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RESEARCH ARTICLE

Food perceptions and breakfast choices among school-age children and parents in southern Peru: A cross-sectional study using projective techniques

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Abstract

Peru's school feeding program applies largely uniform menus across regions with very different food cultures, yet little is known about how children and parents in these regions represent food. This cross-sectional study compared food perceptions and breakfast choices among school-age children (10-12 years) and their parents in five cities of southern Peru (Arequipa, Cusco, Moquegua, Puno and Tacna). Three projective techniques were applied: free drawing and a sorting task with 600 children from public primary schools (120 per city), and a breakfast composition task with 576 parents. Drawings were analyzed by correspondence analysis, sorting data by DISTATIS, and the cognitive salience index (CSI) was calculated for the foods selected by parents. Of the 1,023 foods depicted, 62.7% were healthy foods, 21.8% ultra-processed foods and 15.5% traditional dishes; the share of ultra-processed foods was highest in Tacna (36.6%). Children clearly distinguished healthy from unhealthy foods: fruits were classified as healthy and liked, ultra-processed foods as liked but unhealthy, and broccoli, beans, almonds and nuts as healthy but disliked. In the breakfast task, bread, oats and eggs were the most salient foods in most cities, whereas quinoa reached the highest CSI in Puno (0.39) compared with 0.11 – 0.23 in the other cities. Native foods such as quinoa and tarwi appeared mainly in the Andean cities of Cusco and Puno. These findings reveal marked regional differences in food representations and support adapting school menus to regional food preferences.

Keywords: Food perception; Projective techniques; School-age children; Sociodemographic determinants; Andean diet; Southern Peru.

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1. Introduction

The double burden of malnutrition, characterized by the coexistence of undernutrition and overweight, represents one of the greatest public health challenges worldwide. In 2022, more than 390 million children and adolescents aged 5 to 19 years were overweight, of whom 160 million were obese (WHO, 2024a, 2024b). Other statistics indicate that for this age group, 19.25% of boys and 14.71% of girls are obese (Phelps et al., 2024). In contrast, 190 million were underweight, demonstrating the seriousness of this problem (WHO, 2024a). This situation is intensified in low- and middle-income countries, where processes of urbanization and globalization have displaced traditional nutrient-rich foods with ultra-processed products containing high levels of sugars, saturated fats, and sodium (Monteiro et al., 2019; Popkin et al., 2020; WHO, 2024b). This change in dietary patterns has adversely affected child development, increasing the risk of non-communicable diseases at an early age (Pagliai et al., 2021; Vallianou et al., 2025; Valmorbida et al., 2023).

In Peru, this double burden of malnutrition is evident, with marked regional differences. Data from the Ministry of Health of Peru (MINSA, 2022) show that among children under five years of age, the departments with the highest prevalence of overweight and obesity are Tacna (12.1% overweight, 4.4% obesity), Callao (10.7% overweight, 3.4% obesity), and Moquegua (9.7% overweight, 3.4% obesity). Beyond excess weight, Peru also faces a persistent burden of micronutrient deficiencies, particularly childhood anemia, which remains a

priority public health concern. According to the National Institute of Statistics and Informatics (INEI, 2025), the average prevalence of anemia among children aged 6 to 59 months in the southern macro-region (Arequipa, Cusco, Moquegua, Puno, and Tacna) is 45%.

In response, the Peruvian government has implemented strategies to promote healthy eating among children, including the national school feeding program Qali Warma (Healthy Child), now called Wasi Mikuna (House of Food) (INEI, 2024; MIDIS, 2024). However, children do not always consume the food provided, limiting the program's potential impact on anemia and obesity (Fuentes, 2024). This may be partly due to menus that do not incorporate sensory evaluation and schoolchildren's preferences, as low sensory acceptance is a major driver of food rejection and plate waste, reducing program effectiveness and generating economic losses (Adjapong et al., 2024; Ajito, 2017; Cohen et al., 2021; Coulthard & Sealy, 2017; MIDIS, 2021). Therefore, understanding children's perceptions of food is essential. Recent evidence shows that children's consumption of ultra-processed foods is associated with family and household factors, including food availability at home (Compañ-Gabucio et al., 2026; de Lima Pereira et al., 2026), and that child-centred methods based on drawing allow even young children to express their food perceptions meaningfully (Carpi et al., 2026).

In this context, projective techniques are particularly useful because they capture meanings that traditional methods may not fully elicit, providing indirect access to consumers' representations of food, which are shaped by their sociodemographic characteristics (Patinho et al., 2021). ST explores how children cognitively organize foods, FD elicits subjective and affective associations through spontaneous expression, and free listing identifies representative foods based on frequency and order of mention (Alfaro et al., 2020; Gross & Hayne, 1998; Hough & Ferraris, 2010; Varela & Salvador, 2014). In addition to using projective techniques with children, earlier studies have shown that parental food choices can be examined indirectly, particularly through food-composition tasks based on hypothetical scenarios. This method minimizes social desirability bias and captures more natural representations of habitual meals (Köster, 2003). Specifically, the meal composition task has been used to study how participants select and organize foods in everyday settings, showing high consistency with reported consumption patterns and good reproducibility (Jaeger & Porcherot, 2017; Melendrez-Ruiz et al., 2019). Although projective techniques have been applied to children in several countries, to our knowledge no study has compared children's food perceptions and parents' breakfast choices across Andean and coastal cities of the same macro-region, including native foods such as quinoa and tarwi.

Therefore, the objective of this study was to describe and compare the food perceptions of school-age children (10–12 years) and the breakfast choices of their parents in five cities of southern Peru (Arequipa, Cusco, Moquegua, Puno and Tacna), and to explore their association with regional and sociodemographic characteristics. Within this framework, the following specific objectives were established: (i) to characterize children's food preferences and their symbolic associations using the free drawing technique; (ii) to evaluate children's cognitive classification of foods based on their perception of healthiness and their degree of liking, through a sorting task; and (iii) to explore the composition patterns of parent's breakfasts and their sociodemographic characteristics through a breakfast composition task.

2. Methodology

2.1. Ethical considerations

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics and Scientific Integrity Committee of the Universidad Nacional de Moquegua (approval letter N° 001-2024-PCEIC/UNAM) on November 4, 2024. Written informed consent was obtained from all participating parents, and verbal assent was obtained from the children before their participation, informing them that participation was voluntary and that they could withdraw at any time. No monetary compensation was provided to participants.

2.2. Study design and setting

A cross-sectional, descriptive study using projective techniques was conducted in public primary schools across five cities in the southern macro-region of Peru: Arequipa, Cusco, Moquegua, Puno, and Tacna (Figure 2). Data collection involved two complementary stages (Figure 1): (a) school-based activities with children, using FD and ST; and (b) a parent questionnaire incorporating a BCT.

2.3. Food selection

Peruvian food consumption and sales data were analyzed to identify the most commonly eaten and top-selling foods that represent the local food environment. In addition, the study drew on prior research on local eating habits (Eduardo et al., 2025).

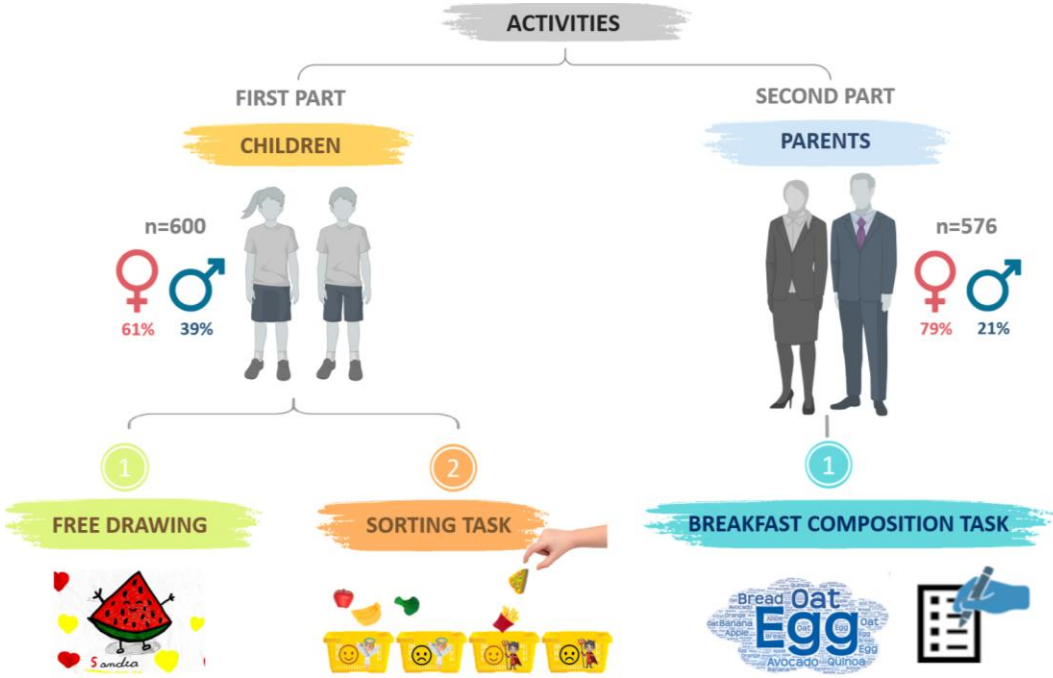


Figure 1. Sequence of activities carried out by children and parents.

The preliminary food list was validated with a group of 50 consumers (parents from Moquegua, recruited in November 2024), who were independent of the final sample; none of them, nor their children, participated in the free drawing, sorting or breakfast composition tasks. Thirty foods were selected and classified by the researchers into three categories: healthy, regularly healthy, and unhealthy (Table 1), following an adapted distribution previously described by Eduardo et al. (2025).

Table 1
Distribution of the 30 foods classified into three unbalanced groups, representing the most consumed foods in the southern macro region of Peru

Classification	Food
Healthy	Apple; Banana; Grapes; Orange; Watermelon; Corn; Cabbage; Carrot; Broccoli; Avocado; Quinoa; Oat; Almonds; Peanut; Nut; Lentils; Bean; Egg; Fish
Regularly healthy	Rice, Bread, Meat
Unhealthy	Pollo a la brasa (Peruvian baked chicken); Potato chips; Pizza; Hot dog; Burger; Ice cream; Candies; Chocolate; Cake

2.4. Participants and recruitment

2.4.1. Children

Children were recruited at the school level with the authorization of school administrators and teachers. Eligibility criteria included age (10–12 years), enrollment in the final years of primary education (grades 5 and 6), written informed consent from parents or legal guardians, and assent from the children. Exclusion criteria were food allergies or medically prescribed diets, conditions that prevented completion of the tasks, absence on the day of data collection, and incomplete participation in either task. Children were recruited from one public primary school in each city (five schools in total). A total of 600 school-aged children aged 10–12 years participated, with an equal number at each of the five study sites (120 participants per site); 366 (61%) were girls and 234 (39%) boys. Data collection took place in classrooms, with class sizes ranging from 25 to 30 students. Figure 2 shows the cities and the distribution of the participants. The sample size was determined by convenience, considering the accessibility of the participating educational institutions and the logistical feasibility of the study. This approach corresponds to non-probability sampling, in which participants are selected based on their availability and ease of access (Andrade, 2021; Etikan, 2016). Although this type of sampling may limit the generalizability of the results, it is widely used in field studies in school and public health contexts. Even so, a sample of 120 children per city allows proportions to be estimated with a maximum margin of error of ±8.9% (95% confidence, p = 0.5), and ±4.0% for the total sample of 600 children, which is adequate for the descriptive and comparative objectives of the study.

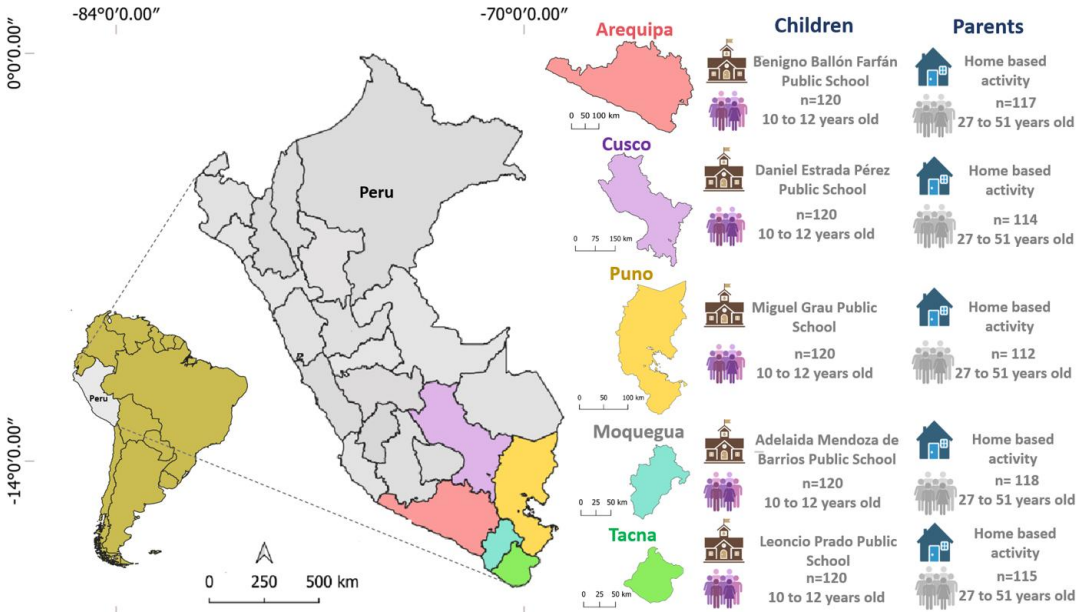


Figure 2. Cities of study and sample distribution of participating children and parents.

Furthermore, the sample size is comparable to that used in previous studies of similar populations, such as Eduardo et al. (2025), and in studies evaluating dietary behaviors, such as Vereecken et al. (2005). The analysis plan was not pre-registered or pre-specified prior to data collection. Subsequent statistical analyses were defined based on the study's objectives. Given the exploratory nature of the research, this approach was deemed appropriate.

2.4.2. Parents

The second study stage involved parents or primary caregivers of participating children (one per child). Of the 600 parents invited, 576 agreed to participate (response rate: 96%), of whom 79% were women and 21% were men. Sociodemographic information was collected, including sex, age, occupation, income level, and family size (Table 5).

2.5. Data collection

2.5.1. Free drawing

Before the activity, classrooms were checked to ensure there were no food-related visual stimuli on the walls or surfaces, so the drawings would reflect only children's spontaneous perceptions. Each participant received a blank sheet of paper and was instructed to use their own pencils, markers, or colors.

The following standardized instruction was then read aloud by the researchers: *"Good morning, children. Today's task is to draw a picture of your favorite food. It can be a plate of food, specific food, or any food that you like very much. Finally, write the name of the food you drew. You will have 20 minutes to complete the drawing. The drawing does not need to be perfect; the important thing is that it represents what you enjoy eating the most. Do you have any questions?"*

During the clarification stage, children asked whether they could draw desserts, fruits, beverages, or multiple food items. Researchers confirmed that any type and number of foods could be represented, provided they reflect personal preference. Once all questions were addressed, the task was conducted individually during regular classroom sessions, with a fixed 20-minute duration and no further guidance or examples provided.

2.5.2. Sorting task

Physical toy representations of the 30 selected foods were used in this activity (Table 1). Children were asked to classify these items into four baskets representing combinations of healthfulness and liking. The baskets were visually coded using facial expressions and characters: basket 1 represented foods perceived as healthy and pleasant (happy face and angel), basket 2 healthy but unpleasant foods (sad face and angel), basket 3 unhealthy but pleasant foods (happy face and devil), and basket 4 unhealthy and unpleasant foods (sad face and devil) (Figure 3). This procedure was adapted from previous applications of FS in children (Alfaro et al., 2020; Varela & Salvador, 2014).



Figure 3. Sorting Task applied to children.

Before starting the task, the researchers explained the procedure using the following standardized instructions:

"Good morning, children. Today we brought some toys that represent different foods and four baskets. Each basket has a different picture. The first basket has a happy face and an angel, where you will place the foods that you like and that are good. The second basket has a sad face and an angel, where you will put the foods, you do not like, but that are good. The third basket has a happy face and a devil, where you will place the foods, you like but that are harmful. The last basket has a sad face and a devil, where you will put the foods, you do not like and that are harmful. Is the explanation clear?"

To ensure comprehension, a brief practice exercise was conducted using two food toys not included in the study set. Children were asked to indicate the appropriate basket for each item and were encouraged to explain their choice. Additional clarifications focused mainly on reminding participants that the classification should be based on their own individual perception and that there were no right or wrong answers. Once all participants confirmed understanding, the ST began. Children performed the sorting individually. A stopwatch was placed on the table, and participants were instructed to press it at the beginning and end of the task to record the completion time. After each session, researchers recorded the foods placed in each basket, and the procedure was repeated with the next participant.

2.5.3. Breakfast composition task

A projective breakfast composition task was administered exclusively to parents to explore their perceptions and criteria for selecting breakfast foods for their school-aged children. This methodology is based on indirect approaches widely used in sensory and eating behavior research to elicit realistic choices and reduce social desirability bias (Jaeger & Porcherot, 2017; Köster, 2003). Each participant was provided with an A4-sized printed sheet containing 30 images of the selected foods (Table 1) representing healthy, moderately healthy, and unhealthy options.

They were asked to select five foods of their choice and use them to compose a breakfast for their child. They were then asked to list the selected foods on the questionnaire and briefly describe the proposed breakfast, indicating whether it reflected the breakfast they usually offered at home. This technique made it possible to identify patterns in parental food selection and to complement the information obtained from projective techniques applied to children, facilitating the analysis of family influence on children's food perceptions.

Parents also provided information on their socio-demographic characteristics, including gender, age, occupation, income level, and family size.

2.6. Data analysis

2.6.1. Free drawing

The drawings were analyzed using a content coding procedure. Subsequently, the foods depicted in each drawing were identified and grouped into healthy foods, ultra-processed foods and traditional dishes. Two researchers independently coded all drawings using a predefined list of food items and categories, and disagreements were resolved by discussion with a third researcher until consensus was reached. All drawings could be identified with

the help of the written label. Because a single drawing could depict more than one food, each food was counted as a separate mention (multiple-response coding). Therefore, frequencies refer to mentions (n = 1,023) rather than to children, and percentages were calculated over the total number of mentions in each city. The absolute and relative frequencies of the foods and categories were organized into a frequency matrix and analyzed using descriptive statistics to characterize the children's food perceptions. To explore the associations between cities and foods, CA was applied to the contingency matrices for cities and foods. Only foods with a total frequency ≥ 5 were included in the CA. CA was chosen because free-drawing data consist of counts arranged in a city × food contingency table. CA decomposes the chi-square statistics of this table and represents cities and foods simultaneously in the same factorial space without distributional assumptions, unlike principal component analysis, which requires continuous variables, or multiple correspondence analysis, which is designed for individual-level categorical data (Greenacre, 2017). The independence between city and food was tested with the χ^2 test, with the p-value obtained by Monte Carlo simulation (10,000 replicates) because of the low expected frequencies in many cells. CA was performed in R software (version 4.5.2; R Core Team, 2024) using the FactoMineR package (Lê et al., 2008), and visualizations were generated with factoextra (Kassambara & Mundt, 2020).

2.6.2. Sorting task

The absolute and relative frequencies of responses by food and by department were organized into frequency matrices and analyzed using descriptive statistics. Subsequently, a food-by-food co-occurrence matrix was generated for each participant. Finally, the individual matrices were integrated using the multivariate DISTATIS technique (Abdi et al., 2007), which enabled the analysis of similarity matrices derived from food classifications. DISTATIS was preferred over classical multidimensional scaling of an aggregated co-occurrence matrix because it analyzes the individual distance matrix of each child and weights each matrix according to its agreement with the group compromise, thereby preserving inter-individual variability while producing a consensus map (Abdi et al., 2007). Multiple correspondence analysis of the food × basket table was also considered, but it does not model the similarity structure between foods derived from each child's classification. The analysis was performed separately for each city using the Free Sorting module of XLSTAT (version 2023).

2.6.3. Breakfast composition task

Individual food selections were organized into a frequency matrix that recorded how often each food was selected in each city. This matrix made it possible to identify the foods most frequently included in breakfast and describe general patterns of choice.

The order of food selection was then incorporated to construct a hierarchy matrix. Based on this information, the average position rank and the CSI were calculated. The CSI measured the cognitive relevance of each food according to its frequency and order of appearance in the lists. Equation 1 was used to determine the average position.

$$Ap_j = \frac{\sum_{i=1}^{N} R_{ij}}{F_j} \quad \ldots (1)$$

Where Ap_j=average position of food *j*, R_{ij}=rank given by respondent *i* to food *j*, and F_j=number of respondents who mentioned food *j*. Subsequently, the CSI was calculated using Equation 2.

$$CSI_j = \frac{F_j}{N \times Ap_j} \quad \ldots (2)$$

Where F_j=number of respondents who mentioned the food *j*, N = total number of respondents, and Ap_j=average position of a food *j*.

All data analyses were conducted using XLSTAT and R software (R Core Team, 2024), version 4.5.2, with DistatisR and ExPosition (Beaton et al., 2014) packages. The significance level was set at $p < 0.05$ for all statistical tests.

3. Results and discussion

3.1. School-based activities with children

3.1.1. Free drawing

Children depicted a total of 1,023 foods (Supplementary Material, Table S1). Healthy foods predominated in Arequipa, Cusco, Moquegua and Puno (58–77% of mentions), led by apple and watermelon, whereas in Tacna healthy foods (38%) were drawn almost as often as ultra-processed foods (37%). Pizza, ice cream and pollo a la brasa were among the most frequent ultra-processed foods in all cities, and ceviche was the most frequent traditional dish in four of the five cities. Native Andean foods such as quinoa and tarwi appeared mainly in Puno and Cusco.

The association between city and food was significant ($\chi^2 = 459.89$, df = 172, $p < 0.001$). The CA shows that dimension 1 accounts for 43% and dimension 2 for 24% of the data structure in the factorial plane (Figure 4).

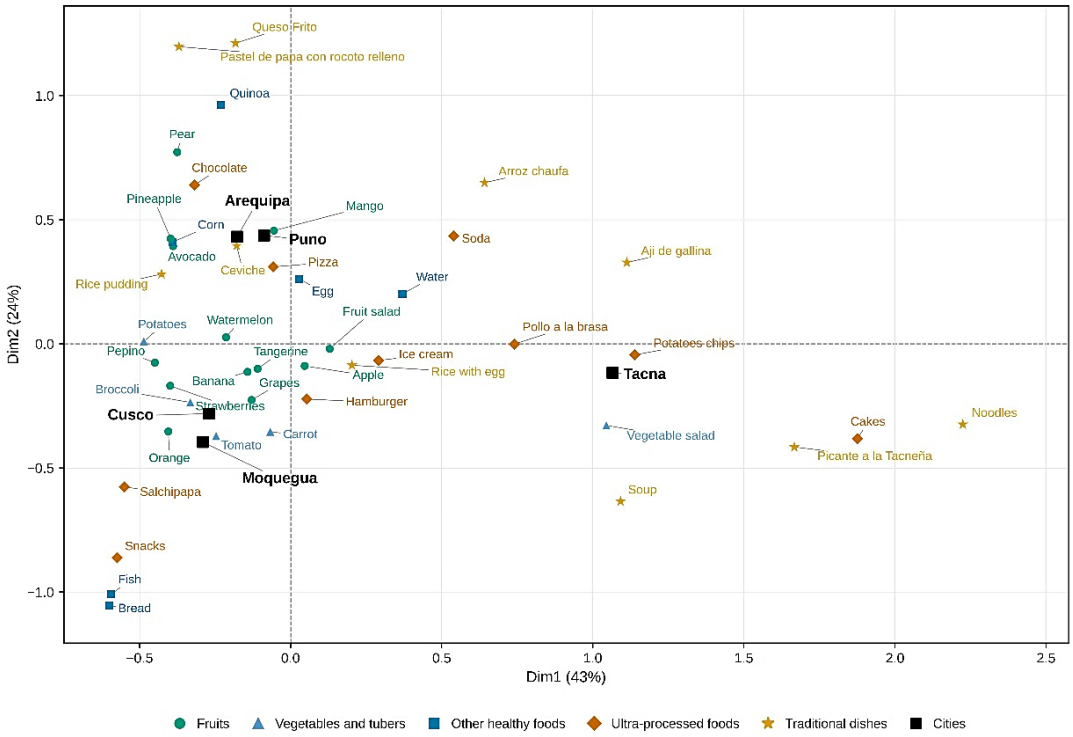


Figure 4. Correspondence analysis biplot of foods depicted in children's drawings by city, colored by food category.

Tacna is located at the positive extreme associated with ultra-processed foods and mixed preparations such as potato chips, *pollo a la brasa*, *arroz chaufa*, vegetable salad, and *aji de gallina*. Puno is positioned near the center of the factorial plane, associated with foods such as pizza, mango, and *ceviche*, indicating a culinary profile that blends traditional preparations with urban fare. Arequipa is located in the upper-left quadrant of the plane, near foods such as chocolate, pineapple, corn, and avocado, reflecting a blend of local and sweet foods. Cusco and Moquegua are located in the lower-left quadrant and are associated with fresh produce such as strawberries, broccoli, grapes, oranges, and carrots. Both cities showed proximity, indicating similar patterns of food representation.

The study of children's drawings from five regions in southern Peru uncovers important patterns in how they perceive food. Through the FD method, the children depicted their food preferences, providing a visual perspective on the foods they consider most relevant in their daily diet. Apple and watermelon were the most frequently occurring fruits. Pizza, ice cream, and grilled chicken were also observed in all regions. *Ceviche* stood out as the most represented traditional dish across all regions; it is one of the most emblematic preparations of Peruvian gastronomy and is widely consumed along the coast. Its presence in the drawings shows that the children identify it as a food appreciated within their family and cultural environment. Table 2 shows drawings of the most frequently represented foods across the five departments.

In the regions of Arequipa, Cusco, Moquegua and Puno, drawings of fruits and vegetables were more frequent than those of other food groups. These findings are consistent with studies by Courtney & O'Reilly (2023); König & Renner (2018), who indicated that children tend to have a natural affinity for sweet and colorful foods, such as fruits. However, the low representation of vegetables in the drawings indicates a lower preference for these foods, which coincides with the low vegetable consumption observed in school-aged children (Chawner et al., 2024). On the other hand, in Tacna, a lower representation of fruits and vegetables was observed in comparison with ultra-processed and traditional dishes. These results show similarities with those reported by (Bernardino et al., 2024), who identified a lower preference of children for fruits and vegetables in comparison with protein and carbohydrate foods.

In Cusco and Puno, the presence of native foods such as tarwi (*Lupinus mutabilis*) and quinoa (*Chenopodium quinoa*) in children's drawings reflects the strong influence of regional food culture on their perceptions. This is consistent with Guiné et al. (2021) and Sproesser et al. (2022), who

emphasize that traditional foods not only fulfill a nutritional function but also act as symbols of cultural identity.

Ultra-processed foods, such as pizza, ice cream, and grilled chicken, were the most prominent in children's drawings in all regions. These results reinforce the findings of (Bernardino et al., 2024), who identified that children show a strong preference for foods high in energy and animal protein. Previous studies have also indicated that children tend to associate these products with pleasure and reward, which may influence their habitual consumption and the consolidation of unhealthy dietary patterns from an early age (Mahmood et al., 2021; Oliveira et al., 2024; Vidal et al., 2022)

The frequency with which these foods were depicted in the drawings could be influenced by factors such as advertising, easy access, and exposure in digital media (Oliveira et al., 2024; Tuorila & Hartmann, 2020). The literature has shown that constant exposure to these products at home and in school settings encourages their preference and acceptance, displacing healthier options (Girona et al., 2019; Monteiro et al., 2019). This trend is worrying, as high consumption of ultra-processed foods has been associated with an increased risk of childhood obesity and other non-communicable diseases (Frías et al., 2023; Vallianou et al., 2025; Valmorbida et al., 2023).

The stronger association of Tacna with ultra-processed foods (36.6% of mentions vs. 13.9% – 21.3% in the other cities) may reflect specific features of its food environment. Regarding availability and price, Tacna is a border city with Chile and hosts a duty-free trade zone (ZOFRATACNA), which facilitates access to imported packaged foods, snacks and beverages at lower prices (Ley N.º 27688, 2002). Tacna is also a predominantly urban, commerce-oriented city where out-of-home foods are widely available; pollo a la brasa alone accounted for 14 of the 63 ultra-processed mentions, which may reflect frequent family consumption of this dish. In addition, the exposure to advertising and digital media discussed above may be particularly intense in this urban context. This profile is consistent with Tacna having the highest prevalence of overweight and obesity among children under five in the country (MINSA, 2022).

Conversely, in Cusco and Puno the local production, availability and lower prices of Andean crops such as quinoa and tarwi may favor their presence in children's representations. Because prices, advertising exposure and food availability were not measured directly in this study, these explanations should be regarded as hypotheses to be tested in future research.

The depiction of traditional dishes in the drawings suggests that children have a connection with regional gastronomy, this being key in the preservation of food culture (Sproesser et al., 2019). However, the frequency with which ultra-processed foods appear compared to traditional foods could indicate a change in eating habits, favoring the consumption of industrialized foods over more nutritious and local options.

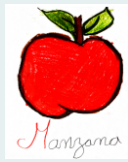
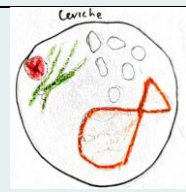
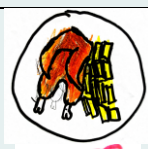
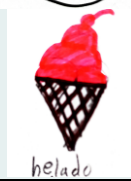
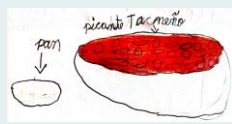
Ceviche emerged as the most frequently depicted traditional dish in children's drawings across all regions, reflecting its strong roots in Peruvian gastronomy. Although its consumption is more common in coastal regions, its presence in the drawings suggests that children recognize and value it as a significant food within their family and cultural environment, in line with its status as part of the country's culinary heritage and a symbol of its identity (Aguirre-Sosa et al., 2025). In addition to *ceviche*, dishes such as *picante a la tacneña*, *adobo arequipeño*, *rocoto relleno*, *cuy chactado*, *ají de gallina*, and *queso frito* were also depicted, indicating the emotional and regional connection that children maintain with local gastronomy. These findings are consistent with Guiné et al. (2021) and Sproesser et al. (2019, 2022), who state that traditional dishes not only meet nutritional needs but also serve as symbols of cultural identity and collective memory, as they are passed down and consumed across generations.

On the other hand, 70% of the children used colors in their representations of foods, including fruits, ultra-processed foods, and traditional dishes. These results are consistent with those reported by Burkitt et al (2003), who found that children tend to use their preferred colors to represent figures they find pleasing. In addition, a frequency analysis indicated that 60% of the drawings were large, occupying the entire sheet of paper, particularly for traditional dishes. This use of space may reflect not only food preference but also a strong emotional and cultural connection to these foods, highlighting their relevance in children's gastronomic identity.

3.1.2. Sorting task

Once the researchers' explanation was finished, the children began sorting the food into the four baskets. The time it took them to complete the sorting was recorded as 3 min 44 s in Arequipa, 4 min in Cusco, 3 min 28 s in Moquegua, 4 min 05 s in Puno, and 3 min 20 s in Tacna, for an average of 3 min 43 s.

Table 2
Drawings of the most frequently occurring foods in the five departments

	Healthy Food	Ultra-process Food	Traditional foods
Arequipa	 	 	 
Cusco	 	 	 
Moquegua	 	 	 
Puno	 	 	 
Tacna	 	 	 

The classification by children across the five departments reveals patterns in how they link their preferences to their perceptions of food healthiness (Supplementary Material, Table S2). Fruits such as apples, bananas, grapes, oranges, and watermelons were mostly placed in basket B1 ("I like them and they are good for me"), with very high percentages across all departments.

Vegetables also had a significant presence in B1, although to a lesser extent than fruits. Carrots, broccoli, avocados, and cabbage were classified as healthy in all regions, but some, such as cabbage, appeared more frequently in B2 (I don't like them, but they are healthy).

Ultra-processed foods such as pizza, hamburgers, hot dogs, ice cream, snacks, and sweets were predominantly placed in B3 (I like them, but they are not healthy). Finally, basket B4 (I don't like them and they are not healthy) recorded the lowest frequencies in all departments.

The consensus maps explained 38% – 41% of the variance in the first two dimensions in all cities (Figure 5). In every city, the first dimension separated healthy from unhealthy foods: fruits, cereals and most vegetables were grouped as healthy and liked (B1); candies, ice cream, pizza, potato chips, burger, hot dog and chocolate cake as liked but unhealthy (B3); and bread, meat and eggs occupied an intermediate position. The main regional difference concerned foods perceived as healthy but not liked (B2): broccoli, cabbage, peanuts, almonds, beans and nuts in Arequipa, a group that in Tacna also included lentils, oats, fish and quinoa.

The results of the ST show a clear distinction between healthy and unhealthy foods across the five departments that comprise the southern macro-region of Peru. These findings are consistent with those reported by Varela & Salvador (2014), who observed that Spanish children aged 6 and 12 years clearly perceive this distinction. The fruits were chosen in basket B1. This pattern coincides with recent studies conducted on Latin American children, which show that fruits are the food group most easily recognized as healthy and enjoyable (Eduardo et al., 2025; Russell et al., 2023).

Foods classified as healthy include fruits, vegetables, and cereals, coinciding with the recommendations of the World Health Organization and the Food and Agriculture Organization of the United Nations, which highlight the role of these foods in a balanced diet and in the prevention of chronic non-communicable diseases (FAO, 2024; WHO, 2024b). According to the NOVA classification, these foods belong to Group one, corresponding to unprocessed or minimally processed foods, recognized for their nutritional benefits and their fundamental role in the daily diet (Monteiro et al., 2018, 2019).

It is also observed that rice was classified as a healthy food in all the departments studied, likely due to its economic accessibility, culinary versatility, and regular presence in the daily diet. According to the (USDA, 2023), the annual per capita consumption of rice in Peru reaches 74 kg, which positions it as one of the most important staple foods in the country. This consumption pattern is also related to its affordable cost: two pounds of rice have an average price of between 0.85 and 1 US dollar, according to data from the *Ministerio de Agricultura y Riego* (MIDAGRI, 2024a).

In southern Peru, Arequipa produces 8.3% of the national rice production and presents the highest productive yield at the national level (MIDAGRI, 2024e). This high regional productivity, together with its affordability, reinforces its positive perception among children and families in this macro-region, aligning with its role in Peru's food security.

Despite the positive perception of healthy foods, it is important to highlight that some foods, such as broccoli, beans, almonds, and nuts, were classified by children in Arequipa, Puno, and Tacna as healthy, but not pleasant (basket 2). Children have basic nutritional knowledge that does not always translate into taste preferences. This phenomenon has been described previously and reinforces the idea that the rejection of certain vegetables does not imply ignorance of their nutritional value, but rather limitations associated with sensory experience (Scaglioni et al., 2018). It could also be due to less frequent consumption or unattractive preparation methods. According to Tuorila & Hartmann (2020), exposure and preparation strategies play a crucial role in the development of food preferences.

On the other hand, ultra-processed foods such as ice cream, burgers, Chips, hot dogs, cakes, pollo a la brasa, and sweets were classified as unhealthy foods in all the regions studied. These foods belong to group four of the NOVA classification, which is characterized by high levels of salt, sugars, fats, and additives (Monteiro et al., 2018, 2019). Despite being perceived as palatable by children, their excessive consumption has been linked to an increased risk of obesity, type 2 diabetes, and other metabolic diseases (Dicken & Batterham, 2024; Frías et al., 2023). This underlines the need for public policies that limit their access and promote healthier alternatives.

The predominant placement of ultra-processed foods in basket B3 indicates that children can clearly differentiate between sensory pleasure and negative health impacts. This distinction has been docu-

mented in recent research, which points to an increase in children's awareness of the adverse effects of products high in fat, sugar, and sodium (Abdoli et al., 2023; Murillo et al., 2024). It is possible that the clear identification of these foods as unhealthy is influenced by the Law for the Promotion of Healthy Eating for Children and Adolescents (Law No. 30021) and its regulation, established by Supreme Decree No. 017-2017-SA (MINSA, 2017). This regulation prohibits the sale of ultra-processed foods in public educational institutions in Peru, promoting healthy school environments.

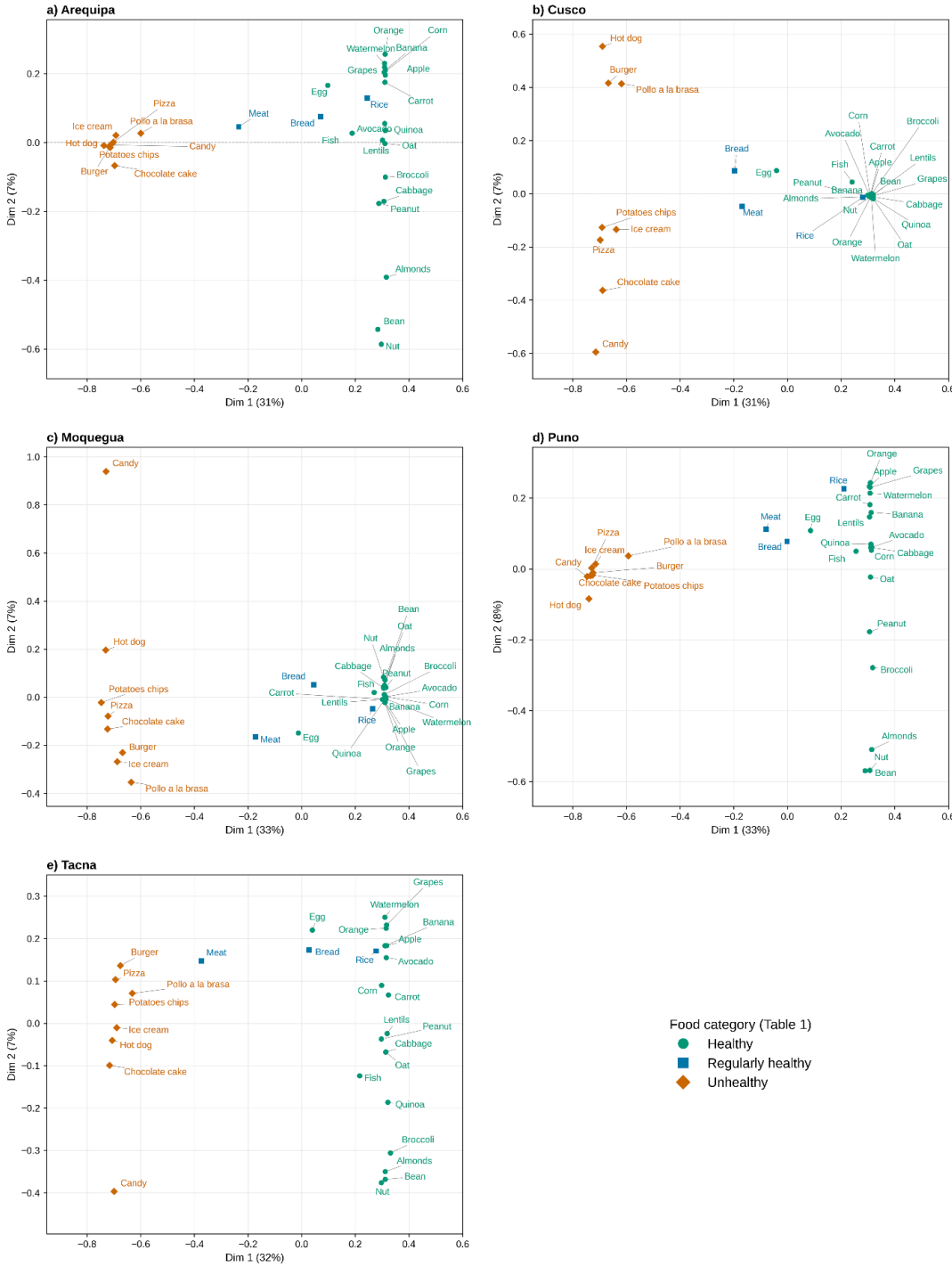


Figure 5. DISTATIS consensus maps of the sorting task performed by children in Arequipa(a), Cusco(b), Moquegua(c), Puno(d), and Tacna(e). Foods are colored and shaped according to their classification in Table 1 (healthy, regularly healthy and unhealthy). Percentages on the axes indicate the variance explained by each dimension.

Limited exposure to these products in the school environment could have reinforced children's awareness of their negative effects, facilitating their classification as unhealthy during the task. Finally, the low frequencies observed in basket B4 could be explained by reduced familiarity with the included foods or by prior negative sensory experiences, as reported in studies on child food rejection (Sleddens et al., 2010).

3.2. Breakfast composition task performed by parents

In each city, a small group of foods concentrated the highest cognitive salience (Table 3; complete data in Supplementary Material, Table S3): oats in Arequipa, bread in Cusco and Tacna, eggs in Moquegua, and quinoa in Puno, where it reached the highest CSI of the study (0.39). A worked example of the CSI calculation is provided in Text S1.

In all cities, the most common breakfast was a beverage (quinoa with apple, oatmeal or fruit juice) accompanied by a sandwich (egg, avocado or meat), ranging from 52% in Puno to 78% in Tacna (Table 4). Meal dishes such as lomo saltado, arroz chaufa or quinoa chaufa were more frequent in Puno (45%) and Cusco (35%), and regional preparations such as adobo (Arequipa), mazamorra de quinua (Puno) and picante a la tacneña (Tacna) were also mentioned.

Foods such as oats, bread, eggs, quinoa, apples, bananas, and rice have high CSI values in several cities, reflecting their importance in the diet of southern Peru. Similar data were reported by Muñoz et al. (2019), in which foods such as fruits, eggs, bread, and rice were most frequently mentioned. According to this study, bread stood out as a staple and traditional food, historically consumed, while rice was considered more natural than pasta and eggs as an important source of protein, which generated greater confidence among pregnant mothers. The high frequency of foods such as bread in all cities indicates that it is a fundamental component of the Peruvian diet, probably due to its accessibility, versatility, and cultural tradition.

Among the most frequently mentioned fruits in breakfast, apples and bananas were found, results that are consistent with those reported by (Hough & Ferraris, 2010) who identified that these fruits were widely preferred. Likewise, according to MIDAGRI (2024c), fruits such as bananas and apples are the most consumed at the national level, which reinforces their importance in the daily diet of Peruvians. The World Health Organization (WHO) suggests consuming 400 grams of fruit and vegetables daily to prevent chronic non-communicable diseases and maintain a healthy diet (WHO, 2020). Similarly, the Food Guide for the Peruvian Population recommends consuming at least three fruits per day as part of a balanced diet (MINSA, 2019). These recommendations underline the need to promote the regular consumption of fruits such as bananas and apples, which, in addition to being accessible, are key options for improving the nutritional quality of the national diet.

In general, oatmeal and quinoa with apple stood out as representative breakfasts across several regions, reflecting their importance in the Peruvian diet. Oatmeal is commonly consumed as a drink accompanied by bread and eggs, a combination that forms part of the typical breakfast in many of these cities. Meanwhile, quinoa with apples, also known as 'quinoa carretillera', was mentioned by several parents as one of the main breakfast choices to prepare at home. This drink, recognized as a classic street breakfast in Peru, is described as thick and restorative, made with quinoa, fruits such as apple and aromatic spices such as cinnamon and cloves (Quinua.pe, 2024).

In Puno, quinoa *mazamorra* is also traditionally consumed, which reflects the cultural and gastronomic connection of this pseudocereal in the region. It is worth noting that Puno is also the main quinoa-producing area at the national level (MIDAGRI, 2024b). Despite its importance, the average consumption of quinoa in Peru is low, reaching 2.5 kilograms per person per year (MIDAGRI, 2024d). This fact highlights the need to encourage its consumption at the national level by promoting its nutritional benefits and versatility in the kitchen.

In addition, regional differences in breakfasts reflect cultural, economic, and climatic influences on dietary choices. For example, in Cusco and Puno, where average temperatures are lower, with maximums ranging between 21.7°C (Cusco) and 21°C (Puno), and minimums that can drop to –1.6°C and –1.3°C, respectively (SENAMHI, 2024).These cold conditions favor a preference for more substantial and energetic breakfasts, and food dishes such as *mazamorra* de quinua, *arroz chaufa*, *quinua chaufa*, *lomo saltado*, which provide warmth and energy to face the adverse climate.

In contrast, in Arequipa, Moquegua, and Tacna temperatures are warmer, with maximums reaching 23.2 °C (Arequipa), 27.3 (Moquegua), and 27.9 (Tacna), while minimum temperatures remain around 6.9 °C, 9.6 °C, and 9.1 °C, respectively (SENAMHI, 2024). These climatic conditions could explain the greater preference for lighter and more practical beverages and sandwich options that align with the energy needs of these regions.

Table 4
Food selection for breakfast by parents in southern Peru

City	Drinks and Sandwich (%)	Meal Dishes (%)	Others (%)
Arequipa	77 %	19%	4%
Cusco	57%	35%	8%
Moquegua	68%	25%	7%
Puno	52%	45%	3%
Tacna	78%	19%	3%

Table 3
Top five foods selected by parents for breakfast according to the cognitive salience index (CSI), by city

City	Food	Frequency	Sum of Ranks	Average Position (Eq.1)	Cognitive Salience Index (Eq.2)
Arequipa	Oat	74	227	3.07	0.21
	Apple	63	166	2.63	0.20
	Bread	56	136	2.43	0.20
	Banana	76	274	3.61	0.18
	Avocado	52	177	3.40	0.13
Cusco	Bread	66	186	2.82	0.21
	Oat	52	121	2.33	0.20
	Egg	63	189	3.00	0.18
	Apple	51	130	2.55	0.18
	Quinoa	45	125	2.78	0.14
Moquegua	Egg	83	253	3.05	0.23
	Quinoa	58	125	2.16	0.23
	Oat	71	193	2.72	0.22
	Bread	67	208	3.10	0.18
	Avocado	63	205	3.25	0.16
Puno	Quinoa	89	183	2.06	0.39
	Bread	72	193	2.68	0.24
	Rice	29	51	1.76	0.15
	Egg	46	130	2.83	0.15
	Apple	47	149	3.17	0.13
Tacna	Bread	93	286	3.08	0.26
	Egg	77	218	2.83	0.24
	Oat	63	162	2.57	0.21
	Apple	43	108	2.51	0.15
	Grapes	39	96	2.46	0.14

The high frequency of bread and oats across all cities could be explained by their low cost and wide availability, making them accessible to families across different socio-economic levels. In contrast, in producing regions such as Puno, quinoa, which is more accessible and cheaper locally, stands out as a main food, while in other cities its consumption is lower due to its relatively high cost. These trends underscore how economic factors, along with culture and climate, shape food preferences across regions.

Parents mentioned traditional foods such as *adobo and rocoto relleno in Arequipa*, *mazamorra de quinua in Puno and picante a la tacneña in Tacna*, highlighting the intergenerational continuity in the transmission of culinary practices and traditions, acting as cultural symbols passed on from generation to generation, strengthening the sense of belonging and collective memory (Sproesser et al., 2019, 2022). Children's drawing and sorting of food in the five cities goes hand in hand with parental choice in composing breakfasts, and these data demonstrate that children adopt parental food habits and preferences as outlined by (Tang et al., 2020).

The sociodemographic data of parents in the five regions are presented in Table 5, where some regional differences are observed; for example, the cities of Cusco and Puno show greater occupational diversity and lower income levels, which could influence eating habits and breakfast preferences. In contrast, Arequipa and Tacna have a higher representation of small families and higher incomes, which could be associated with a more diversified diet and greater access to food. The high participation of women in the study reflects their fundamental role in household food decisions, as they are central to planning and preparing meals. Families of 4 to 5 people are common in most cities, which could influence food purchasing and preparation strategies, where efficiency and economy are sought.

Table 5
Socio-demographic data of parents in the five regions of southern Peru

Characteristics	Categories	Arequipa	Cusco	Moquegua	Puno	Tacna
Sex	Male	18%	14%	20%	28%	23%
	Female	82%	86%	80%	72%	77%
Age Range	27 to 33 years	11%	17%	18%	16%	17%
	34 to 41 years	42%	49%	39%	45%	42%
	42 to 50 years	45%	32%	38%	35%	35%
	>50 years	2%	2%	5%	4%	6%
Occupation	Homemaker	12%	19%	25%	30%	10%
	Dependent worker	47%	39%	38%	33%	48%
	Independent worker	38%	35%	33%	31%	39%
	Other	3%	7%	4%	6%	3%
Income level	< 1025 soles	6%	21%	8%	28%	7%
	1025 soles	24%	41%	18%	31%	19%
	> 1025 soles	70%	37%	74%	41%	73%
Family Size	2 to 3 people	50%	19%	25%	22%	47%
	4 to 5 people	39%	67%	60%	54%	42%
	6 to 7 people	10%	9%	13%	19%	10%
	> 7 people	1%	4%	2%	5%	1%

4. Limitations and strengths

This study has several limitations that should be considered when interpreting the results. First, cross-sectional design precludes causal inferences about the relationship between sociodemographic factors and food perceptions. Second, the sample was drawn exclusively from public schools, which may limit generalizability to children attending private institutions or those in rural areas. In addition, children were recruited from a single school in each city, so the results may reflect school-specific characteristics. Third, the reliance on projective techniques, while effective for capturing implicit perceptions, introduces subjectivity in the coding and interpretation of children's drawings; although coding disagreements were resolved by consensus, inter-rater agreement was not quantified with kappa statistics. Fourth, the study did not include a sex-disaggregated analysis, which may mask potential differences in food preferences between boys and girls. Finally, the breakfast composition task relied on parental self-report, which may be subject to social desirability bias despite the projective framing.

Notwithstanding these limitations, the study has notable strengths. It is among the first to employ multiple complementary projective techniques to examine food perceptions among children and parents across five cities in a developing Andean country. The large sample size (600 children, 576 parents), the even distribution across study sites, and the inclusion of culturally diverse regions strengthen the external validity of the findings. The use of both child- and parent-directed instruments provides a more comprehensive picture of the family food environment than single-informant studies. Additionally, the study contributes novel data on the role of indigenous foods and regional food culture in shaping children's dietary perceptions in southern Peru, a population that remains understudied in the food perception literature.

5. Conclusions

The use of projective techniques with children and parents was useful for understanding perceptions and food selection in southern Peru, which differed across cities in line with their cultural, socio-economic and environmental context. Although the food preferences of children in southern Peru show a bias towards fruits and a notable presence of ultra-processed foods, local gastronomy still influences their choices. However, certain nutritious foods, such as broccoli, beans, and almonds, were perceived as unpalatable, suggesting the need for educational and culinary strategies to encourage their acceptance and consumption from an early age.

Analysis of socio-economic and geographical factors showed marked differences in breakfast composition. In Cusco and Puno, where temperatures are lower, more energetic options predominate, while in Arequipa, Moquegua, and Tacna, lighter alternatives are preferred. In addition, affordability influences food choices, with bread and rice standing out as key components of daily diets in households across all regions. These findings underscore the need to design regionalized food policies that account for the cultural and economic particularities of each region. It is essential to strengthen nutrition education in schools and households, promote strategies to

increase the uptake of vegetables and other healthy foods, and regulate exposure to ultra-processed products in childhood.

From a public policy perspective, the national school feeding program Wasi Mikuna (formerly Qali Warma) should adapt school menus to regional food preferences, incorporating locally produced and culturally valued foods (e.g., quinoa and tarwi in the Andean cities and regional dishes in the coastal cities) and preparations that improve the acceptance of healthy but less-liked foods such as legumes and vegetables. Including sensory evaluation with schoolchildren in menu design could reduce plate waste and increase the nutritional impact of the program.

Future research should adopt longitudinal designs to examine how children's food perceptions evolve over time and whether culturally tailored interventions can shift preferences toward healthier options. Studies incorporating sex-disaggregated analyses and objective dietary assessment methods would further strengthen the evidence base for school nutrition policies in the Andean region.

Credit authorship contribution statement

K. Eduardo: Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **J. Rios-Mera**: Writing – review & editing, Formal analysis. **E. Saldaña:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization.

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Ethical statement

This study was conducted in accordance with the guidelines set forth in the Declaration of Helsinki, and all procedures involving human participants were approved by the Ethics and Scientific Integrity Committee of the Universidad Nacional de Moquegua (approval letter N° 001-2024-PCEIC/UNAM) on November 4, 2024. Written informed consent was obtained from all participating parents or legal guardians, and verbal assent was obtained from all participating children prior to data collection.

Data availability

Data can be made available on request from the corresponding author.

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References

Abdi, H., Valentin, D., Chollet, S., & Chrea, C. (2007). Analyzing assessors and products in sorting tasks: DISTATIS, theory and applications. *Food Quality and Preference*, *18*(4), 627–640. https://doi.org/10.1016/j.foodqual.2006.09.003

Abdoli, M., Scotto Rosato, M., Cipriano, A., Napolano, R., Cotrufo, P., Barberis, N., & Cella, S. (2023). Affect, Body, and Eating Habits in Children: A Systematic Review. *Nutrients*, *15*, 15. https://doi.org/10.3390/nu15153343

Adjapong, E. S., Bender, K. E., Schaefer, S., & Roe, B. E. (2024). School and meal characteristics associated with plate waste in K-12 cafeterias in the United States. *PLoS ONE*, *19*(12). https://doi.org/10.1371/journal.pone.0299043

Aguirre-Sosa, J., Dextre, M. L., & Vargas-Merino, J. A. (2025). Peruvian ceviche: cultural heritage of humanity and its socio-cultural significance. *Journal of Ethnic Foods*, *12*(1), 13. https://doi.org/10.1186/s42779-025-00273-7

Ajito, E. (2017). *Estudio de los factores que estarían contribuyendo o limitando la calidad, monitoreo y distribución de los alimentos que entrega el programa nacional de alimentación escolar Qali Warma basado en la precepción de los actores del programa de 4 instituciones educativas del distrito de Breña*. http://www.qw.gob.pe/?page_id=103

Alfaro, B., Rios, Y., Arranz, S., & Varela, P. (2020). Understanding children's healthiness and hedonic perception of school meals via structured sorting. *Appetite*, *144*, 104466. https://doi.org/10.1016/j.appet.2019.104466

Andrade, C. (2021). The Inconvenient Truth About Convenience and Purposive Samples. *Indian Journal of Psychological Medicine*, *43*(1), 86–88. https://doi.org/10.1177/0253717620977000

Beaton, D., Chin Fatt, C. R., & Abdi, H. (2014). An ExPosition of multivariate analysis with the singular value decomposition in R. *Computational Statistics & Data Analysis*, *72*, 176–189. https://doi.org/10.1016/j.csda.2013.11.006

Bernardino, M., Sison, N. K. D., Bruce, J. C., Tiribelli, C., & Rosso, N. (2024). Understanding and Exploring the Food Preferences of Filipino School-Aged Children Through Free Drawing as a Projective Technique. *Nutrients*, *16*(23). https://doi.org/10.3390/nu16234035

Burkitt, E., Barrett, M., & Davis, A. (2003). Children's colour choices for completing drawings of affectively characterised topics. *Journal of Child Psychology and Psychiatry*, *44*(3), 445–455. https://doi.org/10.1111/1469-7610.00134

Carpi, C., L. Almli, V., & Wergedahl, H. (2026). 'What would you serve as a cook in your kindergarten?' Children's taste perceptions and experiences across seven dimensions – a qualitative study in Norwegian kindergartens. *European Early Childhood Education Research Journal*, 1–18. https://doi.org/10.1080/1350293X.2026.2705507

Chawner, L. R., Birtill, P., Cockroft, J. E., & Hetherington, M. M. (2024). Eating vegetables at school lunchtimes: Pilot and feasibility studies testing strategies to improve intake. *Appetite*, *201*, 107622. https://doi.org/10.1016/j.appet.2024.107622

Cohen, J. F. W., Hecht, A. A., Hager, E. R., Turner, L., Burkholder, K., & Schwartz, M. B. (2021). Strategies to improve school meal consumption: A systematic review. *Nutrients*, *13*(10). https://doi.org/10.3390/nu13103520

Compañ-Gabucio, LM., Oncina-Cánovas, A., Torres-Collado, L. et al. (2026). Consumption of ultra-processed foods and associated factors in Spanish children aged 8–12 years: a cross-sectional analysis within the INMA cohort study. *BMC Public Health*, *26*, 2471. https://doi.org/10.1186/s12889-026-28008-6

Congreso de la República del Perú. (2002, 28 de marzo). *Ley N.º 27688, Ley de Zona Franca y Zona Comercial de Tacna*. Diario Oficial El Peruano.

Coulthard, H., & Sealy, A. (2017). Play with your food! Sensory play is associated with tasting of fruits and vegetables in preschool children. *Appetite*, *113*, 84–90. https://doi.org/10.1016/j.appet.2017.02.003

Courtney, D. E., & O'Reilly, É. J. (2023). Does colour variety accurately quantify nutritional value in children's lunchboxes? A pilot study. *Public Health in Practice*, *5*, 100363.

https://doi.org/10.1016/j.puhip.2023.100363
de Lima Pereira, L., Herkrath, F. J., Siqueira, J. H., do Carmo Leal, M., de Abreu, F. M., Lopes, A. F., & Vettore, M. V. (2026). Associations between socioeconomic status, dietary habits and health-related quality of life among children in rural riverside communities: The mediation role of food insecurity. *Quality of Life Research*, *35*(2), 41. https://doi.org/10.1007/s11136-025-04137-0
Dicken, S. J., & Batterham, R. L. (2024). Ultra-processed Food and Obesity: What Is the Evidence? *Current Nutrition Reports*. https://doi.org/10.1007/s13668-024-00517-z
Eduardo, K., Velásquez, J. C., Mayta-Hancco, J., Rios-Mera, J. D., Lozada-Urbano, M., & Saldaña, E. (2025). Reasons Behind (Un)Healthy Eating Among School-Age Children in Southern Peru. *Foods*, *14*(3), 348. https://doi.org/10.3390/foods14030348
Etikan, I. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1. https://doi.org/10.11648/j.ajtas.20160501.11
FAO. (2024). The State of Food and Agriculture 2024. In *The State of Food and Agriculture 2024*. FAO. https://doi.org/10.4060/cd2616en
Frías, J. R. G., Cadena, L. H., Villarreal, A. B., Piña, B. G. B., Mejía, M. C., Cerros, L. A. D., Gil, G. B., & Montes, J. O. A. (2023). Effect of ultra-processed food intake on metabolic syndrome components and body fat in children and adolescents: A systematic review based on cohort studies. *Nutrition*, *111*. https://doi.org/10.1016/j.nut.2023.112038
Fuentes, A. M. (2024). *Impacto del programa de alimentación Qali Warma sobre la anemia y la Desnutrición crónica infantil en el periodo del 2012 al 2022*. [Tesis de licenciatura, Universidad ESAN]. Repositorio Institucional ESAN. https://hdl.handle.net/20.500.12640/4211
Girona, A., Iragola, V., Alcaire, F., Curutchet, M. R., Pereira, P., Magnani, D., Barreto, P., Petingi, S., Allegue, G., Conzalo, G., Mosteiro, C., & Ares, G. (2019). Factors underlying compliance with a healthy snacking initiative in the school environment: Accounts of school principals in Montevideo (Uruguay). *Public Health Nutrition*, *22*(4), 726–737. https://doi.org/10.1017/S1368980018003488
Greenacre, M. (2017). Correspondence analysis in practice (3rd ed.). Chapman and Hall/CRC. https://doi.org/10.1201/9781315369983
Gross, J., & Hayne, H. (1998). Drawing Facilitates Children's Verbal Reports of Emotionally Laden Events. In *Journal of Experimental Psychology: Applied* (Vol. 4, Number 2).
Guiné, R. P. F., Florença, S. G., Barroca, M. J., & Anjos, O. (2021). The duality of innovation and food development versus purely traditional foods. *Trends in Food Science & Technology*, *109*, 16–24. https://doi.org/10.1016/j.tifs.2021.01.010
Hough, G., & Ferraris, D. (2010). Free listing: A method to gain initial insight of a food category. *Food Quality and Preference*, *21*(3), 295–301. https://doi.org/10.1016/j.foodqual.2009.04.001
INEI. (2024). *Nota de Prensa 60% de la población de 18 y más años de edad tiene alguna cuenta en el sistema financiero*.
INEI. (2025). *Encuesta Demográfica y de Salud Familiar 2024 Nacional y Departamental Perú*.
Jaeger, S. R., & Porcherot, C. (2017). Consumption context in consumer research: methodological perspectives. *Current Opinion in Food Science*, *15*, 30–37. https://doi.org/10.1016/j.cofs.2017.05.001
Kassambara, A., & Mundt, F. (2020). *Extract and Visualize the Results of Multivariate Data Analyses [R package factoextra version 1.0.7]*.
König, L. M., & Renner, B. (2018). Colourful=healthy? Exploring meal colour variety and its relation to food consumption. *Food Quality and Preference*, *64*, 66–71. https://doi.org/10.1016/j.foodqual.2017.10.011
Köster, E. P. (2003). The psychology of food choice: some often encountered fallacies. *Food Quality and Preference*, *14*(5), 359–373. https://doi.org/10.1016/S0950-3293(03)00017-X
Lê, S., Josse, J., & Husson, F. (2008). FactoMineR: An R Package for Multivariate Analysis. *Journal of Statistical Software*, *25*(1), 1–18. https://doi.org/10.18637/jss.v025.i01
Mahmood, L., Flores-Barrantes, P., Moreno, L. A., Manios, Y., & Gonzalez-Gil, E. M. (2021). The Influence of Parental Dietary Behaviors and Practices on Children's Eating Habits. *Nutrients*, *13*(4). https://doi.org/10.3390/nu13041138
Melendrez-Ruiz, J., Chambaron, S., Buatois, Q., Monnery-Patris, S., & Arvisenet, G. (2019). A central place for meat, but what about pulses? Studying French consumers' representations of main dish structure, using an indirect approach. *Food Research International*, *123*, 790–800. https://doi.org/10.1016/j.foodres.2019.06.004
MIDAGRI. (2024a). *Boletín de abastecimiento y precio del ARROZ - JULIO 2024*.
MIDAGRI. (2024b). *Gobierno: Exportación de quinua creció en más de 40% hasta julio de 2024*.
MIDAGRI. (2024c). *MIDAGRI promueve el consumo de frutas y verduras como principal fuente para la alimentación saludable*.
MIDAGRI. (2024d). *Ministerio de desarrollo agrario y riego viceministerio de políticas y supervisión del desarrollo agrario*.
MIDAGRI. (2024e). *Observatorio de commodities del Arroz*.
MIDIS. (2021). *Necesidades y posibles soluciones de innovación en el Programa Nacional de Alimentación Escolar Qali Warma*.
MIDIS. (2024). *Qaliwarma Programa Nacional de Alimentación Escolar*.
MINSA. (2017). *DS 017 -2017-SA*.
MINSA. (2019). *Guías alimentarias para la población peruana*.
MINSA. (2022). *Sobrepeso y obesidad en niños por departamentos*.
Monteiro, C. A., Cannon, G., Levy, R. B., Moubarac, J.-C., Louzada, M. L., Rauber, F., Khandpur, N., Cediel, G., Neri, D., Martinez-Steele, E., Baraldi, L. G., & Jaime, P. C. (2019). Ultra-processed foods: what they are and how to identify them. *Public Health Nutrition*, *22*(5), 936–941. https://doi.org/10.1017/S1368980018003762
Monteiro, C. A., Cannon, G., Moubarac, J.-C., Levy, R. B., Louzada, M. L. C., & Jaime, P. C. (2018). The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing. *Public Health Nutrition*, *21*(1), 5–17. https://doi.org/10.1017/S1368980017000234
Muñoz, A., Fontalba-Navas, A., Arrebola, J. P., & Larrea-Killinger, C. (2019). Trust and distrust in relation to food risks in Spain: An approach to the socio-cultural representations of pregnant and breastfeeding women through the technique of free listing. *Appetite*, *142*, 104365. https://doi.org/10.1016/j.appet.2019.104365
Murillo, M., Akinsola, O., Savoie-Roskos, M. R., Durward, C. M., & Atoloye, A. T. (2024). Exploring Childhood and Adolescent Obesity: A Systematic Review of Parental Influence in the Home Food Environment. *Journal of Nutrition Education and Behavior*, *56*(8, Supplement 1), S41. https://doi.org/10.1016/j.jneb.2024.05.096
Oliveira, G. A. L., Gonçalves, V. S. S., Nakano, E. Y., & Toral, N. (2024). The effect of parents' lifestyle on Schoolchildren's consumption of ultra-processed food. *Public Health*, *237*, 443–448. https://doi.org/10.1016/j.puhe.2024.11.005
Pagliai, G., Dinu, M., Madarena, M. P., Bonaccio, M., Iacoviello, L., & Sofi, F. (2021). Consumption of ultra-processed foods and health status: A systematic review and meta-Analysis. *British Journal of Nutrition*, *125*(3), 308–318. https://doi.org/10.1017/S0007114520002688
Patinho, I., Saldaña, E., Selani, M. M., Teixeira, A. C. B., Menegali, B. S., Merlo, T. C., Rios-Mera, J. D., Dargelio, M. D. B., Rodrigues, H., & Contreras-Castillo, C. J. (2021). Original burger (traditional) or burger with mushroom addition? A social representation approach to novel foods. *Food Research International*, *147*, 110551.

https://doi.org/10.1016/j.foodres.2021.110551

Phelps, N. H., Singleton, R. K., Zhou, B., Heap, R. A., Mishra, A., Bennett, J. E., et al. (2024). Worldwide trends in underweight and obesity from 1990 to 2022: a pooled analysis of 3663 population-representative studies with 222 million children, adolescents, and adults. *The Lancet*, *403*(10431), 1027–1050. https://doi.org/10.1016/S0140-6736(23)02750-2

Popkin, B. M., Corvalan, C., & Grummer-Strawn, L. M. (2020). Dynamics of the double burden of malnutrition and the changing nutrition reality. *The Lancet*, *395*(10217), 65–74. https://doi.org/10.1016/S0140-6736(19)32497-3

Quinua.pe. (2024). *Quinua Carretillera: El Desayuno Clásico Peruano*. https://quinua.pe/quinua-carretillera-el-desayuno-clasico-peruano/

R Core Team. (2024). R: A language and environment for statistical computing. In *R Foundation for Statistical Computing*. https://www.r-project.org/

Russell, A., Jansen, E., Burnett, A. J., Lee, J., & Russell, C. G. (2023). Children's eating behaviours and related constructs: conceptual and theoretical foundations and their implications. *International Journal of Behavioral Nutrition and Physical Activity*, *20*(1), 19. https://doi.org/10.1186/s12966-023-01407-3

Scaglioni, S., De Cosmi, V., Ciappolino, V., Parazzini, F., Brambilla, P., & Agostoni, C. (2018). Factors influencing children's eating behaviours. *Nutrients*, *10*, 6. https://doi.org/10.3390/nu10060706

SENAMHI. (2024). *Pronóstico del tiempo*. https://www.senamhi.gob.pe/?p=pronostico-meteorologico

Sleddens, E. F. C., Kremers, S. P. J., De Vries, N. K., & Thijs, C. (2010). Relationship between parental feeding styles and eating behaviours of Dutch children aged 6–7. *Appetite*, *54*(1), 30–36. https://doi.org/10.1016/j.appet.2009.09.002

Sproesser, G., Ruby, M. B., Arbit, N., Akotia, C. S., Alvarenga, M. dos S., Bhangaokar, R., et al. (2019). Understanding traditional and modern eating: the TEP10 framework. *BMC Public Health*, *19*(1), 1606. https://doi.org/10.1186/s12889-019-7844-4

Sproesser, G., Ruby, M. B., Arbit, N., Akotia, C. S., Alvarenga, M. dos S., Bhangaokar, R., Furumitsu, I., Hu, X., Imada, S., Kaptan, G., Kaufer-Horwitz, M., Menon, U., Fischler, C., Rozin, P., Schupp, H. T., & Renner, B. (2022). Similar or different? Comparing food cultures with regard to traditional and modern eating across ten countries. *Food Research International*, *157*, 111106. https://doi.org/10.1016/j.foodres.2022.111106

Tang, D., Bu, T., & Dong, X. (2020). Are parental dietary patterns associated with children's overweight and obesity in China? *BMC Pediatrics*, *20*(1), 12. https://doi.org/10.1186/s12887-020-1910-z

Tuorila, H., & Hartmann, C. (2020). Consumer responses to novel and unfamiliar foods. *Current Opinion in Food Science*, *33*, 1–8. https://doi.org/10.1016/j.cofs.2019.09.004

USDA. (2023). *Grain and Feed Annual (Issue April 2023). USDA Foreign Agriculture. Foreign Agricultural Service*.

Vallianou, N. G., Kounatidis, D., Tzivaki, I., Zafeiri, G. C. M., Rigatou, A., Daskalopoulou, S., Stratigou, T., Karampela, I., & Dalamaga, M. (2025). Ultra-Processed Foods and Childhood Obesity: Current evidence and perspectives. *Current Nutrition Reports*, *14*(1), 5. https://doi.org/10.1007/s13668-024-00596-y

Valmorbida, J. L., Baratto, P. S., Leffa, P. S., Sangalli, C. N., Silva, J. A., & Vitolo, M. R. (2023). Consumption of ultraprocessed food is associated with higher blood pressure among 6-year-old children from southern Brazil. *Nutrition Research*, *116*, 60–68. https://doi.org/10.1016/j.nutres.2023.05.012

Varela, P., & Salvador, A. (2014). Structured sorting using pictures as a way to study nutritional and hedonic perception in children. *Food Quality and Preference*, *37*, 27–34. https://doi.org/10.1016/j.foodqual.2014.04.009

Vereecken, C. A., Covents, M., Matthys, C., & Maes, L. (2005). Young adolescents' nutrition assessment on computer (YANA-C). *European Journal of Clinical Nutrition*, *59*(5), 658–667. https://doi.org/10.1038/sj.ejcn.1602124

Vidal, L., Iragola, V., Machín, L., Brunet, G., Girona, A., Curutchet, M. R., de León, C., & Ares, G. (2022). A Qualitative Exploration of Parents' Food Choices During Early Childhood. *Journal of Nutrition Education and Behavior*, *54*(8), 764–775. https://doi.org/10.1016/j.jneb.2022.03.006

WHO. (2020). *Healthy diet*. https://www.who.int/es/news-room/fact-sheets/detail/healthy-diet

WHO. (2024a). *Malnutrition*. https://www.who.int/news-room/fact-sheets/detail/malnutrition

WHO. (2024b). *Obesity and overweight*. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight