Available online at www.sciencedirect.com

ScienceDirect

www.nrjournal.com

Original Research

Probability and amounts of yogurt intake are differently affected by sociodemographic, economic, and lifestyle factors in adults and the elderly—results from a population-based study

Gabriela Possa[a,*], *Michelle Alessandra de Castro*[b], *Dirce Maria Lobo Marchioni*[c], *Regina Mara Fisberg*[c], *Mauro Fisberg*[a]

[a] *Department of Pediatrics, Federal University of São Paulo—UNIFESP, São Paulo, Brazil*
[b] *School of Public Health, University of São Paulo—USP, São Paulo, Brazil*
[c] *Department of Nutrition, School of Public Health, University of São Paulo—USP, São Paulo, Brazil*

ARTICLE INFO

Article history:
Received 2 March 2015
Revised 18 May 2015
Accepted 28 May 2015

Keywords:
Dairy products
Yogurt
Diet
Adult
Cross-sectional studies

ABSTRACT

The aim of this population-based cross-sectional health survey (N = 532) was to investigate the factors associated with the probability and amounts of yogurt intake in Brazilian adults and the elderly. A structured questionnaire was used to obtain data on demographics, socioeconomic information, presence of morbidities and lifestyle and anthropometric characteristics. Food intake was evaluated using two nonconsecutive 24-hour dietary recalls and a Food Frequency Questionnaire. Approximately 60% of the subjects were classified as yogurt consumers. In the logistic regression model, yogurt intake was associated with smoking (odds ratio [OR], 1.98), female sex (OR, 2.12), and age 20 to 39 years (OR, 3.11). Per capita family income and being a nonsmoker were factors positively associated with the amount of yogurt consumption (coefficients, 0.61 and 3.73, respectively), whereas the level of education of the head of household was inversely associated (coefficient, 0.61). In this study, probability and amounts of yogurt intake are differently affected by demographic, socioeconomic, and lifestyle factors in adults and the elderly.

1. Introduction

Current food consumption patterns in Brazil have become increasingly distant from common nutritional recommendations. High-nutrient dense foods such as fruits, vegetables and dairy products are being replaced by processed foods low in micronutrients and rich in total fat, saturated fat, and sodium [1]. Such substitutions contribute to the high prevalence

Abbreviations: BMI, body mass index; FFQ, Food Frequency Questionnaire; HS, Health Survey; IPAQ, International Physical Activity Questionnaire; OR, odds ratio.

* *Corresponding author*. Department of Pediatrics, Federal University of São Paulo - UNIFESP, São Paulo, Brazil. Rua Botucatu, 715, Vila Clementino, São Paulo, Brazil, CEP: 04023–062. Tel.: +55 11 5576 4360; fax: +55 54 99762229.
E-mail addresses: gabipossa@gmail.com (G. Possa), mi.ale.castro@gmail.com (M.A. de Castro), marchioni@usp.br (D.M.L. Marchioni), rfisberg@usp.br (R.M. Fisberg).

http://dx.doi.org/10.1016/j.nutres.2015.05.020
0271-5317/

of inadequate nutrient intake, especially those found for calcium (84%-98%) and vitamins A (66%-86%), C (30%-50%), D (>98%), and E (>99%) in the Brazilian population more than 10 years of age [2–4].

In addition to the processed foods rich in fat and sodium, beverages with added sugars, such as juices, soft drinks, and sodas, are popular in the Brazilian population, with consumption even surpassing the intake of milk, yogurt, and dairy beverages. The prevalence of consumption of juices, soft drinks, and milk in the Brazilian population is estimated to be 39.8%, 23.0%, and 12.4%, respectively [1]. Regarding yogurt intake, despite the significant increase in its consumption in recent decades (greater than 700%) [5], its intake is still low in the Brazilian population, with a prevalence of less than 7% [6].

The importance of milk and dairy products is recognized by scientific and government institutions, especially with regard to its high concentrations of nutrients such as vitamins A, B1, B2, B12, and the minerals potassium, phosphorus, magnesium, zinc, and especially calcium [7–9]. Another recognized health benefit of milk and dairy products is the reduction in the risk of chronic disease development [10,11]. Yogurt is a particular type of fermented milk, and despite a nutritional composition similar to milk, as a result of the specific manufacturing procedures and fermentation of yogurt, it contains less lactose, more protein, and a higher concentration of vitamins and minerals such as calcium, phosphorus, potassium, and zinc than other dairy products [12]. Although limited evidence exists about the impact of yogurt consumption on human health, its intake has been associated with a healthier metabolic profile and a reduced risk of weight gain, obesity, cardiovascular disease, and diabetes mellitus [13–17].

There are few population-based epidemiological studies that have investigated yogurt consumption. For this reason, and considering the nutritional benefits of this food, this study aims to investigate demographic, socioeconomic, lifestyle, and anthropometric characteristics associated with the probability and amounts of yogurt intake to contribute to the identification of target population groups to public policies on health and nutrition and to design future studies on the effects of yogurt intake on the health of individuals.

2. Methods and materials

2.1. Study population and design

The data came from a cross-sectional population-based survey entitled 'Health Survey for São Paulo' (HS), which used a random sample of urban area residents of the city of São Paulo, Brazil. This study, a subsample of HS, used data from 532 individuals of both sexes, of which 428 were adults aged 20 to 59 years and 104 were elderly individuals aged 60 years or more (Figure 1). More details on HS survey sampling are available in Selem et al [18].

This study was approved by the local ethics committee. Written informed consent was obtained from the participants.

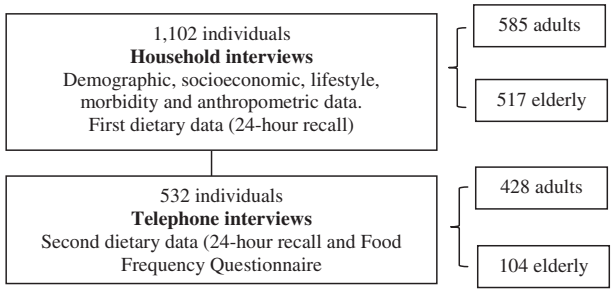

Figure 1. – Flow chart for study participant selection.

2.2. Data collection and processing

A structured questionnaire with information about demographic (sex, age, and race), socioeconomic (per capita household income, head of household's education level), anthropometric (body weight, height), lifestyle characteristics (alcohol use, smoking status, physical activity— International Physical Activity Questionnaire - IPAC) and presence of morbidity (self-reported hypertension, diabetes mellitus, osteoporosis), and anthropometric (body weight, height) was applied at the individual's home by trained interviewers (Figure 1).

2.3. Dietary data

Food and beverage intake was measured using 2 nonconsecutive 24-hour dietary recalls: the first one administered in the household interview and the second in the telephone interview. In addition, a Food Frequency Questionnaire (FFQ) containing 60 food items with frequencies of 0 (never) to 10 times, and units of time that included day, week, and year was administered in the telephone interview to inquire only about frequency of intake. The FFQ was developed and validated for the population of São Paulo to evaluate habitual food consumption during the year preceding its application [19]. Food items are organized into soups and pasta; meat and fish; dairy products, including yogurt (natural or with fruits); legumes and eggs; rice and tubers; vegetables; sauces and spices; fruits; beverages; breads and biscuits; and sweets and desserts.

The US Department of Agriculture Multiple-Pass Method is used for collecting the first 24-hour dietary recalls and its computer version Automated Multiple-Pass Method for second 24-hour recall using the Nutrition Data System for Research version 2007 (Nutrition Coordinating Center, University of Minnesota, Minneapolis, Minnesota, 2007). This multiple-pass method is a 5-step dietary interview that helps individuals to recall foods and beverages consumed on the day before the interview and to record them in detail, thus reducing dietary measurement errors [20]. Information about food and beverage intake was reviewed to identify possible errors in completion and to convert household measures of foods and beverages into grams and milliliters, respectively, according to national publications [21].

Intakes of both energy and yogurt were estimated by adjusting for the within-person variance of the intake using the multiple-source method, a statistical modeling technique. The multiple-source method allows calculation of the usual

dietary intake by combining repeated short-term measurements such a 24-hour recall with frequency information from a long-term instrument such as a FFQ.

In defining individual consumers and nonconsumers of yogurt, the information reported in both 24-hour recalls and the FFQ was considered. Individuals who reported yogurt intake (natural or with fruits) greater than zero in at least 1 of the 24-hour recalls and/or a frequency of intake different to zero in the FFQ were considered consumers, whereas individuals who reported yogurt intake equal to zero in both 24-hour recalls and a frequency of zero in the FFQ were considered nonconsumers.

2.4. Socioeconomic and lifestyle variables

The household head's education level was divided into two categories according to the number of years of study completed: up to 8 and 9 years or more.

The per capita household income was estimated by the sum of incomes from all household members divided by the total number of members. Two per capita household income categories were defined according to the value of the monthly minimum wage at the time of this study (about US $220.00): up to twice minimum wage and more than twice minimum wage.

The presence of a current smoking habit was used to define individuals as smokers. Subjects were also categorized as alcohol consumers or nonconsumers. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ) [22], long version. Subjects were categorized as either insufficiently active or sufficiently active.

2.5. Anthropometric variables

Anthropometric measurements were taken according to procedures recommended by the World Health Organization [23]. Each individual's weight and height were measured in duplicate using a calibrated digital scale (Tanita, model HD-313; capacity, 150 kg; accuracy, 0.1 kg) and a portable wall-mounted stadiometer (Seca, model 208; accuracy, 1 mm). Arithmetic means of weight and height were used to calculate the body mass index (BMI) values (kg/m^2). On the basis of the BMI values and cutoffs proposed by the World Health Organization for adults and by the Pan American Health Organization for the elderly, individuals were categorized as underweight, normal weight, or overweight.

2.6. Presence of morbidity

Self-reported data of chronic conditions (morbidity), namely, hypertension, diabetes mellitus, and osteoporosis, were obtained by the structured questionnaire applied at individual's home. Individuals were inquired about the presence or not of "Hypertension (high blood pressure)", "Diabetes", "Osteoporosis", by the multiple-choice question: "Do you have any chronic disease, any long-term illness or one that repeats itself with some frequency?".

2.7. Statistical analyses

The descriptive analysis of the prevalence of yogurt intake was performed using Stata statistical software (Statistics/Data Analysis, version 11.0, Texas). The percentage of individuals in the population who reported yogurt consumption was calculated according to sex (male/female); age group (20 to 39 years, 40 to 59 years, 60 years or older); race/ethnicity (white/nonwhite); nutritional status (underweight, normal weight, overweight); smoking (yes, no/ex-smoker); alcohol consumption (yes/no); physical activity (insufficiently active/sufficiently active); education level of the head of household (0-8 years/9 or more); strata of family income (up to 2 minimum wage per capita/month, more than 2 minimum wage per capita/month); self-reported hypertension (yes/no); self-reported diabetes mellitus (yes/no); and self-reported osteoporosis (yes/no).

To investigate factors associated with yogurt intake, we constructed a model of multiple logistic regression, with the dependent variable of yogurt intake (yes/no). The independent variables were selected for the multiple regression model based on bivariate analyses (χ^2), adopting the critical value of $P < .20$. The variables entered the model one by one, according to the stepwise-forward procedure. The variables including nutritional status, alcohol consumption, physical activity, and osteoporosis were not significantly different, and further analysis was therefore not completed. The Hosmer-Lemeshow test was used to evaluate the fit of the logistic model, being considered an appropriate adjustment for $P > .05$.

In addition, a multiple gamma regression model [24] was performed to check the factors associated with different degrees of intake (amounts consumed) of yogurt. For this, the analyses were restricted only to individuals consuming the food because this type of statistical modeling requires only positive data of a continuous nature. In this model, the dependent variable was the usual yogurt intake (in grams), and the independent variables were as follows: education of the head of household (years); per capita income (in 100 Reais); nutritional status (underweight, normal weight, overweight); smoking (yes, no/ex-smoker); and osteoporosis (yes/no). The choice was to work with the variables of education and income in its continuous form with the aim of evaluating the linear effect of these variables on the increase in the yogurt intake. In addition to these, the variables of age group (20-39 years, 40-59 years, 60 years or older), sex, and energy are included to fit the model. The procedures for the selection and order of entry of variables in the multivariate model were based on the results of univariate analyses adopting the value of $P < .20$. The other variables (alcohol consumption, physical activity, race/ethnicity, hypertension, and diabetes) did not enter the multivariate model because they were not associated with regular yogurt intake in the univariate analysis ($P > .20$).

In all statistical tests, the 5% significance level was considered.

3. Results

3.1. Characteristics of yogurt consumers and nonconsumers

The sample was primarily composed of females, adults, and Caucasians. The prevalence of individuals who were overweight, smokers, and alcohol consumers were 49.5, 24.2 and 50.9%, respectively. Per capita income was up to two

minimum wages for 75.8% of participants, and 54.4% of the heads of householder had 9 or more years of education. Most subjects did not self-report the presence of hypertension, diabetes mellitus, or osteoporosis (Table 1).

Approximately 60% of the subjects (n = 312) were classified as yogurt consumers or reported yogurt intake greater than zero in at least one 24-hour dietary recall and/or the intake frequency of more than zero in the FFQ.

In the bivariate analysis, the prevalence of yogurt intake differed significantly ($P < .05$) by sex, age, level of education of the head of household, and the presence of self-reported hypertension and diabetes mellitus. The frequency of yogurt intake was higher in females (64.4%), in the group aged 20 to 39 years (44.4%), in the presence of a higher level of education for the head of household (61.1%), and among those without hypertension (77.2%) or diabetes mellitus (95.4%). Other variables associated ($P < .20$) were race, smoking, per capita family income, and habitual energy intake (kcal) (Table 1).

3.2. *Factors associated with yogurt consumption or nonconsumption*

The logistic regression model showed an association of yogurt intake with only the variables of age 20 to 39 years ($P = .001$), sex ($P = .010$), and smoking status ($P = .045$). Individuals aged between 20 and 39 years were 3.11 times more likely to consume yogurt than older individuals (odds ratio [OR], 3.11), and women had 12.2 times the odds of men (OR, 2.12). Moreover, the chance of yogurt intake among nonsmokers was twice as high compared to smokers (OR, 1.98). The

Table 1 – Characteristics of yogurt consumers and nonconsumers

Variables	Nonconsumers (n = 220)		Consumers (n = 312)		Total (n = 532)	
	No.	%	No.	%	No.	%
Sex *						
Male	112	50.8	111	35.7	223	40.9
Female	108	49.2	201	64.4	309	59.1
Age group, y *						
20-39	46	21.1	138	44.4	193	36.3
40-59	113	51.3	130	41.6	239	45.0
60 or more	61	27.6	44	14.0	100	18.7
Race/ethnicity						
White	123	55.8	200	64.1	323	61.2
Non-white	97	44.2	112	35.9	209	38.8
Nutritional status [a]						
Underweight	13	5.7	16	5.0	28	5.3
Normal weight	96	43.6	144	46.2	240	45.1
Overweight	111	50.6	152	48.8	264	49.5
Smoking						
Yes	67	30.7	61	19.7	129	24.2
No/ex-smoker	153	69.3	251	80.3	403	75.8
Alcohol consumption						
Yes	119	53.9	152	48.8	271	50.9
No	101	46.1	160	51.2	261	49.1
Physical activity [b]						
Insufficiently active	172	78.3	247	79.3	420	78.9
Sufficiently active	48	21.7	65	20.7	112	21.1
Household head education, y *						
0-8	121	55.0	121	38.9	242	45.6
9 or more	99	45.0	191	61.1	290	54.4
Per capita family income						
Up to 2 minimum wage PC/month	170	77.5	212	68.0	380	71.3
More than 2 min wage PC/month	50	22.5	100	32.0	152	28.7
Hypertension *						
Yes	84	38.2	71	22.8	155	29.2
No	136	61.8	241	77.2	377	70.8
Diabetes mellitus *						
Yes	22	10.2	14	4.6	37	6.9
No	198	89.8	298	95.4	495	93.1
Osteoporosis						
Yes	12	5.4	8	2.6	20	3.7
No	208	94.6	304	97.4	512	96.3

* $P < .05$, proportions comparison between consumers and nonconsumers through the Pearson test.
[a] According to BMI cutoff points proposed by WHO (2000) and PAHO/WHO (2002).
[b] According to the IPAQ.

prevalence of yogurt consumption, however, did not differ statistically for the following variables: race, education level, per capita family income, presence of self-reported diabetes mellitus, and habitual energy intake (Table 2).

3.3. *Factors associated with yogurt intake (grams of food)*

In the evaluation of the factors associated with amounts of yogurt intake, an association was found between yogurt intake (in grams) and the following variables: smoking status, education of head of household, and per capita family income. It is observed that, with increasing per capita income, yogurt intake increases by 0.61 grams. On the contrary, there is a decrease in yogurt intake with increasing years of education of the head of household head (–1.40 g). Regarding the smoking variable, we found that smokers consume 3.73 less grams of yogurt than nonsmokers or ex-smokers do. There was no association between yogurt intake in grams and nutritional status and osteoporosis variables (Table 3).

4. Discussion

This was the first population-based study in Brazil that investigated the factors associated with the probability and amounts of yogurt intake. The highest probability of intake was observed in females, in individuals aged 20 to 39 years and among nonsmokers. Among individuals who were considered yogurt consumers, food intake was positively related to age and the per capita family income and negatively with years of education of the head of household and the presence of a current smoking habit.

The method used to classify individuals as yogurt consumers or nonconsumers considered two aspects: the presence or absence of this food in the 24-hour dietary recalls and their frequency of intake in the last year as assessed by a FFQ. However, despite the 60% of subjects defined as yogurt consumers in the present study, national data that used two nonconsecutive food records demonstrated a low prevalence of intake of dairy products of less than 7% in the Brazilian population [6], which demonstrates the importance of using complementary methods to classify individuals as yogurt consumers or nonconsumer, such as the FFQ.

This study identified differences in the prevalence of yogurt intake according to the sex and age of individuals. Significant variations in yogurt intake according to demographic changes have also been described in other studies. Wang et al analyzed data from the FHS Offspring Cohort and Generation Three through an FFQ and observed a higher proportion of yogurt intake among women than among men (64.2% vs 41.4%). Furthermore, the average age was lower for yogurt consumers compared to nonconsumers (47.3 vs 52.6 years) [13]. Kim noted that subjects who never or rarely consume yogurt were more likely to be men than individuals with a high frequency of yogurt intake (≥1 times per day) [25]. The association of sex with yogurt intake can be explained by the greater concern with health [26], better knowledge of nutrition topics, and greater quest for nutritional counseling

Table 2 – Factors associated with the probability of yogurt consumption in adults and the elderly (N = 532)

Variables	OR	SE	P
Age group, y *			
20-39	3.11	1.03	.001
40-59	1.53	0.37	.080
60 or more	–	–	–
Education level, y			
0-8	–		
9 or more	1.44	0.30	.080
Sex *			
Male	–		
Female	2.12	0.60	.010
Hypertension			
Yes	0.67	0.20	.188
No	–		
Smoking *			
Yes	–		
No/ex-smoker	1.98	0.67	.045
Diabetes mellitus			
Yes	0.75	0.24	.479
No	–		
Per capita family income			
Up to 2 minimum wage PC/month	–		
More than 2 min wage PC/month	1.47	0.47	.228
Race/ethnicity			
White	–		
Non-white	0.81	0.24	.479
Energy, kcal	1.00	0.0003	.206

Multiple logistic regression models. Model fit quality test (Hosmer-Lemeshow test): $F_{9.56} = 0.49$; $P = .878$. Abbreviations: OR, odds ratio; SE, standard error.
* $P < .05$.

Table 3 – Factors associated with positive amounts of yogurt intake in adults and the elderly

Variables	Coefficient	SE	P
Smoking *			
Yes	–	–	–
No/ex-smoker	3.73	0.70	<.001
Nutritional status [a]			
Underweight	9.65	8.93	.284
Normal weight	–	–	–
Overweight	0.63	1.53	.683
Osteoporosis			
Yes	–0.30	8.80	.973
No	–	–	–
Household head education, y *	–1.40	0.46	.004
Per capita family income (100 reais) *	0.61	0.27	.029
Age group, years			
20 to 39	–3.67	2.67	.174
40 to 59	0.23	2.82	.936
60 or more	–	–	–
Sex			
Male	–	–	–
Female	1.78	1.46	.229
Energy (100 kcal)	0.25	0.15	.099

n = 312. Gamma regression model. Abbreviation: SE, standard error.
* $P < .05$.
[a] According to BMI cutoff points proposed by WHO (2000) and PAHO/WHO (2002).

in females. In relation to age, one of the possible interpretations for the largest yogurt intake among individuals younger than 39 years may be the fact that these individuals formed their eating habits during a period in which yogurt intake in Brazil underwent remarkable expansion. In fact, between 1974 and 2008-2009 in Brazil, there was a significant increase in the acquisition of convenience foods that did not demand much preparation time such as yogurt and a considerable decrease in the intake of basic foods such as rice and beans [5,27,28]. The increased participation of women in the labor market, new forms of distribution and marketing of food, greater consumer knowledge regarding nutrition, and the variation in household incomes are some aspects that could explain changes in food consumption patterns over the past decades [29].

The fact that the lowest prevalence and amount of yogurt intake were observed among smokers instead of nonsmokers or ex-smokers is in agreement with the literature [13,25]; there truly are important differences in the nutritional quality of the diet of these individuals. In addition to the lower intake of yogurt, smokers have lower consumption of vegetables, fruit, and dairy products, and their diets are higher in foods rich in sugar and fat [30–32]. In addition, the Healthy Eating Index scores among smokers are lower than in nonsmokers [33]. These findings are consistent with the differences in micronutrient intake observed between smokers and nonsmokers. Smokers consume more saturated fat, cholesterol, and alcohol and less fiber, vitamin C, vitamin E, β-carotene, iron, and calcium when compared to nonsmokers [30,34].

The socioeconomic factor of per capita family income was positively associated with the amount of yogurt intake, which correlates with the findings of previous studies [25]. The importance of family income on the purchasing of dairy products in Brazil is striking; consumption in the group with the higher income is twice that of the lower income group [28]. The high price of these products, especially yogurt, is considered to be one of the factors limiting its intake by the population with lower socioeconomic status [35]. Moreover, it is possible that individuals belonging to higher socioeconomic classes have greater knowledge of nutrition and are more concerned about their health [36], which could explain the positive association between the amount of yogurt intake and household income. Regarding the education of the head of household, however, we observed an inverse association with yogurt intake, which was an unexpected result considering the direct relationship between income and education. However, in the case of Brazil, even with the recent increase in individuals with an average income of more than twice the minimum wage, there was no improvement in literacy rates in this population segment, which, in the period from 2004 to 2009, had expanded to up to 23% [37].

Milk and dairy products are foods with significant nutritional and health benefits, contributing to a greater source of different dietary nutrients, especially calcium [7–9], and dairy intake is associated with improved bone health, a reduced risk of developing osteoporosis [10] and the prevention of chronic diseases such as obesity, diabetes, hypertension, and coronary artery disease [11]. However, despite its benefits and incentives by the Ministry of Health to increase its consumption [40], national studies have reported low intake of dairy products by the population [33,41,42], which could explain the high prevalence of inadequate nutritional intake in the Brazilian population, especially with regard to calcium, phosphorus, and vitamins A and D [2–4].

This study has limitations because it is a cross-sectional design and does not allow for the determination of the causality of events because exposure and factors are evaluated at the same time. However, because the current study is a population-based study that used probabilistic sampling, the results may then be extrapolated to all adults and senior citizens of São Paulo. In addition, information about the presence of morbidity (hypertension, diabetes mellitus, and osteoporosis) was self-reported. For hypertension and diabetes mellitus, however, evidences show that self-reported information is valid to estimate the prevalence of these conditions in the general population [38,39].

Acknowledgment

The authors thank The State of São Paulo Research Foundation (FAPSEP; process no. 2009/15831-0) and the Brazilian National Research Council (CNPq; process no. 472873/2012-1) for the financial support provided to them.

REFERENCES

[1] Souza ADM, Pereira RA, Yokoo EM, Levy RB, Sichieri R. Most consumed foods in Brazil: National Dietary Survey 2008–2009. Rev Saude Publica 2013;47:190s–9s.
[2] Fisberg RM, Marchioni DML, Castro MA, Verly Jr E, Araújo MC, Bezerra IN, et al. Ingestão inadequada de nutrientes na população de idosos do Brasil: Inquérito Nacional de Alimentação 2008-2009. Rev Saude Publica 2013;47:222s–30s.
[3] Araujo MC, Bezerra IN, Barbosa FDS, Junger WL, Yokoo EM, Pereira RA, et al. Consumo de macronutrientes e ingestão inadequada de micronutrientes em adultos. Rev Saude Publica 2013;47:177s–89s.
[4] Veiga GVD, Costa RSD, Araújo MC, Souza ADM, Bezerra IN, Barbosa FS, et al. Inadequação do consumo de nutrientes entre adolescentes brasileiros. Rev Saude Publica 2013;47: 212s–21s.
[5] Schlindwein MM, Kassouf AL. Análise da influência de alguns fatores socioeconômicos e demográficos no consumo domiciliar de carnes no Brasil. Rev Econ Sociol 2006;44(3): 549–72.
[6] IBGE, Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2008-2009. Análise do consumo alimentar pessoal no Brasil; 2011[Rio de Janeiro].
[7] Gaucheron F. Milk and dairy products: a unique micronutrient combination. J Am Coll Nutr 2011; 30(5 Suppl. 1):400s–9s.
[8] Fungwe T, Bente L, Hiza H, Center for Nutrition Policy and Promotion (U.S.). Nutrient content of the U.S. food supply, 2005. Washington, D.C: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion; 2008.
[9] FAO, Food and Agriculture Organization of the United Nations. Milk and dairy products in human nutrition; 2013[Roma].
[10] Wadolowska L, Sobas K, Szczepanska JW, Slowinska MA, Czlapka-Matyasik M, Niedzwiedzka E. Dairy products, dietary calcium and bone health: possibility of prevention of

osteoporosis in women: the Polish experience. Nutrients 2013;5(7):2684–707.
[11] Rice BH, Quann EE, Miller GD. Meeting and exceeding dairy recommendations: effects of dairy consumption on nutrient intakes and risk of chronic disease. Nutr Rev 2013;71(4): 209–23.
[12] Buttriss J. Nutritional properties of fermented milk products. Int J Dairy Technol 1997;50(1):21–7.
[13] Wang H, Livingston KA, Fox CS, Meigs JB, Jacques PF. Yogurt consumption is associated with better diet quality and metabolic profile in American men and women. Nutr Res 2013;33(1):18–26.
[14] Astrup A. Yogurt and dairy product consumption to prevent cardiometabolic diseases: epidemiologic and experimental studies. Am J Clin Nutr 2014;99(5):1235S–42S.
[15] Ivey KL, Lewis JR, Hodgson JM, Zhu K, Dhaliwal SS, Thompson PL, et al. Association between yogurt, milk, and cheese consumption and common carotid artery intima-media thickness and cardiovascular disease risk factors in elderly women. Am J Clin Nutr 2011;94(1):234–9.
[16] Martinez-Gonzalez MA, Sayon-Orea C, Ruiz-Canela M, de la Fuente C, Gea A, Bes-Rastrollo M. Yogurt consumption, weight change and risk of overweight/obesity: the SUN cohort study. Nutr Metab Cardiovasc Dis 2014;24(11):1189–96.
[17] Sun Q, Hu F. Yogurt consumption and health outcomes: a review of epidemiologic evidence. Funct Food Rev 2013;5(2): 52–61.
[18] Selem SS, Castro MA, César CL, Marchioni DM, Fisberg RM. Associations between dietary patterns and self-reported hypertension among Brazilian adults: a cross-sectional population-based study. J Acad Nutr Diet 2014;114(8):1216–22.
[19] Selem SS, Carvalho AM, Verly-Junior E, Carlos JV, Teixeira JA, Marchioni DM, et al. Validity and reproducibility of a Food Frequency Questionnaire for adults of São Paulo, Brazil. Rev Bras Epidemiol 2014;17(4):852–9.
[20] Moshfegh AJ, Rhodes DG, Baer DJ, Murayi T, Clemens JC, Rumpler WV, et al. The US Department of Agriculture Automated Multiple-Pass Method reduces bias in the collection of energy intakes. Am J Clin Nutr 2008;88(2):324–32.
[21] Pinheiro A, Lacerda E, Benzecry E, Gomes M, Costa V. Tabela para avaliação de consumo alimentar em medidas caseiras. Atheneu: São Paulo; 2000.
[22] Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. International Physical Activity Questionnaire (lPAQ): study of validity and reliability in brazil. Ativ Fís Saúde 2001;6(2):5–18.
[23] Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. World Health Organ Tech Rep Ser 1995;854:1–452.
[24] Bigio RS, Verly E, Castro MA, Cesar CL, Fisberg RM, Marchioni DM. Are plasma homocysteine concentrations in Brazilian adolescents influenced by the intake of the main food sources of natural folate? Ann Nutr Metab 2013;62(4):331–8.
[25] Kim J. Dairy food consumption is inversely associated with the risk of the metabolic syndrome in Korean adults. J Hum Nutr Diet 2013;26(Suppl. 1):171–9.
[26] Travassos C, Viacava F, Pinheiro R, Brito A. Utilização dos serviços de saúde no Brasil: gênero, características familiares e condição social. Rev Panam Salud Publica 2002; 11:365–73.
[27] Levy-Costa RB, Sichieri R, Pontes Ndos S, Monteiro CA. Household food availability in Brazil: distribution and trends (1974-2003)]. Rev Saude Publica 2005;39(4):530–40.
[28] Levy RB, Claro RM, Mondini L, Sichieri R, Monteiro CA. Regional and socioeconomic distribution of household food availability in Brazil, in 2008–2009. Rev Saude Publica 2012; 46(1):6–15.
[29] Claro RM, Levy RB, Bandoni DH. Influence of income on food expenditures away from home among Brazilian families, 2002–2003. Cad Saude Publica 2009;25(11):2489–96.
[30] Suh SY, Lee JH, Park SS, Seo AR, Ahn HY, Bae WK, et al. Less healthy dietary pattern is associated with smoking in Korean men according to nationally representative data. J Korean Med Sci 2013;28(6):869–75.
[31] Engberink MF, Hendriksen MA, Schouten EG, van Rooij FJ, Hofman A, Witteman JC, et al. Inverse association between dairy intake and hypertension: the Rotterdam Study. Am J Clin Nutr 2009;89(6):1877–83.
[32] Goldbohm RA, Chorus AM, Galindo Garre F, Schouten LJ, van den Brandt PA. Dairy consumption and 10-y total and cardiovascular mortality: a prospective cohort study in the Netherlands. Am J Clin Nutr 2011;93(3):615–27.
[33] Fisberg RM, Morimoto JM, Slater B, Barros MB, Carandina L, Goldbaum M, et al. Dietary quality and associated factors among adults living in the state of Sao Paulo, Brazil. J Am Diet Assoc 2006;106(12):2067–72.
[34] Dallongeville J, Marecaux N, Fruchart JC, Amouyel P. Cigarette smoking is associated with unhealthy patterns of nutrient intake: a meta-analysis. J Nutr 1998;128(9):1450–7.
[35] Ricardo CZ, Claro RM. Cost and energy density of diet in Brazil, 2008–2009. Cad Saude Publica 2012;28(12):2349–61.
[36] Deshmukh-Taskar P, Nicklas TA, Yang SJ, Berenson GS. Does food group consumption vary by differences in socioeconomic, demographic, and lifestyle factors in young adults? The Bogalusa Heart Study. J Am Diet Assoc 2007; 107(2):223–34.
[37] Corbucci P. Strategic dimensions and limits of the role of education for Brazilian development. Rev Bras Educ 2011; 16(48):563–84.
[38] Selem SS, Castro MA, César CLG, Marchioni DML, Fisberg MF. Validity of self-reported hypertension is inversely associated with the level of education in Brazilian individuals. Arq Bras Cardiol 2013;100(1):52–9.
[39] Fontanelli MM, Teixeira JA, Sales CH, Castro MA, Cesar CLG, Alves MCGP, et al. Validity of self-reported diabetes in a representative sample of São Paulo city. Rev saúde pública 2015 [in press].
[40] Saúde. Ms. Guia alimentar para a população brasileira: promovendo a alimentação saudável; 2006[Brasília].
[41] de Andrade SC, de Azevedo Barros MB, Carandina L, Goldbaum M, Cesar CL, Fisberg RM. Dietary quality index and associated factors among adolescents of the state of Sao Paulo, Brazil. J Pediatr 2010;156(3):456–60.
[42] Muniz LC, Madruga SW, Araújo CL. Consumption of dairy products by adults and the elderly in the south of Brazil: a population-based study. Ciênc Saúde Coletiva 2013;18(12):3515–22.