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Exploring the perception of Mexican urban consumers toward functional foods using the Free Word Association technique

Edgar Rojas-Rivas | Angélica Espinoza-Ortega ⬤ | Carlos G. Martínez-García | Sergio Moctezuma-Pérez | Humberto Thomé-Ortiz

Instituto de Ciencias Agropecuarias y Rurales (ICAR), Universidad Autónoma del Estado de México, Toluca, Estado de México, Mexico

Correspondence
Angélica Espinoza-Ortega, Instituto de Ciencias Agropecuarias y Rurales (ICAR), Universidad Autónoma del Estado de México, Instituto Literario 100, Col. Centro, C.P. 50000 Toluca, Estado de México, Mexico.
Email: angelica.cihuatl@gmail.com or aespinozao@uaemex.mx

Abstract

Demographic changes in contemporary societies has promoted sectors of consumers aware of the food they buy for health reasons, as functional foods, whose demand has grown in diverse countries as Mexico, recognized as one of the emergent market with the highest consumption of these products in Latin America. However, there is little knowledge on the attitudes of Mexican consumers toward functional foods. The objective was to explore the perception of functional foods by Mexican urban consumers using the free word association technique. A total of 610 persons were asked the three first words that came to their minds with the stimulus "functional food." Twenty-three categories were grouped in nine dimensions, the most important were: Health, Nutrition, and Foods and Nutrients. Differences due to age and schooling level were found in dimensions and categories. Consumers have a clear idea of "functional food" that explains growth in this market. The promotion of functional foods should take into consideration the demands that specific groups of consumers have for these products.

Practical applications

This work is a first approach on the study of the perception of Mexican urban consumers toward functional foods, with results that may be useful for public or private entities. As mentioned in works conducted in other areas of the world, demographic and socio-economic characteristics are identified as significant determinants; the perception toward functional foods is positively associated with educational achievement, age and women. Taking into consideration the diabetes and overweight problems of the Mexican population, research results indicate an opportunity for producers of functional foods for an adequate development, improvement, and promotion of these products to meet specific perceptions of each target group of consumers.

1 | INTRODUCTION

Demographic changes in contemporary societies, as is the growth of the middle class, life expectancy, and the increase in chronic-degenerative diseases, have prompted that some societies and sectors of consumers are considerably more concerned, critical, and aware of the food they buy (Kaur & Singh, 2017; Vicentini, Liberatore, & Mastrocola, 2016); increasing demand for healthy food (Viana, Dos Santos, & Trindade, 2014) in their diverse categories among which there are functional foods. This is a category of food products relatively new in the market (Frewer, Scholderer, & Lambert, 2003; Marina, Cerjak, & Ida, 2014), introduced to Japan in the 1990s (Ares, Giménez, & Gámbaro, 2008b).

The market growth of functional foods moved from US$47.6 billion in 2002 to US$168 billion in 2010, with an 8.6% annual growth rate (Khan, Grigor, Winger, & Win, 2013; Siró, Kápolna, Kápolna, & Lugasi, 2008). The Asian-Pacific region has the highest consumption of functional foods with 34% of total sales, followed by United States and Canada (25%), and Europe (19%) (Vicentini et al., 2016). This growth in consumption has influenced other emergent markets such as Latin America. Vicentini et al. (2016) comment that Brazil and Mexico are recognized as the emergent markets with the highest consumption of functional foods in the region. For example, the Mexican market grew from US$12.7 billion in 2011 to US$16.3 billion in 2015; products observed in markets are fruit or vegetable juices, bakery

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products, sweets, and dairy products among others (Agriculture and Agri-Food Canada, 2014). Since these are foods of daily consumption, some conventional products have been replaced by functional foods (Agriculture and Agri-Food Canada, 2012). These changes in the Mexican food market are taking place without any knowledge of what is motivating those preferences in consumers, or if those changes occur with a real perception of the meaning of functional foods.

Urala and Lahteenmaki (2004) and Markovina, Cacic, Gajdos, and Kovacic (2011) mention that studying the level of awareness or perception of the consumers is an indispensable element in the acceptance and use of these foods; therefore, studies on attitudes, behavior, acceptance and willingness to try, and the perception of functional foods have increased over the last two decades (Ares & Gámbaro, 2007; Chen, 2011; Messina et al., 2008; Siegriest, Shi, Giusto, & Hartmann, 2015; Siró et al., 2008; Urala & Lahteenmaki, 2004). One of the challenges facing these works is to establish the concept of functional foods, which at the beginning in Japan, were named Food for Specified Health Uses (Ares et al., 2008b). Doyon and Lebrecque (2008) after an extensive literature review and the support from North American and European experts established the following definition: "A functional food is, or appears similar to, a conventional food. It is part of a standard diet and is consumed on a regular basis, in normal quantities. It has proven health benefits that reduce the risk of specific chronic diseases or beneficially affect target functions beyond its basic nutritional functions." However, there are various denominations and confusions of the specificity of the concept of "functional food" (Chen, 2011; Kaur & Singh, 2017). For example, they have been associated with the use of new food technologies, with the addition or modification of components or ingredients in their structure (Evans & Cox, 2006), which might affect their image or sensory quality. On the other hand, Urala and Lahteenmaki (2007) stated that the degree of perceived health influences the intention to consume functional foods, but also flavor, quality, price, and convenience, as well as gender, age, and schooling level of the consumers, contribute to the growth in demand (De Barcellos & Laitano, 2011).

However, few works have approached the perception of these foods in other developing countries (Kaur & Singh, 2017) where consumption is growing rapidly (Brečić, Gorton, & Barjolle, 2014). For instance, in Uruguay consumers know very little about the term "functional food" (Ares et al., 2008b), similar results were found in Trinidad and Tobago (Badrie, Reid-Foster, Benny-Ollivierra, & Roberts, 2007). Schnettler et al. (2015) comment that Chilean consumers have good disposition to buy functional foods. However, these works cannot be extrapolated to the particular conditions of other countries, like Mexico, where the economic development, and demographic and sociocultural changes have promoted two phenomena, the polarization of livelihoods of the population, and changes of lifestyles in different social strata (Espinoza-Ortega, Martínez-García, Thomé-Ortiz, & Vizcarra-Bordi, 2016). A negative effect of these changes is reflected in the high incidence of diabetes (9.5%), which will increase in the future due to obesity of 33.3% of children, 35.3% of teenagers, and 72.5% of adults (INSP, 2016).

Despite that scenario, there are no studies that explore the awareness and perception of the Mexican population toward these products. Only the work of Salgado, Camarena, and Díaz (2016) was

identified; who analyze the neo-phobia of new foods such as the functional foods. The health situation, the growth in the market of functional foods, and the little knowledge on the perception and attitudes of Mexican consumers toward these products, state the need for studies on the effect of these changes not only in food consumption, but also on the symbolic elements that consumers consider when they choose their food (Espinoza-Ortega et al., 2016).

Quantitative and qualitative techniques have been used in the study of consumer perceptions. Authors as Ares, Giménez, and Gámbaro (2008a) and Deliza, Macfie, and Hedderley (1999) and Guerrero et al. (2010) have used qualitative techniques, as useful tools to find out prompt information on a specific topic, particularly in exploratory studies, allowing rapid information gathering on the perception of consumers (Deliza et al., 1999). Among the most utilized techniques there are Focus Groups or Repertory Grid, but limitations arise when working in large samples, adding to the need of having trained moderators, implying time and high costs (Ares & Deliza, 2010a, 2010b; Ares & Varela, 2014). According to Steenkamp and Van Trijp (1997), another qualitative technique of greater simplicity that generates more results, is Free Word Association.

Free Word Association is a quick and efficient method to obtain information on consumers, and it is useful to find out how they perceive a concept or new term (Roininen, Arvola, & Lahteenmaki, 2006). It is a simple procedure by means of which the subjects generate spontaneous ideas from a stimulus or a word so that they mention the first words that come to their minds (Donoghe, 2000; Schmitt, 1998). According to Ares et al. (2008a), this technique helps to ascertain the reasons behind the food choices of consumers, and it use has been on the rise in the study of consumers and their reasons, attitudes, perceptions, and behaviors toward foods (Ares et al., 2008a; Cunha De Andrade, De Aguiar, Ares, & Deliza, 2016; Guerrero et al., 2010; Hilverda, Jurgens, & Kuttschreuter, 2016; Martjin, Pasch, & Roefs, 2016; Roininen et al., 2006; Rozin, Fischler, & Shields-Argeles, 2012; Ruby et al., 2016; Son et al., 2014). Thereby, it is a useful tool to study the perception of functional foods among consumers.

The objective of this work was to explore the perception of urban consumers of central Mexico toward functional foods using Free Word Association.

2 | MATERIALS AND METHODS

2.1 | Participants

The study was carried out in Mexico City, with a population near nine million inhabitants and a large flow of migration from other states (INEGI, 2015). A convenience sampling was carried out in public squares and shopping centers (Ares & Gámbaro, 2007). Guerrero et al. (2010) state that convenience samplings are nonprobabilistic methods that are used in exploratory research in order to have a quick approach to the object of study.

The criteria to select the respondents were: persons over 18 years old that lived in Mexico City and were interested and available to participate in the study (Cunha de Andrade et al., 2016; Gámbaro, Parente, Roascio, & Boinbaser, 2014). A total of 610 persons

participated, 50% men and 50% women, the range of ages was from 18 to 73 years old.

2.2 | Testing Free Word Association

The respondents were individually interviewed face to face (Rahnama, Fadaei, & Baghersalimi, 2017); initially they were asked to say the three first words that came to their minds with the stimulus "food," so that they familiarize with the activity (Martjin et al., 2016; Son et al., 2014). Once the respondents understood the dynamics of the experiment, they were asked to mention the first three words that came to mind with the stimulus "functional food." The test lasted between 10 and 15 minutes, including the introduction, training, and the questions related to the sociodemographic characteristics of the respondents: gender, age, schooling level, and income.

2.3 | Data analysis

Analysis followed Guerrero et al. (2010) generating a database in Excel with the words mentioned by each respondent, and the socioeconomic information, including variables as gender, age grouped in four age categories: 18–25, 26–35, 36–45, and 46 and older years old; schooling level grouped in: Low (without elementary studies, elementary, and secondary), Middle (high-school and technical education), and High (university graduates or postgraduates); and incomes per household. Unfortunately, there were inconsistencies in the income variable, so it was not included in the statistical analysis and it is only reported (Table 1).

In the first phase, all mentioned words by respondents were included, frequency of mention of each word was calculated. Second, words were grouped in *Categories* according to meaning or synonyms. For example, words as health and healthy, were renamed as *Health* and included in the new column category. The same procedure was used to merge the categories into "Dimensions." For example, the

categories Nutrition and Good Nutrition were renamed as *Nutrition* and included in the new column dimension (Guerrero et al., 2010; Symoneaux, Galmarini, & Mehinagic, 2012). The formation and naming of categories and dimensions were undertaken by three experts (Guerrero et al., 2010) in the area of food research, who initially worked independently and afterward agreed on the information that determined the final name of the new variables (Ares & Deliza, 2010a, 2010b; Cunha de Andrade et al., 2016; Guerrero et al., 2010).

According to Cunha de Andrade et al. (2016) and Guerrero et al. (2010), the analysis of the categories and dimensions identified by 5% of the respondents were considered for further analyses in order to avoid losing valuable information. The frequency of words mentioned, categories, and dimensions were calculated without considering if the words came from the same or a different respondent; this way, the relative mention frequencies of the categories and dimensions can be over 100% (Cunha de Andrade et al., 2016).

The categories and dimensions were analyzed by gender, age, and schooling level of the respondents, using the Global and Per-cell Chi-square test in order to identify the source of variation in the contingency tables (Ares & Giménez, 2014; Cunha de Andrade et al., 2016; McHugh, 2013; Symoneaux et al., 2012). Similarly, Simple Correspondence Analysis was run (Pontual et al., 2017; Symoneaux & Galmarini, 2014) in order to have a better interpretation of data. Simple Correspondence Analysis is an exploratory descriptive technique to analyze contingency tables of two entries that contain a correspondence between lines and columns enabling a visual representation of the information (Ares et al., 2008a; Gámbaro et al., 2014). This analysis was to assess the relationship between categories and dimensions in diverse groups of consumers according to gender, age, and schooling level. All analyses were done with XLSTAT 2014 (Addinsoft).

3 | RESULTS AND DISCUSSION

Different works have evinced the little familiarity and confusion of the consumers regarding the term "functional food" (Ares et al., 2008b; Badrie et al., 2007; Urala, Schutz, & Spinks, 2011). According to Roininen et al. (2006), the technique of Free Word Association can help to understand the internal conceptual structures of the consumers in order to find out their perception of a new term, without limiting to study their degree of knowledge or familiarity with the term "functional" by means of a close-ended question, as it has been done in other studies (Ares et al., 2008b; Markovina et al., 2011; Urala et al., 2011). According to theories of expectation - value (Ajzen, 1991; Fishbein & Ajzen, 1975), the associations with higher mentions from consumers toward a stimulus, indicate the idea and behavior that consumers have about the stimulus (Guerrero et al., 2010). In the case of food products, the first words that come to mind are the most relevant in purchase decisions by consumers (Ares et al., 2008a; Ares & Deliza, 2010a, 2010b; Roininen et al., 2006).

In the present study, a total of 277 different words were mentioned by the respondents, the most frequent were *nutritious*, *healthful*, and *health* (Figure 1). It seems that Mexican urban consumers have a clear idea about the term "functional" as they mentioned words that are part of their conceptual structure (Doyon & Lebrecque, 2008). The

TABLE 1 Sociodemographic characteristics of the consumers

	n	%
Total	610	100
Gender		
Women	305	50.0
Men	305	50.0
Age		
18–25	297	48.7
26–35	181	29.7
36–45	58	9.5
46 and older	74	12.1
Schooling level		
Low	91	14.9
Middle	296	48.5
High	223	36.6
Monthly income by household		
Less than US$263	106	17.37
Between US$264 and US$526	252	41.31
Between US$527 and US$789	126	20.65
Between US$790 and US$1052	83	13.60
Between US$1053 and US$1579	43	7.04
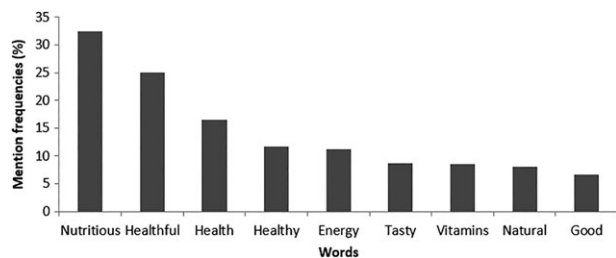
FIGURE 1 Frequency of the MOST mentioned words

least-mentioned words are related with micronutrients (vitamins), hedonistic attitudes, energy intake, and the association as natural products. This is interesting, as in other works functional foods are related to new technologies, but not to the natural concept (Evans & Cox, 2006). In this sense, even though Mexico has one of the highest indices of obesity and diseases related to eating (Carrete & Arroyo, 2014; Espinoza-Ortega et al., 2016), or maybe because of that, the associated words with highest frequency of mention toward functional foods are part of beliefs or attitudes

(Roininen et al., 2006), that is, those foods recreate them an idea of healthy.

According to Siró et al. (2008), the strategies to develop the market for functional products take place when the consumers are well acquainted with the concept. The familiarity that Mexican urban consumers seem to have with the stimulus is possibly an element that explains the growth of this market (Vicentini et al., 2016) in the country, such as reported by Agriculture and Agri-Food Canada (2012).

The words produced 23 categories, grouped in 9 dimensions (Table 2): "Health": was the most mentioned (80.65%), it comprised four categories: *Health, Wellbeing, Specific benefit for health,* and *Vitality.* This dimension indicates that functional foods are deemed healthy, a characteristic element of these products (Gul, Singh, & Jabeen, 2016), particularly the category *Specific benefit for health,* in which there were words such as "metabolism, menopause, or digestion."

The second dimension was mentioned by 56% of the respondents. It was called "Nutrition." It is composed of two categories (Nutrition and Good nutrition); the category *Nutrition* was produced with words such as nutrition, nutritious, or nutritional, so that also

TABLE 2 Dimensions and categories obtained

Dimensions	Categories (most relevant words)	Percentage of mention
Health		**80.65**
	Health (health, healthful, and healthy)	52.46
	Wellbeing (benefit, beneficial, and wellbeing)	12.29
	Specific benefit for health (digestion, metabolism, and menopause)	10.82
	Vitality (life, vital, and lifetime)	5.08
Nutrition		**56.05**
	Nutrition (nutrition, nutritional, nutritious, and nutrimental)	43.27
	Good nutrition (good, good nutrition, and diet)	12.78
Foods and nutrients		**50.49**
	Nutritional characteristics (nutrient, vitamins, and protein)	30.98
	Foods (fruit, vegetable, cereals, salad, yoghurt, milk,and corn)	13.61
	Optimal foods (balanced, harmonious, and full)	5.90
Hedonism and body care		**25.73**
	Hedonistic attitudes (tasty, savory, good taste, and delicious)	15.41
	Sensory characteristics (soft, light, colorful, and attractive)	5.24
	Body image (fat-free, low-calorie, and low sugar)	5.08
Energy and supplement		**25.40**
	Energy (energy, energetic, and invigorating)	12.95
	Supplement (supplement, satisfying)	7.04
	Fortifier (strength, fortifying, and strong)	5.41
New foods		**20.16**
	Foods associated to nature (natural, organic, and ecological)	14.75
	New foods (novel, new, and new food)	5.41
Essential food		**14.74**
	Necessary (necessary, necessity, and basic)	8.19
	Everyday food (food, grocery)	6.55
Practicality and economy		**13.77**
	Economical and practical (inexpensive, economical, and practical)	8.67
	High price (expensive, very expensive, and costly)	5.08
Medical function		**12.95**
	Medicinal and preventive (prevention, improvement, and curative)	7.87
	Functionality (function, [it] functions, and use)	5.08

Mexican urban consumers associate functional foods with their nutritional intake. However, Kaur and Singh (2017) mentioned that characteristics of these foods go beyond their nutritional contribution, as they have positive effects on various body functions.

The third dimension was called "Foods and nutrients." It is interesting that slightly >30% of the respondents mentioned words such as nutrient(s), even referring to some specific element, namely *vitamins*, *protein*, *fiber*, or *antioxidants*. As stated by Saaksjarvi, Holmlund, and Tanskanen (2009), one of the challenges of the market of functional foods is the little familiarity the consumers have with the terminology of these elements. In the category *Foods*, the most mentioned words were fruits and vegetables, similar result that in Trinidad and Tobago (Badrie et al., 2007).

The next dimensions were: "Hedonism and body care." The category *Hedonistic attitudes* was distinguished with words such as tasty, savory, delicious, or good flavor. Urala and Lahteenmaki (2003) and Siegriest et al. (2015) comment that flavor is a key element in the acceptance of functional foods. In this dimension the respondents associated to a lesser extent the stimulus with body image, this is to say, fat-free or sugar-free and low-calorie foods. Joining both categories comes from Verbeke (2006) who indicates that consumers have become more convinced that good taste and healthiness are not necessarily to be traded-off against each other. In the dimension "New foods," it is noticed there is confusion on the term "functional food," since about 8% of the respondents associated them with natural, organic, and ecological produce; only 5% mentioned them as new foods.

The dimension with the fewest mentions was about one of the essence that characterizes functional foods, "Medical function." According to Doyon and Lebrecque (2008), functional foods can help to prevent the risk of disease, something that seems to be of little importance among Mexican urban consumers, which contrasts with "Health" the first dimension of major importance, it is possible to infer that consumers perceive functional foods as curative rather than preventive products. However, concepts in other dimensions may also be helpful. Urala and Lahteenmaki (2007) said that other variables, besides the health issue, as taste, flavor, convenience, and price influence the choice of functional foods.

The dimensions and categories most mentioned suggest consumer concerns toward their health. However, these are in contrast to statistics on obesity and diabetes prevalence in Mexico. In this sense, Espinoza-Ortega et al. (2016) mentioned as a paradox that in their work Weight and Health Care was the factor with greatest importance, which may be due to government media campaigns to prevent obesity and diabetes. These may make people consider these aspects as important, but do not necessarily mean that people take action in response. Carrete and Arroyo (2014) on their behalf, add that Mexican consumers have positive attitudes toward healthy diets as long as they have been exposed to illness. In this change of behavior, functional products could be an option and the industry may contribute to improve the life quality of consumers.

In regards to the influence of gender, age, and schooling level on the perception of functional foods, no statistical differences by gender were found (p = .566) in the Global Chi-square test. However when looking for variations in the contingency table, differences were

noticed in two dimensions. The first was in *New foods* (p = .003), where women tended to relate functional foods with the naturalness and ecology of the product, while men as new foods. The second was *Medical function* (p = .038), where men associated them with a *function*, whereas women were more specific and considered these as medicinal and preventive. Works such as those by Verbeke (2005) and Annunziata and Vecchio (2011) concur that gender influences poorly on the perception and acceptability of functional products. In that same idea, Niva (2006) found that more than gender, there is a closer relation with the fragmented eating habits due the lifestyles of the people. Conversely, Ares and Gámbaro (2007), Espinoza-Ortega et al. (2016), and Escobar-López, Espinoza-Ortega, Vizcarra-Bordi, and Thomé-Ortiz (2017), commented that gender does influence the

TABLE 3 Analysis of dimensions and categories according to age

	Age groups			
Dimension/category	18–25	26–35	36–45	46 and older
	n = 297	*n* = 181	*n* = 58	*n* = 74
Health	82.8	79.0	89.7	68.9
Health	56.6	53.6	48.3	36.5* (−)
Wellbeing	13.8	11.6	5.2* (−)	13.5
Specific benefit	7.0** (−)	9.9	25.9*** (+)	16.2
Vitality	5.4	3.9	10.3	2.7
Nutrition	49.8* (−)	59.1	65.5	66.2
Nutrition	39.0	47.5	51.7	43.2
Good nutrition	10.8	11.6	13.8	23.0** (+)
Foods and nutrients	52.2	52.5	43.1	44.6
Nutritional characteristics	31.0	32.0	29.3	29.7
Optimal foods	7.1	6.6	1.7	2.7
Foods	14.1	13.9	12.1	12.2
Hedonism and body care	21.9* (−)	29.3	29.3	29.7
Hedonistic attitudes	10.8** (−)	19.3	19.0	21.6
Sensory characteristics	4.4	6.1	6.9	5.4
Body image	6.7* (+)	3.9	3.4	2.7
Energy and supplement	25.6	24.3	20.7	31.1
Energy	12.4	11.0	15.5	17.6
Supplement	7.1	7.2	1.7* (−)	10.8
Fortifier	6.1	6.1	3.4	2.7
New foods	21.2	20.4	19.0	16.2
Foods associated with nature	16.5	14.4	13.8	9.5
New foods	4.7	6.1	5.2	6.7
Essential food	21.2*** (+)	11.0	3.4*** (−)	6.8* (−)
Necessary	12.8*** (+)	5.0* (−)	1.7* (−)	2.7* (−)
Everyday food	8.4	6.0	1.7* (−)	4.1
Practicality and economy	11.8	12.7	19.0	20.3* (+)
Economical and practical	7.1	8.3	13.8	12.2
High price	4.7	4.4	5.2	8.1
Medical function	13.5	11.6	10.3	16.2
Medicinal and preventive	7.7	8.3	6.9	8.1
Functionality	5.7	3.3	3.4	8.1

*p ≤ .05. **p ≤ .01. ***p ≤ .001. Values (+) or (−) indicate if the observed frequencies are higher or lower than the theoretical frequencies according to Chi-squared test.

perception and disposition to consume healthy foods. In this regard, Siró et al. (2008) suggested that there is a higher probability that women eat functional foods. This is another opportunity for producers of functional foods, since the role of women in buying food for the family prevails in central Mexico (Espinoza-Ortega et al., 2016).

Segmenting consumers by age helps understand preferences in the different periods of life (Tuorila, 2015). Global Chi-square test performed on the contingency table showed statistical differences in dimensions ($p = .036$) and categories ($p = .008$) (Table 3). In the "Health" dimension, differences in the groups were found in every category. It is noticed that the category *Health* was less significant for the oldest-age group, largely comprised by men who, as mentioned by some authors, are less concerned about health (Kuster-Boluda & Vidal-Capilla, 2017; Siró et al., 2008).

The associations in the category *Wellbeing* were significantly lower for the group from 36 to 45 years. Opposite results were found in Italy from consumers in this age range (Annunziata & Vecchio, 2011). Paradoxically, *Specific benefit for health* was higher for this group, which

suggests that in this age range people begin to perceive the benefits of functional foods; as reported by Ares et al. (2008b) for middle-aged and older groups. Ares, De Saldamando, Giménez, and Deliza (2014) found that in the food context, associations with wellbeing are related to the reduction of specific body problems, as cardiovascular or digestion ailments; as observed in the work herein reported with the words mentioned in the categories that constitute the "Health" dimension.

The dimension "Nutrition" was less significant for the youngest group, which indicates that these consumers are the least concerned by their nutrition in comparison to older age groups. In this way, Carrete and Arroyo (2014), Espinoza-Ortega et al. (2016), and Escobar-López et al. (2017) comment that young Mexican consumers do not take their nutrition as seriously as other population segments. The category *Good nutrition* was significantly more mentioned by the group of 46 years and older, as they may be more aware of health-related problems (Saaksjarvi et al., 2009).

In the dimension "Hedonism and body care," mentions were significantly fewer for the group from 18 to 25 years, which were mainly
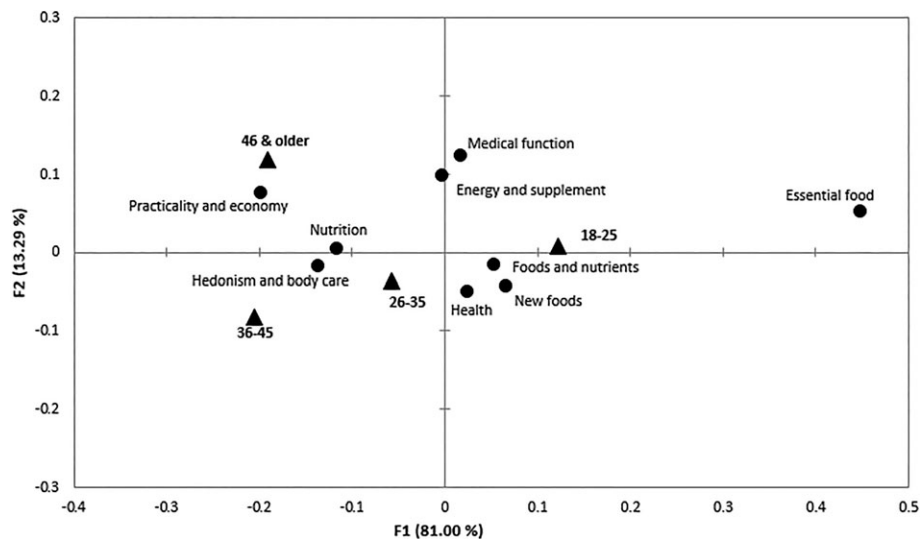

FIGURE 2 Correspondence analysis of the dimensions by age groups
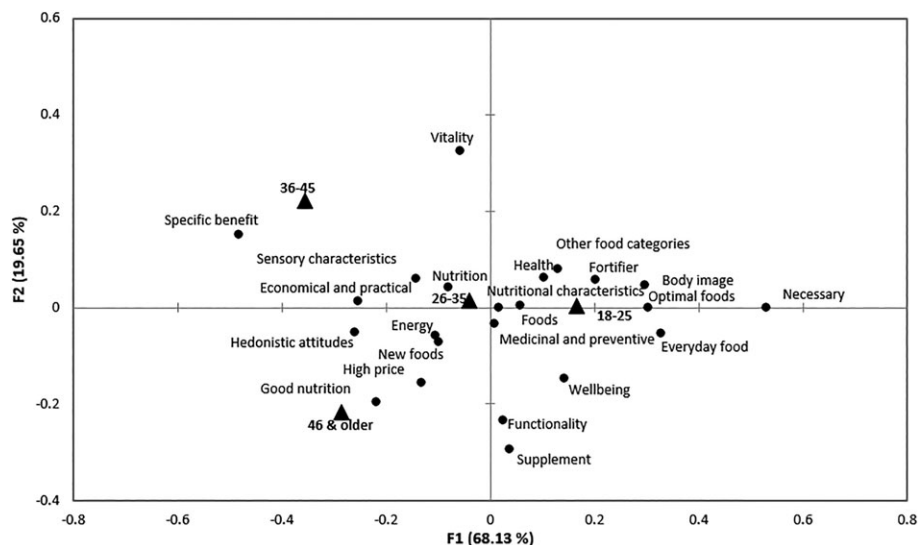

FIGURE 3 Correspondence analysis of the categories by age groups

in *Hedonistic* attitudes. This contrast with other works that report flavor as an essential element for youths to buy functional foods (Marina et al., 2014; Markovina et al., 2011), even in Mexican consumers (Carrete & Arroyo, 2014). In regards to the category of *Body image*, Ares et al. (2008b) mentioned that Uruguayan youths relate functional foods with weight loss and improved body image. In the opposite direction, the work herein reported agrees with Krystallis, Chryssochoidis, and Scholderer (2007) and Espinoza-Ortega et al. (2016) who reported that people under 25 years old give less importance to the health and hedonic variables.

The dimension "Energy and supplement," associations were significantly lower in the category *Supplement* for the group from 36 to 45 years. This can be verified in the dimension "Essential food," as middle-aged groups significantly associated less this dimension, in contrast with the youngest group. Urala and Lahteenmaki (2004) identified that among the attitudes underlying the consumption of functional foods there is "necessity." Results from the work herein reported suggest that a proportion of youths has better disposition to consume these products compared with other age groups, as it has been reported in other works (Armstrong, Farley, Gray, & Durkin, 2005).

In the dimension "Practicality and economy," mentions were significantly higher in the group of 46 years and older. Eight percent of the respondents in this group mentioned that functional foods have an expensive price. Badrie et al. (2007) comment that consumers in Trinidad and Tobago also find them expensive. Paradoxically, the oldest age groups refer these foods as practical and economical too. Messina et al. (2008) commented that the acceptability of functional foods depends on the cost/benefit relation perceived by consumers. Unfortunately the variable for incomes could not be analyzed. In *Foods and nutrients*, *New foods*, and *Medical function* there were no significant differences in the associations by groups. Results are consistent with those reported by Urala and Lahteenmaki (2003) for the dimensions of health, flavor and pleasure, and price and convenience with Finn consumers of functional foods.

The Simple Correspondence Analysis graphically shows this and the coincidences in the dimensions and categories with the various age groups in both analyses, as proposed by Symoneaux and Galmarini (2014). The first two factors of each analysis explained 94.29 and 87.78% of the variance, respectively. The youngest group was placed near to the dimension of *Essential Food*, while the oldest group with *Practicality and economy*. Groups for 26–35 and 46–55 years old were closer to the dimensions *Nutrition*, *Hedonism and body care*, and *Health* (Figure 2). Results suggest that marketing strategies for functional foods could take into consideration the needs of different age groups, as products with low prices for aged consumers, and foods with label statements that promote health and nutrition for middle aged adults.

Also, results from the analysis of category may complement marketing strategies for functional foods among different age groups. The *Body image* or *Fortifier* categories may be considered and included in the promotion of functional foods for youngsters; while promoting the enhancement of life quality (*Vitality*) for middle aged adults (36–45 years old), or products that contain statements toward specific health benefits (Figure 3).

Statistical differences were found in the dimensions (*p* = .004) and categories (*p* = .001) with the schooling level. This variable

TABLE 4 Analysis of dimensions and categories according to schooling level

	Schooling level		
	Low	Middle	High
Dimension/category	*n* = 91	*n* = 296	*n* = 223
Health	68.1* (−)	82.4	83.4
Health	37.4** (−)	55.7	54.3
Wellbeing	13.2	11.8	12.6
Specific benefit for health	14.3	10.5	9.9
Vitality	3.2	4.4	6.7
Nutrition	55.0	50.0* (−)	64.6*** (+)
Nutrition	35.0	38.2* (−)	53.4** (+)
Good nutrition	20.0	11.8	11.2
Foods and nutrients	61.5* (+)	57.8** (+)	36.3*** (−)
Nutritional characteristics	28.6	36.9* (+)	24.2* (−)
Optimal foods	2.1* (−)	7.4	5.4
Foods	30.8*** (+)	13.5	6.7*** (−)
Hedonism and body care	34.1* (+)	24.3	24.2
Hedonistic attitudes	28.6*** (+)	12.5	13.9
Sensory characteristics	2.2	5.4	6.3
Body image	3.3	6.4* (+)	4.0
Energy and supplement	25.3	25.7	25.1
Energy	13.2	11.8	14.4
Supplement	8.8	7.5	5.8
Fortifier	3.3	6.4	4.9
New foods	14.3	20.6	22.0
Foods associated with nature	5.5*** (−)	15.9	17.0
New foods	8.8	4.7	5.0
Essential food	6.6** (−)	15.5	17.0
Necessary	4.4	7.4	10.8
Everyday food	2.2* (−)	8.1	6.3
Practicality and economy	18.7	11.8	14.3
Economical and practical	8.8	7.4	10.3
High price	9.9** (+)	4.4	4.0
Medical function	16.5	11.8	13.0
Medicinal and preventive	13.2* (+)	6.4	7.6
Functionality	3.3	5.4	5.4

*p ≤ .05. **p ≤ .01. ***p ≤ .001. Values (+) or (−) indicate if the observed frequencies are higher or lower than the theoretical frequencies according to Chi-square test.

noticeably influences the associations made by the respondents regarding the stimulus (Table 4). In the dimension "Health," it was less significantly associated by the group with the poorest education. In this regard, Kaur and Singh (2017) analyzing works at a global level on the behavior of consumers toward functional foods found that a determining factor is high schooling levels. Schnettler et al. (2015) concur that Chilean consumers with high schooling levels are interested in functional foods in order to improve bodily functions or prevent diseases. In the dimension *Nutrition*, associations were similar to those of the previous dimension.

In "Foods and nutrients," mentions were significantly more numerous in the group of middle schooling level, which is relevant considering that the population under study largely holds this schooling level (high-school) (Carrete & Arroyo, 2014), and it is also the
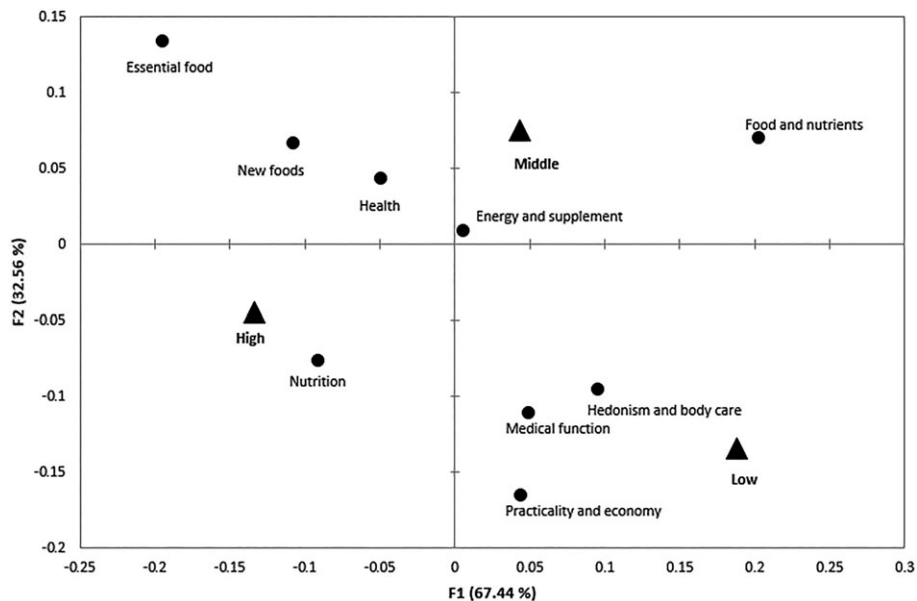
FIGURE 4 Correspondence analysis of the dimensions by schooling level

target of governmental campaigns aimed at improving diets, health, and decreasing obesity issues (Barquera, Campos, & Rivera, 2013). Perhaps, Mexican consumers are more aware of those campaigns to incorporate nutritious foods in their diets such as fruits and vegetables, which were mentioned words in the category *Foods* for the group with lowest schooling level. In this regard Espinoza-Ortega et al. (2016) mentioned that the attention of consumers to these campaigns does not necessarily reflect a change in their diets.

The dimension "Hedonism and body care" had the most associations with the group of lowest schooling level, almost a third of this group are older than 46 years old, and they showed fewest associations with the *Health* category, resulting in a large number of mentions of the category *Hedonistic attitudes.* Hence, this group prefers the taste and flavor of functional foods over health benefits. This group

also significantly associated more the stimulus with the category *Medicinal and preventive,* and considers functional foods expensive, surely owing to such medical association.

In "Essential food," it was noticed that mentions were fewer when the schooling level of the respondents decreased. These results are consistent with those by Salgado et al. (2016), who found that in Mexican consumers the acceptability of new foods increases with higher schooling levels. In youngsters there is an inverse relation with age; this is to say, the older the age, greater the rejection, which also verifies the associations that were significantly fewer in this dimension when the age of the respondents increased.

The Correspondence Analysis of the categories and dimensions of schooling level visually disclosed the associations made by the three groups (Figures 4 and 5) and the relations or differences which
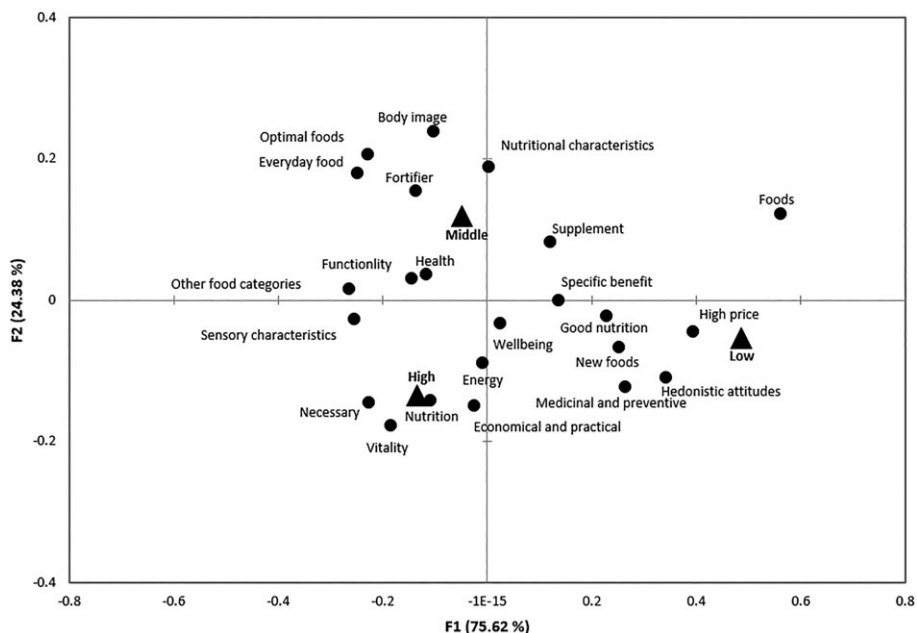
FIGURE 5 Correspondence analysis of the categories by schooling level

were statistically explained in previous paragraphs. In regards to the analysis of dimensions, Factor 1 was positively related to "Food and nutrients," and negatively related to "New foods" and "Health." Factor 2 was negatively related to "Nutrition." The group with low schooling level seems to have more interest in functional foods that promote body care and which are perceived as preventive of some illness. However, a high price may be limiting their use. Groups with middle and high schooling are positioned near *Food and nutrients* and *Nutrition*, respectively. Both groups associated similarly to the *Health* and *Essential food*; which strengthens results in that as schooling level increases in consumers, there is a higher concern toward health and nutrition issues in functional foods (Figure 4).

The analysis of categories complements the information; the two groups with the highest schooling level were located near the categories related with the promotion of health, nutrition, vitality, and functionality (Figure 5). This undoubtedly represents a challenge for producers of functional foods, since they would have to invest in promotion strategies aimed at consumers with low schooling levels that also are related to income problems, and additional restriction for the acquisition of these products.

De Garine and Vargas (2006) established that beyond "being what we eat," we eat signs, since a food is thought before it is eaten, and therefore we eat what we want to believe. In this sense, these results enable the understanding of how in the Mexican conditions of public health problems due to obesity, overweight, and diabetes, the well-being of consuming specific food products is thought (Ares et al., 2015), as is the case for functional foods and in the face of certain sociodemographic variables (Ares et al., 2014). This work thus contributes to reduce the scarce knowledge about the perception of functional foods in Mexico; and together with works by Schnettler et al. (2015), Ares et al. (2008b), De Barcellos and Laitano (2011), and Badrie et al. (2007), contributes to increase the number of research works on this topic in developing countries.

3.1 | Limitations and future research

This work incorporates novel techniques in the field of food research such as the Free Word Association technique, a method that has been on the rise (Cunha de Andrade et al., 2016; Guerrero et al., 2010). Results obtained are a first approach to find out the perception that Mexican consumers give to a term or a new puzzling stimulus such as "functional." However, analysis of results was qualitative, being necessary to incorporate quantitative studies about perception and reasons for consumption of functional foods by urban Mexicans, since consumption is determined by multiple factors (Annunziata & Vecchio, 2013).

Taking into account that the work has an exploratory nature, results have other limitations to be considered. Work was undertaken in Mexico City given that the target population was urban consumers. Future research could focus in other geographic areas and other cultural contexts of the country. On the other hand, given that attitudes toward functional foods are related to health, nutrition, hedonism, and body care, future work may investigate these variables in the motivation for purchase of specific functional products by target populations,

as gender, age, and schooling level; and to develop and promote these foods in terms of life style and health status of the population.

4 | CONCLUSIONS

Considering that the research on the consumption of functional foods has concentrated on North America and Western Europe, rather than on emerging markets, where demand is growing faster like Mexico; this work analyses the perceptions toward functional foods by the Mexican urban population. The Free Word Association technique enabled to know the perception of Mexican urban consumers toward functional foods, effectively identifying that Mexican consumers have a clear idea of functional foods. However, variables are perceived differently according to gender, age, and schooling level.

Youths and people with a medium schooling level identify the function of energy and supplement as most important. Hedonism and body care are identified by middle age people and by medium schooling level consumers; and the concepts of nutrition and economics are more important for people with a higher schooling level and advanced age. In general, women, people with better schooling level, and middle aged and older, have more clarity on the concept "functional foods."

AUTHOR CONTRIBUTIONS

Edgar Rojas-Rivas: Design of research, data collection, analyses of information, interpretation of results, writing of manuscript, and corrections.

Angélica Espinoza-Ortega: Principal researcher and project leader, design of research, analyses of data, interpretation of results, writing of manuscript and corrections.

Carlos Galdino Martínez-García: Analyses of data, revision of manuscript and corrections.

Sergio Moctezuma-Pérez: Theoretical support and revision of manuscript.

Humberto Thomé-Ortiz: Theoretical support and revision of manuscript.

ORCID

Angélica Espinoza-Ortega http://orcid.org/0000-0002-5968-0587

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