.5	45.4
% Calories from fat	37.9	19.6	17.8	44.1	9.8	20.9	18.1	7.0	30.2
% Calories from saturated fat	11.4	2.7	5.2	15.3	1.3	4.4	4.6	0.8	12.1
Monounsaturated fat (g)	2.4	1.3	0.6	3.5	0.7	1.2	1.0	0.2	1.9
Polyunsaturated fat (g)	0.8	0.5	0.5	1.2	0.5	1.2	0.9	0.4	0.8
Omega-3 fatty acid (g)	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Omega-6 fatty acid (g)	0.4	0.1	0.1	0.7	0.2	0.9	0.3	0.1	0.3
Cholesterol (mg)	11.2	0.0	0.4	26.4	0.0	32.3	13.6	0.0	21.6
Sugars (g)	0.7	0.8	0.6	1.2	0.2	0.8	1.7	2.9	3.6
Dietary fiber (g)	3.8	3.7	2.3	3.5	0.5	0.9	1.4	1.6	0.8
Vitamin A (μ g_RAE*)	0.1	0.0	13.1	0.4	0.1	102	2.0	3.0	27.6
Thiamin (mg)	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.2
Riboflavin (mg)	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2
Niacin (mg)	0.8	0.3	0.4	1.5	1.4	1.8	1.9	0.7	2.3
Panthenic acid (mg)	0.3	0.2	0.2	0.4	0.4	0.5	0.3	0.1	0.2
Vitamin B-6 (mg)	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Total folate (μ g)	115	109	76.0	102	79.4	46.4	32.0	25.1	38.2

Table I (Continued)

	Beans (carioca)		Bean soup		Brazilian rice		Spaghetti in		Lasagna	
	with meat (Feijão com carne)	without meat (Feijão sem carne)	without meat (Sopa de feijão sem carne)	without meat (Sopa de feijão sem carne)	(Arroz brasileiro)	Fried rice (Yakimeshi)	tomato sauce with meat (Macarrão a bolonhesa)	tomato sauce without meat (Macarrão ao molho sugo)	tomato sauce with meat (Macarrão a bolonhesa)	without meat (Macarrão ao molho sugo)
Folate, DFE* (µg_DFE)	115	109	78.5	102	133	70.5	49.1	38.0	49.1	6.1
Vitamin B-12 (µg)	0.2	0.0	0.0	0.4	0.0	0.1	0.5	0.0	0.5	0.5
Vitamin C (mg)	1.8	2.0	2.2	1.5	0.7	4.0	2.7	4.2	2.7	3.3
Vitamin D (IU*)	1.1	0.0	0.0	1.2	0.0	2.4	0.0	0.0	0.0	0.1
Vitamin E,	0.2	0.0	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.1
α-tocopherol (mg)										
Vitamin K (µg)	1.7	1.9	14.9	2.1	1.1	7.1	1.2	0.7	1.2	5.7
Calcium (mg)	32.3	33.6	24.7	39.5	14.8	16.8	9.2	8.5	9.2	102
Iron (mg)	1.3	1.2	0.9	1.7	1.5	1.2	1.1	0.7	1.1	1.4
Zinc (mg)	0.8	0.6	0.4	1.9	0.4	0.5	1.4	0.3	1.4	1.2
Magnesium (mg)	41.3	39.7	28.6	46.0	10.1	14.3	19.7	15.2	19.7	8.8
Manganese (mg)	0.3	0.3	0.3	0.3	0.4	0.4	0.2	0.2	0.2	0.0
Selenium (µg)	8.3	4.7	5.5	6.6	5.4	7.9	17.3	15.6	17.3	5.5
Potassium (mg)	348	319	210	437	51	111	116	49	116	106
Sodium (mg)	516	199	246	438	271	220	218	298	218	347

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Table II. Nutritional composition (per 100 g) of commonly consumed main course dishes: beef-based dishes.

	Beef Nishime (Nishime com carne)		Beef, stir-fried with vegetables (Carne refogada com vegetais)		Beef, stir-fried without vegetables (Carne refogada sem vegetais)		Ground beef, stir-fried with vegetables (Carne moída com vegetais)		Ground beef, stir-fried without vegetables (Carne moída sem vegetais)		Beef Stroganoff (Estragonofe de carne)		Beef Milanese steak (Bife à milanesa)		Beef pan-fried steak (Bife frito)	
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Number of recipes	89	183	192	112	112	214	192	214	214	192	192	316	316	198	198	198
Energy (kcal)	373	767	803	467	467	897	801	897	897	801	801	1321	1321	830	830	830
Protein (g)	4.6	17.8	20.8	11.4	11.4	24.6	12.8	24.6	24.6	12.8	12.8	21.8	21.8	21.7	21.7	21.7
Carbohydrate (g)	13.2	5.8	3.2	6.7	6.7	2.8	5.8	2.8	2.8	5.8	5.8	16.1	16.1	3.7	3.7	3.7
Fat (g)	2.2	9.9	10.0	4.3	4.3	11.1	13.0	11.1	11.1	13.0	13.0	18.1	18.1	10.5	10.5	10.5
Saturated fat (g)	0.9	2.3	2.5	1.3	1.3	3.7	5.4	3.7	3.7	5.4	5.4	4.1	4.1	3.1	3.1	3.1
% Calories from protein	20.0	38.7	43.9	41.1	41.1	47.0	26.6	47.0	47.0	26.6	26.6	27.7	27.7	44.2	44.2	44.2
% Calories from carbohydrates	57.9	12.7	6.7	24.0	24.0	5.4	12.1	5.4	5.4	12.1	12.1	20.5	20.5	7.5	7.5	7.5
% Calories from fat	22.1	48.6	47.7	34.7	34.7	47.6	60.8	47.6	47.6	60.8	60.8	51.8	51.8	48.3	48.3	48.3
% Calories from saturated fat	9.1	11.3	11.7	10.4	10.4	15.6	25.3	15.6	15.6	25.3	25.3	11.7	11.7	14.1	14.1	14.1
Monounsaturated fat (g)	0.4	4.5	3.6	1.6	1.6	4.3	5.1	4.3	4.3	5.1	5.1	6.1	6.1	4.7	4.7	4.7
Polyunsaturated fat (g)	0.4	2.3	3.0	1.1	1.1	2.2	1.4	2.2	2.2	1.4	1.4	6.3	6.3	1.7	1.7	1.7
Omega-3 fatty acid (g)	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.0	0.0
Omega-6 fatty acid (g)	0.2	0.2	0.5	0.6	0.6	0.6	0.9	0.6	0.6	0.9	0.9	1.8	1.8	0.2	0.2	0.2
Cholesterol (mg)	16.2	45.4	49.5	30.2	30.2	72.9	47.1	72.9	72.9	47.1	47.1	97.1	97.1	54.9	54.9	54.9
Sugars (g)	3.2	2.5	1.3	1.9	1.9	1.2	2.4	1.2	1.2	2.4	2.4	0.9	0.9	1.3	1.3	1.3
Dietary fiber (g)	2.1	1.3	0.6	1.3	1.3	0.6	0.6	0.6	0.6	0.6	0.6	1.4	1.4	0.5	0.5	0.5
Vitamin A (μg_{RAE} *)	92.4	59.8	5.4	80.5	80.5	10.9	62.8	10.9	10.9	62.8	62.8	16.9	16.9	2.2	2.2	2.2
Thiamin (mg)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Riboflavin (mg)	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Niacin (mg)	1.1	4.3	4.2	3.1	3.1	6.4	3.3	6.4	6.4	3.3	3.3	4.1	4.1	4.7	4.7	4.7
Pantothenic acid (mg)	0.5	0.5	0.4	0.5	0.5	0.8	0.5	0.8	0.8	0.5	0.5	0.6	0.6	0.5	0.5	0.5
Vitamin B-6 (mg)	0.2	0.5	0.5	0.3	0.3	0.5	0.4	0.5	0.5	0.4	0.4	0.5	0.5	0.6	0.6	0.6
Total folate (μg)	14.4	31.9	13.1	15.7	15.7	12.6	13.5	12.6	12.6	13.5	13.5	25.2	25.2	14.7	14.7	14.7
Folate, DFFE* (μg_{DFE})	14.4	31.9	13.1	15.7	15.7	12.6	14.6	12.6	12.6	14.6	14.6	20.6	20.6	14.7	14.7	14.7
Vitamin B-12 (μg)	0.3	1.7	2.4	1.1	1.1	2.6	1.0	2.6	2.6	1.0	1.0	2.3	2.3	2.5	2.5	2.5
Vitamin C (mg)	4.3	16.3	3.8	9.0	9.0	7.2	2.5	7.2	7.2	2.5	2.5	0.3	0.3	2.8	2.8	2.8

Table II (Continued)

	Beef Nishime (Nishime com carne)	Beef, stir-fried with vegetables (Carne refogada com vegetais)	Beef, stir-fried without vegetables (Carne refogada sem vegetais)	Ground beef, stir-fried with vegetables (Carne moída com vegetais)	Ground beef, stir-fried without vegetables (Carne moída sem vegetais)	Beef Stroganoff (Estrogonofe de carne)	Beef Milanese steak (Bife à milanesa)	Beef pan-fried steak (Bife frito)
Vitamin D (IU*)	16.6	7.7	11.4	0.0	0.0	19.5	10.4	7.2
Vitamin E, α -tocopherol (mg)	0.7	0.5	0.2	0.4	0.6	0.3	0.5	0.1
Vitamin K (μ g)	2.3	67.0	5.1	6.4	8.6	3.2	5.7	0.8
Calcium (mg)	25.3	32.9	15.9	20.3	22.9	45.3	30.2	17.6
Iron (mg)	0.6	2.0	2.0	1.6	3.0	1.2	2.0	1.9
Zinc (mg)	0.7	3.1	3.5	2.6	5.9	2.7	3.5	3.9
Magnesium (mg)	21.6	34.1	25.0	21.1	29.2	18.9	24.9	26.2
Manganese (mg)	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1
Selenium (μ g)	4.9	18.7	20.4	8.8	20.1	14.5	24.5	23.1
Potassium (mg)	303	442	409	313	469	282	359	428
Sodium (mg)	844	305	237	345	265	353	570	524

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Table III. Nutritional composition (per 100 g) of commonly consumed main course dishes: chicken-based and fish-based dishes.

	Chicken, stir-fried with vegetables (Frango refogado com vegetais)	Chicken, stir-fried without vegetables (Frango refogado sem vegetais)	Chicken stroganoff (Estrogonofe de frango)	Chicken Milanese (Frango à milanesa)	Fish, steak, stir-fried (Peixe em pedaços refogado)	Fish, whole, stir-fried (Peixe inteiro refogado)	Fried fish (Molho a base de tomate com qualquer peixe)	Moqueca
Number of recipes	5	5	5	5	5	5	5	5
Energy (kcal)	112	153	140	254	142	149	131	198
Energy (kJ)	470	638	585	1063	594	623	550	826
Protein (g)	8.8	18.4	12.5	21.0	17.9	13.8	12.3	11.0
Carbohydrate (g)	10.2	6.4	5.5	14.4	4.1	5.8	6.7	5.1
Fat (g)	4.1	5.7	7.7	12.1	5.8	8.1	6.3	15.5
Saturated fat (g)	0.8	1.0	3.7	2.2	1.0	1.5	1.0	7.7
% Calories from protein	31.3	48.8	35.6	33.6	51.0	36.6	37.2	21.5
% Calories from carbohydrates	36.3	17.0	15.5	23.1	11.8	15.3	20.2	9.9
% Calories from fat	32.4	34.1	48.9	43.4	37.3	48.1	42.6	68.5
% Calories from saturated fat	6.4	5.9	23.8	7.8	6.3	9.1	6.9	35.0
Monounsaturated fat (g)	1.1	1.6	2.3	3.8	1.6	2.8	2.4	5.7
Polysaturated fat (g)	1.8	2.5	1.1	5.0	2.2	1.2	1.9	1.3
Omega-3 fatty acid (g)	0.2	0.1	0.1	0.5	0.6	0.1	0.3	0.4
Omega-6 fatty acid (g)	1.6	1.2	0.6	3.9	0.3	0.2	0.1	0.4
Cholesterol (mg)	23.6	50.9	46.2	91.2	67.8	63.3	34.4	23.8
Sugars (g)	1.8	3.0	2.9	1.2	1.7	3.2	3.9	1.9
Dietary fiber (g)	1.5	1.1	0.7	1.3	0.6	1.0	1.0	0.9
Vitamin A ($\mu\text{g_RAE}^*$)	63.9	20.7	59.3	22.3	29.5	24.8	35.4	70.4
Thiamin (mg)	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
Riboflavin (mg)	0.1	0.1	0.1	0.2	0.2	0.0	0.1	0.1
Niacin (mg)	3.8	8.0	5.8	8.0	3.7	0.8	1.6	1.9
Pantothenic acid (mg)	0.5	0.8	0.6	0.9	0.9	0.2	0.3	0.5
Vitamin B-6 (mg)	0.3	0.5	0.3	0.5	0.5	0.1	0.2	0.3
Total folate (μg)	24.7	17.4	7.3	18.2	15.0	13.6	13.5	16.5
Folate, DFE* ($\mu\text{g_DFE}$)	24.7	17.4	7.3	13.4	15.0	13.6	14.7	16.5
Vitamin B-12 (μg)	0.1	0.3	0.2	0.4	2.6	0.7	0.7	0.7
Vitamin C (mg)	10.1	8.5	4.0	3.2	6.5	10.2	12.6	33.0

Table III (Continued)

	Chicken, stir-fried with vegetables (Frango refogado com vegetais)	Chicken, stir-fried without vegetables (Frango refogado sem vegetais)	Chicken stroganoff (Estrogonofe de frango)	Chicken Milanese (Frango à milanesa)	Fish, steak, stir-fried (Peixe em pedaços refogado)	Fish, whole, stir-fried (Peixe inteiro refogado)	Fried fish (Molho a base de tomate com qualquer peixe)	Moqueca
Vitamin D (IU*)	0.0	0.0	17.3	6.1	7.9	94.8	39.2	11.0
Vitamin E, α -tocopherol (mg)	0.8	1.0	0.3	0.9	0.3	0.3	0.6	1.4
Vitamin K (μ g)	9.2	28.9	2.4	14.2	11.0	24.5	13.7	13.0
Calcium (mg)	21.5	30.7	41.3	36.1	32.9	127	52.4	32.2
Iron (mg)	0.7	1.4	0.7	1.0	1.1	1.3	1.2	1.5
Zinc (mg)	0.7	1.1	0.6	1.1	0.6	0.3	0.3	0.5
Magnesium (mg)	22.0	33.8	22.4	26.8	35.8	18.6	25.2	42.0
Manganese (mg)	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.3
Selenium (μ g)	6.2	13.4	10.2	17.6	34.6	11.1	16.2	17.3
Potassium (mg)	278	374	245	245	438	192	209	260
Sodium (mg)	253	574	370	355	369	465	406	403

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Table IV. Nutritional composition (per 100 g) of commonly consumed pork-based and sausage-based dishes.

	Pork, stir-fried with vegetables (Porco, refogado com vegetais)	Pork, stir-fried without vegetables (Porco, refogado sem vegetais)	Sausage stir-fried (Lingüiça, refogada)	Sausage, stewed with vegetables (Lingüiça cozida com vegetais)	Farofa
Number of recipes	5	5	5	5	6
Energy (kcal)	136	277	381	211	280
Energy (kJ)	570	1158	1593	882	1172
Protein (g)	10.3	25.1	17.7	8.6	5.1
Carbohydrate (g)	7.4	5.1	4.6	11.0	46.4
Fat (g)	7.8	17.5	32.2	14.9	9.0
Saturated fat (g)	1.6	4.1	9.7	4.4	2.3
% Calories from protein	29.1	35.8	18.7	16.1	7.0
% Calories from carbohydrates	21.0	7.3	4.9	20.8	64.7
% Calories from fat	49.9	57.0	76.4	63.1	28.3
% Calories from saturated fat	10.6	13.3	22.9	18.8	7.4
Monounsaturated fat (g)	2.7	6.6	14.2	6.3	3.4
Polyunsaturated fat (g)	3.0	6.0	5.9	3.1	2.1
Omega-3 fatty acid (g)	0.1	0.0	0.3	0.1	0.1
Omega-6 fatty acid (g)	0.4	0.2	4.0	1.4	1.0
Cholesterol (mg)	23.0	62.9	68.0	28.8	47.9
Sugars (g)	2.8	2.2	1.9	2.1	1.7
Dietary fiber (g)	1.7	0.4	0.6	1.7	1.4
Vitamin A (μg _RAE*)	173	3.3	15.4	141	114
Thiamin (mg)	0.1	0.2	0.4	0.2	0.1
Riboflavin (mg)	0.1	0.1	0.2	0.1	0.1
Niacin (mg)	0.8	0.9	4.8	2.5	0.8
Pantothenic acid (mg)	0.2	0.1	0.7	0.5	0.3
Vitamin B-6 (mg)	0.1	0.1	0.4	0.3	0.1
Total folate (μg)	36.1	5.5	10.5	16.0	19.4
Folate, DFE* (μg DFE)	35.8	5.0	10.5	16.0	15.4
Vitamin B-12 (μg)	0.1	0.1	1.1	0.5	0.3
Vitamin C (mg)	20.3	5.1	8.3	11.4	6.7
Vitamin D (IU*)	0.0	0.0	25.3	6.4	3.6
Vitamin E, α -tocopherol (mg)	0.6	0.1	0.0	0.6	0.4
Vitamin K (μg)	56.8	3.0	7.8	7.0	25.8
Calcium (mg)	33.1	17.3	28.4	27.8	25.7
Iron (mg)	0.1	1.2	1.5	1.0	0.6
Zinc (mg)	1.1	2.3	2.3	1.2	0.6
Magnesium (mg)	28.1	35.7	20.7	21.7	11.7
Manganese (mg)	0.2	0.1	0.1	0.2	0.2
Selenium (μg)	1.4	1.9	7.2	4.4	5.6
Potassium (mg)	368	463	361	392	170
Sodium (mg)	421	1144	1071	549	430

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Compared to pan-fried beef steak, beef Milanese steak had more energy (316 kcal vs. 198 kcal per 100 g) and a higher proportion of calories from total fat (51.8% vs. 48.3%).

The stir-fried sausage dish was the most energy-dense (381 kcal/100 g) and had the highest proportion of calories from total fat (76.4%) among all the dishes. Both sausage-based dishes were high in total fat (63.1% – 76.4% calories) and saturated

fat (18.8% – 22.9% calories). Among the fish/seafood-based dishes, Moqueca (stewed seafood) was most energy-dense (198 kcal/100 g) and had the highest proportion of calories from total fat (68.5%).

Nutritional composition of composite vegetable and fruit dishes

A total of 133 recipes were collected for 26 vegetable and fruit dishes from 48 Brazilian and Japanese Brazilian households (57% Japanese Brazilian). The dishes were divided into salads and soups: five salad dishes, three soup dishes, 16 stir-fried vegetable dishes, one baked vegetable dish and one fried fruit dish. The fruit dish was included because participants consider it to be a vegetable dish and consume it as such.

Tables V–VII present the nutritional composition (energy and 32 select macronutrients and micronutrients) per 100 g of each dish and the number of recipes collected for each dish. Among the salad dishes, coleslaw (salpicão) was the most energy-dense dish (124 kcal/100 g) while tomato salad had the highest proportion of calories from total fat (57.3%). Among the soups, vegetable soup with chicken and vegetable soup with beef had similar energy and proportions of calories from total fat. Among the stir-fried vegetable dishes, fried cassava was the most energy-dense dish (290 kcal/100 g), while stir-fried okra, stir-fried escarole and stir-fried cabbage were the dishes with the highest proportion of calories from total fat (61.3% – 61.6%). Baked eggplant had the highest dietary fiber content (4.4 g/100 g). The dietary fiber content of the stir-fried vegetable dishes ranged from 0.7 g (stir-fried pumpkin) to 3.8 g (stir-fried okra) per 100 g of the dish. Banana Milanese had much higher proportion of calories from total fat (70.8%) and was more energy-dense (426 kcal/100 g) compared to all vegetable dishes.

Nutritional composition of snacks, desserts and beverages

A total of 102 recipes (mostly Brazilian foods as opposed to Japanese Brazilian foods) were collected for 19 foods (eight savory snack foods, 11 desserts (cake, pudding and pie)) and one beverage from 30 Brazilian and Japanese Brazilian households (17% Japanese Brazilian). Tables VIII–X present the nutritional composition (energy and 32 select macronutrients and micronutrients) per 100 g of commonly consumed snack foods, desserts and one beverage.

Cheese bread was most energy-dense (450 kcal/100 g) among all the snack foods. The energy density of all the desserts ranged from 231 kcals to 442 kcal/100 g. Palm heart pie and Kibe had the highest proportions of calories from total fat (over 50%) among all the snack foods and desserts. Cake with filling had the highest proportion of calories from carbohydrate (70.9%). Among all the desserts, per 100 g, the sugar content varied from 19.1 g (chocolate-filled bread) to 52.9 g (pudding [Quindim]). Chocolate-filled bread had the highest proportion of calories from total fat (48.1%) among the desserts. The proportions of calories from saturated fat among all the snack foods and desserts ranged from 5.5% (Coxinha) to 19.2% (Chocolate-filled bread). Each dish is described in Appendix 1 (online version only).

Discussion and conclusions

Japanese migrants to Brazil experienced significant sociocultural changes and a transition in lifestyle and dietary patterns as they adapted to the large diversity of

Table V. Nutritional composition (per 100 g) of commonly consumed salads and soups.

	Salads with									
	Tomato salad (Salada de tomate)	Beetroot salad (Salada de beterraba-cozida ou cru)	Salads with vinaigrette (Salada de legumes picados temperado com vinagrete)	Mayonnaise salad (Salada de maionese)	Coleslaw (Salpicão)	Vegetable soup with beef (Sopa de vegetais com carne)	Vegetable soup with chicken (Sopa de vegetais com frango)	Vegetable soup without meat (Sopa de vegetais sem carne ou frango)		
Number of recipes	5	5	5	5	5	6	5	5	5	5
Energy (kcal)	53	54	59	105	124	48	46	39	46	39
Energy (kJ)	223	225	247	439	518	202	193	163	193	163
Protein (g)	0.9	1.6	1.3	1.3	8.0	3.6	3.9	0.9	3.9	0.9
Carbohydrate (g)	5.0	9.6	8.9	10.9	5.3	5.6	5.0	7.7	5.0	7.7
Fat (g)	3.8	1.5	2.7	6.7	7.9	1.3	1.3	0.7	1.3	0.7
Saturated fat (g)	0.6	0.2	0.4	1.1	1.5	0.3	0.3	0.1	0.3	0.1
% Calories from protein	6.2	10.7	7.8	4.8	25.7	29.5	33.6	8.8	29.5	8.8
% Calories from carbohydrates	34.6	65.7	55.1	40.1	17.0	46.4	42.4	75.7	42.4	75.7
% Calories from fat	59.3	23.6	37.1	55.2	57.3	24.1	24.0	15.6	24.0	15.6
% Calories from saturated fat	10.2	3.3	6.1	9.4	10.9	5.6	5.9	2.3	5.9	2.3
Monounsaturated fat (g)	2.9	1.1	1.9	2.0	2.0	0.5	0.4	0.2	0.4	0.2
Polyunsaturated fat (g)	0.4	0.2	0.3	3.1	0.9	0.4	0.5	0.4	0.4	0.4
Omega-3 fatty acid (g)	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0
Omega-6 fatty acid (g)	0.1	0.1	0.1	2.7	0.7	0.2	0.2	0.2	0.2	0.2
Cholesterol (mg)	0.0	0.0	0.0	13.7	27.4	10.6	9.9	0.1	9.9	0.1
Sugars (g)	2.7	7.2	2.3	2.0	1.8	1.1	1.4	1.6	1.1	1.6
Dietary fiber (g)	1.2	1.9	2.8	1.9	1.1	0.9	1.2	1.4	0.9	1.4
Vitamin A (µg_RAE*)	30.1	1.9	175	178	45.1	86.9	61.0	114	45.1	114
Thiamin (mg)	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Riboflavin (mg)	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0
Niacin (mg)	0.5	0.3	0.7	0.6	2.8	1.0	1.8	0.5	1.0	1.8
Panthenic acid (mg)	0.1	0.1	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.2
Vitamin B-6 (mg)	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1
Total folate (µg)	14.9	70.7	21.9	11.3	16.2	15.2	18.1	17.8	16.2	18.1
Folate, DFE* (µg_DFE)	14.9	70.7	21.9	11.3	16.2	15.2	18.1	17.8	16.2	18.1
Vitamin B-12 (µg)	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.0	0.5	0.0

Table V (Continued)

	Salads with									
	Tomato salad (Salada de tomate)	Beetroot salad (Salada de beterraba-cozida ou cru)	Salads with vinaigrette (Salada de legumes picados temperado com vinagrete)	Mayonnaise salad (Salada de maionese)	Coleslaw (Salpicão)	Vegetable soup with beef (Sopa de vegetais com carne)	Vegetable soup with chicken (Sopa de vegetais com frango)	Vegetable soup without meat (Sopa de vegetais sem carne ou frango)		
Vitamin C (mg)	12.7	3.8	12.2	5.2	14.6	4.6	5.3	7.1		
Vitamin D (IU*)	0.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0		
Vitamin E, α -tocopherol (mg)	0.5	0.0	0.4	1.1	0.3	0.3	0.0	0.0		
Vitamin K (μ g)	6.7	1.0	13.6	12.5	18.4	12.7	6.7	4.5		
Calcium (mg)	15.3	16.7	21.8	17.5	28.7	16.6	15.3	17.9		
Iron (mg)	0.4	0.7	0.5	0.5	0.5	0.6	0.3	0.3		
Zinc (mg)	0.2	0.3	0.3	0.3	0.4	1.1	0.3	0.2		
Magnesium (mg)	10.4	20.9	16.5	12.6	14.7	10.5	12.9	12.2		
Manganese (mg)	0.1	0.3	0.2	0.2	0.1	0.1	0.1	0.1		
Selenium (μ g)	0.2	0.7	0.4	1.4	6.0	3.2	3.0	0.5		
Potassium (mg)	208	278	248	192	205	174	156	185		
Sodium (mg)	346	494	229	342	361	209	144	316		

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Table VI. Nutritional composition (per 100 g) of commonly consumed stir-fried vegetable dishes.

	Gobo, stir-fried (Gobo, refogado)	Okra, stir-fried (Quiabo, refogado)	Tumip, stir-fried (Nabo, refogado)	Jiló, stir-fried (Jiló refogado)	Broccoli, stir-fried (Brócolis, refogado)	Pumpkin, stir-fried (Abobora, refogada)
Number of recipes	5	5	5	5	5	5
Energy (kcal)	147	124	61	66	88	53
Energy (kJ)	614	518	256	277	369	221
Protein (g)	2.7	2.7	2.1	1.3	3.1	1.2
Carbohydrate (g)	20.6	10.3	9.3	8.4	9.8	8.2
Fat (g)	6.4	9.2	2.2	3.6	5.1	2.3
Saturated fat (g)	0.9	1.1	0.3	0.5	0.7	0.3
% Calories from protein	7.0	8.0	13.0	7.1	12.8	8.3
% Calories from carbohydrates	53.5	30.4	56.8	47.2	40.1	56.5
% Calories from fat	37.2	61.6	30.2	45.7	47.2	35.2
% Calories from saturated fat	5.5	8.0	4.4	6.8	7.2	54.0
Monounsaturated fat (g)	1.6	5.2	1.0	1.1	3.0	0.5
Polyunsaturated fat (g)	3.6	2.6	0.8	1.9	1.2	1.3
Omega-3 fatty acid (g)	0.3	0.1	0.1	0.2	0.2	0.1
Omega-6 fatty acid (g)	2.3	0.6	0.2	1.4	0.7	0.5
Cholesterol (mg)	0.1	0.0	0.6	0.0	0.0	0.0
Sugars (g)	5.2	1.6	4.8	2.7	2.5	2.6
Dietary fiber (g)	3.3	3.8	2.0	3.2	3.0	0.7
Vitamin A (μg_{RAE} *)	7.1	21.2	7.3	3.0	49.6	306
Thiamin (mg)	0.0	0.2	0.1	0.0	0.1	0.1
Riboflavin (mg)	0.1	0.1	0.0	0.0	0.1	0.1
Niacin (mg)	0.7	1.2	0.6	0.6	0.7	0.6
Panathenic acid (mg)	0.4	0.2	0.2	0.3	0.6	0.3
Vitamin B-6 (mg)	0.3	0.3	0.1	0.1	0.2	0.1
Total folate (μg)	24.5	99.1	17.3	22.2	81.3	15.6
Folate, DFE* (μg_{DFE})	24.8	99.1	17.3	22.2	81.3	15.6
Vitamin B-12 (μg)	0.0	0.0	0.0	0.0	0.0	0.0
Vitamin C (mg)	3.1	25.7	22.4	3.9	81.4	9.8
Vitamin D (IU*)	0.0	0.0	0.0	0.0	0.0	0.0
Vitamin E, α -tocopherol (mg)	0.9	0.5	0.2	0.0	1.2	1.0
Vitamin K (μg)	10.2	61.4	3.7	8.4	123	4.4

Table VI (Continued)

	Gobo, stir-fried (Gobo, refogado)	Okra, stir-fried (Quiabo, refogado)	Turnip, stir-fried (Nabo, refogado)	Jiló, stir-fried (Jiló refogado)	Broccoli, stir-fried (Brócolis, refogado)	Pumpkin, stir-fried (Abóbora, refogada)
Calcium (mg)	43.4	103	38.6	15.3	52.5	25.6
Iron (mg)	1.1	1.0	0.7	0.6	0.9	0.9
Zinc (mg)	0.4	0.8	0.3	0.2	0.5	0.3
Magnesium (mg)	44.3	66.0	15.8	14.9	23.6	13.1
Manganese (mg)	0.3	1.2	0.2	0.3	0.3	0.2
Selenium (µg)	0.8	1.7	1.1	0.6	2.7	0.6
Potassium (mg)	338	369	243	274	332	314
Sodium (mg)	1126	450	509	317	526	424

	Eggplant, Baked (Berinjela assada)	Eggplant, stir-fried (Berinjela, refogada)	Escarole, stir-fried (Escarola, refogada)	Spinach, stir-fried (Espinafre, refogado)	Cauliflower, stir-fried (Couve-flor, refogada)	Cabbage, stir-fried (Repolho, refogado)
Number of recipes	7	5	5	5	5	5
Energy (kcal)	84	68	80	101	79	105
Energy (kJ)	350	285	335	424	330	440
Protein (g)	3.7	1.8	2.0	5.0	2.3	2.4
Carbohydrate (g)	11.9	8.7	6.5	10.0	7.3	8.4
Fat (g)	3.0	3.6	5.9	6.3	5.3	7.7
Saturated fat (g)	1.3	0.5	0.7	0.7	0.7	1.4
% Calories from protein	16.4	9.5	9.0	17.4	10.8	8.4
% Calories from carbohydrates	53.5	46.9	29.7	33.3	33.9	30.0
% Calories from fat	30.1	43.6	61.3	49.4	55.4	61.6
% Calories from saturated fat	13.9	6.6	7.9	6.2	8.0	12.0
Monounsaturated fat (g)	0.8	2.0	3.4	2.4	1.4	3.6
Polyunsaturated fat (g)	0.7	0.9	1.6	2.6	3.0	2.2
Omega-3 fatty acid (g)	0.1	0.1	0.0	0.3	0.2	0.1
Omega-6 fatty acid (g)	0.3	0.4	0.1	0.5	1.1	1.1
Cholesterol (mg)	5.8	0.0	0.0	0.0	0.0	2.7
Sugars (g)	3.3	3.1	0.8	1.4	2.9	3.9

Table VI (Continued)

	Eggplant, Baked (Berinjela assada)	Eggplant, stir-fried (Berinjela, refogada)	Escarole, stir-fried (Escarola, refogada)	Spinach, stir-fried (Espinafre, refogado)	Cauliflower, stir-fried (Couve-flor, refogada)	Cabbage, stir-fried (Repolho, refogado)
Dietary fiber (g)	4.4	3.0	3.6	3.7	2.9	2.4
Vitamin A (μg_RAE^*)	24.0	15.0	115	707	3.8	17.6
Thiamin (mg)	0.1	0.1	0.1	0.1	0.1	0.1
Riboflavin (mg)	0.1	0.1	0.1	0.3	0.1	0.1
Niacin (mg)	1.2	0.7	0.6	1.2	0.6	0.6
Pantothenic acid (mg)	0.4	0.3	1.0	0.2	0.7	0.2
Vitamin B-6 (mg)	0.1	0.2	0.1	0.4	0.3	0.2
Total folate (μg)	38.3	21.3	154	291	59.8	39.4
Folate, DFE* (μg_DFE)	43.0	21.8	154	291	59.8	39.4
Vitamin B-12 (μg)	0.1	0.0	0.0	0.0	0.0	0.0
Vitamin C (mg)	9.4	12.8	9.1	47.1	49.7	30.7
Vitamin D (IU*)	0.0	0.0	0.0	0.0	0.0	0.0
Vitamin E, α -tocopherol (mg)	0.5	0.4	0.5	3.2	0.3	0.3
Vitamin K (μg)	5.9	0.0	246	721	27.1	58.1
Calcium (mg)	48.5	22.6	67.0	167	28.6	53.9
Iron (mg)	0.7	0.5	1.1	4.4	0.5	0.8
Zinc (mg)	0.4	0.3	0.9	0.9	0.3	0.3
Magnesium (mg)	22.3	15.9	19.7	122	16.9	18.4
Manganese (mg)	0.4	0.3	0.6	1.5	0.2	0.3
Selenium (μg)	2.6	1.2	1.0	2.7	0.9	2.3
Potassium (mg)	330	250	376	903	317	294
Sodium (mg)	384	245	428	705	257	543

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Table VII. Nutritional composition (per 100 g) of commonly consumed stir-fried vegetable and fruit dishes.

	Cassava, fried (Mandioca frita)	Chocho, stir-fried (Chuchu, refogado)	Spring greens, stir-fried (Couve- manteiga, refogado)	Squash, stir-fried (Abobrinha, refogada)	Potato, stir-fried (Batata, refogada)	Banana Milanese (Banana a milanese)
Number of recipes	5	5	5	5	5	5
Energy (kcal)	290	71	100	52	91	426
Energy (kJ)	1212	296	417	216	381	1782
Protein (g)	2.1	1.4	3.8	1.5	2.0	3.6
Carbohydrate (g)	48.9	7.5	12.8	6.2	17.5	29.1
Fat (g)	9.8	4.5	5.0	2.9	1.7	35.3
Saturated fat (g)	1.4	0.7	0.6	0.4	0.3	5.0
% Calories from protein	2.9	7.2	13.5	10.6	8.6	3.2
% Calories from carbohydrates	67.0	39.6	46.0	43.3	74.7	26.0
% Calories from fat	30.1	53.2	40.5	46.1	16.7	70.8
% Calories from saturated fat	4.3	8.9	5.4	6.9	3.0	10.6
Monounsaturated fat (g)	2.4	1.3	2.0	1.2	0.7	10.6
Polyunsaturated fat (g)	5.4	2.3	2.0	1.3	0.8	18.3
Omega-3 fatty acid (g)	0.6	0.3	0.3	0.1	0.1	0.0
Omega-6 fatty acid (g)	4.2	1.9	0.8	0.4	0.6	0.2
Cholesterol (mg)	11.5	0.0	0.0	0.0	0.0	42.0
Sugars (g)	2.2	2.8	0.9	3.0	1.5	11.6
Dietary fiber (g)	2.3	2.3	2.4	1.5	1.7	3.2
Vitamin A (μg RAE*)	5.1	7.5	797	14.6	2.3	16.6
Thiamin (mg)	0.1	0.0	0.1	0.1	0.1	0.1
Riboflavin (mg)	0.1	0.0	0.1	0.1	0.0	0.1
Niacin (mg)	1.1	0.6	1.1	0.5	1.1	0.7
Panthenic acid (mg)	0.2	0.3	0.1	0.2	0.3	0.4
Vitamin B-6 (mg)	0.1	0.2	0.3	0.3	0.3	0.4
Total folate (μg)	35.9	107	32.0	31.6	15.9	2.7
Folate, DFE* (μg DFE)	35.9	107	32.0	31.6	15.9	27.4
Vitamin B-12 (μg)	0.0	0.0	0.0	0.0	0.0	0.1
Vitamin C (mg)	26.4	14.5	127	18.7	17.3	7.9
Vitamin D (IU*)	1.0	0.0	0.0	0.0	0.0	3.5
Vitamin E, α -tocopherol (mg)	1.0	0.5	0.1	0.3	0.2	0.2
Vitamin K (μg)	18.2	17.3	849	10.0	3.8	0.5
Calcium (mg)	22.0	33.6	149	27.2	16.8	15.8
Iron (mg)	0.4	0.7	1.9	0.6	0.7	0.5
Zinc (mg)	0.5	0.9	0.5	0.3	0.3	0.3
Magnesium (mg)	27.3	17.5	37.3	20.1	22.0	28.1
Manganese (mg)	0.5	0.3	0.9	0.3	0.2	0.3
Selenium (μg)	1.8	0.9	1.5	0.6	0.6	4.4
Potassium (mg)	351	190	496	302	385	352
Sodium (mg)	256	267	274	259	268	138

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Brazilian foods, which may play a role in the risk of CRC and other chronic diseases (Freire et al. 2003; Iwasaki et al. 2004; Nobre et al. 2006; Mondini et al. 2007; de Figueiredo et al. 2008; Ferreira et al. 2008). To assess the current diet for a colonoscopy-based case-control study of adenoma conducted among Japanese Brazilians in São Paulo, Brazil and to investigate the association of dietary intake with CRC, an up-to-date culturally appropriate FCT is necessary for the analysis of a QFFQ

Table VIII. Nutritional composition (per 100 g) of commonly consumed snack foods in Brazil.

	Cheese bread (Pão de queijo)	Coxinha	Pastel (Pastel, qualquer recheio)	Kibe	Esfíha	Empada	Palm heart pie (Torta de palmito)	Chicken pie (Torta de frango)
Number of recipes	5	5	5	6	5	5	5	5
Energy (kcal)	450	228	343	252	348	332	272	287
Energy (kJ)	1882	954	1434	1053	1454	1387	1136	1202
Protein (g)	10.5	10.1	13.2	16.9	13.4	9.6	6.3	12.0
Carbohydrate (g)	48.2	27.1	36.4	14.4	38.8	32.7	26.0	25.8
Fat (g)	23.9	8.6	15.3	14.2	15.2	18.0	16.1	15.0
Saturated fat (g)	6.3	1.4	3.1	3.2	3.7	5.4	4.0	4.7
% Calories from protein	9.3	17.8	15.7	26.7	15.5	11.6	9.2	16.8
% Calories from carbohydrates	42.9	48.0	43.3	22.8	44.9	39.5	37.9	36.1
% Calories from fat	47.8	34.2	41.0	50.5	39.6	49.0	52.9	47.1
% Calories from saturated fat	12.6	5.5	8.1	11.4	9.6	14.6	13.2	14.7
Monounsaturated fat (g)	8.7	2.2	4.0	5.8	4.0	8.2	6.6	6.7
Polyunsaturated fat (g)	7.6	4.0	6.8	4.5	6.4	2.6	3.9	2.3
Omega-3 fatty acid (g)	0.6	0.2	0.6	0.4	0.5	0.1	0.1	0.1
Omega-6 fatty acid (g)	4.3	1.7	4.5	3.1	3.5	2.1	1.9	1.8
Cholesterol (mg)	90.9	32.3	28.9	41.8	30.6	75.8	54.4	64.2
Sugars (g)	1.9	1.5	1.5	0.7	2.9	1.5	5.7	1.6
Dietary fiber (g)	0.0	1.3	1.4	3.6	1.4	1.9	1.8	1.5
Vitamin A ($\mu\text{g_RAE}^*$)	46.0	10.4	18.9	47.4	17.8	80.7	54.4	46.5
Thiamin (mg)	0.0	0.3	0.0	0.1	0.4	0.3	0.3	0.3
Riboflavin (mg)	0.2	1.2	0.1	0.1	0.3	0.3	0.2	0.2
Niacin (mg)	0.0	3.3	0.9	4.7	4.0	3.4	1.9	4.1
Panathenic acid (mg)	0.3	0.3	0.1	0.6	0.4	0.5	0.3	0.4
Vitamin B-6 (mg)	0.0	0.1	0.1	0.4	0.1	0.1	0.1	0.2
Total folate (μg)	9.7	56.9	3.9	14.1	89.4	88.9	78.6	67.5
Folate, DFE* ($\mu\text{g_DFE}$)	9.7	85.2	3.9	12.8	140	130	109	98.9
Vitamin B-12 (μg)	0.6	0.1	0.5	1.5	0.7	0.2	0.2	0.2
Vitamin C (mg)	0.3	2.1	1.1	1.6	1.5	4.7	6.7	4.4
Vitamin D (IU*)	18.4	5.8	0.0	0.0	4.9	7.6	7.4	7.3
Vitamin E, α -tocopherol (mg)	0.9	0.4	0.9	1.0	0.7	0.6	0.4	0.4

Table VIII (Continued)

	Cheese bread (Pão de queijo)	Coxinha	Pastel (Pastel, qualquer recheio)	Kibe	Esfiha	Empada	Palm heart pie (Torta de palmito)	Chicken pie (Torta de frango)
Vitamin K (µg)	15.7	14.3	22.0	22.9	14.3	20.6	26.2	14.8
Calcium (mg)	266	32.3	128	21.6	175	52.5	77.8	46.1
Iron (mg)	0.5	1.7	2.6	2.4	2.9	2.8	2.6	2.3
Zinc (mg)	0.9	0.5	1.2	3.9	1.9	0.8	0.8	0.7
Magnesium (mg)	9.3	14.1	7.9	46.1	20.4	22.5	23.8	21.1
Manganese (mg)	0.0	0.3	0.0	0.6	0.3	0.6	0.6	0.4
Selenium (µg)	8.6	15.1	4.6	12.4	21.9	18.8	0.6	0.4
Potassium (mg)	46	94	83	333	170	151	170	153
Sodium (mg)	472	520	553	263	590	494	370	344

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

Table IX. Nutritional composition (per 100 g) of commonly consumed desserts in Brazil.

	Cheesecake (Queijadinha)	Chocolate cake (Bolo de chocolate)	Coconut cake (Bolo de coco)	Corn cake (Bolo de milho)	Cake with filling (Bolo com recheio)	Chocolate- filled bread (Bomba de chocolate ou caramelo)
Number of recipes	5	5	5	6	5	5
Energy (kcal)	442	315	356	322	354	324
Energy (kJ)	1848	1318	1490	1346	1481	1354
Protein (g)	11.8	8.0	7.9	5.4	7.2	7.4
Carbohydrate (g)	57.8	52.5	48.3	47.4	62.9	34.9
Fat (g)	18.0	8.2	14.7	13.0	8.3	17.4
Saturated fat (g)	5.9	2.5	4.7	2.6	2.9	6.9
% Calories from protein	10.7	10.2	8.9	6.6	8.1	9.0
% Calories from carbohydrates	52.5	66.4	54.1	57.8	70.9	42.9
% Calories from fat	36.8	23.4	37.1	35.6	21.0	48.1
% Calories from saturated fat	12.0	7.1	11.9	7.3	7.4	19.2
Monounsaturated fat (g)	2.2	3.5	3.3	5.9	2.1	7.8
Polyunsaturated fat (g)	0.5	1.4	1.3	3.3	0.9	1.5
Omega-3 fatty acid (g)	0.0	0.1	0.0	0.2	0.0	0.1
Omega-6 fatty acid (g)	0.5	1.3	1.2	1.9	0.5	1.4
Cholesterol (mg)	114	176	102	66	75	160
Sugars (g)	51.2	36.7	34.4	31.6	48.8	19.1
Dietary fiber (g)	1.9	1.0	1.5	1.4	1.0	1.1
Vitamin A (μg RAE*)	54.9	95.2	84.4	62.7	47.7	157
Thiamin (mg)	0.1	0.2	0.1	0.1	0.2	0.2
Riboflavin (mg)	0.1	0.3	0.2	0.1	0.2	0.3
Niacin (mg)	0.3	1.2	1.0	0.9	1.1	1.1
Panthenic acid (mg)	0.3	0.6	0.4	0.4	0.3	0.6
Vitamin B-6 (mg)	0.0	0.1	0.0	0.0	0.1	0.1
Total folate (μg)	19.2	57.4	41.0	33.0	39.9	50.0
Folate, DFE* (μg DFE)	24.2	78.4	58.2	42.0	57.8	67.8
Vitamin B-12 (μg)	0.4	0.3	0.3	0.2	0.2	0.5
Vitamin C (mg)	0.2	2.9	0.3	2.2	1.6	0.8
Vitamin D (IU*)	10.7	21.4	10.7	15.3	10.2	25.3
Vitamin E, α -tocopherol (mg)	0.3	0.0	0.6	0.6	0.4	1.0
Vitamin K (μg)	2.3	5.0	6.3	8.7	3.3	9.4
Calcium (mg)	284	109	136	93	151	107
Iron (mg)	1.0	1.5	1.6	0.9	1.3	1.6
Zinc (mg)	0.7	1.1	0.5	0.3	0.7	0.8
Magnesium (mg)	14.3	9.5	14.6	8.8	11.0	20.7
Manganese (mg)	0.0	0.2	0.2	0.1	0.2	0.2
Selenium (μg)	8.6	19.8	12.6	8.0	9.7	15.0
Potassium (mg)	97	90	111	72	72	151
Sodium (mg)	234	263	258	278	184	224

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

that was recently developed for this population and includes a list of commonly consumed Japanese Brazilian and Brazilian foods (Sharma et al. 2009a).

Prior to this work, there was lack of data on the nutritional composition of commonly consumed Brazilian foods and beverages, thus limiting studies on dietary intake and diet-disease associations. The 2008 version of the Brazilian FCT developed by the Department of Experimental Foods and Nutrition of the University of São Paulo

Table X. Nutritional composition (per 100 g) of commonly consumed desserts and beverages in Brazil.

	Strawberry pie (Torta de morango)	Lemon pie (Torta de limão)	Pudding (Pudim de Leite condensado)	Pudding (Manjar branco)	Pudding (Quindim)	Caipirinha ^a
Number of recipes	5	5	5	5	5	5
Energy (kcal)	255	373	303	231	376	152
Energy (kJ)	1065	1560	1267	967	1575	635
Protein (g)	6.2	7.2	8.7	4.4	5.9	0.1
Carbohydrate (g)	37.2	62.4	48.2	35.6	56.3	20.7
Fat (g)	8.8	10.5	8.0	8.2	15.3	0.0
Saturated fat (g)	3.3	4.4	4.5	5.5	2.4	0.0
% Calories from protein	9.7	7.7	11.6	7.5	6.1	0.2
% Calories from carbohydrates	58.8	67.0	64.4	60.7	58.2	53.1
% Calories from fat	31.4	25.3	24.0	31.6	35.6	0.1
% Calories from saturated fat	11.6	10.6	13.4	21.4	5.7	0.0
Monounsaturated fat (g)	3.1	3.5	0.8	0.2	3.6	0.0
Polyunsaturated fat (g)	1.1	1.0	0.3	0.0	1.2	0.0
Omega-3 fatty acid (g)	0.0	0.0	0.0	0.0	0.1	0.0
Omega-6 fatty acid (g)	1.0	0.9	0.3	0.0	1.1	0.0
Cholesterol (mg)	57.7	38.4	111	14.6	254	0.0
Sugars (g)	22.8	48.6	48.0	29.1	52.9	19.7
Dietary fiber (g)	1.0	0.5	0.0	0.5	2.0	0.1
Vitamin A (µg_RAE*)	41.8	62.0	30.0	1.0	96.6	0.3
Thiamin (mg)	0.2	0.1	0.0	0.0	0.0	0.0
Riboflavin (mg)	0.1	0.2	0.1	0.0	0.2	0.0
Niacin (mg)	1.1	1.0	0.0	0.1	0.0	0.0
Panthenic acid (mg)	0.3	0.2	0.3	0.0	0.7	0.0
Vitamin B-6 (mg)	0.0	0.0	0.0	0.0	0.1	0.0
Total folate (µg)	41.8	34.9	10.0	2.5	29.9	1.5
Folate, DFE* (µg_DFE)	59.5	53.2	10.0	2.5	29.9	1.5
Vitamin B-12 (µg)	0.2	0.1	0.3	0.0	0.5	0.0
Vitamin C (mg)	14.7	2.5	1.0	2.0	0.1	4.4
Vitamin D (IU*)	10.8	3.3	23.6	25.2	22.7	0.0
Vitamin E, α-tocopherol (mg)	0.3	0.3	0.2	0.0	0.6	0.0
Vitamin K (µg)	3.3	4.7	0.1	0.6	2.0	0.1
Calcium (mg)	127	142	216	143	38.5	2.9
Iron (mg)	1.0	0.9	0.4	0.7	1.1	0.0
Zinc (mg)	0.3	0.2	0.2	0.1	0.8	0.0
Magnesium (mg)	9.1	6.8	2.6	9.4	13.5	1.5
Manganese (mg)	0.2	0.1	0.0	0.1	0.0	0.0
Selenium (µg)	8.8	8.7	6.8	0.2	14.7	0.1
Potassium (mg)	86.2	62.1	28.8	59.8	118	17.9
Sodium (mg)	141	180	120	63.7	89.1	1.3

^aBeverage, which is commonly consumed in Brazil.

*RAE: Retinal Activity Equivalent; DFE: Dietary Folate Equivalent; IU: International Unit.

provided chemical analyses of only single-ingredient food items (TBCAUSP n.d.). The 2006 version of the Brazilian FCT coordinated by the Nucleo de Estudos e Pesquisas em Alimentacao and the State University of Campinas provided the values of 20 nutrients for only 12 composite dishes, although individual raw or processed foods were included (TACO 2006). Furthermore, none of the 12 composite dishes was common in the Japanese Brazilian diet, such as ‘Yakimeshi’ (fried rice) or stir-fried

'gobo' (burdock root). In addition, the methods of preparation for the foods are not available, the values of some macronutrients and micronutrients are missing, or the nutritional composition of some ingredients is missing (TBCAUSP n.d.). For example, the nutritional composition of the commonly consumed filled-pastry 'pastel' reflects the nutrients of the pastry but the nutrients of the filling inside are not accounted for.

Calculating the nutritional composition of Brazilian foods and beverages is challenging as many foods include a variety of ingredients. The existing Brazilian FCT includes few commonly consumed Japanese Brazilian foods (TACO 2006). It is also important to note that some Japanese Brazilians still use traditional ingredients from Japanese cuisine, such as soy sauce, sugar, and sake mirin, which should be included in the FCT.

Although the names of some Brazilian dishes are the same as dishes consumed in the United States, the ingredients and preparation methods are very different and thus the nutritional composition differs. For example, typical Brazilian lasagna includes a red sauce made of ground beef and tomato sauce and a white sauce made of margarine, milk and corn starch. The lasagna is usually prepared by alternating layers of sauces, lasagna noodles, mozzarella cheese and ham. Both the white sauce and ham are not ingredients typically included in an American lasagna recipe (US Department of Agriculture Agricultural Research Services n.d.).

Although biochemical analysis is the most precise method of producing nutrient values (Greenfield and Southgate 2003), we chose to calculate the nutritional composition of these commonly consumed foods because the high cost of biochemical analysis exceeded the available budget. We calculated the nutritional composition using weighed recipes as calculated by other researchers and in our own previous studies (Sharma et al. 1996, 2007, 2008, 2009a, 2009b; Bogнар and Piekarski 2000; Hakala et al. 2003).

A comparison of calculated nutritional composition data with direct chemical analyses has been conducted by several researchers. A good agreement between the two methods was reported by Matthews (1988) and Westrich et al. (1994), when comparing the nutritional composition of different dishes and food items, although there was greater agreement for some nutrients than for other nutrients. This difference in agreement could be attributed to slight discrepancies of FCT and possible nutrient modifications during the preparation process.

Our study is not without limitation. A nutrient database based on foods in the United States was used to calculate the nutritional composition of Brazilian dishes, which might not reflect the true values of some nutrients in the dishes. There were missing values in the database we used for some nutrients such as vitamin D; therefore, there might have been under-estimation for these nutrients. However, there was not a more complete nutrient database that we could have used for calculating our recipe data when we conducted this study. In addition, we were not able to account for the discrepancy in nutritional composition of each ingredient due to the difference in soil content, animal feeding practices, grain enrichment, and food fortification between Brazil and the United States. It is also possible that we did not collect all of the variations of each recipe used by Japanese Brazilians. However, we did recruit participants from various age groups, different socioeconomic backgrounds and different locations in São Paulo, and obtained at least five versions of each recipe to increase the variety captured by our data.

In conclusion, a total of 387 recipes were collected for 75 composite dishes, snack foods, desserts and one beverage. The availability of this up-to-date and culturally appropriate nutritional composition data will enable the accurate analysis of dietary intake among Japanese Brazilians in our on-going colorectal adenoma case-control study and facilitate the ability of other researchers to study dietary intake and diet-disease associations in this population.

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