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Using the free listing technique to study consumers' representations of traditional gastronomy in Argentina

Facundo Cuffia^{1,2}, Edgar Rojas-Rivas^{3*} , Ayelen Urbine⁴ and Jazmin Zaragoza-Alonso⁵

Abstract

The aims of this research were (i) to study with a sample of Argentine consumers the representations of traditional gastronomy through the free listing method; (ii) to identify consumers' typologies according to their representation of traditional gastronomy; and (iii) to establish some methodological implications using the free listing in the study of the gastronomic field. A survey was conducted in which 249 Argentines from the Littoral area were recruited. Through a free listing task, participants were asked to mention the main foods or dishes of Argentina's gastronomy. Twenty-eight foods, dishes or food categories were obtained that are part of the representations of Argentina's gastronomy. The results showed a strong connection between gastronomy and the representations of the consumers with the "Asado" (CSI = 0.289, Smith = 0.613), the traditional and characteristic food of Argentine gastronomy. Three groups of consumers were identified, presenting differences in the representation of traditional gastronomy ($p < 0.05$). This work is pioneering for studying gastronomy representations from the consumers' language through the free listing method using the case of traditional Argentine gastronomy. Future directions of free listing in the gastronomic field are identified and discussed.

Keywords Argentina, Cognitive Salience Index, Smith Index, Free listing, Traditional gastronomy, Representations, Consumer behavior

Introduction

What is gastronomy?

Etymologically, the term gastronomy (*gaster-nomos*) refers to the rules (*nomos*) of eating and drinking foods that go into the stomach (*gaster*) [1]. The classic definition of gastronomy is: "the art of preparing and eating good food" [2]. Another definition widely accepted is the one proposed by Brillat-Savarin [3], who states that gastronomy is not only related to the preparation of food but also to how, with whom, where and when the human consumes it.

Gastronomy is essential in any society and contributes to understanding people's food choices and preferences. Therefore, through the study of gastronomy, it is possible to identify people's eating behaviors [4] and study the different perceptions of consumers according to the cultural

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context of each region [5, 6]. Likewise, gastronomy comprises traditional foods and beverages representing society's food culture [7].

Recent studies establish that [7–9] its conceptualization is associated with the culture of a region or territory, where the sensory characteristics of the food or dishes allow the recognition of the gastronomic heritage and are associated with consumer pleasure (hedonism). Finally, the methods, ingredients and ways of preparing food are fundamental in identifying the traditional dishes of each gastronomy. This definition is recent and was established from the language of consumers and chefs using a qualitative approach [8].

At a theoretical level, gastronomy is conceived as one of the cultural manifestations of a social group in terms of norms, rules, beliefs and values associated with eating [10], which in current societies is becoming blurred. Fischler [11] calls this phenomenon *gastro-anomia*. Therefore, identifying the representations of food associated with gastronomy can help to understand modern societies' eating patterns, mainly due to the modification of the diet related to the consumption of ready-to-eat foods or processed and ultra-processed products [9] and indeed also contribute to the valorization, promotion and consumption of traditional foods and dishes.

Free listing: a methodological tool for the study of gastronomy

Gastronomy is considered a new discipline of knowledge. Hence, it is essential to establish a theoretical and methodological corpus to understand the preferences, perceptions or representations of gastronomy in a population [12]. This becomes relevant because the generation of concepts or identification of cultural domains within the field of gastronomy and food science can be done from the language of consumers. Rojas-Rivas et al. [13] have shown that qualitative techniques (e.g., projective methods) could be instrumental in defining concepts or cultural domains from the consumers' language.

Qualitative techniques can be helpful to define concepts or cultural domains and contribute to understanding populations' eating behaviors [13, 15]. For instance, Rojas-Rivas et al. [5] recently identified the cross-cultural representations of gastronomy using projective methods (Word Association) and the structural approach of social representations. Likewise, these authors introduced the application of the cognitive salience index (CSI) of the free listing method to ascertain how consumers construct this concept in Argentina and Mexico. Some of these tools (including the free listing) have been used to study traditional Mexican cuisine. For example, this method identified a diversity of products from different regions of Mexico that are part of the country's food

culture. However, it is crucial to explore and extend the use of qualitative techniques to understand perceptions and representations of food in the gastronomic field, given that qualitative methods such as projective techniques, focus groups, open-ended questions or free listing have become relevant to explore the food consumer behavior [13, 14].

The free listing method is a qualitative tool used to understand cultural domains from the consumers' language. It is widely used in sociology and anthropology [16, 17]. It is based on a simple procedure in which people are asked to list all the words, ideas or things they think or refer to some concept, topic or domain [16, 18]. Several studies using the free listing technique have obtained information on people's behaviors in a food-related context [19–21], as well as on the particular characteristics of some foods [22, 23], and to study the perceptions of consumers and chefs toward Mexican cuisine [8].

One of the main aspects of the free listing technique is to identify the elements, categories, ideas or salient words of greater cognitive relevance in a task of this nature, for which the Smith and Sutrop cognitive indexes become relevant. The Smith index was introduced in the 1990s to study the most relevant elements of a free listing task [24]. This index contemplates the number of participants, the length of the lists mentioned by each participant and the rank assigned to each object within the list [18]. Subsequently, Sutrop [25] established the CSI to identify the elements of greater cognitive relevance in the free listing exercises. Unlike the Smith index, CSI considers the average position (AP) of each object within the lists, the number of participants and the frequency of citation of each object. Both indexes oscillate between 0 and 1. Suppose an object, word or thing mentioned within the lists of a sample has a value close to 1. In that case, it indicates that it is an element with a higher frequency of mention and representation. In contrast, values close to 0 show a lower rate of mention and low representation among a population group. Furthermore, the free listing combined with the Smith and Sutrop indexes in the gastronomic and food science field has been limited [8, 18, 21]. In this context, this research contributes to extending the free listing method combined with cognitive indexes in the gastronomic field, taking the cultural domain of Argentina's gastronomy as a case study.

Consumers' representations

Consumers' representations are part of the ordinary and non-institutionalized language. In other words, representations are part of the ideas, beliefs or jargon people use daily to define or represent some object or concept [8]. The representations are structured mainly in three dimensions. The first is "Information" and reflects the

sum of knowledge a social group has about the object of representation. The second is the “Field of representation,” which is observed hierarchically and determines the most relevant elements in the representation. Finally, the third one is “Attitude” which shows the positive or negative orientation of the representation and influences human behavior [8, 15]. This theoretical approach has been used in recent studies to identify the representations of different products or concepts related to gastronomy and feeding [26, 27].

Research problem and aims

Gastronomy is related to the norms, rules, beliefs and ways of preparing and consuming food. Likewise, a population's preferences and eating behaviors can be expressed and understood through it. Therefore, there needs to be more information on the representations and perceptions of the Argentine population toward the food they consume. This becomes more complex since the scientific data on the representations of consumers toward the cultural domain of traditional Argentine gastronomy are even more limited [28].

In addition, food preferences are strongly marked by culture, which is defined as a series of ideas, beliefs, languages, institutions and power structures that influence human behavior, including food selection [29]. In this context, some works carried out in Argentina have studied the perception of consumers toward genetically modified foods [30], preferences on meat consumption [31], attitudes toward emblematic foods (e.g., alfajor, wine, beer, among others) [32] or consumption patterns of fruits and vegetables among young consumers [33]. Some other investigations [16, 18] have even used the free listing method to study how consumers associate different foods according to their income. However, the studies mentioned above have not investigated the representations of consumers toward the cultural domain of traditional Argentine gastronomy, which may be the first step of the study in the persistence or modifications in the consumption patterns of this population.

Some works have established an important influence of the European continent on the gastronomy and eating behaviors of this South American population, which is reflected in the consumption of traditional food products such as wine, cheese, meat, pizzas, milanesas, among other foods [5, 9, 28]. Verhaert [28] mentions that the “Asado” is a traditional Argentine food and reflects the population's food identity. However, according to our knowledge, academic information regarding traditional foods or dishes that are part of the representations of Argentine consumers toward their gastronomy is very limited. Some authors approach Argentine gastronomy from a global perspective as a tool for tourism

development [34, 35]. Therefore, this research not only can provide information on the representations of Argentine consumers about their traditional gastronomy but also some methodological implications of the free listing method in the gastronomic field can be identified.

Summarizing, the aims of this research were (i) to study with a sample of Argentine consumers the representations of traditional gastronomy through the free listing method; (ii) to identify consumers' typologies according to their representation of traditional gastronomy; and (iii) to establish some methodological implications of the use of the free listing in the study of the gastronomic field.

Material and methods

Place of study and participants

To explore the representations of consumers toward traditional Argentine gastronomy, the free listing method was used with a sample of consumers. According to Libertino et al. [18], several studies establish different sample sizes to apply the free listing method, ranging from 20 to more than 300 participants [36, 37]. For this research, 249 Argentine consumers took part in the study. A convenience sampling was carried out, and participants were recruited in four of the most important cities of the Littoral zone (Santa Fe, Entre Ríos, Corrientes and Misiones) of the country, and questionnaires were applied face to face. Convenience sampling is a non-probabilistic method used in exploratory research to have a quick approach to the object of study. However, some drawbacks of these sampling methods are the limitation in generalizing the results [7, 38].

The Littoral area was selected for convenience as it concentrates on one of the largest urban centers in Argentina. This contributes to the stability and representativity of the sample. The Littoral area includes the Argentine territory formed by the provinces mentioned above, is located near the Paraná, Paraguay and Uruguay rivers and has an approximate population of 10.000.000 inhabitants. All participants provided their consent to participate in the study and did not receive any financial compensation. Regarding the sociodemographic characteristics of the sample, 70% were female participants, mainly with medium and high educational levels (56.62%). Table 1 details the characteristics of the sample.

Free listing method

The originality and relevance of our research at a methodological level is the application of the free listing to explore the representations of traditional Argentine gastronomy from the language of consumers. According to Hough and Ferraris [16], the free listing technique asks people to list *X* number of things or words toward a specific domain. Therefore, participants were asked to

Table 1 Sociodemographic characteristics of the sample and average length of lists mentioned

Sociodemographic characteristics	Total N = 249	Average list length
Gender		
Male	30.0%	7.040 ^a
Female	70.0%	6.643 ^a
Age		
18–25	20.48%	6.666 ^a
26–35	37.34%	6.397 ^a
36–45	18.87%	7.659 ^a
46 or more	23.29%	6.706 ^a
Education level		
Low	16.46%	4.975 ^a
Medium	56.62%	6.475 ^b
High	29.90%	8.462 ^c

Different superscripts indicate different statistically significant differences according to the ANOVA test. Except for the gender variable, since the t test was used

mention all the foods or dishes they considered part of their gastronomy. The following question was used to identify how Argentinian consumers define the cultural domain under study:

“Could you mention all the foods or dishes that you consider to be part of Argentina’s gastronomy? (There is no limit).”

The interviewer wrote down each participant’s food or dishes, respecting the order of mention and position of each food or dish. This process was not carried out with any software or electronic equipment for data capture [18]. Finally, the sociodemographic characteristics of the sample were collected. On average, each interview lasted 10 min.

Data analysis

The information was placed in Excel, considering in the database columns the following aspects: the number of participants, gender, age, educational level, food or dishes mentioned considering their position and the list length. The minimum and the maximum number of foods mentioned in the sample were calculated. In addition, the average number of foods named, the percentage of mention of each food and the AP it occupied in the list of the study sample were calculated. This procedure followed the methodological guidelines proposed by Hough and Ferraris [16] and Libertino et al. [18].

The foods or dishes mentioned in a singular, plural or with an adjective were unified singly. For example, “alfajor,” “alfajores” or “alfajores santafesinos” were

named in a new column as “Alfajor.” In addition, some foods or dishes that represented a food category were also unified; for example, “pastas,” “ravioles,” “sorrentinos” or “pasta fresca” were renamed “Pastas.” Finally, multiple responses about food or dish were considered only the first time they were mentioned, respecting their position on the list of each participant [18].

Subsequently, the CSI [25] and the Smith index [18, 24] were calculated to identify the most relevant elements at a cognitive level among consumers toward the cultural domain of Argentine gastronomy. Finally, all foods mentioned by more than 5% of the study sample were considered for future analysis to avoid the loss of valuable information.

The Smith index [24] was calculated with the following formula:

$$S = \left(\left(\sum (L - R + 1) \right) / L \right) / N$$

where S represents the Smith index; L is the length of the list mentioned by each participant, that is, the total number of foods or dishes for each subject; R is the rank or position of each food or dish mentioned within the list of each participant; and N is the total number of participants in the study [18].

Likewise, the CSI [25] was calculated with the following formula:

$$CSI = F / N * AP$$

where CSI represents the cognitive salience index; F is the number of participants who mentioned each dish or food; N is the total number of people who were part of the study; and AP is the average position of each food or dish on the participants’ mention lists. Both indexes oscillate between 0 and 1. A dish or food with a value close to 1 indicates a high frequency of mention and an AP of greater cognitive importance. In contrast, the less frequently mentioned foods have a value close to 0 and present less relevance. Both indexes provide similar results, indicating the salient elements of greater relevance in the representation of the population toward some object, concept or cultural domain [38].

The information was represented in a descending sedimentation graph, where the most relevant elements of a cultural domain can be observed. When a breaking point is marked in the chart, the elements with the most significant influence at the cognitive level can be defined in the cultural domain of study [19].

Once the most important foods or dishes were identified through the free listing task, cluster analysis was used to identify consumer groups according to both indexes. Hierarchical cluster analysis was carried out using Ward’s agglomeration method on the matrix of

participants x foods or dishes identified in the free listing [19, 23, 38].

Student's t test and ANOVA test were used to study the list's length of participants' lists according to their sociodemographic characteristics (gender, age and educational level) and to identify the statistical differences between the groups established through cluster analysis. Groups and sociodemographic variables were used as dependent variables, while the length of the lists was used as the independent variable. This process was carried out with the groups identified from the cluster analysis. The chi-square test was used to evaluate the differences in the frequency of mention of foods, dishes or food categories among the groups identified. When the value was significant ($P < 0.05$), the cells were inspected with the chi-square per cell test to determine the source of variation [13, 39].

To better visualize and interpret the foods and dishes mentioned by the groups of consumers identified through cluster analysis, correspondence analysis (CA) was conducted. CA is a descriptive technique used to analyze two-way contingency tables that contain a measure of correspondence between the rows and columns of the contingency table. Its purpose is to obtain a reduced number of factors that allow a simplified interpretation of the broad possible relationships between a large number of variables and to explain with the greatest possible precision the total inertia of the contingency table [39, 40].

Finally, the Smith and CSI indexes were calculated for each group to recognize which foods, dishes or food categories are of greater cognitive importance among the identified groups. All statistical analyses were performed with the XLSTAT 2014 software.

Results

Representations of traditional Argentinian gastronomy with the free listing

The minimum number of foods or dishes mentioned among the general sample was two, and the maximum was twenty-two. On average, 6.763 foods or dishes were mentioned through the free listing task. Male consumers mentioned 7.040 foods or dishes on average, while females 6.643. Through the t test, no statistical differences ($P > 0.05$) were found in the length of the mentioned lists according to the gender of the sample. The ANOVA test found no differences between the age groups ($P > 0.05$). However, with educational level statistically significant differences ($P < 0.001$) were identified since the participants of the group with a high educational level mentioned a more significant amount of foods or dishes on average (8.462) compared to the other two groups.

Twenty-eight foods, dishes or categories representing traditional Argentine gastronomy were identified. Table 2

summarizes the traditional food products identified through the free listing task and briefly describes each one. Reference is also made to the frequency of mention of each food, AP and Smith and CSI indexes. It can be observed that the traditional food with the highest mention was "Asado" (83.13%) and obtained an AP close to the first food or dish mentioned among the participants' lists. Also, this product got the highest values in the Smith (0.613) and CSI (0.289) indexes which positions it as one of the most relevant and representative traditional foods at the cognitive level among Argentines.

The next most important food was "Empanadas," with a Smith index of 0.387 and a CSI of 0.156. The traditional dish "Locro" was the third most important as it had a frequency of mention close to 50% and the cognitive indexes were high. It is worth highlighting that the food category "Cow meat" had a similar AP to "Asado," suggesting that both products have an equivalent representation among Argentinians.

It is important to note that alcoholic beverages such as "Wine" (CSI=0.072—Smith index=0.201) and "Beer" (CSI=0.070—Smith index=0.184) are highly relevant in the representation of Argentinean gastronomy since at the cognitive level they were of great relevance unlike other dishes or foods mentioned.

For their part, "Fish or Fish-based preparations" are also relevant in the definition of traditional gastronomy, showing a Smith index of 0.135. "Dulce de Leche" is a traditional preparation mentioned by 28.91% of the sample and obtained a CSI of 0.056. The "Bakery products" and the "Milanesas" got similar values in the Smith and CSI indexes. Finally, "Mate" was mentioned by 22% of the sample and had an average position of 5.163 (Table 2).

In the sedimentation graph (Fig. 1), the "breaking point" establishes the most important aspects of the study domain (those with values higher than it, located to its left on the ordinate axis) [19]. In the case of CSI (Fig. 1A), it can be observed that the breaking point in the graph is in "Cow meat" which establishes that this food category, together with "Asado," "Empanadas" and "Locro" are the most cognitively relevant in the representation of the cultural domain of traditional gastronomy among Argentine consumers. In the case of the Smith index (Fig. 1B), the breaking point is also at "Cow meat" and is therefore consistent with the results obtained with the CSI. However, this index also considers the traditional alcoholic beverages of Argentine gastronomy.

Groups identified through the cluster analysis

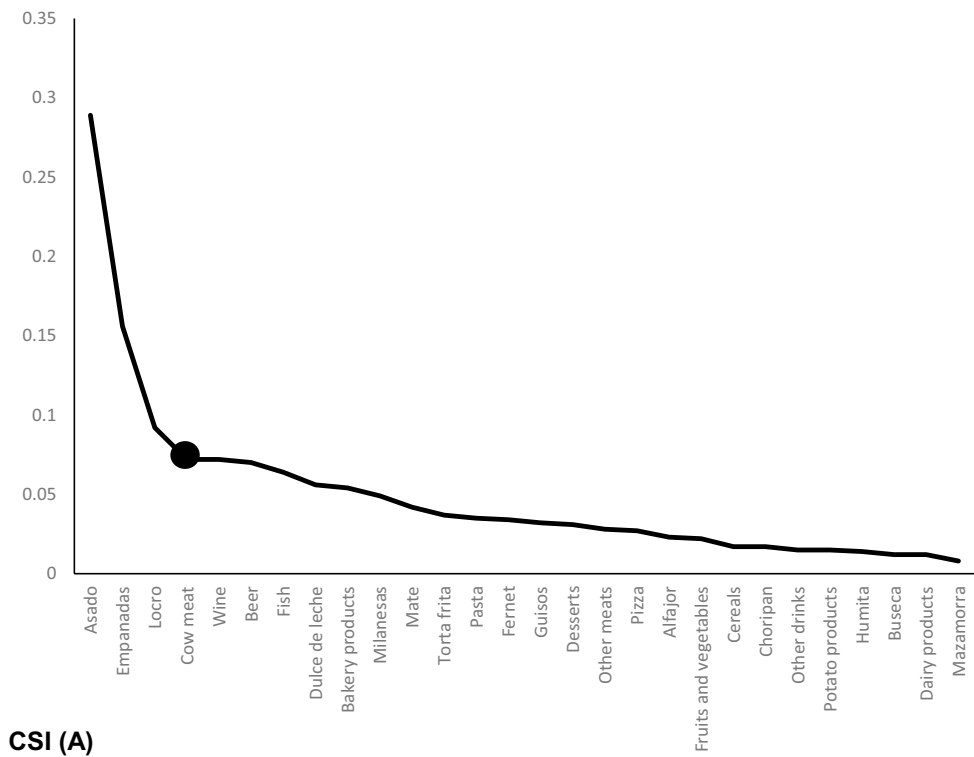
Three groups were identified through cluster analysis. When inspecting sociodemographic characteristics, statistically significant differences were found by age ($P < 0.05$) and educational level ($P < 0.001$) according

Table 2 Main foods and dishes of traditional Argentine gastronomy identified with the free listing

Food	Description	%	Average Position	CSI	Smith Index
Asado	Beef and entrails cooked on a grill with charcoal or firewood	83.13	2.874	0.289	0.613
Empanadas	Baked or fried closed dough filled with beef with vegetables and egg	64.25	4.112	0.156	0.387
Locro	Low-cost stew made from white corn, vegetables, greens, spices and different cuts of beef and pork	44.97	4.848	0.092	0.241
Wine	Alcoholic drink derived from the fermentation of different types of grapes from yeasts	35.74	4.910	0.072	0.201
Beer	Alcoholic drink based on the fermentation of cereals from yeasts	32.53	4.592	0.070	0.184
Cow meat	Different cuts of beef	21.68	2.981	0.072	0.160
Dulce de leche	Concentrated milk sweetened and browned by heating	28.91	5.097	0.056	0.154
Milanesas	Beef steak in batter with egg, breadcrumbs and spices, baked or fried	25.70	5.234	0.049	0.142
Bakery products	Products based on wheat flour, water and salt. There are different sweet or salty variants depending on the additional ingredients that its preparation includes (fats, yeasts, sweets, etc.)	24.09	4.650	0.051	0.138
Fish products	Species obtained from river or sea fishing	22.48	3.660	0.061	0.135
Mate	Infusion of "yerba mate" that is drunk in a pumpkin container called "porongo" through a "bombilla" (metal or wooden straw made by hand)	22.08	5.163	0.042	0.123
Fernet	Alcoholic drink obtained from the maceration of different herbs	16.86	4.928	0.034	0.096
Torta frita	Fried product based on wheat flour, warm water and salt. There are variants in its preparation depending on different additives such as yeast, eggs, milk, sugar, butter or fat	18.07	4.777	0.037	0.089
Guisos	Preparations based on tomato sauce, water, vegetables, legumes, cereals and meat	16.86	5.261	0.032	0.085
Desserts	Sweet preparations that are usually consumed at the end of lunch or dinner	15.66	5.000	0.031	0.081
Pastas	Preparations based on corn flour, egg, salt and water (ravioli, gnocchi, fresh pasta, among others)	13.65	3.852	0.035	0.078
Other meats	Different types of meat include chicken, pork and lamb	11.64	4.103	0.028	0.073
Pizza	Base of bread dough is usually thin and round, covered with tomato sauce, mozzarella cheese or similar and various chopped ingredients and baked	11.64	4.275	0.027	0.072
Alfajor	Two or more cookies joined by a sweet filling (commonly "Dulce de leche"), usually dipped in chocolate and other toppings	14.05	5.885	0.023	0.064
Choripan	Sausage based on beef and pork cooked on the grill that is put between two loaves and is added different sauces based on spices, vinegar and oil	9.63	5.500	0.017	0.054
Fruits and vegetables (F&V)	Different products of vegetable origin	8.83	4.181	0.021	0.049
Other beverages	Alcoholic or non-alcoholic drinks such as sodas, whiskey and carbonated water	7.63	4.789	0.015	0.049
Cereals	Corn grains, rice, wheat, chia, quinoa, among others	6.02	3.466	0.017	0.041
Humita	Corn-based food wrapped and cooked in the same leaves of the cob or in different types of dough	7.22	4.944	0.014	0.041
Potato products	Preparations based on boiled, baked or fried potatoes	7.63	4.842	0.015	0.039
Buseca	"Mondongo" stew: tissue of the beef belly cooked with tomato sauce, vegetables, legumes and spices	7.63	6.105	0.012	0.036
Dairy products	Milk and derivatives of its processing	7.22	6.111	0.012	0.036
Mazamorra	Preparation is based on white corn, milk and sugar	5.22	6.153	0.008	0.029

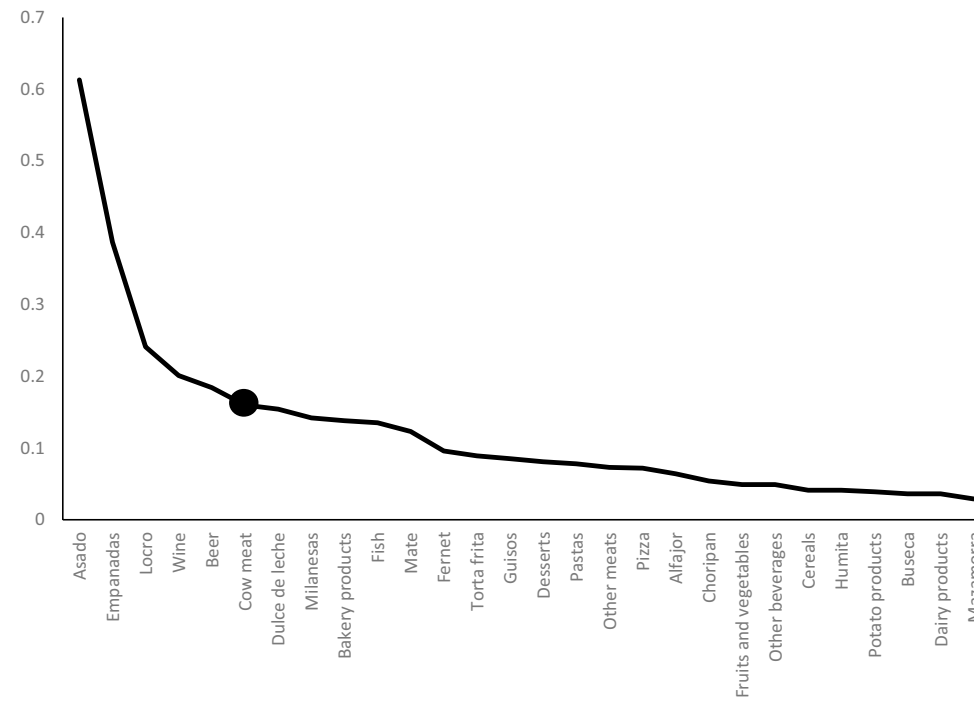
to the chi-square test. The first was the largest group since it concentrated almost 50% of the study sample ($n=120$). Furthermore, this group was significantly less composed of people aged 46 and over and substantially more highly educated consumers. The second group comprised 29.71% ($n=74$) of the total sample and mainly

comprised people aged 46 and over with a high level of education. Furthermore, this group included fewer consumers with medium and low educational levels than the other two. Finally, the third group was the smallest (22%, $n=55$), composed of a higher proportion of people with a medium level of education.



CSI (A)

● Indicates the break point on the sedimentation graph



Smith Index (B)

● Indicates the break point on the sedimentation graph

Fig. 1 CSI and Smith indices in the representation of the cultural domain of traditional Argentine gastronomy

Regarding the length of the lists of the three groups, statistically significant differences were found ($P < 0.001$) with the ANOVA test. The second group presented the highest average number of food mentions (8.324), while the first group had the lowest amount (4.654). These results suggest that participants with a high level of education tend to associate a greater quantity of foods or dishes referring to the cultural domain of traditional Argentinian gastronomy. The chi-square test was used to identify the differences in the frequency of mentioning traditional foods, dishes and food categories obtained through the free listing task among the three groups (Table 3).

The first group associated significantly more ($P < 0.05$) the following foods, unlike the other two groups: “Asado,” “Dulce de Leche,” “Empanadas,” “Humita,” “Locro,” “Mate,” “Mazamorra,” “Bakery products” and “Torta frita.” The second group associated significantly more the alcoholic beverages (“Beer,” “Fernet,” “Other beverages” and “Wine”). They also mentioned some of the characteristic foods of gastronomy such as “Pizza” and “Milanesas.” Finally, the third group associated with a greater proportion the following products: “Cereals,” “Fruits and vegetables,” “Other types of meats,” “Pastas” and “Products made with potatoes.” Notably, this group associated significantly less with most of the traditional food products of Argentinean gastronomy. “Buseca,” “Choripan,” “Guisos,” “Dairy products,” “Fish products” and “Desserts” showed no significant differences in the frequency of mention between the three groups.

CA was conducted to corroborate and obtain a better visualization of each group’s foods, dishes or food categories (Fig. 2). The first factor explained 63.29% of the variance, while the second 36.71%. Through the ellipses on the map, it can be seen more clearly how each group was positioned closer to the traditional foods or dishes that they associated significantly more. For example, the second group associated significantly more with convenience foods (Milanesas) and the traditional beverages of Argentinean gastronomy. The first group positioned themselves closer to traditional foods and dishes of Argentine cuisine, including “Asado,” “Alfajor,” “Dulce de Leche,” “Torta frita” or “Empanadas.” Finally, the third group was closer to “Products made with potatoes,” “Fruits and vegetables” and “Other types of meat products.”

The Smith and CSI indexes were calculated to visualize the foods, dishes or food categories of greater cognitive importance in representing Argentine gastronomy among the identified groups. Figure 3A and B presents the graphs with the two indexes. For the first group, it can be observed that the most relevant elements in the representation of Argentine gastronomy are “Asado,”

Table 3 Differences in the association of traditional Argentine gastronomy between the identified groups

Food	Group 1 N= 120	Group 2 N= 74	Group 3 N= 55	P
Alfajor	25 (+)	9	1 (-)	0.003
Asado	109 (+)	59	35 (-)	< 0.0001
Buseca	11	6	2	0.433
Cow meat	17 (-)	20	17	0.018
Cereals	4 (-)	3	8 (+)	0.010
Beer	12 (-)	62 (+)	7 (-)	< 0.0001
Choripan	12	8	4	0.783
Dulce de leche	51 (+)	20	1 (-)	< 0.0001
Empanadas	98 (+)	51	11 (-)	< 0.0001
Fernet	17	24 (+)	1 (-)	< 0.0001
F&V	4 (-)	7	11 (+)	0.001
Guisos	20	15	7	0.525
Humita	16 (+)	2 (-)	0 (-)	0.001
Dairy products	7	8	3	0.363
Locro	74 (+)	37	1 (-)	< 0.0001
Mate	38 (+)	11 (-)	6 (-)	0.001
Mazamorra	13 (+)	0 (-)	0 (-)	0.000
Milanesas	20	28 (+)	16	0.003
Other drinks	4 (-)	12 (+)	3	0.003
Other meats	7 (-)	9	12 (+)	0.017
Pasta	6 (-)	11	17 (+)	< 0.0001
Fish	28	15	13	0.860
Pizza	4 (-)	16 (+)	9	0.000
Desserts	18	14	6	0.454
Potato products	2 (-)	7	10 (+)	0.000
Bakery products	42 (+)	16	2 (-)	< 0.0001
Torta frita	38 (+)	4 (-)	3 (-)	< 0.0001
Wine	22 (-)	64 (+)	3 (-)	< 0.0001

The signs (+) or (-) indicate whether the observed frequencies were higher or lower than the theoretical frequencies according to the chi-square per cell test. Values in bold indicate whether the frequency of a food or dish was statistically different between groups according to the Chi-Square test

“Empanadas,” “Dulce de Leche,” “Locro” and “Bakery Products.” For the second group, “Beer” and “Wine” were the traditional beverages of greater cognitive importance. However, in the Smith index graph, “Milanesas” also acquired relevance for this group. Finally, for the third group “Pasta,” “Bakery Products” and “Fruits and Vegetables” were the elements of greater cognitive relevance to the cultural domain of study.

Discussion

The first aim of this work was to use the qualitative technique of free listing to study traditional Argentinean gastronomy. This technique has proved to be an easy-to-apply tool that has allowed us to obtain reliable results in the cultural domain of study. Twenty-eight foods, dishes

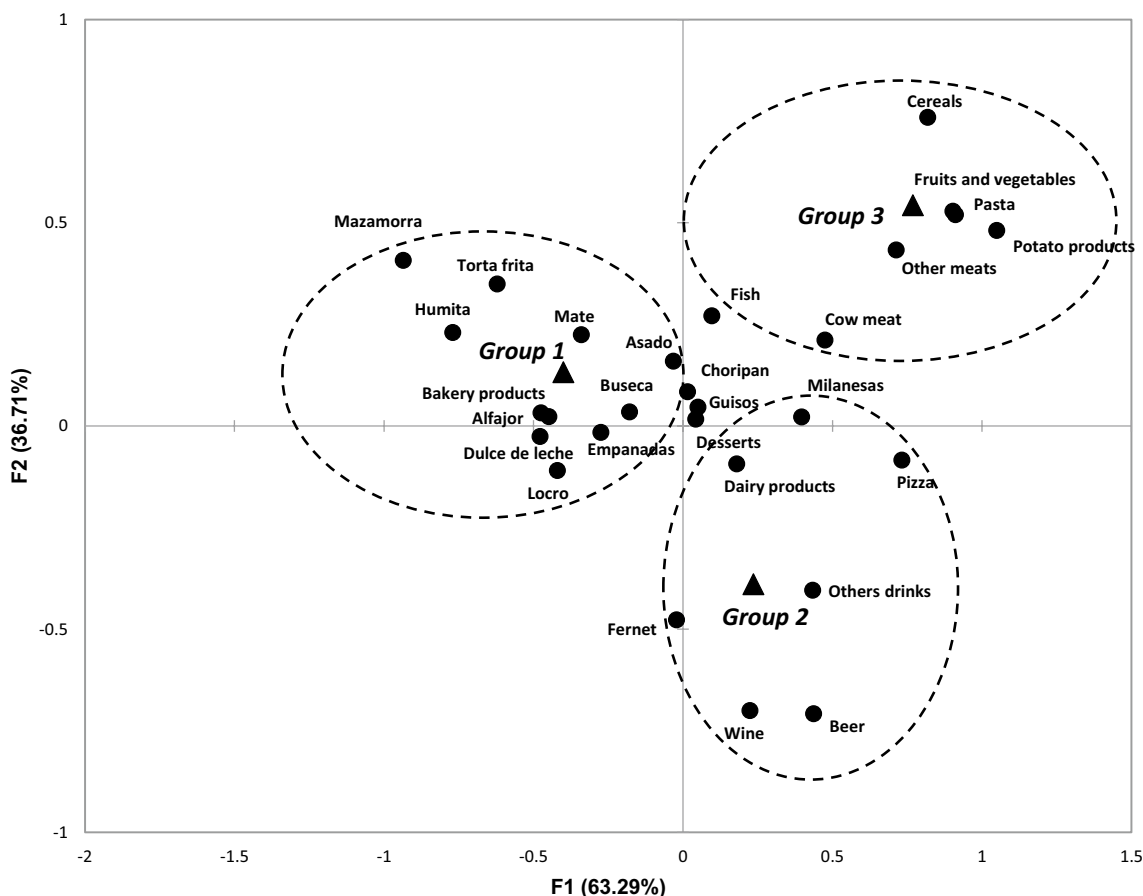


Fig. 2 Correspondence analysis of foods and groups identified through the free listing task

or food categories of most significant importance were identified. The traditional food with the highest mention was “Asado,” which had the highest frequency of mention and cognitive significance with the Smith index (0.613) and CSI (0.289). These results suggest that “Asado” is the traditional food that is part of the gastronomy of this South American country. According to Verhaert [28], this food is part of the identity of Argentines and is comparable to other cultural manifestations such as tango and soccer. More than a national dish, “Asado” is a historical construction that has been present in different stages of the Argentineans’ life. Its consumption is widespread as it is found on the consumer’s table, either on weekends or special occasions, as a social event manifestation [28]. Likewise, our results establish that traditional foods that are part of gastronomy such as “Asado” represent a nation and consumers associate them with the raw materials of production [41, 42]. In this case, the “Asado” and some parts are derived from the beef with which this traditional food is prepared.

Although some of the traditional foods identified in Argentine gastronomy have a strong influence from

other cultures (e.g., pizza, milanesas, pastas or wine), it is essential to note that for a food to be considered traditional, it must be associated with a territory, anchored to gastronomic heritage, consumed on special occasions and be part of people’s daily habits. Furthermore, some traditional foods adapt to the changes in modern societies, so consumers look for convenient, simple and tasty traditional foods [43].

However, our results suggest that some other dishes or traditional foods are part of the collective representation of Argentine gastronomy. For example, “Locro” or “Empanadas” were foods with the highest mention and cognitive importance with the Smith index and CSI. Furthermore, alcoholic beverages such as wine or beer were important in representing gastronomy. Concerning wine, there is a long-standing winemaking tradition in different regions of Argentina, which is considered their national beverage and, on many occasions, it is the perfect accompaniment for the “Asado,” as established by Verhaert [28]: “a glass of Malbec wine” is the companion of the Asado and represents the essence of the Argentine identity.

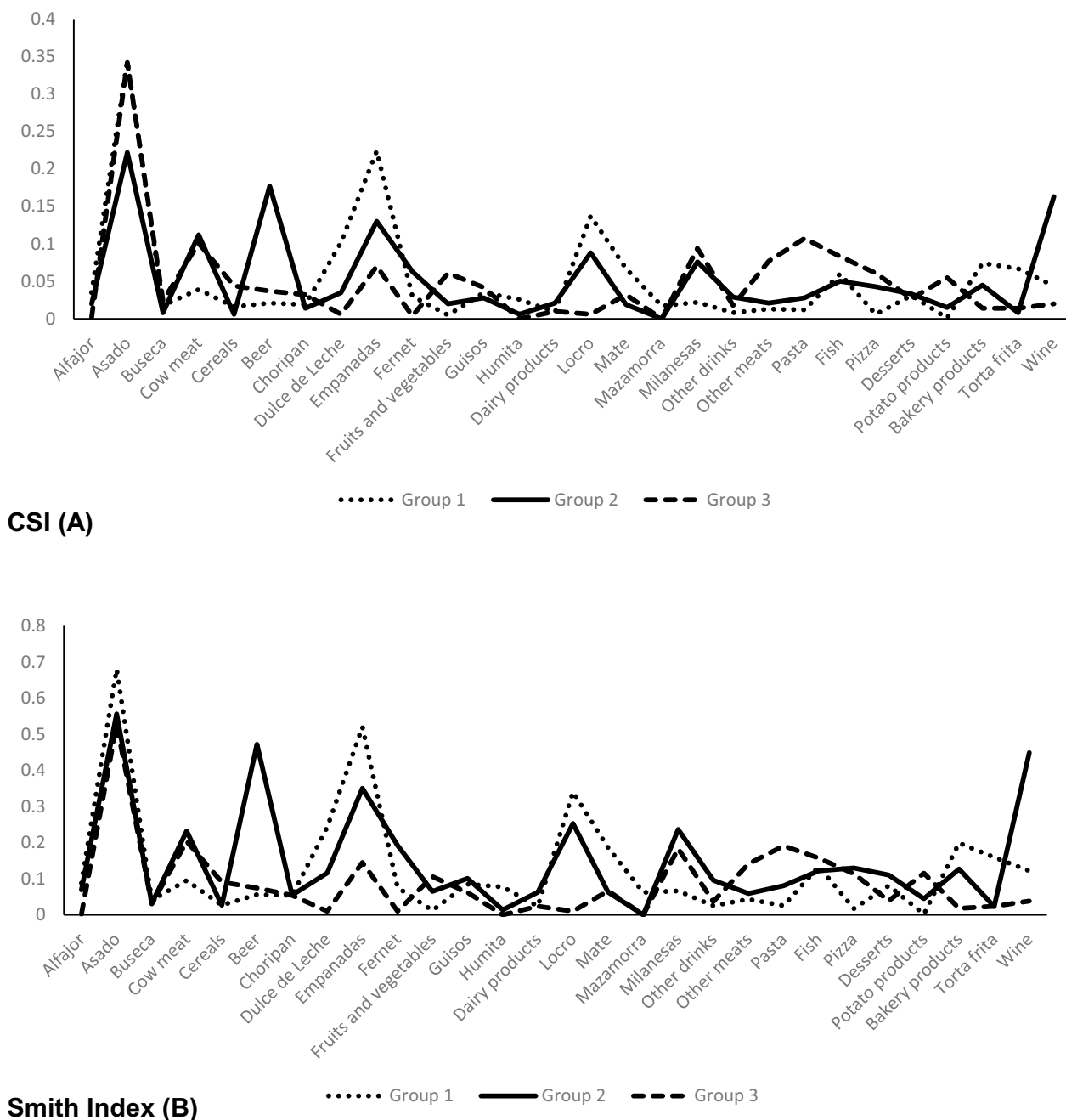


Fig. 3 CSI and Smith indices of the cultural domain of traditional Argentine gastronomy among the identified groups

Our results are also consistent with Libertino et al. [18]. They applied the free listing method to find out the menus associated with consumers of different incomes in two cities in Argentina. Some of the foods agree with those reported in this research; for instance, “Milanesas,” “Fish,” “Empanadas” and different types of “Pastas” such as ravioli, spaghetti or cannelloni were listed. However, CSI was different, possibly because

participants were asked to mention all the menus they knew, regardless of whether they had consumed them. For this research, the free listing task focused on describing the specific domain of traditional Argentinean gastronomy.

On the other hand, several studies using cluster analysis with free listing focus on studying how food products or their descriptors are related or grouped [16, 18,

19, 38]. For example, Ares and Deliza [23] combined free listing with cluster analysis not only to identify how several features of the packaging of milk desserts are related but also to identify groups of consumers according to the terms or descriptors generated. In this context, the present work extended the use of the free listing since it identified heterogeneous groups of consumers with different perspectives of Argentinean gastronomy through cluster analysis.

Three groups of consumers were identified that showed differences in the representation of the domain of study and cognitive importance according to the indexes used. The first group was significantly more associated with most of the traditional dishes or foods on the list obtained unlike the other two groups, including the “Asado.” This could suggest that these foods or dishes might be a fundamental part of their eating patterns and are cooked regularly, on special occasions or at social events [28].

The second group mainly associated alcoholic beverages and convenience foods such as “Milanesas” or “Pizza.” Libertino et al. [18] found that these foods are consumed daily among Argentines and have an almost similar cognitive representation among low- and upper-middle-income consumers. However, only the “Milanesas” were of higher mental importance among low-income consumers.

The third group associated significantly more foods such as “Fruits and vegetables,” “Dishes made with potatoes,” “Pastas” and “Other types of meats.” This suggests a preference for foods with healthy and economic connotations. This is seen in the correspondence analysis (Fig. 2). Despite this, “Fruits and vegetables” was one of the least frequent categories in the study sample within this group, as it was mentioned only by 20% of the participants. Arce et al. [33] establish that Argentine’s consumption of fruits and vegetables is relatively low and does not present a great variety. These results could be helpful to promote the consumption of these products through gastronomic preparations, either as main foods or to accompany other emblematic dishes since they can lower blood pressure, reduce the risk of heart disease and stroke, prevent some types of cancer, lower the risk of eye and digestive problems and have a positive effect upon blood sugar [44].

In terms of methodological implications, this research has shown consumers’ representations of traditional Argentinean gastronomy using the free listing technique and two cognitive indexes (Smith and CSI) to identify the foods or food categories of greatest importance among the study sample. To our knowledge, few studies [18, 22, 38] incorporate these two indexes together to analyze cultural domains in the area of consumer behavior and their representation of food and traditional gastronomy.

According to Libertino et al. [18], the CSI and Smith index are the most relevant measures in the understanding of a cultural domain as opposed to the other calculated statistics (frequency of mention and average position) as they provide similar ranges of importance in the main products highlighted through the free listing task. In this sense, incorporating the Smith index, CSI and the other calculated measures provided a comprehensive understanding of the cultural domains associated with the gastronomic field. On the other hand, Ginon et al. [38] establish that although both indices offer similar results and allow identifying the salient elements of greater cognitive relevance toward a cultural domain, the Smith index is more discriminative. In other words, it enables visualizing more features toward the object of representation. For instance, our results establish that the distinctive alcoholic beverages of Argentine gastronomy were relevant with the Smith index, unlike the CSI.

Furthermore, this work incorporates CA to visualize better and interpret the food products identified through free listing. Therefore, this statistical technique could help future studies better characterize consumers’ representations of traditional gastronomy. For example, in the correspondence map, it can be observed that the first group was positioned closer to the products that were significantly more associated (traditional foods) and obtained the highest values of the CSI and the Smith index.

Given that through the free listing method, the representations of consumers toward a cultural domain can be identified, this method could have potential applications within the gastronomic field, for instance, to obtain the representations from the common language of consumers toward sensory characteristics of foods. It could be used to generate pairing proposals between foods and beverages or to study the representation of traditional ethnic or little-known foods that could become in disuse in different populations. Likewise, it could be used to obtain sensory and emotional descriptors of foods. The traditional gastronomy industry of the Littoral region in Argentina could take advantage of the information identified in this research to carry out market segmentation strategies and promote traditional foods according to the characteristics of the consumer groups.

In addition, our results contribute to understanding how modern societies represent their traditional food in an era characterized by food destructuring due to the high consumption of processed or ultra-processed products. Some foods in this research need to be analyzed in greater depth, identifying the ingredients, traditional knowledge and production processes such as the “humita, locro or buseca.” Future studies could examine the frequency of consumption of traditional dishes or

foods identified in this research, mainly those less known among consumers, that is, those with an AP and cognitive indexes of lesser importance.

Finally, since this research was exploratory, it presents some limitations that should be considered. The study was carried out in the Littoral zone of Argentina, the sample was composed of 249 participants, and three groups were identified. Therefore, future studies could explore the representations of traditional Argentinean gastronomy in other regions of the country, as these may be influenced by geographical distances and cultural context [45, 46]. It would be worthwhile for other works to incorporate the free listing method for the study of cultural domains related to gastronomy in different regions of the country, with different sociodemographic characteristics and more representative sample sizes, using the two indexes employed in this study to have a comprehensive representation of traditional gastronomy. Furthermore, future works could incorporate the free drawing method in conjunction with the free listing [47] to obtain more information on the representation of gastronomy among consumers.

Conclusions

This research explored the social representations that Argentinean consumers have of traditional gastronomy and the foods associated with the national cuisine. The free listing method has allowed obtaining quick and effectively valuable information regarding the cultural domain of study, so its use is recommended for future research in terms of characterization and analyzes other cultural domains related to the gastronomic field. Notably, this research identified twenty-eight foods as a fundamental part of traditional Argentinean gastronomy from the consumer representation, and the most important at a cognitive level were “Asado,” “Locro,” “Empanadas” and “Wine.”

Through cluster analysis, three groups of consumers were identified that presented differences in the representation of Argentinean gastronomy. The first group showed the highest frequency of citation and cognitive importance toward the majority of traditional and emblematic foods; the second group associated significantly more the alcoholic beverages and convenience foods such as “Pizza” or “Milanasas”; and the third group associated primarily with “Fruits and vegetables,” “Dishes made with potatoes,” “Pasta” and “Other meats.”

Finally, the results presented in this research showed different representations of Argentine gastronomy according to the identified groups, suggesting that this information could benefit the public and private sectors. Furthermore, since gastronomy is a new academic

discipline, this research incorporates new methodological tools for its consolidation through a methodological–conceptual framework, which can be helpful for academics, chefs and those interested in the gastronomic field.

Author contributions

FC contributed to methodology, formal analysis and writing—review and editing; ERR was involved in conceptualization, methodology, formal analysis and writing—review and editing; AU contributed to investigation and data curation; and JZA was involved in methodology, formal analysis and writing—review and editing. All authors read and approved the final manuscript.

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Availability of data and materials

Data will be available upon reasonable request to the corresponding author.

Declarations

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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