



Consumer behavior of organic and functional foods in Brazil

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Abstract

The objective of this study was to correlate the gender and behavior of consumers of organic foods enriched with functional properties. The study was carried out by investigating the profile of organic and functional food consumers through the application of a questionnaire. A total of 1230 responses (of the questionnaire) were collected from people from all Brazilian states through social networks and e-mails following the snowball technique during the months of February and March 2017. The results showed that women expressed greater interest in consuming organic foods enriched with functional properties compared to men. Men and women agree that organic food are produced in a sustainable. Their high price, difficult access, irregular supply and availability in few establishments were highlighted as the main limiting factors for not consuming organic food, while an increased motivation (of consumption) was related to the awareness that organic foods are healthier and can improve quality of life. Fruits and vegetables are the most consumed organic foods among men and women, however women consume more functional foods than men. Thus, there are few differences in behavior and eating habits of organic foods between men and women.

Keywords: healthy foods; consumption frequency; reasons for consumption; quality of life.

Practical Application: The segments responsible for food production should be aligned with the profile of a consuming public increasingly concerned about consuming healthy food produced in harmony with the environment.

1 Introduction

Conventional agriculture is dependent on the use of chemical fertilizers and pesticides known to cause serious problems for human health and the environment. However, consumers are increasingly concerned with purchasing products that are not only of good nutritional quality and enjoyable sensory properties, but which also provide diverse health benefits (Assmann et al., 2014; Rana & Paul, 2017; Silva et al., 2016). In this context, we have foods with functional properties and those produced from organic farming systems.

Studies indicate that consumers of organic foods tend to be women, individuals with a higher education level, are older, and aware of the benefits provided by this type of food to their health and the environment, and who are willing to pay more (Annunziata & Vecchio, 2016; Kapuge, 2016; Pozzo, 2012). Despite the trend towards food consumption that favors a healthy lifestyle, the worldwide segment of organic crops is still small. Data from the International Federation of Organic Agriculture Movements (IFOAM) show that the amount of agricultural land occupied by organic agriculture in the world reached 57.8 million hectares in 2016, representing only 1.2% of cultivated land. Asia accounts for 40% of world organic food production, followed by Africa (27%) and Latin America (17%) (International Federation of Organic Agriculture Movements, 2018). In Europe, organic

vision movements predict that by 2030 only 50% of Europe's agricultural land will be managed according to the organic principles of health, ecology and justice. (Popa et al., 2019). In Brazil, the Ministry of Agriculture, Livestock, and Supply develops several policies to support the development of organic production (Brasil, 2018). This segment grew by 35% between 2014 and 2015 (Mota & Carvalho, 2016).

The reasons that lead consumers to opt to purchase organic and functional foods are related to quality, taste, food safety, healthy lifestyle, concerns about the environment and animal welfare (Bozga, 2015; Van Doorn & Verhoef, 2015; Pappalardo & Lusk, 2016; Ueasangkomsate & Santiteerakul, 2016); however, the high price, difficult access and lack of confidence are often reported as barriers to their purchase (Bozga, 2015; Yadav & Pathak, 2016). In addition to insufficient marketing work (Suciu et al., 2019).

Based on the above, this study aimed to investigate the Brazilian consumer behavior of organic foods with functional properties in relation to gender, verifying whether there are any differences in behavior between men and women in relation to the degree of knowledge, limiting causes and reasons for consumption, places of acquisition, and the most consumed organic and functional foods.

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2 Methods

2.1 Study type

This was an exploratory and descriptive study with a quantitative approach. The profile of consumers of organic products was assessed through research using a structured questionnaire with exploratory and descriptive multiple choice questions with verbal and numerical evaluation scales. All procedures were carried out with the authorization of Research Ethics Committee (CEP/UFRN), under license number (94022818.3.0000.5537).

2.2 Structure of the research instrument

Multiple choice questions were used for surveying the sociodemographic profile (age, gender, education level and income). Verbal scales were used for the variables WOULD P, OFTEN O, TRUST O and OFINTE, which respectively correspond to the following questions: How much more would you pay for organic Coalho Cheese? WOULD P; How often do you eat organic food? OFTEN O; Express how much do you trust that the food you get is really organic TRUST O; What is your degree of interest in consuming foods enriched with functional properties? OFINTE.

The responses varied according to verbal scales described in Table 1.

The remaining questions were evaluated using the variables presented in Table 2, using a numerical scale ranging from 0 (zero), when the respondent totally disagreed with the proposed sentence, to 10 (ten), when the respondent totally agreed with the proposed sentence. The list of functional foods was elaborated based on data from the Virtual Health Library of the Ministry of Health (Brasil, 2009).

2.3 Data collection procedure

An infinite population was considered for this study, since it is not possible to determine a sample frame, which generated a non-probabilistic sampling by convenience using the snowball technique. This technique is applied in social surveys where the initial participants of a study point out new participants, who in turn suggest new participants and so on, until the proposed goal is reached (Baldin & Munhoz, 2011).

The questionnaire was hosted at the *Google Forms*[®] web site (docs.google.com/forms/) and spread via social networks (*WhatsApp*[®] and *Facebook*[®]) and e-mails of postgraduate programs from several universities throughout Brazil. The data

were collected during 37 days between the months of February and March of 2017.

The application of the questionnaire used the branching logic feature provided by the referred site. This resource made it possible to guide the respondent according to their previous response. Thus, an individual who had never consumed organic food was directed to respond about which functional foods they consume the most.

2.4 Procedure for statistical analysis

The responses were collected directly from the site, transferred to Excel[®] (Redmond, Washinton, US), and the data were subsequently analyzed using *IBM SPSS22 Statistics*[®] statistical software (Armonk, New York, US). The profile of the participants was analyzed using descriptive statistics tools and the t-test for independent samples was applied for comparison of the means.

3 Results and discussion

3.1 Profile of respondents

The survey had the participation of 1,230 volunteer respondents, being women (68.8%) and men (32.2%), with the majority aged between 21 and 60 years (93%), with income between one and five minimum wages (64.4%) and complete secondary education (98.9%). With respect to schooling, 12.4% stated they had completed an undergraduate course, and almost half of the respondents had completed graduate studies (49%). This high participation of postgraduates in the study reflects the wide dissemination of the questionnaires among graduate programs. The study reached people from all regions of Brazil, with the highest percentage being observed in the Midwest (32%), Northeast (27.6%) and Southeast regions (21.4%), while the South (11.3%) and North (7.7%) had lower participation.

This sample profile does not correspond to the Brazilian reality. According to Instituto Brasileiro de Geografia e Estatística (2016), the percentage of women in 2015 was 51.5% (105.5 million) and men was 48.5% (99.4 million), more than half of the population aged 25 or over was concentrated in education levels corresponding to complete primary education or equivalent (52.0%), 26.4% had completed secondary education, and 13.5% had completed higher education. In this case, it is understood that the results presented in this study are appropriate to the target of the study population.

Table 1. Verbal scales.

WOULD P	OFTEN O	TRUST O	OFINTE	NCVS
I would not pay anything more	Never	I do not trust it	None	1
I would pay up to 10% more	Almost never	I trust it a little	A little interested	2
I would pay up to 20% more	Sometimes	I'm indifferent	Indifferent	3
I would pay up to 30% more	Often	I trust it	Interested	4
I would pay more than 40%	Always	I trust it a lot	Very interested	5

WOULD P = willingness to pay more for an organic cheese; OFTEN O = frequency of organic consumption; TRUST O = level of confidence that food is organic; OFINTE = interest in consuming organic foods with functional properties; NCVS = number corresponding to the verbal scale.

Table 2. Dimensions, variables and codes.

DIMENSIONS	VARIABLES	CODES
Degree of knowledge of organic foods consumer. What is an organic food for you?	Organic foods are those produced in an environmentally sustainable way	SUSTEN
	Organic foods are those without preservatives	NOPRSV
	Organic foods are those produced without chemical fertilizers or pesticides	NOPEST
	Organic foods are natural	NATUR
	Organic foods are obtained in production systems that preserve animal welfare, the environment and human health.	PRESER
Limiting Causes for Organic Food Consumption. What are the main reasons that limit your consumption of organic foods?	High price	HIGHPR
	Lack of interest	LINTER
	Lower quality	LQUALI
	Low variety	LVARIE
	Lack of confidence	LCONFI
	Difficult access	ACCESS
	Irregular offer	IOFFER
	Availability limited to a few establishments	LIMAVA
Reason for organic food consumption. Why do you consume organic foods?	Because they are tastier	TASTIE
	Because they are more nutritious	NUTRIT
	Because I have environmental awareness	AWAREN
	Because they improve the quality of life	QUALIF
	Because they are healthier	HEALTH
Establishments for purchase of organic foods. Where do you usually purchase organic foods?	Supermarkets	SUPERM
	Directly from the production site	PRODSIT
	Organic markets	ORG MKT
	Greengrocer	GGROCE
	Natural Product Stores	NAPRST
	Own production/I grow my own	OWNPRO
Most consumed organic foods. Which organic foods do you consume the most?	Organic fruits and vegetables	FRUVEG
	Organic Milk and its derivatives (of animal origin)	OGMILK
	Organic certified eggs	OCEGGS
	Organic certified meat (poultry, beef, goat, sheep and pork)	OCMEAT
	Organic certified fish	OCFISH
	Organic bee products (honey, pollen and royal jelly)	OCBEEP
	Organic cereals and its derivatives	OCEREA
Most consumed functional foods. Which functional foods do you usually consume?	Soybeans, maize and whole grains (oats, rye, barley and wheat bran) and its derivatives.	FUNSOY
	Flaxseed and its derivatives, nuts and almonds.	FUNFLA
	Green tea, red wine and artichoke.	FUNTEA
	Fruits (apple, purple grape, watermelon, cashew, red guava, blackberries, raspberries, cherries, pequi and citrus fruits).	FUNFRU
	Vegetables (tomatoes and derivatives, green leaves, cabbage, broccoli, Brussels sprouts, radish, bell peppers and onions)	FUNVEG
	Condiments (garlic, mustard, basil and nutmeg).	FUNCON
	Probiotic dairy derivatives (fermented milks and probiotic yogurts, and probiotic cheeses).	FUNPRO

3.2 Consumer behavior of organic and functional foods

Women were more interested in consuming organic foods enriched with functional properties than men ($p < 0.05$). For the other variables, men and women presented similar behavior, meaning there was no statistically significant difference between the mean values observed (Figure 1). The willingness to pay more for organic cheese was between 10% and 20%, the consumption frequency of organic food between “almost never” and “sometimes”, and the degree of trust between “indifferent” and “confident”.

The higher interest among women regarding the consumption of this type of food observed in the present study corroborates

findings published by Annunziata & Vecchio (2016) in a study carried out in southern Italy. The authors found that 53% of consumers of organic foods were women. Results of a study conducted by Hempel & Hamm (2016) with German consumers also point to the same behavior, in which women are often identified as having a higher preference for organic foods compared to men. This finding may be related to the greater interest of the female public in maintaining a healthier lifestyle in order to minimize certain diseases, as well as concern for longevity (Pozzo, 2012).

With regard to the willingness to pay more for this type of product, this behavior may be related to the awareness of the

quality and the benefits provided to health (Basha et al., 2015; Van Doorn & Verhoef, 2015; Ueasangkomsate & Santiteerakul, 2016). A study carried out by Leitão (2017) on the intent-to-purchase and the overall preference for cheese with added red fruits of antioxidant functional properties found that the appeal of healthy food may arouse greater consumer interest for purchase when compared to conventional food products. However, Pappalardo & Lusk (2016), when studying the role of beliefs in the process of purchasing functional foods, based on a type of high fiber enriched snack, point out that consumers of functional foods, despite seeking health in food products, They may not be willing to forgo values such as taste, food safety, naturalness and origin. Thus, it is crucial that producers and industry produce foods that balance such aspects.

3.3 Consumers degree of knowledge about organic food

Men and women agree that organic foods are produced in a sustainable way, without preservatives, chemical fertilizers or pesticides, they are natural and obtained in production systems that preserve animal welfare, the environment and people's health (Table 3). Despite the existence of a statistically significant difference among all variables, except for NOPRSV, the results present means with very close values for both genders. These

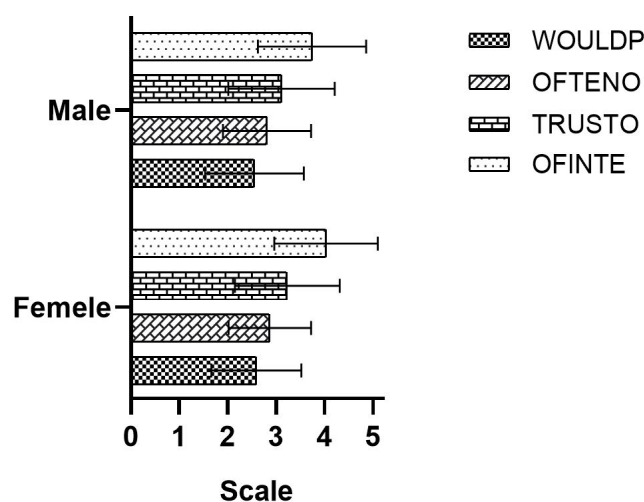


Figure 1. Relationship between gender and factors that affect the consumption of organic foods. WOULDP = willingness to pay more for an organic cheese; OFTEN = frequency of organic consumption; TRUSTO = level of confidence that food is organic; OFINTE = interest in consuming organic foods with functional properties.

findings are in line with studies that demonstrate that consumers believe that organic food contains less chemical waste, respects the environment and allows the welfare of animal production (Denver & Christensen, 2015; Gottschalk & Leistner, 2013).

On the other hand, they demonstrate the high level of awareness of the respondents regarding organic foods. The degree of knowledge of the population can reinforce the consumption trend and consequently increase the interest to purchase, the willingness to pay more and increase the consumption frequency, since increasing consumer awareness about the benefits certain foods have stimulates their acquisition (Lee & Yun, 2015), meaning that the more benefits perceived, the greater the intent to consume (Demirtas, 2018; Yazdanpanah et al., 2015).

3.4 Limiting factors and reasons for organic food consumption

Regarding the limiting factors, men presented higher averages than women in relation to high price, lack of interest, inferior quality and low variety (Table 4). The high price, difficult access, irregular supply and availability of products in few establishments were highlighted as the main limiting factors for not consuming organic food, with a higher average for the high price. Such factors constitute barriers to commercialization (Bryła, 2016) and can lead to discouraging those people who want to change their eating habits. Although the high price is considered an obstacle in Brazil (in this study) and in other countries such as Poland (Bryła, 2016), Denmark (Marian et al., 2014), Netherlands (Van Doorn & Verhoef, 2015) and the Tunisia (Ghali-Zinoubi & Toukabri, 2019), the resistance provoked by this factor can be overcome with marketing studies highlighting the benefits of regularly consuming this type of food (Ghali-Zinoubi & Toukabri, 2019; Lee & Yun, 2015) by employing price policies that balance sacrifice and optimal quality (Huang et al., 2019). Moreover, the other limiting factors indicate that producers and those responsible for marketing must develop strategies to correct these problems.

The motivations for consumption attributed by the respondents were the fact that they were tastier, more nutritious and the existence of environmental awareness, as well as the contribution to improving quality of life and being healthier, with these two factors reaching averages above 8.00 (Table 3). Annunziata & Vecchio (2016) reinforce that consumers purchase organic food because they are healthier and more sustainable than conventional foods. The term "organic" has positive connotations in food, being understood as safer and of higher quality than conventional

Table 3. Relationship between gender and consumers' knowledge level about organic food.

Variables	Female (N=846)		Male (N= 384)		t	p
	\bar{x}	s	\bar{x}	s		
SUSTEN	8.29	2.39	7.78	2.79	3.10	0.02
NOPRSV	8.18	2.87	7.90	2.97	1.55	0.12
NOPEST	9.42	1.42	9.10	2.00	2.84	< 0.00
NATUR	8.65	2.45	8.62	2.38	0.19	0.02
PRESER	8.98	1.86	8.40	2.57	3.97	< 0.00

N = number of respondents; \bar{x} = mean; s = standard deviation; t = t-test statistic; p = significance by applying the t-test for independent samples.

foods, and preservation of the environment is only a mediator of consumption and not a final motivation (Vega-Zamora et al., 2013), since consumption is mainly driven by its effects on health and well-being of the individual and their family (Annunziata & Vecchio, 2016; Yadav, 2016; Yadav & Pathak, 2016).

In relation to quality, consumers of organic foods usually attribute higher nutritional quality to conventional foods (Denver & Christensen, 2015); however, this idea is controversial (Florence et al., 2012; Schwendel et al., 2017). For example, Bernacchia et al. (2016) argue that studies in this respect have flaws concerning the comparison between environments, crop inputs used for development, yield, plant and fruit quality.

Men and women presented close means, but with higher values regarding the motivation for organic food consumption ($p < 0.05$). These differences between men and women are likely to reinforce the trend towards greater preference for organic foods among women, as shown in a study conducted with German consumers (Hempel & Hamm, 2016).

3.5 Acquisition sites and most consumed organic and functional foods

The present study shows that the purchase of organic foods in Brazil based on the profile sample used is mainly carried out at supermarkets and organic markets (Table 5), and women also shop at natural product stores more often than

Table 4. Limiting factors and reasons for consuming organic foods.

Variables	Female		Male		t	p	
	\bar{x}	s	\bar{x}	s			
Limiting consumption causes Female (n=846) Male (n=384)	HIGHPR	8.24	2.36	8.01	2.32	1.60	0.10
	LINTER	2.34	3.09	3.29	3.20	-4.86	< 0.00
	LQUALI	0.92	1.99	1.59	2.53	-4.55	< 0.00
	LVARIE	3.65	3.29	4.05	3.23	-2.00	0.04
	LCONFI	3.33	3.33	3.57	3.36	-1.12	0.26
	ACCESS	6.92	2.94	6.89	2.90	0.19	0.84
	IOFFER	6.18	3.08	6.42	2.90	-1.34	0.18
	LIMAVA	7.82	2.51	7.53	2.55	1.90	0.05
Reasons for consumption Female (N=802) Male (N=360)	TASTIE	6.92	2.86	6.27	2.97	3.45	0.01
	NUTRIT	7.90	2.57	6.98	2.83	5.26	< 0.00
	AWAREN	7.98	2.27	7.41	2.58	3.61	< 0.00
	QUALIF	8.87	1.71	8.30	2.21	4.31	< 0.00
	HEALTH	9.34	1.42	9.08	1.60	2.68	< 0.00

N = number of respondents; \bar{x} = mean; s = standard deviation; t = t-test statistic; p = significance by applying the t-test for independent samples.

Table 5. Locations for the purchase of the most consumed organic and functional foods.

Variables	Female		Male		t	p	
	\bar{x}	s	\bar{x}	s			
Locations for purchase Female (N=802) Male (N=360)	SUPERM	5.89	3.53	5.53	3.49	1.64	0.10
	PRODSIT	3.59	3.76	3.88	3.76	-1.21	0.22
	ORGMKT	5.45	3.89	5.44	3.81	0.05	0.95
	GGROCE	3.67	3.68	3.45	3.40	1.00	0.31
	NAPRST	5.39	3.69	4.78	3.65	2.62	< 0.00
	OWNPRO	3.30	3.91	3.42	4.08	-0.47	0.63
Most consumed organic products Female (N=802) Male (N=360)	FRUVEG	6.34	2.53	6.24	2.71	0.58	0.55
	OCMLK	3.14	3.20	3.21	3.31	-0.36	0.71
	OCEGGS	4.05	3.70	3.34	3.60	3.09	< 0.00
	OCMEAT	2.07	2.83	2.23	2.96	-0.85	0.39
	OCFISH	1.91	2.93	2.26	3.14	-1.80	0.07
	OCBEEP	4.84	3.76	4.20	3.67	2.69	< 0.00
	OCEREA	3.95	3.41	3.98	3.48	-0.12	0.90
Most consumed functional foods Female (N=846) Male (N=384)	FUNSOY	5.90	3.19	5.46	3.42	2.14	0.03
	FUNFLA	5.58	3.50	4.27	3.37	6.25	< 0.00
	FUNTEA	3.97	3.48	3.33	3.27	3.12	< 0.00
	FUNFRU	7.48	2.78	6.60	3.00	4.89	< 0.00
	FUNVEG	8.06	2.42	7.22	2.82	5.06	< 0.00
	FUNCON	6.48	3.38	5.29	3.61	5.42	< 0.00
FUNPRO	4.74	3.55	4.34	3.49	1.86	0.06	

N = number of respondents; \bar{x} = mean; s = standard deviation; t = t-test statistic; p = significance by applying the t-test for independent samples.

men ($p < 0.05$). This latter information is in agreement with a study by Nascimento et al. (2017) carried out at an organic and natural product distributor located in the central region of Rio Grande do Sul. The authors observed that 83.3% of the clients were females, which suggests a higher demand of this group in relation to the male clientele in these locations.

With regard to the places of purchase, it is important to take into account marketing strategies that improve the distribution channels (Yadav & Pathak, 2016), so that they are made available at different locations and consequently become more accessible to consumers. In addition, considering that awareness of the benefits provided by food ingredients may be related to the time of knowledge of scientific evidence (Bornkessel et al., 2014), it is important that such findings are disseminated to the population to increase the consumer public.

Fruits and vegetables are the most consumed organic foods, followed by apicultural foods/bee products, cereals and their derivatives, and milk and its derivatives (Table 5). This emphasizes that from the statistical point of view, women consume eggs and apicultural foods slightly more than men ($p < 0.05$). Meat and fish with organic certification were rated as the least consumed among both men and women, with scores below 3.00. The same table also shows that women were higher than men in the consumption of all the described functional foods, with the exception of probiotic dairy products. Vegetables and legumes can be highlighted as the most consumed functional foods by men and women, followed by fruits, condiments and soy, corn and whole grains.

4 Conclusion

Men and women exhibit similar behavior in relation to the consumption of organic foods, which are perceived as products produced in a sustainable way, without preservatives, pesticides or chemical fertilizers, which are natural and obtained in production systems that preserve animal welfare, the environment and people's health. Differences in behavior and consumption habits among Brazilian men and women were few: from the statistical point of view, women are more interested in consuming organic foods with functional properties, purchasing natural products from stores and consuming eggs and apicultural foods and functional foods a little more than men in general.

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